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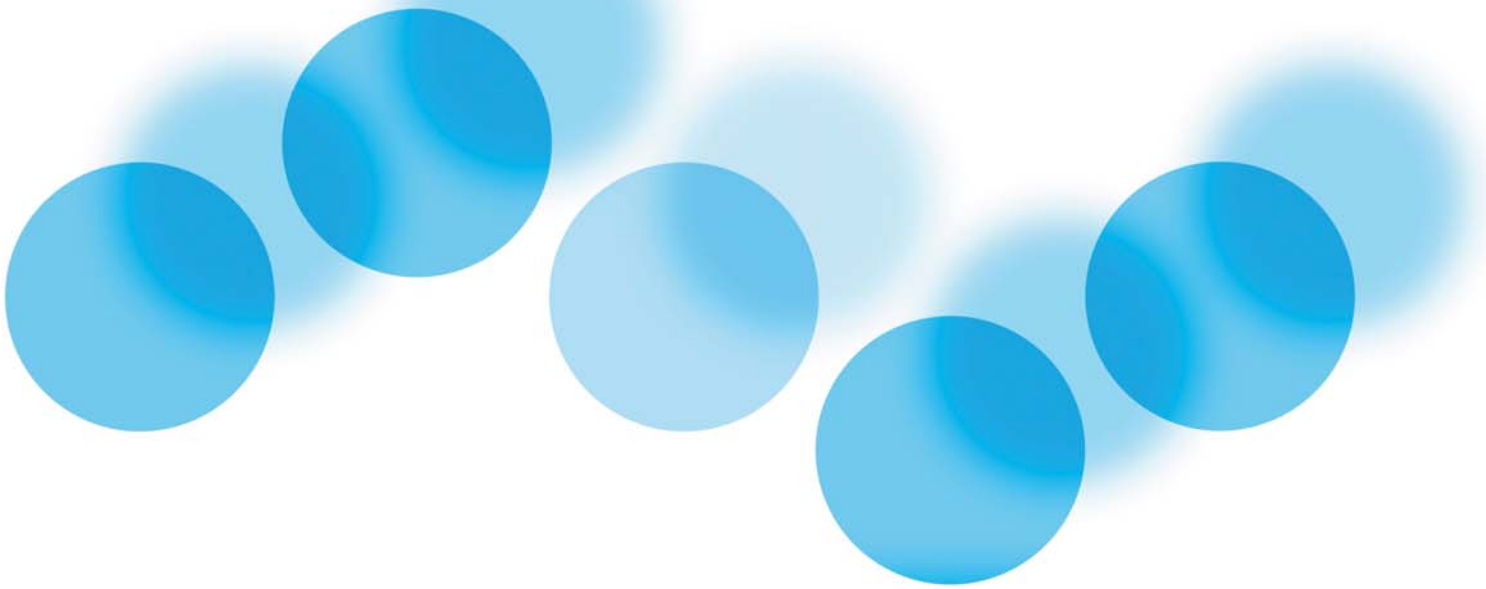
ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Romania – National Profile



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WORKING FOR THE DANUBE AND ITS PEOPLE

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PROJECT

AUTHORS

Dr. Victor Platon
George Dulcu

PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

Glenn Morris: glennmorris@bellsouth.net
András Kis: kis.andras@makk.zpok.hu

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ACRONYMS

Danish Environment Protection Agency	DEPA
European Bank for Reconstruction and Development	EBRD
European Investment Bank	EIB
Construction Authorization	CA
Consumer Price Index	CPI
Environmental Protection Inspectorate -	EPI
Local Authority	LA
Local Council	LC
Management Unit	MU
Ministry of Agriculture, Forestry, Waters and Environment	MAFWE
Ministry of Economy	MoE
Ministry of Health and Family	MHF
Ministry of Public Finance	MPF
Ministry of Transport, Housing and Tourism	MTHT
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National Administration Romanian Waters	NARW
National Authority for Municipal Utilities	NAMU
National Environmental Action Plan	NEAP
National Institute for Research and Development of the Environment	ICIM
Pre Accession Instrument for Structural Policy Instrument	ISPA
Regulatory Unit	RU
River Basin Committees	RBC
Romanian Lei	RoL[1]
Romanian Water Association	RWA
Service User	SU
Unit of Measure	UM
Urbanism Certificate	UB
United State Agency for International Development	USAID
Water and Wastewater	W&WW
Water Management Approval	WMAp
Water Management Authorization	WMAu

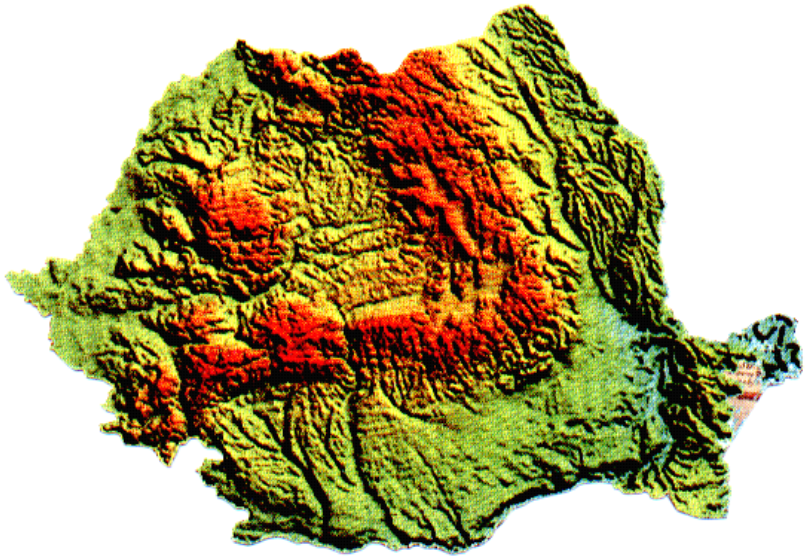
[1] Evolution of the exchanges rates RoL/€ and RoL/$ is illustrated in the Annex 1

1 Introduction

This paper was drafted within the framework of the project "*Assessment and Development of Water and Wastewater Tariffs and Effluent Charges Designs for Nutrient Reduction in the Danube River Basin (DRB)*". The main purpose was to give an overview of the organization and functioning of the management units in the Romanian water sector (Danube basin), regulatory framework, service users etc. in order to improve both water resource management generally and protection of water bodies from nutrification and hazardous substances. In this respect was explored the use of water and waste-water service tariffs and effluent charges, fines and incentives as a tool for nutrient reduction. The paper ends with policy issues that will need solutions and policies for suggested reforms.

1.1 General Considerations

Despite a relatively small surface area, the natural conditions of Romania are very diverse and the different geographic areas cover small distances within the territory. The mountains cover most of the central area of the country, the hills cover 30% of the area and are situated in the central part of the country and the areas surrounding the mountains (see Map 1). The bigger towns of the country were established and developed within the contact area situated between the mountains and the hills and in those situated between the hills and the plains, forming three urban circles. The plains are situated in the border areas and have a higher population density of important concentrations within the river valleys.



Map 1. Relief of Romania

The Danube river basin can be divided into four parts: the upper region, the middle region, the lower region and the Danube Delta. The lower region of the Danube is mainly the Romanian and Bulgarian plain area and the plateaus and mountains of the higher areas surrounding the plain. From the mouth of the Timok River to Silistra (km 374), the Danube defines the Romanian-Bulgarian border, flowing eastward. In this part, the Danube flows as a wide river (800 m), with well-developed alluvial plains on its left (Romanian) bank. The area flooded during flashfloods may reach a width of up to 10 km. The right (Bulgarian) bank is a narrow floodplain flanked by a steep bank.

Romania is a Danube riparian country (see Map 2) and 98% of the territory lies within the Danube river basin. The Danube river flows over Romanian territory for 1,575 kilometers. Raw water from the Danube is used in Romania for the preparation of drinking water, for irrigation, industry, fisheries and navigation.

Map 2. Danube, Riparian Countries

1.2 Administrative Structure of Romania

Romania has three territorial-administrative levels: central level, county level and communal level (including communes, towns and villages). Romania's entire territory is divided into 41 counties[2] plus the Bucuresti municipality (see Map 3). Bucuresti municipality is the capital of Romania and has the same standing as a county.

Map 3. Counties of Romania

[2] A county consists of a county capital municipality, where the headquarters of the county public administration are located, several municipalities, and all the towns and communes within that county's territorial limits. Law establishes the territorial limits of the counties, municipalities, towns or communes, and their modifications.

Certain towns can be declared by law municipalities. The distinction between municipalities and towns is made according the law taking into account the size and number of inhabitants, historical traditions, and the social, economic and cultural importance. A city could become municipality by law and this depends mainly on the level of infrastructure[3] and could have a larger territory. Communes may be formed of one or several villages and hamlets.

Table 1: Classification of Localities in Romania (2001)

Groups of administrative units	Locality units		Population	
	Number	%	Number	%
	Municipalities and Towns			
Total	**265**	**100**	**12243748**	**100**
Under 2000	1	0.4	1798	0.0
2000 - 4 999	12	4.5	47463	0.4
5000 - 9999	59	22.3	450943	3.7
10000 - 19999	85	32.1	1165881	9.5
20000 - 49999	61	23	1910885	15.6
50000 - 99999	23	8.7	1744334	14.3
100000 - 199999	12	4.5	1729594	14.1
200000 - 999999	11	4.1	3196036	26.1
Over 1000000	1	0.4	1996814	16.3
Communes				
Total	**2686**	**100**	**10164645**	**100**
Under 1000	56	2.1	40936	0.4
1000 - 1999	405	15.1	640850	6.3
2000 - 4999	1626	60.5	5412303	53.2
5000 - 9999	563	21.0	3637391	35.8
10000 and over	36	1.3	433165	4.3

Source: Romanian Statistics Yearbook., 2003

In 2001, in Romania were 265 towns and 2,686 communes (see Table 1). From the total towns the most numerous group is that of towns with a population between 5,000-10,000 inhabitants and 10,000-20,000 inhabitants; this group of towns represents 54.4% of the total number of towns but only 13.2% of the total population. As regarding to communes the most important group is that having 2,000-4,999 inhabitants; there are 1626 communes of this category cumulating 53.2% of the population living in communes.

It should be mention that each year a number of villages are declared communes, communes are declared towns and towns are declared municipalities. In the period 2001-2004 a number of 180

[3] According to the law there is the next structure: level 0 – Bucuresti, level 1 – 11 large towns, level 2 – 95 municipalities, level 3 – other towns (out from 270 towns in Romania).

villages have been declared communes, 33 communes[4] have been declared towns and 10 towns have been declared municipalities.

According to Romanian legislation, communes, towns, municipalities and counties are legal entities, have full capacity, own a patrimony, and hold the initiative in everything related to the administration of local public interests, exercising authority within their established territorial-administrative units. For the purpose of ensuring local autonomy, the public administration authorities of communes, towns and counties elaborate and approve the local budget and are entitled to collect local duties and taxes. Local autonomy could be expressed within the limits of the local budget and other financing sources as municipal bonds, grants or loans. This implies that W&WW services are not entitled to receive subsidies from the central budget. All investments in communal and urban W&WW services should be financed with local sources.

In 2002 there were 268 towns and 1,423 communes with systems for drinking water supply. Sewerage systems were identified in 266 towns and in 378 communes.

Map 4. Development Regions in Romania

[4] According to the law 351/2001 on Spatial Planning, a commune could be declared town if: there are more than 5000 inhabitants and 75% of them must be involved in non-agricultural activities, 70% of houses should be connected to the water network and 50% of them to have bath and toilets. Other conditions should be fulfilled as well.

The Law 151/1998 on Regional Development introduced in Romania the development regions[5] (see Map 4), the regional development boards and the agencies for regional development (the eight regions created are not administrative units). The existence and position of compact zones of similar development characteristics and featuring similar problems has given rise to the need of creating new development tools for solving problems. The regions (also named macro-regions) have been delineated not in terms of similar levels of development, but as potential functional units and contain several counties (see Map 4). The Law 15/1998 concerning the regional development in Romania establishes the institutional frame, the principles, the purposes, the competence and the specific instruments necessary for regional development.

At the national level it was created the National Council for Regional Development (NCRD) as a Steering Body for policy guidelines. The executive body is the General Directorate within the Ministry for EU Integration; this is entrusted with the elaboration and co-ordination of the policy for social cohesion and regional development.

At the regional level there are eight Councils for Regional Development (CRD). These councils are composed of the presidents of the county councils (elected persons) and majors and presidents of some of the local town councils. The executive body is the Regional Development Agency (eight of them), subordinated to the CRD.

So far the regional dimension was not important for public water utilities but in the future will play a bigger role in financing regional infrastructure projects and in the W/WW sector[6] as well.

1.3 Aggregate Supply of Raw Water and Production

The raw water industry has in Romania an old history starting with Roman Empire and even before. In terms of quantity, the water resources are relatively unequally distributed in time and space. The major sources are surface waters (inland rivers, lakes and reservoirs, the Danube River) and ground waters. The quantitative structure of the raw water resources is illustrated in the Table 1.

Table 2: Water Resources, by Categories, in Romania (2001)

- Billion m^3/ year -

Water resource category	Multi year average-	Manageable water resource
Inland rivers, lakes	40	34
Danube River	85*	20
Underground water	9	5.8
TOTAL	134	39.8

* half of the annual flow at the country entrance

Source: Ministry of Waters and Environmental Protection., Yearbook on Environment in Romania., National Institute for Statistics, 2002

The theoretical yield of water resources of the inland rivers and lakes is estimated at about 40 billions m^3/year, of which, in a natural flow regime (without reservoirs), only 5 billions m^3/year are utilizable and 14 billions m^3/year, in the existing regime with water works (with reservoirs and dams).

[5] These were proposed by the Green Paper for Regional Policy in Romania, published by the Romanian Government and the European Commissions in May 1997.

[6] For instance will be some PHARE projects within the heading PHARE 2004 – 2006 Economic and Social Cohesion Programme - Regional Large Scale Infrastructure Projects that will finance W&WW investment.

Out of the Danube theoretical resources, Romania could get 85 billions m^3/year, but the possibilities of extraction are limited because of the river navigable character and its peripheral position etc.

Thus, only about 40 billions m^3/year of the water resources could be used for consumption. The Black Sea water resources, although very important, cannot be utilized for the time being because of the technical and economical difficulties of seawater desalination.

Although in Romania there are about 3,450 natural lakes with a water capacity of 2 billions m^3, these are of local importance in water management because only 400 millions m^3 are fresh water and the rest are with salted water in the different degree of salinity.

Because only 12.5 % of the water resource potential can be used in natural flow regime, a lot of reservoirs were developed to smooth water availability over the seasons. Inter-basin diversions for a territorial reallocation of the water resources according to the local demands were developed as well.

In 2000, the existing 1300 water reservoirs (400 having a capacity of over 1 million m^3 each) stored a total volume of 14 billions m^3 of which 5.5 billions m^3 is water supply for population, industry and irrigation and the rest for flood protection and hydroelectricity. There are also 2000 km of canals and galleries for inter-basin water diversions and the reallocation of water resources according to the needs of agricultural irrigation in dry periods and other demands for water. However, more than 70% of the inland watercourses are in their natural state (unregulated).

Taking into account existing and the future reservoirs, from the inland rivers Romania could have about 25 billions m^3 in a waterless year, which represents the maximum limit that could be increased only by a successive reuse of the wastewater discharged through the sewage systems, treatment plants from localities and industrial units, as well as by intensifying the industrial wastewater recycling and by reducing consumption .

Ground waters, generally have a better quality than that of the surface waters. The quantity being estimated as available is 9 billions m^3/year, of which about 5.8 billions m^3/year could be used under the existing technical and economical conditions. At the present, only 1.5 billion m^3/year is used.

The main use of raw water resources is illustrated in Table 3. The general trend in water use is down. In the period 1997-2001, the reduction in water use was 1.92 billion m^3,(-21%). The biggest reduction (-27%) was registered by the industry and by the domestic sector (-19%). Only Agriculture recorded a small increase for irrigation purposes but this amount is small taking into account that before 1990 Romania has had an irrigation system that covered 3 million hectares.

Table 3: Raw Water Distributed to Users, in Romania (1997-2001)

- million m^3/year -

Users	1997	1998	1999	2000	2001	2001/1997	Difference 2001-1997
Municipalities	2 946	2 887	2 776	2 609	2 391	81%	- 555
Industrial activities (independent extraction systems)	5 247	4 823	4 728	4 388	3 833	73%	- 1414
Agriculture (total) (out of which):	1 026	1 299	1 027	940	1 090	106%	+ 64
• Irrigation	287	560	266	513	701	244%	+ 414
• Livestock farms	92	79	69	46	36	39%	- 56
• fishery	647	660	692	381	353	55%	- 294
Other users	45	42	45	30	29	64%	- 16
TOTAL	9 264	9 051	8 576	7 967	7 343	79%	- 1921

Source: Ministry of Waters and Environmental Protection, Yearbook on Environment in Romania., National Institute for Statistics, 2002. Water produced by NARW and distributed.

In Romania there are all types of water resources (rivers, lakes and underground water). The biggest resource is the Danube river and inland rivers. There are 11 basin rivers with various water volume. The biggest one is Siret basin with 224 m^3/second or 7,083 million m^3/year representing 17% of the total water resources. The next basin is Mures with 14% and Olt basin with 13%. These three river basins provide 44% of the total amount of water resources in Romania. Other basins, with the same surface, have less water resources.

Another characteristic of the water resources in Romania is related to season variability of water flows. In the spring the water debit represents 39.7% of the annual water total flow and in fall the water debit is 14.2% of the annual debit. In the summer the debit is 26.7% and in the winter is 19.4%.

The numerous lakes (3450) have a small contribution to water resources.

1.4 Quality of Surface Water

About 40 physical, chemical, biological and microbiological parameters (such as oxygen content, BOD - biological oxygen demand, COD - chemical oxygen demand, TDS - total dissolved solids, nutrients, organic pollutants, heavy metals) are used to categorize the water.

Based on Romanian standard for surface waters (STAS 4706/1988), quality of the watercourses are categorized as follows:

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

Romania has 4864 watercourse with a total length of about 78,900 km, out of which 22,031 km are monitored for water quality. In 2001, about 7% of the total length of monitored rivers was considered as degraded (see Table 3).

The worst conditions, falling in *degraded* class Category D occurred within the following river basins: *Prut (21.9%); Ialomita (20%)*; *Vedea (10.6%)* (see Figure 1). In the period 1993-2001, there was a substantial increase in *category I class* of total river length, as well as a decrease in *category II class* of total river length since 1996, and a relative stabilization of the length of rivers within *category III* and *Degraded class* of total river length.

Table 4: Water Quality of Monitored Rivers in Romania, 2001

Total number of monitored sections	**Class of overall river water quality by Category I sections, 2001**							
318	**I**		**II**		**III**		**Degraded**	
	No.	%	No.	%	No.	%	No.	%
	198	63.5	64	20.5	25	8.0	25	8.0
Total monitored length, km	Class category of overall river water quality by monitored length, 2001							
22,031	**I**		**II**		**III**		**Degraded**	
	km	%	km	%	km	%	Km	%
	14,979	68.0	4,117	18,7	1,401	6.3	1,534	7.0

Source: National Company "Apele Române[7]", „Synthesis of water quality in Romania in 2001, 2002

In the past 10 years, water quality in Romania has slightly improved, but not because of increased pollution control. Due to poor economic conditions, industrial and agriculture water consumption has decreased, thus decreasing the quantity of wastewater discharged into surface water.

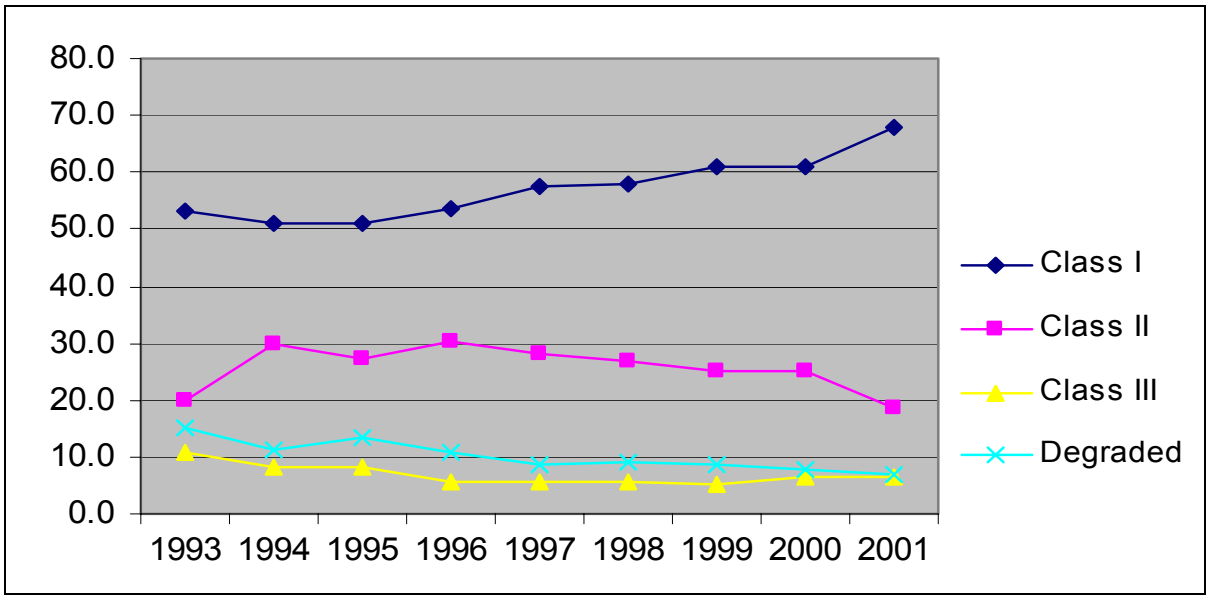


Figure 1: Trends in River Water Quality, 1993-2001

Source: The impact on industry, agriculture and local utilities systems of implementing directives 91/271/EEC, 98/83/EC, 76/464/EEC (and the seven "daughter" directives) and 91/676/EEC., Phare Project RO 9907-02-01: Pre-accession Impact Studies., FINAL Report

Non-point sources have decreased because smaller quantities of fertilizers and pesticides are used, but ground water contamination, especially by nitrates, remains high. It is difficult to fully characterize water contamination, because only a limited number of hazardous pollutants are monitored. Existing

[7] This is the former name of NARW; owing to various institutional changes the same institution have had different names. In quoting a range of papers and documents drafted in the past the original name was used.

wastewater treatment facilities, half of which are not working properly, will not be able to treat the additional quantities of wastewater discharges from the industrial and agriculture sectors when economic growth resumes. Therefore, water quality is likely to worsen.

The overall water quality and the trophic level of the reservoirs and lakes are shown in Table 5. The percentage of eutrophic reservoirs and lakes could be explained by an existing high potential for contamination, due to diffuse or "non-point" sources and specific hydraulic conditions, rather than to point pollution sources.

The worst situation within the category degraded class was registered within the seaside area.

Table 5: Water Quality of Monitored Reservoirs and Lakes in 2001

Total number of monitored lakes and reservoirs	Class category*)							
	I		II		III		Degraded	
	No.	%	No.	%	No.	%	No.	%
	63	67.0	16	17.0	6	6.4	9	9.6
	Trophic level*							
	Oligotrophic		Oligo-mesotrophic		Mesotrophic		Meso-eutrophic		Eutrophic	
94	No.	%	No.	%	No.	%	No.	%	No.	%
	27	28.72	7	7.45	30	31.91	11	11.7	19	20.21

Source: National Company "Apele Române", „Synthesis of water quality in Romania in 2001", 2002

*) STAS 4706/1988 for surface waters, quality categories and conditions.

Water Monitoring

In Romania, water authorities[8] use to monitor the **quality of rivers** in 22,000 km out of 78,900 km, using 318 gauging stations. When flows are high, water quality data are transmitted daily from 65 control stations. When flows are low, surface waters are monitored in the 318 stations once a month. About 40 physical, biological and microbiological parameters are measured.

Monitoring **water quantity** is carried out by 1,016 hydrometric stations by measuring the flows. About 40% of the stations that monitor water quality also use to monitor the quantity. For the other stations discharge information is transmitted from the nearest hydrometric station.

Groundwater is usually monitored in 3,695 hydrological stations, of which 1,434 take qualitative measurements. In addition there are some 12,000 survey points situated in the vicinity of pollution sources, drillings and water wells for water supply, mainly in rural areas. Eighteen general physical-chemical parameters (temperature, pH, conductivity, total dissolved solids, oxygen regime, nutrients, etc.) are measured in groundwater. As well, for the drinking water supply, bacteriological parameters are measured too.

The **monitoring of waste-water discharges** (emission monitoring) of about 2,100 point pollution sources is performed by water authorities, including municipalities' discharges points. As well, the laboratories[9] of the Environmental Protection Inspectorate (EPI) can perform environmental audits or inspections. EPI laboratories can also perform water analyses on a commercial basis.

[8] The description of Water Authorities is made in Section 2.2

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

1.5 Major Sources of Pollution

In 2001, the total volume of water discharged was 5.03 billion m^3. Of this amount 52% are wastewaters that require treatment.

From the total amount that require treatment (2595.3 m^3/year) 16.5% have been adequate treated; out of the rest 35% are waters not treated and 48.5% is water insufficient treated.

Local water utilities are the main dischargers of wastewaters that requires treatment with 1.87 billions m^3 in 2001; out of this amount 0.8 billion m^3 was not treated and 0.91 billion m^3 was insufficiently treated. On the second place is the industry with a volume of 0.64 billion m^3 of wastewaters that requires treatment.

In Romania, the natural raw water resources, while technically utilizable, cannot be used without making certain significant investments in complex development water works of the hydrographic basins and in treatment installations because:

- one of the most important water resource, the Danube river, can be used in a small extent, due to its eccentric position, at the Southern limit of the territory;
- the inland rivers are unequally distributed all over the territory, significant areas remaining with insufficient resources, presenting at the same time important flow variations in time and space;
- the pollution of certain inland rivers, exceeds the admissible limits, which makes difficult and sometimes even prohibitive their use.

From the data presented we may see that municipalities are one important water polluter. The situation is significant where localities are situated up stream and down stream of a river that is the only water source. As it is mentioned in the Case Study, Pitesti is situated on the Arges river and, down stream an agglomeration of more than 2.5 million (mainly Bucuresti city) is getting the drinking water. So, the MUs should meet effluent standards in order to reduce the nutrient load and allow other entities to take advantage of a natural resource without excessive processing costs.

2 Legal and Institutional Framework

In Romania, raw waters are considered a natural resource that is managed by a public body. The water users are municipalities (trough MUs), industry that it is not linked to a municipal network and has its own water source, agriculture for irrigation and other users. Municipal W&WW operators have to observe water laws that are general for all users. This section describes the legal and institutional framework in which the MUs and municipalities should operate. The legal framework is very important for municipalities especially in this period when the whole environmental "acquis" was transposed in Romania. As a consequence for municipalities, the targets of water infrastructure development programmes are, to a large extent, externally determined by the EU laws. Some estimates say that only for the water sector, Romanian municipalities will have to invest around 9 billion €, in order to implement all EU laws.

2.1 Laws of the Water Sector

I. Water Law

The main legal act regulating the water sector in Romania is the Law no 107 of 25 September 1996 on waters, published in the Official Gazette Part I, no 244 of 8 October 1996, with its subsequent modifications. This law aims at water sources preservation, development and protection, protection against pollution, water quality modification and alteration of surface waters' beds and shores. Also, the law provides for restoring the quality of surface and ground water, preserving aquatic ecosystems, securing potable water supply, complex exploiting of water as an economic resource, its rational distribution and the maintaining of waters' natural productivity, as well as at floods and other hydro-meteorological risks management.

In Romania, waters are public property and their protection, exploitation and sustainable development should be carried out in accordance with the public interest. For that reason, both the right of use and corresponding obligations regarding water resources protection and preservation should be exercised according to the water law, which establishes specific regulations with regard to different types of water and their beds and shores. Law no 107 on waters, together with adjacent secondary legislation, also rules on the construction works connected with waters and generating direct or indirect, permanent or temporary modifications on waters' quality or flowing status. Underground water should be used in accordance with relevant legal provisions.

Rivers, banks and riverbeds together with tributaries with lengths greater than 5 km or with basin larger than 10 km^2 are public property.

The water law provides for the setting up of special sanitary protected areas around potable water supply sources and installations (Government Decision no 101 of 3 April 1997 on approving the Special Norms regarding the characteristics and size of the sanitary protected areas, published in the Official Gazette no 62 of 10 April 1997). Ministry of Health and Ministry of Water and Environmental Protection are responsible for sanitary protected areas. Ministry of Health is also in charge of monitoring drinking water quality. Standards have been set for surface waters intended for abstraction of drinking water as well as for the quality of water destined for human consumption and bathing. The law also establishes that in artificial lakes representing potable water supply sources, only natural fish breeding is permitted, fish foddering and fungicide and veterinary drugs spreading being forbidden. Even in cases different from above, fish foddering and chemicals utilization is allowed provided that it does not alter water quality downstream and a valid water management authorization does exist.

The right of utilizing surface or ground water is established through the **water management authorization** and is exercised according to the legislation (see details in Section 2.3). This right also refers to the discharging of wastewater, drain, and storm water into water sources. Water users are bound to observe certain norms on water consumption per production unit and per activity and to save water through rational utilization and recycling. They are also legally responsible for ensuring the maintenance and repair of water installations under their jurisdiction.

Taking into consideration the highest performance of existing technologies, water consumption norms are proposed by water users, consented by stakeholder ministries and approved by the Ministry of Water and Environmental Protection. These water consumption norms are regularly updated. In case of divergences, the RUs should intervene.

On joint proposal of Environment and Health Ministries, limits concerning pollutants concentration in wastewater discharged into water sources have been set by Government Decision no 730 of 10 November 1997 on approving the Norms[10] on establishing limits regarding pollutants concentration in wastewater discharged into water resources..

Carrying out any new investment on drinking or industrial water supply cannot take place without appropriate and simultaneous extension of the sewerage network and sanitation equipment. The law also prohibits the throwing of solid waste into any type of water and the discharging of wastewaters into ground water or natural and artificial lakes. In cases of new

Potential investors or beneficiaries should apply for the **water management approval** during the preparation phase of the feasibility study for a project and should show evidence of other permits[11] previously acquired (see Section 2.3 for details).

Water users located in inhabited zones, suburbs or industrial areas may discharge wastewater into the sewerage network only with the agreement of the sewerage system's administrator, in conformity with the established conditions and provided that the terminal sanitation station has an adequate capacity and technologic profile for the wastewater discharged.

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[10] The NORM "NTPA-001", published in the Official Gazette Part I no 327 of 25 November 1997

[11] . An Annex to the Waters and Environmental Protection Minister's Order no 148 issued on 27 February 1997 and published in the Official Gazette Part I no 100 *bis* of 26 May 1997 lists a number of nineteen approvals, consents and certificates issued by other authorities, that may be required, on a case by case basis, before to start the water permitting procedure which is the last one.

II. Other Laws

Other important laws are:

- **Minister's Order no 1100 of 28 December 2001** on the modification and completion of the Water and Environmental Protection Minister's Order no 706/2001 was issued for approving the Rules of Procedure regarding the organization of the certifying activity for institutions specialized in accomplishing studies, projects, consultant work in the field of water management and technical documentation supporting applications for water management approvals and authorizations[12].
- **Law No. 215/2001, Law No. 216/2001, Law No.326/2001, Law No 213/1998 and Law No 219/1998** have created the legal framework for proper management and development of public services of communal husbandry. The Law No. 326 of 28 June 2001 on the Public Services for Communal Husbandry, a framework law of modern European conception, which sets important tasks with regard to the responsibilities of the Government of Romania and the structures of the central public administration regarding the general policy of the state in this field. This law was followed by a series of sector regulations which, for the first time in the post-war Romania, settle administrative, legal and technical rules for every service of communal husbandry, namely for: drinking water and sewerage, production and distribution of thermal energy, sanitation, waste management, local public transport for passengers, roads and green areas and electric energy distribution in localities.

Other EU directives, with impact on the municipal water system, have been transposed so far (for more details see Annex 2):

- **Directive no. 91/271/EEC regarding urban sewage waters** approximated by Government Decision no. 188/2002 regarding some effluent norms regarding water discharged into natural waters (Official Journal no.187/ 20 March 2002);
- **Directive no. 75/440/EEC regarding the quality of surface waters designated for drinking water** is transposed in: Ministerial order no. 377/2001 regarding the approval of the norms for surface water quality; Gov. Decision no. 100/2002 for the norms to measure and associated frequency for analysis for the surface water designated for extraction and preparation of drinking water and Ministerial order no. 1146/2002 for classification of the quality of the surface waters (Official Journal 197/ 27 March 2003);
- **Directive no. 98/83/EC regarding drinking water** transposed in Law no. 458/2002 regarding drinking water (OF. Journal no552/29.07.2002);
- **Directive no. 80/68/EEC regarding the protection of the underground waters from pollution with some dangerous substances** is transposed in Min. Order no. 1049 from 13.11.2002 for approving the Plan of Measures for reducing and eliminating the risk of polluting underground waters.

2.2 Institutional Framework; Major RUs in the Water Sector

Public water resources are managed by the National Administration "Romanian Waters" (NARW) which implements the national strategy and policy. NARW is the major regulatory unit (RU) in the field of raw water.

Water management activity in Romania is planned and carried out across river basin units within which surface and ground waters are considered as a unit both from a quantitative and qualitative perspective, with the view to ensure sustainable development.

Law no 106/1996 refers to the "**Romanian Waters**" *Regie* Autonomous, the name of the **national authority on water resources management**. Water management authority's name and status have been changed twice since 1996. In 1998, by the Government Decision no 981/1998 the National

[12] It has been published in the Official Gazette no 77 of 31 January 2002

Company "Romanian Waters" (joint stock corporation) was created. On 5 September 2002, Government Decision no 981 has been repealed by the Government Emergency Ordinance no 107 on the creation of the **National Administration "Romanian Waters"**. This Emergency Ordinance became effective[13] on 20 September 2002, the date when it was published in the Official Gazette.

The **National Administration Romanian Waters** (NARW) is responsible for preparing water management plans and programmes. Through its branches for each 11 river basins, (corresponding to the river basins), it also responsible for enforcing water legislation and policy, monitoring, for preparation of river basin management plans, floods and drought control etc.

NARW through its basin branches, is also responsible for the prevention and warning of accidental pollution. In this regard, adequate planning is conducted, taking into consideration the specific conditions of a hydrographic basin and the nature of hazardous substances involved and in accordance with the methodology established by the former Ministry of Waters and Environmental Protection. Water users should devise their own plans on preventing and combating accidental pollution. In case an accidental pollution occur, the polluter should take urgent measures to address pollution's causes and consequences, and to inform immediately the closest water management unit.

The public water management body should warn water users and local governments downstream about the accident. Potential polluting companies, local governments and water management bodies should be equipped with adequate intervention means for cases of accidental pollution. Downstream water users suffering material losses from an accidental pollution, that could take place upstream, have the right to receive compensations from the natural person or legal entity that, according to the law, bears responsibility for the accident. The polluter should also compensate natural persons and legal entities, including NARW for their expenses related to the neutralizing of accidental pollution effects.

The implementation and enforcement responsibilities involve other institutions including: ministries, public institution, institutes and local authorities.

Ministry of Agriculture, Food, Forestry and Environmental Protection[14] (MAFWE) plays the main responsibility for implementing the environmental *acquis;* as well it has an important role in implementing the Water Directives trough its Water Department. This ministry and its Water Department is RU in the field of environment, waters and forestry.

Water Department, along with NARW, was entitled to set limits or suspend temporarily water utilization in order to face the risk or consequences of accidents, drought and water shortage caused by depletion of existing resources. Temporary restriction plans can be instituted during periods with water deficit by NARW, after consultation with authorized users. These plans should be sanctioned by the Ministry, approved by the water basin committees and made known to the public in a timely manner. To implement restriction plans, in case of emergency, NARW devises certain measures that are compulsory on all users and prevail on the provisions of the water management authorization. The methodology for restriction plans' issuance and public information is established by the Ministry.

Ministry of Economy (ME) has legislative responsibilities related to the industrial sector, develops strategies and plans etc.

Ministry of Health and Family (MHF) has joint implementation responsibilities for Urban Wastewater, Nitrates and Air quality Directives, mainly for standards regarding drinking water.

Ministry of Transport, Housing and Tourism (MTHT) has primary responsibility, among others, for drafting spatial development plans ensuring that the infrastructure works are correlated and issuing requirements and norms for the implementation of heavy infrastructure investment. This ministry is mainly responsible for large infrastructure projects at the national level (national roads, highways, harbors, airports etc.) but not direct related to W&WW investment. It finances the infrastructure under its authority.

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[13] It should be mentioned that the instability of the main institutions is significant. For instance, in the last four years, NARW changed its status and name for several times as well as the regulatory authority, namely the Ministry of Water and Environmental Protection.

[14] In mid August 2003, Ministry of Water and Environment Protection was dissolved and water and environmental attributions were transferred to the Ministry of Agriculture and Forestry. For the time being there is also a Water Department in MAFWE.

The **Ministry of Public Finance (MPF)** makes decisions on the state budget, allocations to local budgets, taxation etc.

The **National Institute for Meteorology, Hydrology and Water Management** provides technical support in air quality and emission control, water quality, radioactivity, data collection and emissions inventory.

The **Institute for Public Health** is the expert agency of the Ministry of Health and Family, carries out research, collects and processes data on various aspects of environment that might impact on human health.

The **Romanian Standards Institute** develops technical standards for all domains.

The **Romanian Research Marine Institute** and the **R&D Institute of the Danube Delta**, play an important role in conducting research and monitoring for the Black Sea and the Danube Delta, respectively.

The **National Institute for Research and Development for Environment** (ICIM) carries out studies, strategies, actions plans, legislations, norms, lab methodologies, national survey of wastes, water resources quality, water use and water users.

At local and regional level the following institutions are responsible for the enforcement of water regulations:

Environment Protection Inspectorates (42 EPIs)**,** corresponding to the 41 counties and Bucharest, are in charge with permitting, inspection, enforcement and monitoring. They report to the MAFWE, but are partially self-financed.

Local Authorities (LA), at the county and municipal levels[15], have the duty to insure that population has access to public services and related infrastructure (i.e. wastewater treatment works, water and sewage networks, landfills); as well LA identify and propose public projects for investment. Local Authorities have certain obligations aimed at the rational utilization of water and preserving its quality. They should employ installations with low water consumption and less polluting, to avoid losses and wasting and reduce effluent concentration. LA as infrastructure owners should also ensure the maintenance and operation of stations and installations for water quality processing at the authorized capacity, monitor their efficiency through lab analyses and, in case of non-compliance, take measures to bring emission/effluent indicators within the limits stipulated in the water management authorization.

According to the water law, in urban and rural localities, the local authorities should ensure adequate management of water supply, sewerage and sanitation, as well as storm water drainage, using local legislation and local budgets. All investment in W&WW should be carried out with the local level financial resources. There are no subsidies from the state budget in financing W&WW services[16]. As a redistribution tools, the central budget is transferring some revenues from the richer counties to poorer ones in order to cover some expenditures at the county level.

Local Agriculture Agencies – at county level – enforce and monitor, among other duties, the Nitrates Directive.

River Basin Committees (RBC). The G.D. No. 1212 11.29.2000 (O.J. No. 644, 12.11.2000) lays down the rules for the structure and operation of the River Basin Committees. The M.O. No. 678, 07.17.2001 (MWEP), not published in the Official Journal, established 11 River Basin Committees, actually corresponding to the 11 River Basin Districts under the NCAR. The structure of the River Basin Committees consists of 15 appointed, elected and selected members (in accordance with specified procedures), representatives from MWEP, MHF, NCAR, local public authorities, legal water users, NGOs, and consumer protection offices.

National regulatory units that affect MUs

[15] Towns and communes

[16] There are direct subsidies from the central budget in the case of local transport and household heating in the winter period.

The **National Authority for Municipal Utilities**[17] (NAMU) is a new institution that has important attributions in the field of communal utility services including water and wastewater. This new institution has responsibilities in regulating, monitoring and controlling all communal activities that are natural monopoly. Among other duties, NAMU has to:

- issue licenses to the operators of communal water services;
- collect and publish information regarding the activities of the operators of communal water services and publish it;
- oversee the mechanism of the adjusting the prices or tariffs to the conditions of the contracts;
- adjudicate solutions in the conflict between the operator and the consumers;
- ask for improvement programs of the activity from the other operators, when their activity does not meet the standards set by the operator license, namely the contract of delegating the administration;
- withdraw the operating license, if the operator refuses to consider the measures means to improve the activity.

NAMU is the RU for all MUs at municipal level in all cases where is a natural monopoly.

2.3 Water Permitting

2.3.1 Water Management Approval (WMAp)

All MUs should have a WMAp when is undertaking an investment or an old facility is modernized. This rule should be observed by all entities that carry out a water work.

For a new water user or an old one that is undertaking a new investment or retrofitting an old one, getting the construction emplacement approval does not exclude the obligation to apply for the **water management approval**. Consequently, individual works can be performed only on the basis of the water management approval issued by the territorial branches of the National Administration "Romanian Waters" after reviewing the required documentation[18]. Potential investors or beneficiaries should apply for the water management approval during the phase of preparation of the feasibility study for a project and should show evidence of other permits previously acquired[19]. In addition, the solicitor should present, as the case may be, proposed measures on providing sustainable management of water resources, proposed measures on minimizing adverse impacts, proposed actions on securing optimal water flow and aquatic ecosystems preservation. Technical documentation submitted to the approving authority should be accompanied by a photocopy of the public information letter on the intended activities that the solicitor should accomplish.

Water management approval - or substantiated refusal - should be issued within sixty days from the date when the last document required has been submitted. Water management approval is valid throughout the execution work on the objective for which it was issued; on the condition that full compliance with the provisions set therein does exist. This permit looses validity after two years if execution work does not begin within this interval. Yet, water management approval can be renewed upon request submitted six months before the expiration date. A new water management approval is required for the development or modernization of some technological processes or existing equipment of water users if the planned change implies the modifying of the previous approval's provisions. By water management approval provision, investors can be obliged to perform certain works not included in the technical documentation but necessary to ascertain that proposed works, constructions and installations will not cause damage to existing water users or riverside residents.

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[17] This is subordinated to the Ministry for Administration and Internal Affaires (created in mid 2003).

[18] The standard application form is presented in annex 1d of the Procedure on water management approval and authorization issuance, adopted by the Waters and Environmental Protection Minister's Order no 148 issued on 27 February 1997 and published in the Official Gazette Part I no 100 *bis* of 26 May 1997.

[19] Annex 1i to the above-mentioned Procedure lists a number of nineteen approvals, consents and certificates that may be required, on a case by case basis, during the permitting procedure.

The law allows for performing of some minor works without a water management approval[20] on the basis of a notification to the National Administration "Romanian Waters" 20 days prior to the works' start. Carrying out these works can take place in similar conditions, i.e. without an authorization but upon previous notification.

Reference material supporting the application for water management approval[21] should draw upon meteorological, hydrological or hydro-geological studies, as the case may be, as well as on water management studies and studies on the impact that individual works would have upon water resources and riparian zones. These studies can be accomplished by authorized public and private institutions[22] and should demonstrate that the water approval solicitor is able to comply with relevant legal provisions.

The law points out that water management approval and construction emplacement approval are separate permits but have to be in concordance. The same legal act specifies that getting water management approval and authorization do not exclude the obligation to apply for the environment approval and environment authorization in accordance with the law.

The steps in having all approvals for an investment or a modernization of an existing plant are in the next table.

[20]Categories of works and activities for which the water management approval is not required are listed in annex 1c of the Procedure on water management approval and authorization issuance. Categories of works and activities for which a water management approval is required are listed in annex 1b of the same Procedure, which also establishes which is the approving authority for different categories of works (annex 1g).

[21] By the former Waters and Environmental Protection Minister's Order no 277 of 11 April 1997, Norms on the technical documentation necessary to obtain the water management approval and authorization have been adopted. These norms have been published in the Official Gazette Part I no 100 *bis* of 26 May 1997.

[22] Minister's Order no 1100 of 28 December 2001 on the modification and completion of the Water and Environmental Protection Minister's Order no 706/2001 on approving the Rules of Procedure regarding the organization of the certifying activity for institutions specialized in accomplishing studies, projects, consultant work in the field of water management and technical documentation supporting applications for water management approvals and authorizations has been published in the Official Gazette no 77 of 31 January 2002.

No.	Type of permit	Issuing institution
1.	Urbanism Certificate (this document includes a list with all approvals and consents needed in order to get the CA)	Town Hall of the city or the County Council
2.	Water Management Approval	NARW
3.	Environmental Approval	EPI
4.	Other approvals, if there are necessary or asked by the Urbanism Certificate	Other institution as power generator, gas supplier, MPWTH etc.
5.	Construction Authorization (CA) (final document)	Town Hall of the city

The final document is the CA that allows to start construction works; this is usually valid for one year and could be extended.

2.3.2 Water Management Authorization (WMAu)

All MUs operating in Romania should have a valid WMAu.

MUs and other operating business in the water sector (water extraction, mineral aggregates exploiting etc.) can take place only after receiving the **water management authorization** (*autorizatia de gospodarire a apelor*). In addition, Ministry of Transport's approval is required in case of works to be accomplished into the navigable national waters. Applicants should pay for water management approval and authorization services certain fees and tariffs due to the Water Fund.

As well, the water management authorization includes the discharge limits for water users . Surpassing these limits is banned by law. The law also prohibits the opening of new economic objectives or extending of existing ones, constructing new dwellings or replacing production technologies with new ones that produce increased effluent concentration, without simultaneously opening new sewerage systems and sanitation installations or taking other measures aimed at complying with the provisions on wastewater set by the water management authorization.

Water management authorization is issued within sixty days from the application date and at the latest on the date of inauguration for the economic objective to be authorized, on the basis of technical facts finding conducted in the presence of the solicitor. WMAu is granted only if legal provisions regarding water management are observed and information included in the application form[23] and supporting documentation[24] prove to be accurate. WMAu can be issued for a period of time varying from one to ten years, according to the type of activity to be authorized[25].

In case of extending of activities, improvements of production technologies, etc., the water user (MUs as well) have to apply for update the water management authorization.

WMAu is one of the documents that are needed, among other consents and permits from relevant authorities, in order to have the Environmental Authorization. The Environmental Authorization allows a company to run.

[23] Standard application form for the water management authorization is presented in annex 1f of the Procedure on water management approval and authorization issuance.

[24] Standard application form should be accompanied by the water management approval, previous authorization if existing, a program for compliance in cases of authorizations issued for a limited timeframe, a general plan of the water works, constructions and installations to be authorized, mentioning their construction and operation parameters, the operation and maintenance rules of procedure, and the agreement of the owners of the water supply and sewerage systems involved.

[25] For example, mineral aggregates exploiting for individual household or local government's needs may be authorized for maximum one year, but installations for water abstraction, treatment, pumping, transport, accumulation, distribution and cleaning can be authorized for maximum five years. Other activities such as energy production, navigation, fish breeding, rafting and entertainment activities can be authorized for a period up to ten years.

3 Water Used by Localities

From the 22.4 million inhabitants, living in Romania, only 14.7 million persons (65% of total) have drinkable water supplied by public service; of this amount 11.3 million persons are in the urban area (76.9 %) and 3.4 mil. in the rural area (23.1 %). In the last 25 years, there was an increase in the number of households connected to the network from 29% to 65% of the population.

3.1 Production and Consumption of Drinking Water

A total number of about 304 drinking water treatment plants were identified in Romania by NARW, during year 2001, operating in general using the classical treatment technology including: coagulation – settling- rapid sand filtration and chlorination (in certain cases pre-chlorination was used). The capacity of these installations to produce drinking water was of 10.5 million m^3/day.

According to the Romanian Statistic Yearbook, in 2001, the volume of drinking water pumped into networks was 2.4 billion m^3 and the volume of drinking water distributed to users was 1.53 billion m^3 (for details see Annex 5). The share of water distributed to domestic users was 64.6% in 2001 and to public users the share was 13.1% (see Table 6).

Table 6: Volume of Drinking Water Distributed in Networks, in 2001

Volume of drinking water distributed	**million m^3**	**%**
At users, out of which:	1,530	100
• for domestic purpose	988.3	64.6
• for public purpose	200.2	13.1

Source: Data from Annex 5

Table 7: Regional Distribution of Drinking Water and Population

- (%) -

	Drinking Water distributed to users by regions	**Population by regions**
1. North-East	11.9	17.1
2. South-East	13.3	13.1
3. South	11.8	15.4
4. South-West	7.9	10.7
5. West	9.3	9.1
6. North-West	11	12.7
7. Center	14.8	11.8
8. Bucharest-Ilfov	19.9	10.1
Total	100	100

Source: Processed Data from Annex 5

At regional level, the Region 8 which is a big urban agglomeration, gets 19.9% of the water distributed but only 10% of the population. The water is distributed across the eight regions in correspondence with the population living in these regions (see Table 7).

According to the Ministry of Public Administration, by taking into account the losses and the share for both public and economic uses, the water consumption in Romania has the following pattern: **for the urban area 335 l /inhabitant per day and for the rural area 126 l /inhabitant per day (in 2001). If the calculation is made eliminating losses than the average consumption of drinking water was**

160.7 l/inhabitant in urban areas (in 2002). This value is lower than the average consumption in 2001 that was 183 l/inhabitant.

3.2 Metering and Leakage of Drinking Water

In 2001, at national level, metering of drinking water progressed. From the volume of drinking water distributed to users of 1,530 mil m^3, a quantity of 1,124 mil m^3 was metered which represented an average of 73.4% (for details see Annex 5). The metering process started several years ago but in the last two years it increased in intensity not only for drinking water but for hot water and apartment heating as well.

For people living in single houses there is not a problem to introduce a meter (for this category of SUs metering is a standard procedure) but for people living in block of flats there is still no an acceptable approach. One solution was to introduce a meter at each stair of flats and a cluster of apartments should divide the water bill. This division could be made according to the number of people living in each apartment or each apartment to install meters to count the water. This last solution is very complicated owing to the fact that usually, for each apartment in a block of flats, are needed 3-4 meters for drinking water without taking into account other 3-4 meters for heating. Having so many meters it is time consuming to read them and to make calculations for the water bills. Not to mention that in some localities the individual metering is not taken into account by the MUs because high transaction costs. In such a situation the readings of the apartment meters are used only to split the water bill among the people living in the same block of flats.

Another solution, experimented in Pitesti, is to install a more advanced meters that send by radio the data to a central unit that processes these data and calculate the bill for each apartment. In this way the huge cost of reading individual meters is diminished. This solution could be applied now only in blocks of flats that have the adequate pipe network.

Across regions, the metering and losses are not uniform (see Figure 2). We could notice that losses of drinking water are lower than the national average in six regions: South, Centre, North-West, West, North-East and South-West. Only two regions registered losses higher than the national average: Bucuresti-Ilfov and South-East. It is important to mention that the biggest consumer of drinking water, region Bucuresti-Ilfov, has had the most important losses – 49.2% (almost half of the 601.2 million m^3 introduced into Bucuresti-Ilfov network (in 2001 – see Annex 5).

Regarding metering in regions, the situation is next: four regions have a higher degree of metering than the national average and four have less. In regions as Region South and Region South-West, where the losses were low, the metering is low as well. In Bucuresti-Ilfov, where is recorded the biggest loss, it is the highest degree of metering. This situation is explained by the fact that population and industry installed meters with the naive idea that in this way they will pay only the consumption and not the losses.

It is obvious that the problem of losses will not be solved by installing meters but only by undertaking repairs and investment.

Data available are only for the year 2001 and in 2002 and 2003 the metering advanced in all regions but losses did not change owing to the fact that few investment took place in such a short period.

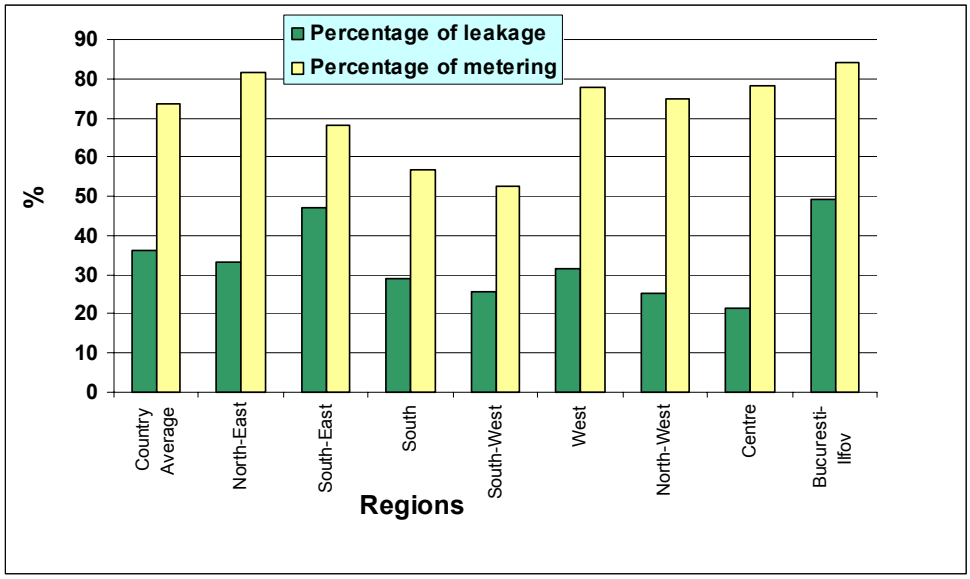


Figure 2: Losses and metering of drinking water, across regions, in Romania (2001)

Source: Data from Annex 5

3.3 Wastewater from Localities

As in the case of supplying with drinkable water, the population that has a sewerage service is far greater in the urban (10.3 million inhabitants) than in the rural area - 1.15 million inhabitants. Considering the rural-urban split, the population of the country can be grouped into there categories:

- Households with both services – 51%;
- Households that have only water supply but no sewerage – 14%;
- Households that have neither water supply nor sewerage - 35%.

The trend in declining drinking water consumption is reflected in the trend in wastewater which is down by 14% in the period 1997-2001 (see Table 8).

Table 8: Volume of the Municipal Wastewater Treated

Year/	Wastewater treated (thousands m^3)
1997	1,239,888
1998	1,254,453
1999	1,203,558
2000	1,272,556
2001	1,070,695
2001/1997	86%

Source: National Institute of Statistics, 2002

As regards the regional distribution of the wastewater treated, the situation is illustrated in the Table 9. We notice that Region 8 (Bucuresti-Ilfov) has no treatment of wastewater. The biggest amount treated is recorded in N-E and Central Regions; each account for 19% of the total wastewater treated (in 2001). Regarding the quantities of sludge resulted from the treatment of wastewater it is interesting to note that the biggest quantity of sludge is collected in the South (34% of total) without correlating with the quantity of wastewater. Region S-W and Region S-E registered smaller shares of the sludge compared with the volume of wastewater treated. This situation shows that the procedures of cleaning the wastewater are not uniform; across regions there are used one, two or three stage purification plants and not all parameters of the cleaned water are observed (this explains again the term *insufficient treated*).

The differences between wastewater generation and sludge collected could be explained as well by the local conditions as: industrial and urban concentration, population connected to network, prices of water and wastewater, metering etc.

Table 9: Volume of the Municipal Wastewater and Sludge Collected in Romania , by Regions, (2001)

	Wastewater treated		Sludge resulted from treatment	
Region	thou m^3	%	tons	%
TOTAL Country	1,070,695	100	657,549	100
Region North-East	206,819	19	133,916	20
Region South-East	137,604	13	41,374	6
Region South	165,272	15	226,155	34
Region South-West	64,192	6	5,568	1
Region West	116,753	11	64,519	10
Region North-West	165,126	15	84,559	13
Region Centre	207,781	19	100,914	15
Region Bucharest	7,148	1	544	0

Source: Data from Annex 6

4 Pricing Water and Wastewater

In Romania, economic instruments for water management and protection include fixed service charges (drinking water treatment and distribution, and sewage network and waste-water treatment), various water charges, taxes, penalties and allowances (bonus). The major aim is to have a rational and economical management of waters to ensure that users respect the quality limits for water discharges, to prevent the depletion of the water resources and to avoid quality damage, and resource conservation. There are used the next pricing instruments:

- *Prices* - are the same throughout Romania but differ in accordance with the source of water (e.g., inner rivers, the Danube, or groundwater) and the category of users (industries, households, power plants, farms, fisheries, etc.);
- *Tariffs* - are levied on water pollution to reduce suspended and oxygen-depleting substances in river flows using limits set by the law. If the limits are exceeded, fines or penalties are levied. NARW is responsible for establishment of the limits;
- *Fines* are levied for violation of the laws, standards, regulations;
- *Penalties* are levied for discharging larger amounts of pollutants or abstracting higher amount of water than the quantities established by WMau.

- *Bonuses* are granted by NARW to water users that take measures to protect waters and discharge less pollutants that the level granted by WAau; the bonus could be up to 10% of the raw water bill in one year.

Prices and tariffs are revenues to cover NARW expenditures.

The penalty revenues provide a source of funding for the "Water Fund" created in 1991 and administered by NARW. The Water Fund was created to finance some improvements in water quality, in river bed stabilization, flood control, efficient water use, and to cover water management units' expenses in critical periods (droughts and floods).

4.1 Price for Raw Water Abstraction

Water abstraction charges are the same all over Romania, but differ according to the source of water (inland rivers, Danube, groundwater) and the category of user (industry, household, power plant, agriculture, fisheries). In August 2000, the prices of raw water (water abstraction charges) were approved by the Competition Office[26] at a level of 0.09 RoL/m^3 for electricity production and 71.2 RoL/m^3 for municipal water supply up to 153.6 RoL/m^3 for industrial water abstracted from groundwater.

Water users pay for the quantity of raw water they are entitled to withdraw, specified in their contracts or their WMAu (except when water is rationed during drought periods). NARW imposes substantially higher charges for amounts taken in excess of contracted volumes. Based on the Emergency[27] Ordinance no. 107/2002 the raw water tariffs, for 2002 and 2003, was and are those in Table 10.

[26] In that period the Competition Office has had this responsibility. Today the Competition Office is closed and its attributions have been transferred to the Ministry of Finance.

[27] Emergency Ordinances are legal procedures used by governments to issue legal acts with similar power as those issued by Parliament. Later on the Parliament must approve or correct these acts issued by Government. This procedure is often used in transposing EU legislation owing to the fact it is very fast and more accurate than parliamentarian legal documents.

Table 10: Price of the Raw Water (2002 and 2003), by Sources

Water source	Price - RoL/ m^3
1. Water abstracted from inland rivers	
• For municipalities, industry and livestock	238
• For irrigation and fisheries	18
2. Water abstracted from Danube	
• For municipalities, industry and livestock	28
• For irrigation and fishery	18
3. Water abstracted from underground	
• For industry	264
• For irrigation and fishery	18
• For municipalities	123
• For livestock	156

Source: Data from NARW, 2002

4.2 Tariffs for Drinking Water

Prices of drinking water are set up at municipality level taking into account the local conditions and costs associated with providing drinking water. Owing to the fact that each town has its own water sources (various distances to pump the water, various qualities and sources of raw water), its own network with losses etc. than the tariff for W&WW varies across MUs.

In July 2000, the tariff fluctuated from 3,780 RoL/m^3 (or US$ 0.18/m^3 in Ploiesti) and 4,670 RoL/m^3 (or US$ 0.23/m^3 in Bucharest) to 9,904 RoL/m^3 (or US$ 0.48/m^3 in Petrosani[28]).

Table 11: Tariff Evolution for Water Supply, for Households, in Romania

1994	250-800 RoL/m^3 in the country and 186 RoL/m^3 in Bucharest
1995	400 RoL/m^3 in Bucharest
1996	786 RoL/m^3 in Bucharest
1997	1000 – 4300 RoL/m^3 in the country and 1,400 RoL/m^3 Bucharest
1999	6000 RoL/m^3 Petrosani (maximum in Romania at that time)
2000	2386 RoL/m^3 in Bucharest and in Iasi 6250 RoL/m^3
2001	5260 RoL/m^3 in Bucharest and 6843 RoL/m^3 in Satu Mare
2003	8478 RoL/m^3 in Bucharest (September 2003)

Source: National Institute for Environmental Research and Engineering, 2002 and Apa Nova 2003

[28] Petrosani has a very poor water abstraction source; the river Jiu is the water source but as well it is used for cleaning the coal at a nearby coal mine so 8-12 hours/day it is not possible to supply safe drinking water.

The mechanism for setting water tariffs is mainly regulated by the Governmental Ordinance 32/2002 regarding the Organization and functioning of public services for drinking water and sewage, amended in 2003 by the Gov. Ordinance 35/2003. These regulations created the framework for W&WW services. In providing W&WW services, MUs should follow some principles as:

- reliability of the service;
- equitable pricing;
- quality of services;
- transparency and public responsibility;
- consultation.

In providing W&WW services, some conditions must be fulfilled:

- continuity (qualitative and quantitative);
- adaptability to users demand;
- non-discriminatory access;
- observance of norms and regulations in the field.

The framework for W&WW services includes rules for funding the level of prices and tariffs. As a general rule, prices and tariffs for W&WW are based on production costs, including variable costs and fixed costs, maintenance and repair costs, amortization, other financial obligations as credit's interest and principal, percentages for development of the system and profit for the company then is added .

In setting up the tariff's structure, for W&WW, must be observed several ideal conditions:

a) the level and the structure of tariffs are reflecting the full costs of providing the W&WW services and is correlated with the users' affordability;

b) the financial autonomy of the MU is ensured;

c) MUs have the right to propose a two-part tariff with a fixed component, direct correlated with the maintenance costs and a variable one linked to the volume of water consumed;

d) the approval of tariffs is the duty of the local council with the consent of the NAMU.

In practice there are two major ways to get approved a change in the tariff if the local conditions are changing (electricity price, raw water price, other commodities' price etc.).

I. Operators owned by local councils

The most common case is when a MU, owned by the Local Council is asking for a tariff increase for W&WW; in this case it is needed a dossier to back up the demand and the consent of the NAMU; if the Local Council agrees, the change of the tariff could be applied in a predetermined period of time; if rejected there is no way to appeal but to draft a new dossier and start again the procedure;

The main rule for funding the tariffs for W&WW is based on production costs (operating costs, repairs and maintenance, amortization of the fixed capital, interest for credits, development quota and a profit. The profit share is limited at 10% of the total production cost, excluding the development share. The development portion is limited up to 3% of the production cost but in special cases, local authorities could establish a higher development quota. The development quota is accumulated in a special account and could only be used only for the development of the network with the consent of the local authority.

Adjusting the tariffs

A W&WW operator could ask for an adjustment of the tariff for drinking water or/and wastewater every three months if the CPI changes with more than 3%. Formula used for adjustment is next:

$$\mathbf{p_1 = p_0 + Dp}$$

where:

- p_1 - adjusted tariff
- p_0 – existing tariff

- Dp – increase of tariff

$$\mathbf{Dp = [Dct*(1 + r\% + d\%)]/Q}$$

where

- Dct – increase in total expenditure;
- r% - profit quota;
- d% - development quota
- Q – quantity of water estimated for the year when adjustment take place.

Changing the tariffs

In cases when a significant increase of the production costs take place (as for instance making operational a large new installation) or when, due to economic conditions, the operator registered an increase of its cost more than 5% for three consecutive months, it is allowed a change of the tariff for drinking water or/and wastewater.

The formula for changing the tariff is next:

$$\mathbf{p_1 = p_0 + Dp}$$

where:

- p_1 - adjusted tariff
- p_0 – existing tariff
- Dp – increase of tariff

$$\mathbf{Dp = [Dct*(1 + r\% + d\%)]/Q}$$

Where:

$$\mathbf{Dct = Dcv + Dcf}$$

- Dcv – increase of the variable costs
- Dcf – increase of the fixed costs

Two part tariff

There is the possibility to use two part tariff (called binomial tariff). This tariff has two parts:

- one is the fixed part, depending of the fixed cost of the system;
- another one is the variable component, depending of the quantity of water used or wastewater discharged by the subscriber.

These tariffs could be established at the demand of operators.

The binomial tariff should be applied if there are three cumulative conditions: there are meters at the final users, agreement of the local authority, the binomial tariff is part of the supplying contract.

II. Operators that took in concession the W&WW service

In few cases in which W&WW services are in concession to a private company[29], then a formula is negotiated and included in the concession contract[30]; according to this formula an update of the tariff could be made each to three months with the agreement of the NAMU and of the Local Council (formulas for Ploiesti City are exposed in the Annex 7). The formulas have been asked by the investors as shield to protect their profits.

For instance, in Bucuresti, the company that has the concession of the W&WW service could ask for a change in tariffs, according to the contract, in three cases:

1. Ordinary adjustment: when inflation rate is higher than 5%, the national inflation rate at the expenditures is applied in local currency and exchange rate depreciation is applied to expenditures in EURO;
2. Extraordinary adjustment: it is applied when unexpected situations take place (changes in legislation, grants available, subsidies etc.);

[29] So far only Bucuresti and Ploiesti are in this situation.

[30] Formulas are approved by Gov. Decision and published in the Official Gazette

3. Adjustments necessary to achieve a certain level of services: it is applied according to the contract

4.3 Tariffs for Wastewater

The level of tariffs for sewage, paid by inhabitants of a city, are determined according with the formulas presented earlier. Some examples are presented in the Table 12.

Table 12: Average Sewage Tariffs, in Romania

1994	10 – 20 RoL/m^3 in Bucharest and 17 RoL/m^3 in the country
1997	350 RoL/m^3 in Bucharest and 500-700 RoL/m^3 in the country
2001	1165 RoL/m^3 in Bucharest and 808 RoL/m^3 in Baia Mare
2003	1879 RoL/m^3 in Bucharest

Source: National Institute for Environmental research and Engineering, 2002 and Apa Nova 2003

The effluent charges are levied on a set of pollutants and aimed at reducing their content in the rivers to within the limits set by the law. If the limits are exceeded, fines or penalties are levied. Penalties are levied for non-compliance with the WMAu or contracts, for both water intakes and discharges of wastewater. A list of charges and penalties applied by NARW is in Annex 8. From this list is easy to see that the charges are very low; their main purpose is to raise revenues for NARW and for Water Fund[31] (only penalties).

The penalties are used as income for the Water Fund. The income from all water charges is used to cover NARW operating costs. It does not include any financial resources for the development of raw water infrastructures. To improve the economic mechanisms for water resources, the level of service prices and water charges has been updated recently in line with the inflation rate; the fines for violations have also been updated as well. The level of tariffs for sewage is presented in the Table 12.

5 Water and Wastewater Infrastructure

5.1 Infrastructure for Drinking Water

In 2001, in Romania, drinking water networks have had a length of 39104 Km and a capacity for producing drinking water of 10.5 million m^3/day (see Table 13). Across regions drinking water network are even distributed without big discrepancies.

Table 13: Distribution Network for Drinking Water and Capacity of Drinking Water Treatment Plants, in Romania, by Regions, (2001)

Region	Total length of distribution networks		Capacity of drinking water treatment plants	
	(km)	%	(m^3/day)	%
TOTAL country	39104	100	10,499,506	100
Region North-East	4452	11	1,249,870	12
Region South-East	6945	18	2,102,852	20
Region South	6473	17	1,137,001	11
Region South-West	3043	8	847,088	8

[31] Water Fund is at the disposal of Water Department as a tool to support investment in raw water supply, floods prevention etc.

Region West	4864	12	1,164,198	11
Region North-West	6362	16	1,242,209	12
Region Centre	4770	12	1,300,402	12
Region Bucharest-Ilfov	2194	6	1,455,886	14

Source: Data from Annex 4

The National Report on Water Supply and Sewerage Systems in Romania, published by the Romanian Water Association (RWA) in September 2000 revealed the following data regarding the infrastructure:

- Water transport and distribution networks: the main materials used for the drinking water supply pipes are: asbestos cement (45%), steel (30%) and cast iron processed under high pressure (21%). Over 50% of the drinking water supply distribution networks are obsolete, having exceeded their operational lifetime, therefore causing frequent breaks in the provision of drinking water. The claim for the ineffective operation of meters for all drinking water used was considered to be one cause of incorrect assessments of water losses.
- Storage capacity. The total existing daily storage capacity of the tanks for drinking water supply of localities at the national level was about 2.5 millions m^3; compared to the total volume of drinking water distributed in 1998, the demand for drinking water supply could be covered only for about 11 hours/day.

5.2 Infrastructure for Wastewater

In 2001, the lengths of sewerage network was 16590.1 km and the capacity for treating wastewater was 5.15 million ^{m3}/day (see Table 14). The sewerage network has a 15,525.8 km length in towns. The length of the streets equipped with a sewerage network is of about 12,666.5 km covering about 49% of the total length of the streets. From the streets that have water supply only 71% are equipped with a sewerage network.

From regional point of view, the wastewater network is uniform distributed but there are significant shortages. The biggest one is Region 8 (Bucuresti has no wastewater treatment plant) and in the Region S-W where the shortage of treating capacity is important (4.5% of total treating capacity in comparison with 8% of the length of the sewerage network).

Table 14: Network for Wastewater and Capacity of the Treatment Plants, in Romania, by Regions, (2001)

Region	Total length of sewerage networks		Capacity of the wastewater treatment plants	
	(km)	%	(m^3/day)	%
TOTAL	16,590.1	100	5,151,739	100.0
Region North-East	2,460.6	15	1,113,483	21.6
Region South-East	2,430.6	15	651,818	12.7
Region South	2,005.5	12	882,327	17.1
Region South-West	1,352.5	8	229,746	4.5
Region West	2,054.1	12	731,324	14.2

Region North-West	2,225.1	13	767,188	14.9
Region Centre	2,175.8	13	752,479	14.6
Region Bucharest	1,885.9	11	23,374	0.5

Source: Data from Annex 6

Wastewater treatment plants. In 2001, in Romania were identified 1141 facilities for the treating the wastewater, out of which 313 for treatment of wastewater from localities. From 313 only 162 were properly operated.

From the total number of 602 wastewater treatment plants ineffectively operating, 61.5% are from the industry sector, 25.1.0% from localities and 13.5% from agriculture (see Figure 3). There are 47 towns, including important urban centers as Bucureşti, Craiova, Drobeta-Turnu-Severin, Brăila, Galați, Tulcea, that do not have wastewater treatment plants and eliminate used waters in the nearby rivers.

In the period 1997-2001 it has been registered an increase of the sewage network with 1,088 Km (see Table 16).

Table 15: Existing Wastewater Treatment Plants in Romania, 2001

Activity	Total no. of plants	Out of which				
		Properly operating		Ineffectively operating		Total under construction
	Number	Number	%	Number	%	Number
Agriculture	111	30	27.0	81	73.0	-
Industry	717	347	48.4	370	51.6	1
Local utilities	313	162	51.8	151	48.2	2
Total WWTP	1,141[32]	539	42.0	602	58.0	3

Source: Adapted from National Company "Apele Române", „Synthesis of water quality in Romania in 2001, 2002"

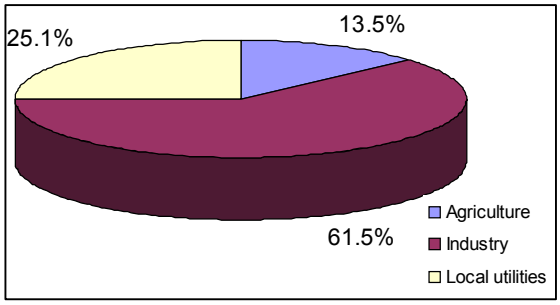


Figure 3: Wastewater Treatment Plants Ineffectively Operating, by Activity, 2001

Source: The impact on industry, agriculture and local utilities systems of implementing directives 91/271/EEC, 98/83/EC, 76/464/EEC (and the seven "daughter" directives) and 91/676/EEC., Phare Project RO 9907-02-01: Pre-accession Impact Studies., FINAL Report

Table 16: Evolution of the Sewerage Network and Treatment of Municipal Wastewater, in Romania (1997-2001)

(km)

Year/	Total Lengths of Sewerage Network	Total Lengths of Streets with Sewerage Pipes
1997	15,502	11,684
1998	16,011	11,876
1999	16,080	12,177
2000	16,352	12,540
2001	16,590	12,666
2001/1997	107%	108%

Source: National Institute of Statistics, 2002

[32] The „Synthesis of water quality in Romania in 2001", carried out by NCAR, includes a number of 304 existing and 9 under construction "wastewater treatment plants" under the economic activity no.16: Water intake and processing for supplying water (p 135)

5.3 Opportunities for Investment in Water and Wastewater Infrastructure[33]

Because of the very low GDP, the amount of financial resources for water management investments is not adequate in Romania. Due to this shortage, many important investments in diversion channels, flood-control reservoirs and waste-water treatment plants have been stopped. For example, 31 waste-water treatment plants just under construction cannot be completed for lack of finance; only one of these, in Constanta, has received financial support from EU. In Bucuresti, the construction of the wastewater treatment plant started in 1988 and has not been completed yet.

The need for new investments in the water sector is very high. For example, work on hot spots identified under the Joint Action Programme for the Danube River Basin is prioritized for implementation, and has been retained for financing under ISPA. The financial resources needed to control the 10 municipal discharge "hot spots" have been estimated at € 393 million, while the consolidated[34] State budget for 2000 on investments in water management was only € 25 million. Another € 30 million is needed to solve the problems of industrial and agricultural "hot spots".

Most of the 286 projects retained in the 1999 NEAP concern water facilities. ISPA is anticipated to be the key funding source for those projects. In the short term, ISPA will spend € 1,053 million on waste-water treatment and water management over a period of seven years (2006-2007). The minimum domestic contribution to any project co-financed by ISPA is 25%, an amount that Romanian municipalities will find difficult to afford in the present circumstances.

In order to calculate the necessary investment for water supply and sewerage services the following things have been taken into consideration: the period necessary to be in line with the parameters asked by the EU concerning water supply and sewerage is of 20 years in urban areas and 28 years for rural areas, the population who will benefit from these services is in urban areas of about 12.3 mil inhabitants and in rural areas around 7.9 mil inhabitants.

Romania would be integrated in EU in 2007 and in the negotiation process asked for 15 years transition period for the EU Heavy Water Directives. Therefore, the time frame for urban areas is about 20 years.

In 2003 a new National Environment Action Plan was drafted. The new NEAP identified four main priorities: 1) water quality; 2) air quality and climate change; 3) waste management and 4) nature protection, biodiversity and forest protection. In the field of water quality 28 project have been analyzed and prioritized; all these projects are investment in W&WW systems in 28 cities. The total estimated value is 614.34 million € or 22 million € /project. It is interesting that NEAP proposed a financing scheme for all projects: 8% from the state or local budget, 9% own contribution, 12% environmental fund, 41% foreign financing and 30% other sources. This means that only for water the Environmental Fund should provide 73.7 € million. Taking into account that in 2003 the Environmental Fund collected approx. 12 million € the assumption of the NEAP is unrealistic. As well the heading "Others" means only for water 184 million €. The whole measures in NEAP amounted to 1,9 billion € of which from the Environmental Fund 225.2 million €, foreign finance 781 million € and from other sources 576.6 million €. These financial schemes proposed by NEAP raise serious question marks one reason being that neither willingness to pay nor a realistic time frame was estimated.

[33] Data and information concerning investments were taken from The Ministry of Public Administration (for details see Annex 14)

[34] The Consolidated State Budget includes the State Budget and all other budgets as those of local authorities.

5.3.1 Urban Areas

Governmental Strategy for Public Services[35] estimated the need for investment in the water supply sector and wastewater in urban areas. Unit values taken into account for estimating the needed investment were the following:

- for drinking water stations 40 US $/inhabitant;
- for distributing and transporting drinking water 110 US $/ inhabitant;
- for sewerage network 100 US $/ inhabitant;
- for wastewater plants 90 US $/ inhabitant.

A roughly estimation of the water investment costs is presented in Annex 9 where the number of inhabitants from towns and municipalities in each county was multiply by unit cost mentioned above for four categories of water investments. Therefore, the total necessary investment for rehabilitation and for modernizing the system of water supply and sewerage and the coming into line with European Water Directives is: total investments 4,173,205 thousand US $, out of which for drinking water treating 490,965 thousand US $, for drinking water distribution 1,350,155 thousand US $, for sewerage service 1,227,413 thousand US $ and for wastewater plants 1,104,672 thousand US $.

5.3.2 Rural Areas

The same mentioned paper has estimated the specific investment for new stations to supply drinking water and sewerage services in rural areas. The total amount needed was calculated taking into account that supplying water for 10,146,564 inhabitants will be completely achieved in 2017. In a first stage the systems of supplying drinkable water will be provided by street pumps, and as sewerage is extended there will follow a second stage for achieving individual connections. The average flow will be 170 l/person and day. The sewerage network will be finished till 2030 and the wastewater treatment plants will be built in 2-3 stages, starting with the mechanical part and continuing with the biologic and a third stage if necessary.

Under these circumstances the specific investment will be: for drinkable water supply 250 US $/ rural inhabitant and for sewerage and wastewater cleaning 350 US $/ rural inhabitant. For a roughly estimation of the water investment costs in rural area was prepared the table presented in Annex 9 and Annex 10 where in each county the number of rural inhabitants was multiply by units costs presented above.

Therefore the Annexes 9 and 10 and are presenting the figures showing the necessary investments for extending the system of drinking water supply and sewerage in rural areas. Total investments 5,407,205 thousand US$, out of which for drinkable water service 1,983,713 thousand US $ and for sewerage 3,423,492 thousand US $ (for details see Annex 10). These strategies use to present very ambitious goals without taking into account neither the willingness to pay nor the possibility to mobilize such enormous amount of money (Annex 14).

[35] National Strategy for the Development of Communal Public Services., Ministry for Public Administration., Bucuresti – 20 august 2001

6 Financing Water and Wastewater Services in Romania

6.1 Financing the Current Activities of Drinking Water and Wastewater Services

In Romania, financing local services could be made in several ways, involving only local authorities and/or MU:

- Granting subsidies trough the local budget for 100% of expenditures (the case of road maintenance and green areas, parks etc.);
- Granting subsidies that cover a part of the cost of the service (heat and public transport); subsidies could be granted directly to the service provider or to some social groups with low revenues (mainly for public transportation and heating in winter period).
- Tariffs and charges that cover the running costs (mainly the W&WW services);

So, for W&WW services there is neither grant nor subsidy available from central government to cover current costs (the same situation is for waste management). MUs should cover their expenditures only from tariffs and charges.

According to the law[36], tariffs should also provide a share for a development fund and a small benefit for MU. Owing to the fact that in most of cases Local Councils want to keep tariffs down, many MU are in red, registering loses. When the situation is aggravated by inflation or increase of the price for other utilities and the power utilities threaten to switch off the power, Local Councils agree for an increase of the tariffs and charges. In cases when a formula was agreed, then the increase of the tariffs is made automatic.

In some areas, of low income or high unemployment, an important problem is that of unpaid bills for W&WW associated with the bills for hot water and heating. There are cases of non-payment and the delay in paying the invoices for drinking water supply and sewerage; there are some localities where the average time until receipt of payment is more than 200 days. This was damaging in the period with high inflation rate when long delays means a significant devaluation of the money received. In the last period when inflation rate is down this delay reduced its consequence. In order to cover the lack of liquidity, MUs use to have short term credits from commercial banks.

This situation has, as the main cause, the difficulties of cutting off from the system of those who do not pay especially in big buildings with many flats.

On the other hand there are very high production costs generated by the bad technical condition of the network and of the equipment. Thus, in the winter period when it is added the heat bill, the amount to be paid becomes too high compared with the income of the population[37]; so unpaid bills are a severe problem in areas where is in place an acute restructuring program for the industry. In most cases the bill for W&WW is not so high, compared with families revenue and usually the bills are paid in due time. The advance of metering made people more careful in paying their bills.

6.2 Financing the Investment in Water and Wastewater Infrastructure

Financing infrastructure investment, necessary for these services of great importance was made in the past, by tradition, from the local budgets or transfers from the state budget. The MUs, either

[36] Governmental ORDINANCE 32/2002 regarding the Organisation and Functioning of Public Services for Drinking Water and Sewage, amended in 2003 by the Gov. ORDINANCE 35/2002.

[37] For example, the prices for thermal energy, warm water, drinkable water and sewerage represent in wintertime the amount equal with two medium wages for a family with four members, living in a three-room apartment. If the cost of electric energy, telephone bill and other important services are added, all the costs represent more than 50% of their monthly income which is very much. The situation is much worse for retired persons.

commercial companies or independent administrations, have very limited financial power due to the small ratio of the profit (when there is any).

In Romania, environmental infrastructure projects and water projects as well could, in principle, be financed up-front through the following mechanisms:

- The National Budget;
- Local budgets;
- Commercial loans and private investors;
- International Financial Institutions;
- The National Environmental Fund or Water Fund.

The National Budget

From the National Budget there are financed only investment for managing raw water sources, flood protection, reservoirs, hydro dams and other water works.

In 1999, the Law on Local Administration established the financial autonomy of local government and since, most environmental infrastructure is the responsibility of local government. As a consequence, no funding is available from the central budget to develop local W&WW networks.

This lack of support from central government has until mid 2000 extended to a lack of any sovereign guarantees for municipally raised loans. The Ministry of Finance has now established a guarantee fund specifically for ISPA projects.

Local budgets

Local budgets are the main channel to finance water infrastructure and networks in towns and communes. Even in the larger cities, in general, the local budget does not have the resources to finance directly environmental infrastructure projects.

The low level of wages, linked with the high inflation rate, mean that consumers of municipal services cannot afford to pay the increased tariffs which would be required to cover the investment costs for improvements in infrastructure.

Therefore there is a severe problem throughout Romania in the financing of environmental infrastructure projects from local budgets. This problem extends to the co-financing of ISPA supported projects; the 25% minimum which is required as co-financing is still beyond the direct funding capacity of local budgets (in some fortunate cases Local Councils managed to bring a contribution of 5%). Usually EBRD or EIB provided loans to cover the gap.

Commercial loans and private capital

Romanian municipalities cannot take loans from commercial banks but they could finance various investment by issuing Municipal Bonds on the internal market with various rates and maturity periods. Since 2000, LCs could issue municipal bonds on the national and international market within a limit of 20% of the local budget. This new financing method is becoming more and more used by municipalities to undertake various development projects[38]. In principle the MUs could borrow, particularly if supported by a municipal guarantee. Two commercial banks (Romanian Development Bank and “Tiriac” Bank) have the mechanisms in place to provide this type of loan. As far as official information is available, no such loans have been established, because of the transaction costs and the bureaucracy involved.

[38] In 2003 have been recorded 21 situations when municipalities issued municipal bonds in order to cover their investment cost. In 2002 the total amount of municipal bonds was 600 billion RoL (around 18 million €). Source: Data from the newspaper Adevarul from 9/02/2004.

Private capital involvement is at its beginnings. There are some important examples of this kind in Bucuresti and Ploiesti, in the field of drinking water network and sewage (a French company negotiated a concession for W&WW services for 25 years, from 2000).

MUs have big difficulties in borrowing due to the fact that most of them operate in the red, the tariffs are controlled by LCs, there are no miraculous sources, assets are owned by the LC etc. This is why banks are reluctant to give long term loans for infrastructure projects in W&WW sector. There are many other profitable business in which a bank could invest its money.

International Financial Institutions and bilateral donors

Loans for environmental infrastructure development must be provided without a sovereign guarantee. That the only international financial institution that is normally available for this purpose is the European Bank for Reconstruction and Development (EBRD).

The overall structure of such a financing scheme is next: up to 50% loan from EBRD, 50% grant from Romanian Government or EU and 5% local sources.

For custom taxes and VAT (19%) the Romanian part is in charge. For projects financed by EU the MoF could grant VAT exception if MoU is providing for this.

In Romania, various water works and programmes have been financed by bilateral donors as Danish Government, Dutch Government, US (USAID) etc.

EU Financing (ISPA and PHARE)

EU is the biggest donor to environmental programs and water as well through the PHARE (Economic and Social Cohesion component) and ISPA grant programmes. The main instrument for water investment is ISPA, covering up to 75% of the value of the investment (mainly water supply systems and sewage water and waste management).

The economic and social conditions in Romania mean that most beneficiaries (in the first phase only towns with more than 250 000 inhabitants were eligible) find it difficult to provide co-financing of ISPA projects beyond the minimum level of 25%. This is made particularly difficult owing to the fact that the central Government does not contribute to ISPA co-financing.

However, since a primary objective of the ISPA programme is to maximize the additionally of the ISPA grants, it will be a strategic objective of the Romanian ISPA Programme to encourage potential beneficiaries to expect grants of less than 75% wherever this is feasible.

At present the predominant source of co-financing for the ISPA Programme (the 25%) so far has been EBRD, there are also other sources. EIB is already involved thanks to the special arrangement of the Ministry of Finance, and in some cases there is a small but significant contribution from the local budget. Bilateral support has also been used (for example Danish co-financing[39] in Piatra Neamt).

The ISPA Strategy will encourage these other sources of co-financing in addition to EBRD and to support the development of the National Environmental Fund as a major source of ISPA co-financing.

National Environmental Fund and Water Fund

Romania has been the only country in central Europe without an Environmental Fund, which has limited the country's ability to tackle environmental problems. In May 2000, a law was published and ratified, then authorized by the President in June, which established a National Environmental Fund. This Fund could receive financing from the pollution charges, central budget, from environmental fees and fines, donations etc.

It was anticipated that this Fund will be fully operational in due time, and will represent an important source of financing of environmental infrastructure projects, including the co-financing of ISPA projects. This did not take place and the optimistic time limit for starting the operations is late 2004.

[39] For details see next section

The Fund should do some steps as:

- establish internal mechanisms to finance environmental infrastructure projects, including ISPA;
- elaboration of an investment strategy;
- elaborating the Project Cycle Manual;

In any case this fund will hardly finance any W&WW investment taking into account that there are no revenues from the water sector and earmarking of revenues is preferred. As it was mentioned, the Water Fund is used only for investment carried out by NARW.

Other Instruments

In the future, more than the grant-donation mechanisms should be initiated and completed with alternative mechanisms such as:

- state-guarantee soft loans combined with revolving funds;
- financing by financial contracts in public-private partnership (BOOT, BOT);
- mixing up with other financial assistance programs (EU or WB programs);
- commercial banks loans and co-financing investment funds;
- better planning by grouping of projects by hydrographic basin basis in order to have a scale effect.

As well, the privatization/concession process of the water infrastructure has to include the environmental burden as compulsory. Particularly, the business sector needs to cover increased costs to comply with EU legislation. For that reason the EU assistance instruments, inclusive ISPA, could facilitate the investment efforts connected to the environmental standards, disclosed by PEPA reports (at European level), and twinning reports (at National level).

6.3 Water and Wastewater Investment Co-Financed with Foreign Aid

In the last 3 years several international programmes financed W&WW projects in Romania. We have to mention that these projects are not special tailored for W&WW but for other general goals as environmental protection (waste management, drinking water supply and wastewater treatment), improving municipal facilities, rural development etc.

1. ISPA program

The biggest programme is ISPA, addressing issues in the field of transport and environment (water and waste management). Up to present, 33 ISPA Financing Memorandums have been signed by Romanian authorities, with a total amount of 1,6 billion euro, representing 70% of the EU contribution for the period 2000-2006. There are more than 20 W&WW projects financed under ISPA (see Annex 11). The amount of the W&WW projects financed by ISPA is more than 680 million €. Many cities as Arad, Buzău, Brăila, Braşov, Cluj-Napoca, Constanța, Craiova, Focşani, Iaşi, Oradea, Timişoara, Paşcani, Satu-Mare, Sibiu, Piatra-Neamț, Târgu-Mureș, Valea Jiului will carry out W&WW projects (see Map 5). The strategy for ISPA was to begin with larger cities with a population bigger than 250000 inhabitants and later on to continue with small cities. As the ISPA financing covers only 75% of the investment and 25% have to be local contribution, all municipalities have to find ways to cover their share. For this loans from EBRD and EIB have been used.

2. Loans from EBRD and EIB

EBRD financed several W&WW projects in Romania: in Iaşi, Braşov, Constanța and Arad (around 55 million €); a part of these projects have received the state guarantee while others not (see Annex 12). As well EIB financed projects for improving water networks. Both institutions co-financed several

ISPA projects. Some of the projects for W&WW received state guarantee while others did not. Several cities as Brăila, Cluj, Craiova, Focşani and Paşcani got loans from EIB for co-financing W&WW projects. As well should be mentioned the loan of 25 million € from EBRD to rehabilitate the water supply system in Bucuresti.

3. PHARE co-financing

There are few PHARE programs that finance the modernization municipal infrastructure, including W&WW infrastructure. One of these is SAMTID program that has a total value of 380 million €. The financing scheme is next: 50% loans (50 million € from EBRD, 140 million € from IEB) and 50% grants (40 million € from the National Fund - local contribution fro the state budget - and 142 million € is EU contribution from the Social and Economic Cohesion fund).

SAMTID was designed to cover investment needs for small and medium towns that do not have access to ISPA financing. Local authorities will finance costs related to project design, feasibility study, environmental impact assessment study and other documents needed.

4. SAPARD financing

The Objectives of SAPARD are two fold: to assist in implementing the acquis communautaire in agriculture and rural development and to solve priority and specific problems related to developing a sustainable agricultural sector and rural areas. SAPARD has a budget of 150 million for the period 2000-2006 and 50 million € from the Romanian Government

From the 11 measures to be financed it is important to mention the Measure 2: Improving infrastructure for rural development and agriculture. This measure has a total budget of 438.77 million euro (329.08 million € is EU contribution). Two sub-measures are important for W&WW sector:

- Drinking water supply systems for rural areas: building new water supply systems and upgrading or/and extending the existing ones (spring water catching, water supply, water treatment stations, tanks for water storage, plumbing stations, distribution network etc.);
- Centralized systems sewerage in rural areas: building new sewerage systems and extending/upgrading the existing ones (network of wastewater collecting pipelines, wastewater treatment plants, pumping stations and wastewater evacuation pipelines).

SAPARD projects should be carried out in rural areas and the value of a project should be between 0.1 and 1 million €. For projects that do not generate substantial net benefits the contribution from SAPARD may be up to 100% of the total eligible costs.

5. Bilateral assistance

Apart from the assistance delivered by international institution, Romania took advantage from bilateral assistance granted by developed countries. In the field of environment countries as US, Denmark and the Netherlands have a very important contribution.

5.1. PSO – the DUTCH programme of cooperation with East-European countries

PSO has been formulated in response to the need of developing sustainable trade relationships and industrial partnerships with East-European countries. Within this bilateral programme, the projects are carried out by the Netherlands – through SENTER agency of the Ministry of Economic Affairs – and the beneficiary country, on the basis of an Intergovernmental MoU.

For Romania, this Memorandum covers the following cooperation fields: agriculture, industry and technology; transport and infrastructure, small and medium-sized enterprises; Romania's preparation for accession to the European Union.

PSO Projects

A PSO project is a package of activities aimed at improving the business performances of the Romanian partner. To this end, the PSO projects have to be practical, to lead to visible, clear and

quantifiable results. The best ways to achieve this are the transfer of technology and improvement of working methods.

The non-reimbursable financial assistance of the Netherlands covers the activities within PSO, while the Romanian partners covers the local costs, such as wages of the staff involved in the project, the working location, local transport or translation services.

The PSO projects have in general a duration of two years and a budget between approx. 250,000 – 1,000,000 €.

Starting with 2001, an ecologic component is binding in all the PSO projects in the field of agriculture, transport and industry. In the water sector three recent projects should be mentioned (see Table 17):

- The project called **Implementation of the Water Framework Directive** has the wider objective to assist Romania with its compliance efforts in relation to the Acquis Commaunitaire (water sector) and thus facilitate the country's accession into the EU. The immediate purpose of the project was to support at national level the former Ministry of Water and Environmental Protection (now the Water Department in Ministry of Agriculture, Forestry, Waters and Environment) and NARW and at river basin level Directorate Mures Branch in Tirgu Mures, with the implementation of the Water Framework Directive. This project, with the pilot activities in the Mures river basin, assists in further developing the skills of the Romanian experts and other parties in the field of integrated water management at river basin level.
- The project called **System Management for contingency in case of accidental or deliberate marine pollution with harmful substances** has as immediate purpose to assist the Romanian authorities in the preparation of a National Contingency Plan for combating marine pollution by harmful substances.
- The project called Implementation of the Water Framework Directive (WFD) and Integrated Coastal Zone Management (ICZM) in transitional and coastal waters in Romania has the purpose to help Romanian authorities for the elaboration of an integrated management plan for sea waters.

Table 17: Water Management Projects Financed by the Netherlands

Title of the project	Budget Thou. €	Executing Agency	Beneficiary	Duration
System Management for contingency in case of accidental or deliberate marine pollution with harmful substances	428	Royal Haskoning BV and Rijksinstitute voor Kust and Zee/RIKZ	Ministry of Water and Environmental Protection NARW	January 2003-December 2004
Implementation of the Water Framework Directive	500	Arcadis Euroconsult Bv (cooperation with ICIM and RIZA)	Ministry of Water and Environmental Protection NARW	01/01/2002 – 31/12/2003
Implementation of the Water Framework Directive (WFD) and Integrated Coastal Zone Management (ICZM) in transitional and coastal waters in Romania	503	Royal Haskoning BV	Ministry of Water and Environmental Protection NARW	01/01/2003-31/12/2004

Source: Data from SANTER., 2004

6.4 Bilateral Assistance Granted by Denmark

In 1990, Danish Government created the following programmes for co-operation with CEE countries: found for democratization; investment fund; environmental fund; sectoral fund; programme for administrative assistance; fund for projects.

Since 1998, Danish co-operation was restricted to two areas : environment and pre-accession issues.

General objectives for environment assistance were: Investment in environmental protection, limitation of the pollution locally and regionally, technological transfer of clean technologies and sustainable development, democracy support, improving market economy, economic development environmental friendly.

Selected projects were in the areas such as:

- Modernization of sewage plants (for details see Annex 13);
- Water supply (for details see Annex 13);
- Waste management;
- Reducing air pollution in some industrial sectors as: cement industry, furniture, power plants, chemical industry etc.;
- Introducing clean technologies;
- Power sector rehabilitation ;
- Managing protected areas.

In 1995, with help from DEPA, Romanian authorities drafted the National Action Plan for Environment; in 1997 this plan was revised and completed with help from DEPA.

In early stages projects were small ones (total 2 million Euro/year) but now the total assistance amounted to 8 million Euro/year. All environmental projects financed by Danish Gov. amounted to more than 20 million Euro.

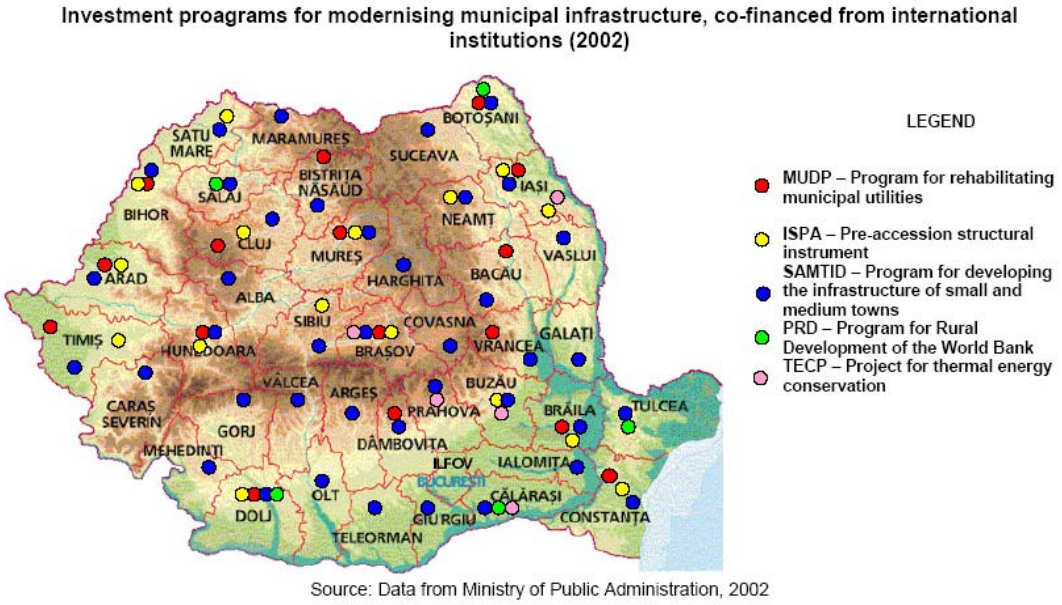
Latest development

In 2002 was signed the new MoU regarding the assistance granted by Denmark. In principle the assistance will cover the next areas: agriculture/PAC/SAPARD instrument, internal market, structural funds, staff training in administration at central and local level;

6.5 Bilateral Assistance Granted by the US

In the field of water management USAID programs have started in Romania since 2001. The most recent ones are:

- DESWAT project that will create an early warning system in case of floods and accidental pollution; the project will implement 605automatic monitoring stations for the quantity and quality of inland waters, realization of some basin centers and a national centre for forecasting (the project will be implemented in the period 2003-2007); the main beneficiary is NARW;
- WATMAN project will create an integrated management system of the water resources; trough this project will be created 11 centers of rapid intervention, modernizing of the existing informational system, system for allocating water resources; the main beneficiary is NARW.



Source: Data from Ministry of Public Administration, 2002

Map 5

7 Management Units (MUs)

In Romania, there are 268 municipalities and towns and 1423 communes with systems to distribute drinkable water. Not all communes have W&WW networks; the peoples use to take the water from the underground reserves from wells in the soil.

7.1 Types of Management Units and their Operation

In 2001, public services of communal husbandry was offered by a number of 556 MUs, subordinated to the local public administration authorities or operating with private capital; there were registered 74 Autonomous Regie and 482 commercial companies (Limited Liability Companies, stock companies etc.). Considering the participation with capital, commercial companies could be divided into the next categories:

- 216 commercial companies with 100% capital owned by the local authorities;
- 30 commercial companies in which local public authorities have contributed with more than 50% capital;
- 236 commercial companies where local public authorities have contributed with less than 50% capital.

In time the situation changes owing to the fact that a consolidation process is taking place. Taking into account that some W&WW operators are not efficient due to the small operating size, the Strategy for sustainable development of the W&WW services estimated that the number of W&WW operators will decrease up to 80-100 in 2007 and up to 40-50 in 2015.

These companies have a great diversity of their activity profile. The most frequently activities were waste management, water management, sewerage, sometimes local transport and heating.

In all these companies, in 2000, employed 155,802 persons, and in 2001, employed 152,759 persons. The wages, paid to the persons working in companies subordinated to the authorities of the local public administration amounted in 2000 to 5,048,148 RoL, and in 2001 to 6,473,822 RoL. The average monthly wage in the field, in 2000, was 3,3 million RoL.

Regarding the economic-financial situation of the companies subordinated to the local public administration authorities, in 2000, as a result of the balance, 223 operators had profits, while 98 operators had losses.

In localities, all responsibility for organizing, administration, management and monitoring of drinking water and wastewater services comes under the umbrella of the Local Council, which is the owner of the public assets, networks etc.

From the administrative point of view the public services of communal water and wastewater are of local interest. MUs are organized and function in co-operation with the public local authority after the following principles:

- the public local authority owns public or private assets which it uses to supply the services;
- the operators, irrespective of their juridical status, can operate on the basis of a contract of delegation won by auction;
- the contract for delegating services and the rules of delegation are made after a model contract elaborated by the RUs (mainly NAMU);
- all operators will be licensed by the NAMU in accordance with a approved procedure;
- the contract of delegating services and the regulations will be monitored by the local authorities and supervised by NAMU;
- the tariffs and their indexation are going to be verified by NAMU;
- the activity of the operator managers will be evaluated by contract and performance criteria;

In order to get the performances of quality and costs NAMU has to evaluate the operator's performances in the field of public services of communal water and wastewater using a benchmarking.

To use the balance between cost and recovering and permanently control the fare which must cover all costs without exaggerated profits and having a development component. Wages will be at the level negotiated with the trade unions, observing the regulations and to separate the water and wastewater services from social protection. The social protection for the population with a low income, have to be ensured by special programs financed by the local or state budget.

7.2 Trends in Formation and Consolidation of MUs

The provisions of Law No. 215/2001 of the Local Public Administration and Law No. 326/2001 of Public Services of Communal Husbandry, together with the former regulations namely Law No. 23/1998 regarding public property and its judicial regime and Law No. 219/1998 regarding the granting regime create a coherent framework, which could support the organizing and administration of the public services for water and wastewater. The provisions of these laws are very important:

- a distinction can be made between the owner of the assets, namely the public local authority and the operator, which can have 100% public capital, joint or 100% private;
- no matter the judicial condition of the operator, the local authority delegates the administration by using a contract and the operator will be selected by a competitive bidding process;
- the contract delegating system management and operations the labor rules will follow the model given by the Ministry of Public Administration and put into practice by an order of the Minister of Public Administration;
- all operators, no matter their judicial status must get an operating license from NAMU;

The transposition of EU legislation will have an important effect on creation of new MUs.

Agglomeration of localities that have a population equivalent bigger that 2000 inhabitants have to build W&WW networks, according to the latest estimate of the 11 branches of NARW. There are 2609 agglomeration with more than 2000 inhabitants:

- 2346 agglomerations with a population between 2000 – 10000 inhabitants;

- 111 agglomerations with a population between 10000 – 15000 inhabitants;
- 131 agglomerations with a population between 15001 – 150000 inhabitants.;
- 21 agglomerations with a population with more than 150000 inhabitants.

Combining small localities for the creation of W&WW networks will be a complicated problem.

Out of the 2609 agglomerations, 453 agglomeration have sewage systems and 340 agglomeration have wastewater treatment plants. Out of these only 11 wastewater treatment plants and two sewage systems are in compliance with EU legislation.

8 Policy Issues

Romania's water system is broadly developed and we could say that quantitatively, the water resources are sufficient to cover the national water demand. In particular, hydro structures have spare capacity and are generally sufficient to manage floods and droughts. One important problem arise from the fact that there are geographical differences of the rivers' debit and significant seasonal variations: there are seasons with high precipitation level and other season when the rain is missing for long periods. Owing to this peculiarity in Romania many reservoirs have to be developed in order to retain water.

From the previous sections of the study we have identified the next policy issues.

8.1 Issue 1: Water Consumption and Wastewater Generation

In Romania could be identified three major water pollution problems:

1. The degradation of quality raw water has been caused mainly by untreated waste-water discharges from municipalities: only 18% of municipal wastewater is treated properly. The capital city, Bucharest, and other important cities still do not have waste-water treatment plants;
2. The degradation of groundwater is important;
3. Accidental pollution from industrial tailing ponds is also a serious problem.

We could identify three water allocation problems.

Water allocation problem (I)

Industry (including energy production) is still responsible for 60% of raw water demand. An effort should be made to reduce this consumption.

The demand for drinking water for household purposes is still at a high level. This is, in fact, due to:

- water losses in the obsolete distribution networks, and
- very largely to water wastage by the consumers caused by:
  - the bad state of household plumbing,
  - cuts in water supply in some areas.

Water allocation problem (II) a

The result of high drinking water consumption is a correspondingly excessive volume of diluted wastewater generated by the users. As a consequence, it is needed a correspondingly oversized sewage network and waste-water treatment facilities, and unnecessary investment

After 2001, when started the process of metering the apartments in block of flats, the water consumption decreased significantly (in some cases by 40-50%).

Water allocation problem (II) b

After metering process will end and leakages will be reduced than the water consumption could be stabilized at a lower level (150-250 l/inhabitant/day), comparable with other CEE countries. In this situation it may result an overcapacity in water supply. On one hand this could be regarded as a reserve capacity in case of expanding the network or the population will increase. On the other hand the overcapacity brings important maintenance costs that has an influence on existing tariffs.

New investments, especially in municipal water supply and waste-water treatment plants, should take into account the likely drop in water consumption which should be brought about by an improvement of the water supply network, water metering and pricing system.

Reform Proposal (I) a

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

- Rehabilitating the water supply system and ensure continuous supply of drinking water and hot water where centralized hot water supply systems exist. This implies the rehabilitation and upgrading the water supply systems and household installations; In this way we may register joint benefits: 1) reducing losses and 2) improving reliability. The later effect may increase water consumption but the increased reliability will also increase the value of the service and the willingness to pay more for that service.
- In case of hot water supply a feasibility study should be carried out in order to show the viability and the efficiency of this solution[40].

Reform Proposal (I) b

- Extending the installation of individual cold and hot water metering;
- Developing economic incentives to encourage owners of buildings and flats to repair their water infrastructures.

As an example, if a person will improve his water infrastructure to be allowed to deduce the expenditures from his tax bill, at the end of the year or to provide some subsidized loans to make the repairs.

8.2 Issue 2: Municipal Water Tariffs

Tariffs and charges are too low to provide resources to MUs for any new investment or the complete overhaul of obsolete networks. The tight State and local-authority budgets make it impossible to develop the construction programmes for new water management facilities and waste-water treatment plants. Available foreign aid is not even sufficient to solve the problems of identified hot spots, and demand an additional domestic contribution that Romanians are unable to afford.

A vicious circle is in place:

1) losses and impossibility to finance new investment ➔ **2)** minimum development fund (if any) ➔ **3)** minimum investment for replacement ➔ **4)** significant raise of the maintenance costs owing to old equipment ➔ **5)** reducing the profit of the Management Units (MU) ➔ **1)** losses and impossibility to finance new investment

To aggravate this circle MU should face significant water losses on the network and delays in payment of the water and sewage bills.

Reform proposal II

Investing in controlling water losses in order to brake the vicious circle:

1) Financial analysis ➔ **2)** Investment to reduce losses ➔ **3)** Benefits resulting from loss reduction (cost reduction) ➔ **4)** More revenues for MUs ➔ **5)** Increasing benefit

By tariff reduction it could be demonstrated that investing in water loss control is valuable.

8.3 Issue 3: Economic Sustainability of the Water Utility

Economic sustainability of MUs is poor. It is very difficult to raise the capital needed for development. Therefore there is a severe problem throughout Romania in the financing of environmental infrastructure projects from own MUs sources or from local budgets. This problem extends to the co-

[40] In some cases could be preferable individual heaters.

financing of ISPA supported projects; the 25% minimum which is required is still beyond the direct funding capacity of local budgets.

On the one hand there are difficulties in raising tariffs owing to limited affordability to pay and on the other hand private finance is not accessible.

So far, Municipalities are allowed to issue bonds on the internal financial market up to 20% of the budget value.

Reform proposal III

In the future, taking into account the enormous task to introduce W&WW systems in the rural area and to upgrade that existing in towns, more than the grant-donation mechanisms should be initiated and completed with alternative mechanisms such as: state-guarantee soft loans combined with revolving funds;

State Revolving Fund could complement ISPA grants. This will reflect the growing financing responsibilities of local authorities and encouraged the increase of efficiency and cost-recovery in program implementation. State Revolving Fund is a credit mechanisms capitalized from grants (either from state budget or from EU) and co-financing local contribution in W&WW investment (80 percent and 20 percent, respectively). The Revolving Fund will provide low-interest rate loans and other non-grant assistance to local and municipal authorities to build or improve sewage treatment systems and water supply.

As a result of the change from grant to loan mechanism, the increase in household user fees could be as high as 20 percent and annual adjustments in charges will become common. Additionally, the incentive to construct lower cost facilities to minimize the impact of capital costs on user fees will increase. As a result of shrinking grant funding, states and municipalities will have to find alternative channels of financing, and were forced to require greater efficiency and greater cost-recovery in service provision. With increased cost-recovery, market-based financing schemes will gain larger acceptance.

This fund will be an earmarked fund and all wastewater system costs will be financed from sewer related revenues accruing to the Fund. Such revenues include sewer service charges, industrial waste quality surcharges, inspection and other fees.

Taking into account that W&WW service will provide constant revenues in long run, the Fund will not be short on money. This Fund could be supervised by Min. of Public Administration and Interior.

9 ANNEXES

Annex 1: Evolution of the Exchange Rate - ROL/USD or EURO -

Year	USD	EURO*
1985	17.14	N.A.
1986	16.15	N.A.
1987	14.56	N.A.
1988	14.28	N.A.
1989	14.92	N.A.
1990	21.56	N.A.

Year	USD	EURO*
1991	76.47	87.81
1992	307.95	400.00
1993	760.01	884.60
1994	1 655.09	1 967.14
1995	2 033.28	2 629.51
1996	3 082.60	3 862.90
1997	7 167.94	8 090.92
1998	8 875.55	9 989.25
1999	15 332.93	16 295.57
2000	21 692.74	19 955.75
2001	29 060.86	26 026.89
2002	33 055.46	31 255.25

Source: Data from the Romanian National Bank, 2003

Annex 2: EU Water Directives Transposed in Romanian Legislation (March 2003)

1. Directive no. 91/271/EEC regarding urban sewage waters

Transposed by:

- Government Decision no. 188/2002 regarding some norms to discharge used water into natural waters (Official Journal no.187/ 20 March 2002).

2. Directive no. 75/440/EEC regarding the quality of surface waters designated for drinking water

Transposed by:

- Ministerial order no. 377/2001 regarding the approval of the norms for surface water quality.
- Gov. Decision no. 100/2002 for the norms to measure and associated frequency for analysis for the surface water designated for extraction and preparation of drinking water.
- Ministerial order no. 1146/2002 for classification of the quality of the surface waters (Official Journal 197/ 27 March 2003).

3. Directive nr. 91/676/EEC regarding water protection from nitrogen fertilizer from agriculture sources

Transposed by:

- Ministerial order no. 740/08.08.2001 for the approval of the Commission for the Action Plan for protecting waters from fertilizer fro agriculture sources.
- Ministerial order no. 918/ 8.10.2002 for approvals of the Code of good practice in agriculture, for farmers.

4. Directive no. 76/464/EEC regarding pollution from some dangerous substances discharges into waters (and 7 Daughter Directives).

Transposed by:

- Gov. Decision no.118/2002 for the approval of the Action Plan for protecting waters from pollution from some dangerous substances discharges into waters.

5. Directive no. 76/160/EEC regarding the quality of water for bathing

Transposed by:

- Gov. Decision no. 459/2002 for approving the Norms regarding the quality of water for bathing in special places for public recreation.

6. Directive no. 78/659/EEC regarding fresh water quality that support fish live

Transposed by:

- Gov. Decision no. 202/2002 for approving the Norms regarding the quality of water for supporting fish environment (Official Journal 196 from 22 March 2002).

7. Directive no.79/923/EEC water quality for mollusks

Transposed by:

- Gov. Decision no. 201/2002 for approving the Norms regarding the quality of water for mollusks.
- Emergency Ordinance 202/2002 for managing coastal area

8. Directive no. 98/83/EC regarding drinking water

Transposed by:

- Law no. 458/2002 regarding drinking water (OF. Journal no552/29.07.2002)

9. Water framework directive no. 2000/60/EEC

Transposed by:

- Min. Order no. 913 from 15.10. 2001 regarding the approval of the Plan for Basin Water Management
- Min. Order no. 1125 from 03.12.2002 for approving the Committee for Coordination and Monitoring of the implementation of the Water Framework Directive and other water Directive

10. Directive no. 80/68/EEC regarding the protection of the underground waters from pollution with some dangerous substances

Transposed by:

- Min. Order no. 1049 from 13.11.2002 for approving the Plan of Measures for reducing and eliminating the risk of polluting underground waters

Annex 3: Number of Localities with Drinking Water and Sewerage Networks, in 2001

Region / County	Number of localities with drinking water network		Number of localities with sewerage network	
	Municipalities and towns	Communes	Municipalities and towns	Communes
TOTAL	**265**	**1383**	**264**	**383**
Region North-East	**32**	**212**	**32**	**94**
BACAU	8	51	8	39
BOTOSANI	4	39	4	15
IASI	4	22	4	8
NEAMT	4	36	4	9
SUCEAVA	8	28	8	18
VASLUI	4	36	4	5
Region South-East	**33**	**236**	**33**	**47**
BRAILA	4	31	4	3
BUZAU	4	52	4	3
CONSTANTA	11	48	11	15
GALATI	4	27	4	13
TULCEA	5	36	5	9
VRANCEA	5	42	5	4
Region South	**43**	**218**	**42**	**49**
ARGES	6	58	6	13
CALARASI	5	27	4	2
DIMBOVITA	6	34	6	4
GIURGIU	3	5	3	1
IALOMITA	4	32	4	1
PRAHOVA	14	54	14	23
TELEORMAN	5	8	5	5
Region South-West	**32**	**126**	**32**	**21**
DOLJ	5	4	5	3
GORJ	7	25	7	6
MEHEDINTI	5	28	5	6
OLT	7	47	7	2
VILCEA	8	22	8	4
Region West	**37**	**149**	**37**	**40**
ARAD	8	56	8	13
CARAS-SEVERIN	8	20	8	6
HUNEDOARA	14	18	14	12
TIMIS	7	55	7	9
Region North-West	**35**	**265**	**35**	**67**
BIHOR	9	54	9	12
BISTRITA-NASAUD	4	23	4	8
CLUJ	6	65	6	23
MARAMURES	8	52	8	16
SATU MARE	4	34	4	6
SALAJ	4	37	4	2
Region Centre	**50**	**159**	**50**	**50**
ALBA	11	39	11	3
BRASOV	9	24	9	5
COVASNA	5	12	5	7

Region / County	Number of localities with drinking water network		Number of localities with sewerage network	
	Municipalities and towns	**Communes**	**Municipalities and towns**	**Communes**
HARGHITA	9	27	9	5
MURES	7	48	7	27
SIBIU	9	9	9	3
Region Bucharest	**3**	**18**	**3**	**15**
ILFOV	2	18	2	15
BUCURESTI	1	1	1	1

Source: Data from National Institute of Statistics, 2002

Annex 4: Drinking Water Distributed in Romania, in 2001

Region County	Total length of distribution networks (km)	Total length of streets with water networks (km)	Capacity of drinking water treatment plants (m^3/day)	Drinking water introduced in networks (thou m^3)	Drinking water distributed to the users (thou. m^3)		
					TOTAL	out of which:	
						Domestic use	Public use
TOTAL	**39,104**	**30,334.9**	**10,499,506**	**2,397,477**	**1,530,241**	**988,359**	**200,,207**
Region North-East	**4,451.6**	**3,071.1**	**1,249,870**	**272,768**	**182,040**	**115,665**	**18946**
BACAU	753.4	604.5	137,729	60,739	44,645	30,977	4,276
BOTOSANI	695.3	488.9	191,053	25,648	15,245	8,277	1,319
IASI	957	513.7	358,612	80,939	61,175	36,290	4,452
NEAMT	678.7	528.8	172,661	39,572	21,635	16,494	5,141
SUCEAVA	660.4	472.4	233,985	42,946	24,852	11,872	2,444
VASLUI	706.8	462.8	155,830	22,924	14,488	11,755	1,314
Region South-East	**6945**	**5,665.8**	**2,102,852**	**382,261**	**203,039**	**150,529**	**15,692**
BRAILA	1,172.4	809.4	150,310	22,602	19,180	14,944	285
BUZAU	1101	1,008.3	165,831	28,249	24,466	19,287	3,920
CONSTANTA	1,982.8	1,660.2	1,218,172	221,566	80,929	52,093	5,805
GALATI	907.2	639.7	348,847	68,647	45,653	36,652	1,115
TULCEA	913.6	810.1	121,556	15,640	15,606	13,224	1,829
VRANCEA	868	738.1	98,136	25,557	17,205	14,329	2,738
Region South	**6,473.4**	**4,850.1**	**1,137,001**	**255,656**	**180,921**	**131,744**	**16,623**
ARGES	1593	1,013.5	294,232	72,250	47,252	31,350	3,046
CALARASI	694.3	528.6	126,464	12,085	11,572	85,96	2,976
DIMBOVITA	630.7	585.9	137,602	35,543	29,070	22,300	2,263
GIURGIU	150.2	105.8	64,491	9,460	7,931	6,064	174
IALOMITA	769.1	667.2	99,550	21,949	13,297	10,141	1,563
PRAHOVA	2,199.7	1,670.2	237,923	87,097	57,291	42,603	4,496
TELEORMAN	436.4	278.9	176,739	17,272	14,508	10,690	2,105
Region South-West	**3,042.9**	**2,503.7**	**847,088**	**163,352**	**121,180**	**83,806**	**16,916**
DOLJ	709.1	506.6	397,286	50,042	38,212	26,448	3,780
GORJ	709.3	561.7	85,737	25,849	22,711	15,363	1,352
MEHEDINTI	470.7	394	137,535	31,668	17,538	12,878	812
OLT	632	545.1	118,115	23,034	18,341	13,166	2,840
VILCEA	521.8	496.3	108,415	32,759	24,378	15,951	8,132
Region West	**4,864.7**	**4,097.1**	**1,164,198**	**208,571**	**142,957**	**98,246**	**16,828**
ARAD	1,552.8	1369.2	297,787	44,957	39,642	26,387	4,891
CARAS-SEVERIN	580.9	440.9	123,753	28,237	21,693	13,199	937
HUNEDOARA	931.3	658.1	374,936	58,213	32,560	22,537	6,494
TIMIS	1,799.7	1628.9	367,722	77,164	49,062	36,123	4,506
Region North-West	**6362**	**4,586.9**	**1,242,209**	**225,110**	**168,188**	**116,171**	**29,697**
BIHOR	1368	994.7	273,300	45,714	34,671	23,334	2,812
BISTRITA-NASAUD	620.9	329.8	156,171	20,677	12,524	5,922	2,074
CLUJ	1,788.6	1,408.4	378,082	74,904	61,883	42,182	17,310
MARAMURES	1,362.7	859.7	185,750	42,455	30,473	20,961	4,047
SATU MARE	537.9	484.8	155,212	27,965	18,095	15,230	2,865
SALAJ	683.9	509.5	93694	13,395	10,542	8,542	589

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Region County	Total length of distribution networks (km)	Total length of streets with water networks (km)	Capacity of drinking water treatment plants (m^3/day)	Drinking water introduced in networks (thou m^3)	Drinking water distributed to the users (thou. m^3)		
					TOTAL	out of which:	
						Domestic use	Public use
Region Centre	**4,770**	**3,699.3**	**1,300,402**	**288,505**	**226,779**	**148,390**	**30,806**
ALBA	767.5	625	172,888	48,846	40,448	12,761	3,469
BRASOV	1,293.1	965.3	366,786	65,330	52,426	37,118	6,534
COVASNA	332.2	257.5	86,802	17,685	13,462	8,883	612
HARGHITA	886	713.3	137,856	68,471	60,937	51,862	7,194
MURES	884	643.9	272,751	37,551	26,694	15,211	3,085
SIBIU	607.2	494.3	263,319	50,622	32,812	22,555	9,912
Region Bucharest-Ilfov	**2,194.4**	**1,860.9**	**1,455,886**	**601,254**	**305,137**	**143,808**	**54,699**
ILFOV	113.4	89.7	20,886	30,504	4,666	3,792	614
BUCURESTI	2,081	1,771.2	1,435,000	570,750	300,471	140,016	54,085

Source: National Institute of Statistics, 2002

Annex 5: Leakage and Metering of Drinking Water, in 2001

Region County	Drinking water introduced in networks (thou cm)	Percentage of leakage (%)	Drinking water distributed to the users (thou cm)		
			Total	Distributed to the users with metering devices	Percentage of metering (%)
TOTAL	**2397477**	**36.2**	**1530241**	**1123832**	**73.4**
Region North-East	**272768**	**33.3**	**182040**	**148530**	**81.6**
BACAU	60739	26.5	44645	40672	91.1
BOTOSANI	25648	40.6	15245	10215	67.0
IASI	80939	24.4	61175	54190	88.6
NEAMT	39572	45.3	21635	19300	89.2
SUCEAVA	42946	42.1	24852	19090	76.8
VASLUI	22924	36.8	14488	5063	34.9
Region South-East	**382261**	**46.9**	**203039**	**138365**	**68.1**
BRAILA	22602	15.1	19180	14561	75.9
BUZAU	28249	13.4	24466	18090	73.9
CONSTANTA	221566	63.5	80929	53122	65.6
GALATI	68647	33.5	45653	36144	79.2
TULCEA	15640	0.2	15606	6876	44.1
VRANCEA	25557	32.7	17205	9572	55.6
Region South	**255656**	**29.2**	**180921**	**102593**	**56.7**
ARGES	72250	34.6	47252	32501	68.8
CALARASI	12085	4.2	11572	6085	52.6
DIMBOVITA	35543	18.2	29070	11424	39.3
GIURGIU	9460	16.2	7931	7595	95.8
IALOMITA	21949	39.4	13297	3983	30.0
PRAHOVA	87097	34.2	57291	35208	61.5
TELEORMAN	17272	16.0	14508	5797	40.0
Region South-West	**163352**	**25.8**	**121180**	**63585**	**52.5**
DOLJ	50042	23.6	38212	30886	80.8
GORJ	25849	12.1	22711	7093	31.2
MEHEDINTI	31668	44.6	17538	8612	49.1
OLT	23034	20.4	18341	11963	65.2
VILCEA	32759	25.6	24378	5031	20.6
Region West	**208571**	**31.5**	**142957**	**111119**	**77.7**
ARAD	44957	11.8	39642	39450	99.5
CARAS-SEVERIN	28237	23.2	21693	11024	50.8
HUNEDOARA	58213	44.1	32560	26861	82.5
TIMIS	77164	36.4	49062	33784	68.9
Region North-West	**225110**	**25.3**	**168188**	**126081**	**75.0**

Region County	Drinking water introduced in networks (thou cm)	Percentage of leakage (%)	Drinking water distributed to the users (thou cm)		
			Total	Distributed to the users with metering devices	Percentage of metering (%)
BIHOR	45714	24.2	34671	21166	61.0
BISTRITA-NASAUD	20677	39.4	12524	10349	82.6
CLUJ	74904	17.4	61883	54212	87.6
MARAMURES	42455	28.2	30473	18543	60.9
SATU MARE	27965	35.3	18095	14397	79.6
SALAJ	13395	21.3	10542	7414	70.3
Region Centre	**288505**	**21.4**	**226779**	**177265**	**78.2**
ALBA	48846	17.2	40448	34264	84.7
BRASOV	65330	19.8	52426	35023	66.8
COVASNA	17685	23.9	13462	11509	85.5
HARGHITA	68471	11.0	60937	51992	85.3
MURES	37551	28.9	26694	26694	100.0
SIBIU	50622	35.2	32812	17783	54.2
Region Bucharest	**601254**	**49.2**	**305137**	**256294**	**84.0**
ILFOV	30504	84.7	4666	3011	64.5
BUCURESTI	570750	47.4	300471	253283	84.3

Source: Data from National Institute of Statistics, 2002

Annex 6: Data on Sewerage and Wastewater from Localities, in 2001

Region County	Total length of sewerage networks (km)	Total length of streets with sewerage (km)	Capacity of the wastewater treatment plants (m^3/day)	Wastewater treated (thou m^3)	Sludge resulted from treatment (tons)
TOTAL	**16590.1**	**12666.5**	**5151739**	**1070695**	**657549**
Region North-East	**2460.6**	**1956.9**	**1113483**	**206819**	**133916**
BACAU	488.7	348.7	164406	48346	14264
BOTOSANI	223.8	199.7	128780	17247	62638
IASI	528.7	486.3	452623	78447	16801
NEAMT	313.8	233.6	58244	19669	17729
SUCEAVA	547.3	332.8	216810	25544	10796
VASLUI	358.3	355.8	92620	17566	11688
Region South-East	**2430.6**	**1544.8**	**651818**	**137604**	**41374**
BRAILA	280.4	225.8	5276	517	122
BUZAU	185.8	170.1	113284	22889	28734
CONSTANTA	1030.9	646.3	451203	99028	5661
GALATI	603.9	252.9	17882	2887	658
TULCEA	162.2	91.8	970	351	111
VRANCEA	167.4	157.9	63203	11932	6088
Region South	**2005.5**	**1473.4**	**882327**	**165272**	**226155**
ARGES	629.6	348.1	310996	65258	203377
CALARASI	140.6	126.1	81480	6503	983
DIMBOVITA	186.4	127.2	108459	17647	523
GIURGIU	111.7	67.8	38750	5058	1527
IALOMITA	150.4	100	80800	4960	5512
PRAHOVA	582.9	536.8	177982	53795	10874
TELEORMAN	203.9	167.4	83860	12051	3359
Region South-West	**1352.5**	**1067**	**229746**	**64192**	**5568**
DOLJ	517.2	362.2	4940	1511	131
GORJ	176.7	147	48764	12775	247
MEHEDINTI	177.3	154.2	3920	983	20
OLT	235.8	165.9	74636	19878	4141
VILCEA	245.5	237.7	97486	29045	1029
Region West	**2054.1**	**1516.3**	**731324**	**116753**	**64519**
ARAD	537.2	319	149856	16233	179
CARAS-SEVERIN	280.8	237.4	53262	12645	1442
HUNEDOARA	665.2	401.2	194505	23700	7619

Region County	Total length of sewerage networks (km)	Total length of streets with sewerage (km)	Capacity of the wastewater treatment plants (m^3/day)	Wastewater treated (thou m^3)	Sludge resulted from treatment (tons)
TIMIS	570.9	558.7	333701	64175	55279
Region North-West	**2225.1**	**1601.7**	**767188**	**165126**	**84559**
BIHOR	538	391.7	218888	30115	97
BISTRITA-NASAUD	315.3	171.4	57898	12702	73
CLUJ	625.4	490.9	173011	56648	614
MARAMURES	309.2	221.8	154472	34896	48195
SATU MARE	279.3	220.6	105662	23141	35259
SALAJ	157.9	105.3	57257	7624	321
Region Centre	**2175.8**	**1720.4**	**752479**	**207781**	**100914**
ALBA	297.6	252.8	52791	17313	10965
BRASOV	574.5	475.6	187951	52163	15974
COVASNA	147.8	99.2	73950	10175	1599
HARGHITA	216.1	174.7	97855	13803	2733
MURES	550.7	436	186996	43211	26525
SIBIU	389.1	282.1	152936	71116	43118
Region Bucharest	**1885.9**	**1786**	**23374**	**7148**	**544**
ILFOV	134.9	104.8	23374	7148	544
BUCURESTI	1751	1681.2	0	0	0

Source: National Institute of Statistics, 2002

Annex 7: Setting up Tariffs in Ploiesti City

I. BASE TARIFFS

Base tariffs are those tariffs existing in force at 1st September 1999 when was signed the concession contract. The base tariffs do not include VAT or other taxes and are established at the next levels:

- RoL/ m^3 -

	2001	**2002**	**2003**	**2004**	**2005-2024**
Base tariff for drinking water T_{Ban}	2888	3300	3850	4400	4675
Base tariff for sewage T_{Bcn}	688	1030	1356	1735	2063

II. ADJUSTING TARIFFS

- **0** mean base period;
- **n** means adjusting period;

a) Adjusting the tariff for drinking water

It is used the formula:

$$Ta_n = (T_{Ban} - Aa_0)*K_n + Aa_n$$

In which:

- Ta_n - proposed tariff at the date of adjustment;
- K_n – adjusting coefficient;
- T_{Ban} – base tariff defined earlier;
- Aa_0 – average cost for 12 months for a cubic meter of drinking water calculated with the formula (unit cost of raw water purchased by the company): $Aa_0 = EP_0/V_o$
  - EP_0 = cost for purchasing underground water (without VAT) for 12 months, before 1st September 1999;
  - V_0 = volume of drinking water billed for 12 months, before 1st September 1999;
- Aa_n = average cost for one m^3 of drinking water for 12 months before the date of adjusting the tariff (unit cost before adjustment);

b) Adjusting the tariff for sewage

It is used the next formula:

$$T_{cn} = Tb_{cn} * K_n$$

In which:

- T_{cn} = new tariff for sewage;
- Tb_{cn} = base tariff for sewage;
- K_n – adjusting coefficient;

c) Adjusting coefficient

K_n is determined with the formula:

$$K_n = a_1 \times (IPC_n/IPC_0) + a_2 \times (El_n/El_0) + a_3 \times (ROL_n/RPL_0) \times (IPCE_n/IPCE_0)$$

In which:

- $a_1 + a_2 + a_3 = 100\%$
- $a_1 = 65\%$; $a_2 = 15\%$; $a_3 = 20\%$
- IPC_0 = Consumer price index, published by the National Institute for Statistics in September 1999;
- IPC_n = Consumer price index, published by the National Institute for Statistics in the month of adjustment;
- $IPCE_n$ = Consumer price index in EU, at the moment of adjustment;
- $IPCE_0$ = Consumer price index in EU in September 1999;
- ROL = official exchange rate EURO/ROL;
- El = average price paid for electricity (VAT excluded).

Source: Gov. Decision nr. 149/20.02.2002 for setting up and adjusting tariffs for W&WW services in Ploiesti City., Official Gazette nr. 145/26/02.2002

Annex 8: Levels of Penalties for Infringement of the Norms Concerning Maximum Pollutant Concentration Admitted in Wastewater Discharged into the Surface Water Resources

Over passing the maximum admitted concentration in sewage waters	Unit of Measure (UM)	Penalty RoL/UM
a. General Chemical Indicators		
Total Suspended matters (MTS)	Kg	100
Clorures (Cl^-), sulfurs (SO_4^{2-})	Kg	350
Sodium (Na^+), potassium (K^+), calcium (Ca^{2+}), magnezium (Mg^{2+})	Kg	350
NO_3^-	Kg	400
Ammonium (NH^{4+}), nitrogen (N_{total}), (NO_2^-)	Kg	30 000
$CB0_5$	Kg	800
CCOMn (method with potassium permanganate)	Kg	1 800
CCOCr (method with potassium bi-chrome)	Kg	5 000
PO_4^{3-}	Kg	8 000
Total Phosphor (P)	Kg	30 000
Manganese (Mn^{2+})	Kg	9 000
Aluminum (Al^{3+}) and total ionic iron (Fe^{2+}, Fe^{3+})	Kg	9 000
Oil waste	Kg	10 000
Synthetic Detergents	Kg	15 000
Dray Rezidus at 105^0 C	Kg	350
b. Specific Chemical Indicators		
SO_3^{2-}, fluor (F^-), phenols (C_6H_5OH)	Kg	30 000
Nickel (Ni^{2+}), chrome (Cr^{3+})	Kg	150 000
Ammonium (NH^3)	Kg	150 000
Barium (Ba^{2+}), zinc (Zn^{2+}), cobalt (Co^{2+})	Kg	9 000
Sulfurs (S^{2-}), (H_2S)	Kg	80 000
c. TOXIC and VERY TOXIC Chemical Compounds		
Arsenic (As)	Kg	1 000 000
Cyanide (CN^-)	Kg	1 000 000
Mercury (Hg^{2+}), cadmium (Cd^{2+})	Kg	1 000 000
Lead (Pb^{2+}), silver (Ag^+), chrome (Cr^{6+}), cupper (Cu^{2+}), molibden (Mo^{2+})	Kg	150 000
Cl_2	Kg	50 000
Carcinogen Substances	Kg	6 000 000
Aromatic Hydrocarbures	Kg	4 000 000
Pesticides - erbicides	Kg	1 000 000
Pesticides - insecticides	Kg	2 000 000
Pesticides - insecticides: organo-phosphorus	Kg	4 000 000

Over passing the maximum admitted concentration in sewage waters	**Unit of Measure (UM)**	**Penalty RoL/UM**
d. BACTERIOLOGICAL INDICATORS		
Coli Bacillus - total	10^6 bacillus/ 100 cm^3	1000000
Coli Bacillus - fecal	10^4 bacillus / 100 cm^3	2000000
Fecal Streptococcus	$5x10^3$bacterii / 100 cm^3	5000000
Salmonella	nr./100 cm^3	10000000
e. PHYSIC INDICATORS		
Temperature	$m^3x^0C^{*)}$	10
pH (Hydrogen ion concentration)	m^3 x units pH	5

Source: Emergency Ordinance 107/2002 for the creation of the National Administration "*Romanian Waters"*, Official Gazette nr. 691/September 2002

Annex 9: Investment Costs for the Modernization, Rehabilitation and Development of the Water and Sewerage Services in Romanian Towns and Municipalities (Estimates)

crt no.	County	Towns and cities (number)	Inhabitants (number)	Estimation of the costs for the rehabilitation of the water and sewerage services (thousand USD)				
				Total	From which:			
					Treating drinking water	Water distribution	Sewerage	Waste Water plants
1	ALBA	11	232.664	79.106	9.306	25.593	23.265	20.940
2	ARAD	8	246.172	83.698	9.847	27.079	24.617	22.155
3	ARGES	6	321.706	109.380	12.868	35.388	32.171	28.953
4	BACAU	8	374.417	127.302	14.977	41.186	37.442	33.697
5	BIHOR	9	307.968	104.709	12.319	33.876	30.797	27.717
6	BISTRITA-NASAUD	4	120.172	40.858	4.807	13.219	12.017	10.815
7	BOTOSANI	4	182.199	61.948	7.288	20.042	18.220	16.398
8	BRASOV	9	474.231	161.238	18.969	52.165	47.423	42.681
9	BRAILA	4	255.899	87.006	10.236	28.149	25.590	23.031
10	BUZAU	4	207.765	70.640	8.311	22.854	20.776	18.699
11	CARAS-SEVERIN	8	201.247	68.424	8.050	22.137	20.125	18.112
12	CALARASI	5	130.801	44.472	5.232	14.388	13.080	11.772
13	CLUJ	6	497.098	169.013	19.884	54.680	49.710	44.739
14	CONSTANTA	11	542.322	184.389	21.693	59.655	54.232	48.809
15	COVASNA	5	120.195	40.866	4.808	13.221	12.019	10.818
16	DAMBOVITA	6	172.741	58.732	6.910	19.001	17.274	15.547
17	DOLJ	5	383.881	130.519	15.355	42.227	38.388	34.549
18	GALATI	4	383.844	130.507	15.354	42.223	38.384	34.546
19	GIURGIU	3	90.695	30.836	3.628	9.976	9.069	8.163
20	GORJ	7	168.138	57.167	6.726	18.495	16.814	15.132
21	HARGHITA	9	155.656	52.923	6.226	17.122	15.566	14.009
22	HUNEDOARA	14	402.254	136.766	16.090	44.248	40.225	36.203
23	IALOMITA	4	126.261	42.929	5.050	13.890	12.626	11.363
24	IASI	4	420.942	143.120	16.837	46.304	42.094	37.885
25	ILFOV	2	30.254	10.286	1.210	3.328	3.025	2.723
26	MARAMURES	8	284.207	96.630	11.368	31.262	28.421	25.579
27	MEHEDINTI	5	156.562	53.231	6.262	17.222	15.656	14.091
28	MURES	7	307.892	104.683	12.316	33.868	30.789	27.710
29	NEAMT	4	253.901	86.326	10.156	27.929	25.390	22.851
30	OLT	7	202.712	68.922	8.108	22.298	20.272	18.244
31	PRAHOVA	14	444.135	151.006	17.765	48.855	44.414	39.972
32	SATU MARE	4	180.262	61.289	7.210	19.829	18.026	16.224

crt no.	County	Towns and cities (number)	Inhabitants (number)	Estimation of the costs for the rehabilitation of the water and sewerage services (thousand USD)				
				Total	From which:			
					Treating drinking water	Water distribution	Sewerage	Waste Water plants
33	SALAJ	4	107.482	36.544	4.299	11.824	10.748	9.673
34	SIBIU	9	303.113	103.058	12.124	33.342	30.311	27.280
35	SUCEAVA	8	252.532	85.861	10.101	27.778	25.254	22.728
36	TELEORMAN	5	157.349	53.499	6.295	17.308	15.735	14.161
37	TIMIS	7	425.067	144.523	17.003	46.757	42.507	38.256
38	TULCEA	5	127.541	43.364	5.102	14.029	12.754	11.479
39	VASLUI	4	199.123	67.702	7.965	21.903	19.912	17.922
40	VALCEA	8	177.910	60.489	7.116	19.570	17.791	16.012
41	VRANCEA	5	148.212	50.392	5.928	16.304	14.821	13.339
42	BUCURESTI	1	1.996.612	678.848	79.865	219.627	199.661	179.695
TOTAL		**265**	**12.274.134**	**4.173.205**	**490.965**	**1.350.155**	**1.227.413**	**1.104.672**

Source: Ministry of Public Administration., 2001

Annex 10: Estimation of the Necessary Investment for Supplying Drinking Water to the Romanian Rural Localities

No	County	Total number of rural localities	Inhabitants (number)	Rural localities without centralized systems for drinking water supply			Estimated investment (thousand USD)
				Localities (number)	Inhabitants (number)	Water Flow needed (l/s)	
1	ALBA	656	162,989	580	144,106	288	36,026
2	ARAD	273	229,116	215	180,439	361	45,110
3	ARGES	577	350,756	467	283,887	568	70,972
4	BACAU	490	378,336	444	342,819	686	85,705
5	BIHOR	435	307,348	301	212,671	425	53,168
6	BISTRITA.-NASAUD	235	206,090	197	172,765	345	43,191
7	BOTOSANI	336	282,155	274	230,090	460	57,522
8	BRASOV	150	153,569	111	113,641	227	28,410
9	BRAILA	140	129,617	79	73,141	146	18,285
10	BUZAU	482	298,772	354	219,430	438	54,858
11	CARAS -SEVERIN	287	148,832	268	138,979	278	34,745
12	CALARASI	160	202,273	115	145,384	291	36,346
13	CLUJ	420	224,576	229	122,447	245	30,612
14	CONSTANTA	189	204,781	75	81,262	162	20,315
15	COVASNA	122	112,715	98	90,542	181	22,635
16	DAMBOVITA	361	372,233	286	294,899	590	73,725
17	DOLJ	380	360,900	375	356,151	712	89,038
18	GALATI	180	260,184	131	189,356	379	47,339
19	GIURGIU	166	203,609	161	197,476	395	49,369
20	GORJ	414	222,946	349	187,943	376	46,986
21	HARGHITA	236	185,779	160	125,952	252	31,488
22	HUNEDOARA	458	118,532	410	106,110	212	26,527
23	IALOMITA	130	178,512	99	135,944	272	33,986
24	IASI	420	420,187	396	396,176	792	99,044
25	ILFOV	103	246,106	84	200,708	401	50,177
26	MARAMURES	226	246,439	75	81,783	164	20,446
27	MEHEDINTI	344	160,526	291	135,794	271	33,948
28	MURES	486	293,794	421	254,501	509	63,625
29	NEAMT	347	351,249	270	273,306	546	68,326
30	OLT	378	304,007	296	238,058	476	59,514
31	PRAHOVA	405	404,602	271	270,734	541	67,683
32	SATU MARE	226	207,944	183	168,379	336	42.095

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No	County	Total number of rural localities	Inhabitants (number)	Rural localities without centralized systems for drinking water supply			Estimated investment (thousand USD)
				Localities (number)	Inhabitants (number)	Water Flow needed (l/s)	
33	SALAJ	281	148,054	142	74,817	150	18.704
34	SIBIU	173	141,827	161	131,990	264	32.998
35	SUCEAVA	396	473,175	358	428,964	858	107.241
36	TELEORMAN	231	298,706	220	284,482	569	71.121
37	TIMIS	317	261,357	210	173,139	346	43.285
38	TULCEA	133	134,055	70	70,555	141	17.639
39	VASLUI	456	268,024	390	229,231	458	57.308
40	VALCEA	564	250,347	502	222,827	446	55.707
41	VRANCEA	331	241,545	211	153,976	308	38.494
TOTAL		**13.094**	**10.146.564**	**10,328**	**7,934,854**	**15,802**	**1.983.713**

Source: Ministry of Public Administration., 2001

Annex 11: Water and Wastewater Projects Financed within ISPA Framework, in Romania

- Million € -

No	Projects	Total Budget	ISPA contribution
2000			
Map 1.	Rehabilitation of the sewage network and wastewater treatment facility in **Craiova**	70.378	52.783
Map 2.	Rehabilitation of the sewage network and wastewater treatment facility in **Constanta**	96.556	72.417
Map 3.	Improvement of the W&WW system in **Iasi**	51.378	38.533
Map 4.	Rehabilitation and modernization of the water supply and sewage network in **Cluj**	46.755	35.066
Map 5.	Expanding wastewater treatment capacity in **Danutoni** – biological treatment	9.680	7.260
Map 6.	Rehabilitation and expansion of the sewage network and building a wastewater treatment plant in **Braila**	59.877	44.908
Map 7.	Rehabilitation of the sewage network and wastewater treatment facility in **Arad**	18	13.5
Map 8.	Technical Assistance for preparing the project: Finalization and modernization of the wastewater treatment plant in **Bucuresti**	1.810	1.357
Map 9.	Seminar **EIA**	8.875	8.875
2001			
Map 1	Rehabilitation of the sewage network and of the wastewater treatment plant in **Focsani**	15.876	11.748
Map 1	Rehabilitation of the sewage network and of the wastewater treatment plant in **Oradea**	23.906	16.734
Map 1	Rehabilitation of the sewage network and of the wastewater treatment plant in **Timisoara**	49.080	34.136
Map 1	Rehabilitation and modification of the sewage network and wastewater treatment facility in **Pascani**	16.262	12.196
Map 1	Rehabilitation of the water supply system and of the sewage network in **Târgu Mures**	27.909	20.932
2002			
Map 1	Modernizing the water distribution network and of the sewage system in **Sibiu**	37.588	25.559
Map 1	Rehabilitation of the wastewater treatment plant, of the sewage system and the water distribution network in **Piatra Neamt**	28.594	21.159

No	Projects	Total Budget	ISPA contribution
Map 1	Rehabilitation of the wastewater treatment plant of the sewage system and the water distribution network in **Buzău**	35.433	26.220
Map 1	Improving the W&WW system in Satu Mare	37.355	26.522
Map 1	Drinking water preparation and wastewater treatment in **Brasov** and nearby localities	58.708	41.683
Map 2	Rehabilitation of the wastewater treatment plant, of the sewage system and the water distribution network in Bacău	52.006	39.004

Source: Data from the report ISPA financing in Romania., EU 2003 and data from RAPORT referitor la „Stadiul Investitiilor in Infrastructura Serviciilor de Gospodarie Comunala" Ministerul Administratiei Publice din România 2003

Annex 12: Water and Wastewater Projects Co-Financed by EIB and EBRD in Romania

No.	Project	Objectives	Total Value of the Project	IFI Contribution
		EIB		
1.	Project regarding municipal water and wastewater	Rehabilitation of the water infrastructure and wastewater treatment in five cities: Braila, Cluj, Craiova, Focsani and Pascani.	224.8 Mil. €	55.0 Mil. €
2.	Co-financing of the ISPA projects	Rehabilitation of the water infrastructure and wastewater treatment in three cities: Buzau, Satu Mare and Piatra Neamt	101.382 Mil. €	27.478 Mil. €
		EBRD		
3.	**MUDP I – program with** state guarantee The program ended in 2001	The program included five cities: Brasov, Craiova, Tg. Mures and Timisoara, for improving and modernising the W&WW network, including water purification plants.	60 Mil. USD	28 Mil. USD
4.	**MUDP II – program** with state guarantee **The program ended in 2002**	The program included 10 cities: Oradea, Cluj, Botosani, Braila, Focsani, Targoviste, Bacau, Bistrita, Arad, Constanta	192 Mil. USD	Co financed by EBRD, EU - PHARE and Romanian Government
5.	Program for Jiul Valley - program with state guarantee The program ended in 2002	The program included 5 cities for improving the W&WW systems	50 Mil. USD	…
6.	Projects for W&WW systems **without state guarantee**, to co-finance ISPA projects	Constanta	100 Mil. €	20 Mil. €.
		Iasi	60 Mil. €	13.2 Mil. €
		Arad	18 Mil. €	4.5 Mil. €
		Brasov	60 Mil. €	15 Mil. €
7.	Project for rehabilitating the water supply system	Bucuresti	…	25 Mil. €

Source: Data from *RAPORT on Stage of Investment in Housbandry Infrastructure*., Min. of Public Administration and Interior., 2003

Annex 13: Water and Wastewater Projects Co-Financed by the Danish Government

- DKK ($) -

Project	**Technical Assistance**	**Investment**	**Total Danish contribution**
Project for water supply in Ramnicu Valcea – first phase (feasibility study)	564,938. (76,341)	775,000 (104,729)	1,339,938 (181,070)
Project for water supply in Ramnicu Valcea – second phase (water supply in the village Goranu)	2,259,980 (281,000)	12,240,000 (1,526,000)	14,499,980 (1,807,000)
Improvement of the wastewater treatment plant in Suceava – phase I (feasibility study)	619,546 (83,730)	-	619,546 (83,730)
Improvement of the wastewater treatment plant in Suceava – phase II (pilot phase)	684,088 (82,720)	2,990,442 (361,600)	3,674,530 (444,320)
Improvement of the water system in Craiova	…	…	7,450,150 (1,049,317)
Development of the wastewater treatment plant and sewage system in Arad – phase I	…	…	9,526,000 (1,341,690)
Improvement of the wastewater treatment plant in Arad - phase II	258,080 (36,349)	-	258.080 (36,349)
Optimization of the drinking water consumption and improving wastewater monitoring in Brasov city	…	…	1,990,220 (280,313)
Treatment and disposal of solid residue from the wastewater treatment plant in Brasov – Braşov – phase I	405.405,- (57,099.-)	-	405.405,- (57,099.-)
Treatment and disposal of solid residue from the wastewater treatment plant in Brasov – phase II	1.524.844 (214,767)	5.027.925 (708,158)	6.552.769 (922,925)
Water supply in Breaza	…	…	7,853,225 (1,106,088)
Expansion and modernization of the wastewater treatment plant in Mangalia	…	…	10,499,000 (1,478,732)

Source: Ministry for European Integration, www.mie.ro 2003

Annex 14: Strategies and Action Plans

In Romania, during the time, various strategies and plans have been drafted. Many of them have been carried out with the help of foreign institutions such as World Bank, EU etc. Some of these strategies have important provisions and good intentions for the water sector.

A. The Water Strategy (1995)

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

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

B. National Environmental Action Plan (updated in 2000)

In the field of Water Management there is an important document called the National Environmental Action Plan, adopted by the central Government. In this document the Polluters Pays Principle is seen as a driven force as it concerns funding of water management infrastructure.

The **National Environmental Action Plan** (NEAP) defines the national requirements for water management as follows:

- Ensuring permanent water supply to users
- To develop new water sources, particularly multifunction reservoirs in the poor-water areas;
- To build distinct water supply distribution networks for population and industry;
- To save water and to reduce its cost.
- Improvement the quality of the water resources
- To use new clean, non-polluting technologies;
- To develop new wastewater treatment plants and modernize the existing ones;
- To provide for preventing, reducing and limiting the effects of accidental pollution.
- Ecological reconstruction of the river basins
- To improve and develop adequate habitats for conserving biodiversity;
- To ensure, if possible, adequate water flows in the rivers to protect aquatic eco-systems, and to facilitate fish migration.
- Reducing flood risk
- To develop multifunction (complex) reservoirs to provide a protection volume against floods;
- To make embankments which are compatible with wetlands protection;
- To ban the construction of buildings on flood plains.

C. Central Government Programme

The new 2001 Government Programme placed a special emphasis on the social aspects of water management such as water supply and flood protection and on more ecological aspects such as water quality protection through approximation to the EU Directives on water.

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

The river basin is the natural physical entity for water management;

Water quantity and quality management are closely related; therefore they must be tackled jointly by integrated and cost-effective/efficient solutions;

Water management should be based on the principle of human common interest through close, all-level collaboration and cooperation of public administrations, water users, representatives of the local communities, in order to obtain maximum social benefit;

The polluter pays principle should apply;

Water is not an economic good like any other, but rather a precious heritage that must be defended, protected and treated as such.

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

Source: Ministry of Public Administration, 2001

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UNDP I GEF
DANUBE
REGIONAL
PROJECT

September 2004

ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Romania – Case Study

UNDP GEF

WORKING FOR THE DANUBE AND ITS PEOPLE

UNDP I GEF
DANUBE
REGIONAL
PROJECT

AUTHORS

Dr. Victor Platon
George Dulcu

PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

Glenn Morris: glennmorris@bellsouth.net
András Kis: kis.andras@makk.zpok.hu

Table of content

Abbreviations

EUR	Euro
FCR	Full cost recovery
IEB	Investment European Bank
ISPA	European Grant Programme
GD	Governmental Decree
HH	Household
NNR	Black Sea Level
MAKK	Hungarian Environmental Economics Center
MU	Management unit
SA	Company on shares
SC	Commercial company
SU	Service user
ROL	Romanian Lei
WWTP	Wastewater treatment plant

Executive Summary

City Pitesti, located at 120 km West of Bucharest, is the capital of the Arges district and is located at the confluence of Arges and Doamnei rivers. Drinking water treatment and distribution, wastewater collection and treatment for Pitesti fall under the responsibility of APA-CANAL-PITESTI. At present, neither the drinking-water treatment installation nor the wastewater treatment installations operate to international standards. In addition, the water distribution network and the sewerage systems need substantial rehabilitation. The existing installations and pipe works are old and much equipment is in need of modernization and/or replacement. Given the importance of providing adequate water and wastewater services, both to the population and industries, APA-CANAL-PITESTI has undertaken initiatives towards rehabilitation of the installations.

APA-CANAL-PITESTI is a Romanian juridical person, registered in the Commercial Register and has a status as commercial company on shares, with an unique share holder – Pitesti Local Council, which approves the Rules of Organizing and Operations. The company signed in 2001 with the Local Council Pitesti one Concession Contract which has as object of activity the concession of the public service of local interest referring to the activity of drinking water production, transport and distribution, as well as the wastewater and storm water collection, transport and treatment. The contract was signed for a period of 20 years. According to the contract stipulations, all the actives in the Local Council property used for drinking water supply, transport and treating wastewater collection, transport and treatment are given for administration to the contractor.

The company performs services for around 207,000 inhabitants and the important economical agents in the Pitesti city area, the surrounding villages (Albota, Maracineni, Bascov, Stefanesti, Bradu) and the area Platforma Cotmeana. The drinking water produced in 2002 was 30,035 thousands m^3 (invoiced 76%) and around 27,428 thousands m^3 (invoiced 70%) in 2003. The metering activity covers 92.9% from the water delivered but for dwellings only 63.4%.

The average level in 2003 of the water & sewerage tariffs of APA-CANAL are 6,462 ROL/m^3 and 5,236 ROL/m^3 and are the same for population and economic units & industries. The tariff for drinking water is the tariff for cold water. The tariffs in 2003 charged by APA-CANAL-PITESTI were in the lower range, compared to other Romanian cities. In the chapter 6.1 the operation and maintenance costs are given for material costs, energy costs, salary costs and other costs and in chapter 6.2 is detailed the total costs of the investments amounted to 53 million €, for rehabilitation of the drinking water and sewerage networks as well as of the drinking water and the wastewater treatment plants. Financial sources are: the IEB loan, the ISPA Grant that was approved in October 2003 and the contribution by APA-CANAL-PITESTI.

Tariffs of drinking water and sewerage treatment will have to be adapted to cover all investment costs, financing costs and operations and maintenance costs caused by the new investments in the drinking-water production & treatment and sewerage collection & treatment.

For the Pitesti case study a financial model ASTEC was used and three scenarios were implemented. For each scenario, five situations for APA-CANAL-PITESTI was given and the results obtained (cash-flows, profit and losses and the balance sheet) are in terms of: drinking water and wastewater tariffs, drinking water consumption and wastewater discharges, revenues of drinking water services and wastewater services, balances of drinking water service accounts and wastewater service accounts and balance of drinking water and wastewater service accounts.

As can be seen from the results obtained with the ASTEC model, the financial effects for APA-CANAL-PITESTI are the largest under the effect of metering and investments (from loans and grants) that will decrease the consume and discharge of water, will decrease leakage and will diminish the operation and maintenance costs.

Drinking Water and Sewerage Systems of Pitesti, Romania

1 Physical Conditions

Pitesti, located at 120 km West of Bucharest, is the capital of the Arges district and is located at the confluence of Arges and Doamnei rivers (see Map 1) and at the crossing of the Northern latitude 44^0 51' 30" parallel with Eastern longitude 24^0 52'. The mean altitude of the city is 287 meters, with an altitude level difference between 252 m, at the minor bed of Arges river (in the South), and 356 m in the Trivale area (in the Western part).

Map 1 Romanian Main Rivers

Pitesti is stretched out in a shallow valley, where the center of the city is situated in the middle and deeper part. It is divided into three terraces. The soil exists of rocks and pebbles in the higher parts of the city, and of coarse and fine coarse sand in the lower parts of the city. The groundwater level ranges from several meters below ground surface at the higher situated parts, up to one meter in the lower situated parts of the city.

South and east of the city are the flat, empty plains, that stretch out to Bucharest and further; north of the city are hills and forests. The Carpathians are located ninety kilometers further to the north.

The Pitesti city and its surroundings have a mild - continental climate. This climate is determined by the influence of Western and North – Eastern continental marine air. Its geographical position offers to

the city the advantage of a mild climate. Consequently, during the winter months, the temperatures are not very low and during the summer months, the temperatures are not too high. The mean temperature of January is -2.4 ^{0}C; the mean temperature of July is 20.7 ^{0}C. The annual rainfall level is higher than the country mean, varying between 680 – 700 mm.

All these characteristics influence the water resources of the region, namely the surface water flow, the water resources and their exploitation, the pluviometric water collection system size, drinking water distribution reservoirs configuration etc.

Water supply treatment, drinking-water distribution, wastewater collection and treatment for Pitesti fall under the responsibility of APA-CANAL-PITESTI, the utility company of Pitesti. The company operates one drinking-water treatment facility at Budeasa and one wastewater treatment facility at Prundu.

At present, neither the drinking-water treatment installation nor the wastewater treatment installations operate to international standards. In addition, the water distribution network and the sewerage systems need substantial rehabilitation. The existing installations and pipe works are old and much equipment is in need of modernization and/or replacement. Given the importance of providing adequate water and wastewater services, both to the population and industries, APA-CANAL-PITESTI has undertaken initiatives towards rehabilitation of the installations.

Most industries are supplied with water from the municipal water supply network, and are discharging their wastewater untreated into the municipal sewerage system. A few industries have separate water resources and only the refinery Arpechim has a wastewater treatment plant.

2 The Company: APA-CANAL-PITESTI

APA-CANAL-PITESTI is a Romanian juridical person, constituted by the Pitesti Local Council Decision 28/ 17.02.2000. The company is registered in the Commercial Register as J03/185/2000, SIRUES code 033218232, fiscal code R13009001. The APA-CANAL-PITESTI is a commercial company on shares, with an unique share holder – Pitesti Local Council, which approves the objectives of the company, established by the Rules of Organizing and Operations. It develops its activity in accordance with the Law for the commercial companies 31/1990 and according to the Constitutive Act of the company approved by the Local Council Decision 89/05.10.2000 and notary authenticated.

The social capital integrally deposited at the date of constituting has an estimated total value of 10,700,000,000 ROL, of which: in cash – 110,441,563 ROL and in tangible assets – 10,589,558,437 ROL. According to the Constitutive Act stipulations, the social capital is divided in 107,000 nominative equal shares, each having a value of 100,000 ROL.

According to Law 137/2002 stipulations, referring to the measures to accelerate privatization, the obligation of the commercial companies to elaborate and present to the entitled institutions the necessary documentation for the license certifying the right on the land used for activity developing. In the period when was constituted APA-CANAL-PITESTI started the procedure for the plot surfaces included in the previous companies' patrimony RA Regocom being assumed by the effect of reorganizing by division into commercial companies. APA-CANAL-PITESTI accomplished its obligations erecting from the stipulations of the Law 213/17.11.1998, concerning the private propriety and the juridical regime of the land and the duties erecting from the stipulations of the GD 548/08.07.1999, referring to the possession inventory of the public area of the villages, towns, cities and counties. The land is not a propriety of the company but can be used under the concession contract with Pitesti Local Council.

The object of activity of the company APA-CANAL-PITESTI is the drinking water producing and distribution and the wastewater collection and treatment. The company performs services for around 207,000 inhabitants and the important economical agents in the Pitesti city area, the surrounding villages (Albota, Maracineni, Bascov, Stefanesti, Bradu) and the area Platforma Cotmeana (see map 2).

Map 2 Pitesti and Adjacent Villages

Based on the Law of the local public administration 215/2001 stipulations, the Local Council is responsible for the public and private patrimony administration and is entitled to lease or rent the goods and services of pubic utility, being allowed to create, organize and supply services, either by their direct administration or by permitting some physical or juridical persons to administrate them by signing proper contracts.

The concession regime is now controlled by the following norms:

- Law 219/1998 referring to the concession regime, supplemented by Governmental Decree 216/25.03.1999, having as object of activity the regulation and organizing the concession regime of the local and central public services. The regulations refer to the goods under public or private propriety of the state, county, town or village;
- Governmental Decree 216/1999 for the approval of the application framework of the Law 216/1998 which stipulates the framework contents of the tender documents of the concession, instructions referring to the organizing and development of the concession procedure, as well as the general framework referring to the juridical regime of the concession contracts under the conditions of Law 219/1998.
- Law 139/2002 referring to the authorities' right to sign contracts of delegation to a third part for administration and concession.

Under this legal general framework APA-CANAL-PITESTI signed with the Local Council Pitesti The Concession Contract 8268/04.01.2001, which has as object of activity the concession of the public service of local interest referring to the activity of drinking water production, transport and distribution, as well as the wastewater and storm water collection, transport and treatment. The contract was signed for a period of 20 years.

According to the contract stipulations, all the actives in the Local Council property used for drinking water supply, transport and treating wastewater collection, transport and treatment are given for administration to the contractor – APA-CANAL-PITESTI.

Based on 2002 census, the water company APA-CANAL-PITESTI Pitesti performs services for 206,494 inhabitants, 64,563 dwellings (see Table 1), as well as for public institutions and the commercial agents that are developing their activity in the area. The activity area includes besides Pitesti City, the surrounding areas – Albota, Maracineni, Bascov, Stefanesti, Bradu, and the area Cotmeana Platform.

Table 1 Town Pitesti and Surrounding Villages (Population and Dwellings Connected to Drinking Water and Sewerage APA-CANAL-PITESTI Systems)

	Population	Dwellings connected to:		
		Drinking water	Sewerage system	Only with drinking water
Town Pitesti	168 756	60 049	59 558	491
Surrounding villages				
Albota	3 917	99		99
Bascov	8 873	1 222	1 205	17
Mărăcineni	4 526	866	817	49
Bradu	5 158	430		430
Ştefăneşti	13 005	1 839	1 699	140
Cotmeana	2 259	58		58
TOTAL villages	37 738	4 514	3 721	793
TOTAL Pitesti + villages	**206 494**	**64 563**	**63 279**	**1 284**

Sources: Census 2002

In 2002 the total volume of the distributed water by APA-CANAL-PITESTI Pitesti was 22,754 thousand m^3 (see Table 2), meaning 27.4% less than in 2001. The estimation of invoice delivery of water in 2003 is 19,200 thousand m^3, meaning 15.6% less than in 2002. The decreasing volume of drinking water distributed by the company was reported on the background of an important diminishing of the water consumed in the households, because of: 1) metering systems introduced in the flats and 2) of the reduction by about 5-7% of the commercial companies including industry and public institutions consume.

Table 2 Volume of Drinking Water Production and Invoiced Amounts, in 2002 and Estimation for 2003 (Delivery for Semester I and Estimation for Semester II)

	2002 thousands m^3	**2003** thousands m^3
Drinking water production	**30,035**	**27,428**
Drinking water delivered	**22,754**	**19,200**
Of which:		
* for Households	11,675	9,696
* for public institutions and commercial companies including industry	11,079	9,504
Sewerage services	**16,526**	**14,784**
Of which:		
* for Households	8,286	7,466
* for public institutions and commercial companies including industry	8,240	7,318

Source: APA-CANAL-PITESTI

The drinking water produced in 2002 was 30,035 thousands m^3 (invoiced 76%) and in 2003 will be 27,428 thousands m^3 (invoiced 70%). The wastewater collected by the sewerage system in scope of the further treatment was in 2002 72.6% of the total delivered drinking water volume, the collection degree being in 2003 in a value of 77%. The total wastewater volume collected by the company decreased by 10% in 2002-2003 and respectively about 10% for the Households and about 11% in case of public institutions and commercial companies including industry.

APA-CANAL-PITESTI offers services of wastewater collecting to the inhabitants in the urban as well as rural areas, but in different percentages. In Pitesti city, the multi-floor buildings with dwellings and administrative center area are totally served, the water services offered by the company being the only way for the moment to assure the water necessary to the households and public institutions. The economical agents accept the services offered by APA-CANAL-PITESTI, as they do not have proper supplying facilities (especially groundwater).

There are also households in the urban and rural area which keep using their own supplementary water sources, usually from groundwater wells, for their yards and gardens.

The metering activity covers 92.9% from the water delivered but for dwellings only 63.4%.

Even though the extension of individual metering for the households and the impact of the unfavorable economical environment on the companies and institutions activity in the area served by APA-CANAL-PITESTI led to important decreases in the service market, in the medium and long term, a reestablishment of the demand is expected. To support this statement at least the following arguments can be mentioned:

- trends of relative increase registered in local budget revenues of Arges County;
- similar economic growth of reestablishment at the Arges County level will follow the positive evolutions of economy at national level and will be reported also in case of mean values of the income per capita, per employed person and per employee.

3 Drinking Water System of APA-CANAL-PITESTI

There are two sources of water, the river Arges provides 2,135 l/s potable water (after treatment) and the groundwater sources provide 225 l/s. Groundwater is only chlorinated in a separate substation. On the north banks of the river are many shallow ground water wells with an average depth of 10 meters. This water is collected and pumped into storage tanks in the town.

Seven artificial reservoirs have been created in the Arges river, of which the Budeasa Lake (one but last) is used for the abstraction of raw water for drinking water production. The five reservoirs upstream control the water levels in the river; the water level fluctuations in the last reservoir, the Bascov reservoir, are less than one meter throughout the year.

The Drinking Water Treatment Plant consists of two lines of filters built in 1969 and 1980 respectively. The existing drinking water production plant Budeasa has a design maximum capacity of 3,000 l/s (94 million m^3/yr). Under normal circumstances, the capacity of the plant is 2,135 l/s (7,686 m^3/hr or 67 million m^3/yr) but the plant was designed in the past for a vast expansion of industry.

Water is abstracted right at the exit of Budeasa reservoir near the dam. The level in the reservoir is normally maintained at 301m NNR (reference standard Black Sea Level) and is maximum 306 m NNR. Water is abstracted through 2 meters high intake screens. The raw water is transported through two 1400-m long mains.

There is also the possibility to abstract water from the reservoir Bascov; this is done at the dam near the exit of the reservoir. The problem with the second reservoir is that due to insufficient maintenance by Romanian National Water Authority - the owner of the reservoirs - the reservoir Budeasa is becoming blocked and shallower with growth of water plants. At the top of the Budeasa reservoir, this process of sedimentation and plant growth is also starting and might cause problems for the future water supply. Water is abstracted from reservoir Bascov on average once every three months. This is done for maintenance, to avoid the pumps not being in working order when they are not used for a long period.

The incoming water is pre-chlorinated (doses varying from 1 to 3 mg/l Cl_2), next aluminum sulphate (doses varying dependant on incoming water quality/turbidity between 5 and 130 mg/l), with average concentration 15 mg/l and lime (doses approximately half the doses of aluminum sulphate). From the mixing chambers the water is transported to three radial decanters (line I) and to one cyclator decanter (line II). Residence time in the radial decanters 1 to 1.5 hrs and in the cyclator 40 minutes.

The clarified water is fed to rapid sand filters (ten in line I and three in line II). The rapid sand filters are back-washed, with cleaned water and air, approximately every 36 to 40 hours. Sludge and backwash water is discharged downstream of the plant in the Arges River. The filter bed consists of 0.6 m support layer of coarse sand and the actual filter material 1.10 m of fine sand 0.85 – 2.0 mm. Currently experiments are carried out to optimize the back washing process through the use of a different type of nozzles that are less prone to obstruction by particles. After filtration, the water is post-chlorinated (doses 2 to 5 mgCl_2/l).

Since the plant is 20 to 30 years old, most mechanic and electric equipment, although reasonably well maintained, has approached the end of the normal life span. All mechanic and electric equipment is of Romanian origin and most equipment has a lower efficiency than we can expect from modern equipment.

The treatment required depends on the raw water quality and on fluctuations in raw water quality. The treatment of the raw water needs to achieve the following improvements:

- Full removal of coli form bacteria;
- A decrease in turbidity of the water from 5-80 FTU to below 2 FTU;

- Removal of algae especially Asterionella and Cyclotella during the spring bloom, and Fragillaria during the autumn bloom.

The quality of the raw water is very high, though with seasonal fluctuations in phytoplankton and turbidity. The raw water generally meets the requirements of the highest water resources Category I.

The current treatment process as it is operated at the moment is not always able to produce drinking water that meets the turbidity and aluminum standards. This is thought by the improper design of the plant (especially the rapid sand filters) and ineffective operation of the plant.

There is no monitoring of substances in drinking water that result from the treatment, such as Tri-Halo-Methane from the disinfections process and there is insufficient knowledge of the nature and occurrence of part of the organic matter (seasonally) present in the raw water (including the significance of pesticides present in the reservoir).

The backwash water and sludge produced is simply dumped in the Arges river downstream of the Pitesti plant. This is not an environmental friendly solution especially because of the high aluminum content and possibly other pollutants in the sludge.

Water from the treatment, is pumped through different pipes to five pumping stations in the city (see Table 3). Each pumping station has one or more storage tanks and a number of distribution pumps. The water from the groundwater wells is pumped via a chlorination station to the storage tanks of Razboieni. A number of booster stations are present for the distribution to the different pressure zones.

Table 3 The Pumping Stations and Booster Stations for Water Distribution

	Name	**Storage Volume (m^3)**	**Pumping Capacity m^3/hr**
1	Razboieni	4x5,000	5,000
			2,350
2	Smeura	2x5,000	1,360
		1x3,000	
3	ZIN	2x5,000	4,000
		2x2,500	
4	Gavana	2x50,00	1,400
5	Booster stations		220
Total		**58,000**	

Source: APA-CANAL-PITESTI

The layout of the drinking water network is stretched out over the town centered around a ring main. The water is pumped from the drinking water treatment plant to the four operating booster stations, which also have a storage capacity. The pressure in the distribution mains varies from 4 to 6 Bar.

The total length of the pipe network is estimated to be 768 km from which the major part – approximately 80% - is made of steel. The pipes are usually situated 1 to 1.5 meters below ground surface. The groundwater level has no influence on the pipes.

There were about 800 major incidents in 1998 causing damage to the network. The costs of repair were 4,500 million ROL (346,000 US$ in 1998) and most of the repairing is done as a reaction on the damages. About 90% of the damages are at the welded joints of the steel pipes, due to corrosion. The steel pipes are badly coated and at the joints, the coating is damages because of the welding.

Furthermore, there is no cathodic protection applied against corrosion. The pipes made of ductile iron and asbestos cement are performing well and are far less damaged than the steel pipes.

Most of the pipes have an inside layer of sand and lime caused by sedimentation. This influences the hydraulic performance of the network, and with the expansion and rehabilitation of the network, it is recommendable to clean the network.

The booster pumps are about 30 years old and ready for replacement in due time. The storage tanks are to be cleaned and disinfected.

APA-CANAL-PITESTI has plans to rehabilitate and replace large parts of the existing network by using HDPE for pipes with a diameter up to 350mm, and ductile iron or polyester reinforced polyethylene for larger pipes.

Because of the serious damage and corrosion, the replacement of the steel pipes should have the highest priority. However, 70% of the network consists of steel pipes older than 10 years. The replacement of the older pipes (concrete and ductile iron) together with the steel pipes up to 10 years (about 15% of the total network) should have a medium priority. The remainder 15% of the network consists of well functioning and younger pipes made of ductile iron, concrete and asbestos cement.

Based on the data recorded by APA-CANAL-PITESTI for the first half of 2003 and the estimates for the second half, the drinking water activities of the company will be characterize by data presented in Table 4.

Table 4 Drinking Water Activities of APA-CANAL-PITESTI for 2003

	m^3	Number of entities	m^3/year/entity
Water delivered	**19,200,000**		
1. Households	***9,696,000***		
A. Total city	9,007,000	59,558	
• Households without metering		21,799	165
• Households with metering		37,759	140
• Households without sewerage		491	165
B. Villages (total)	689,000		
• Households with water and sewerage		3,721	160
• Households only with drinking water		509	160
2. Public and economic units	***8,084,000***	2,594	3,116
3. Industry (ARPECHIM)	***1,420,000***		

Source: Census 2002 and APA-CANAL-PITESTI

4 Sewer System of APA-CANAL-PITESTI

The oldest part of the sewerage system is a combined system, where wastewater and storm water flow in one sewer. This comprises 20% of the total system; the other 80% consist of separated sewers for storm water and wastewater. About two times a year the water flows over from the storm water sewers via sumps to the Arges River.

The total length of the sewers is 450 kilometers and consists of reinforced concrete. The sewers are buried 1.5 to 5 meters deep, depending on the frost, groundwater level and grade of the sewers.

The high infiltration rate and the large content of sand in the waste and storm water indicate bad jointing. However, for the large content of sand in the sewers is another explanation possible. There is a lot of fine coarse sand at the streets that easily flushes into to the sewers during a storm event or during street cleaning. The bad condition of joints could be caused by insufficient installation or by ground settlement. Due to the high groundwater level, especially at the lower parts, and due to the sediments, settlement is likely to occur.

The occurrence of cracks and corrosion in the sewers can be explained by way of accumulation of organic material. Under the circumstances, sewage is conveyed in closed pipes, complex organic reactions can take place resulting in the attendance of organic acids. In sewers made of acid-soluble materials, such as concrete and iron, this acid formation could lead to destruction of the sewer. Sewer corrosion could be combated by chlorination, forced ventilation and lining with inert materials. Chlorination halts the biological activity. Forced ventilation reduces the anaerobic and moist conditions required for the reactions. Another cause of cracks is high external load e.g. traffic. This is could be a major cause in Pitesti, as most of the sewers are installed under the roads.

APA-CANAL-PITESTI gives priority to replacing the existing sewerage system with new PVC sewer pipes. PVC sewers are durable and better resist on corrosion and settlement.

Taking into account the main problems - probably caused by bad jointing- it is recommended to at least examine the possibility to rehabilitate the existing network. Used pipes in good condition could be excavated and cleaned. New lining, e.g. epoxy coating could be applied, as well as rubber rings at the joints to prevent water and sand infiltration. Probably this alternative is less expensive because material costs are 30% (for the smaller sewer diameters) to 75 % (for the larger sewer diameters) of the total costs. Only when the structural lining should be applied because of the bad condition of the pipe, might it be less expensive to install new sewers.

The wastewater treatment plant (Prundu plant) is discharging its effluent to the Arges River. The effluent is supposed to meet extra strict environmental criteria, because this river is used, 120 km further to the east, as a drinking-water source for the city of Bucharest.

The public institutions and commercial companies including industry, that discharge into the Pitesti sewerage system important quantities of polluted water, have the pretreatment plants. The obligations for pretreatment plants are included in contracts with APA-CANAL-PITESTI. The refinery ARPECHIM do not discharge used water into the town sewerage system.

5 Water and Sewerage Tariffs in Pitesti

The level of the water & sewerage tariffs of APA-CANAL-PITESTI is given in Table 5. Two categories of users are distinguished: population and economic units & industries. In the next table the 2003 tariffs per m^3 are given. The tariff for drinking water is the tariff for cold water. APA-CANAL-PITESTI do not produce warm water but invoiced the drinking cold water delivered to the companies that produced warm water and heating.

Table 5 Drinking Water and Sewerage Tariffs in Pitesti (2003)

	Drinking water ROL/m^3	**Sewerage ROL/m^3**
First Half - 2003	5 903	4 720
Second Half – 2003	7 020	5 752
Average for 2003	**6 462**	**5 236**

Source: APA-CANAL-PITESTI

The tariffs for drinking water and sewerage in 2003 are the same for population and economic units & industries.

For illustrative purposes, the tariffs of APA-CANAL-PITESTI are compared in Table 6 for 2001 with the tariffs in other towns. This shows that the water and sewerage tariffs charged by APA-CANAL-PITESTI were in the lower range, compared to other Romanian cities situation that remained the same in 2003.

The big difference between 2001 and 2003 water tariffs in Pitesti is caused (mainly) do to the high rate of inflations.

Table 6 Comparison of Drinking Water and Sewerage Tariffs in Romanian Cities (December 2001)

CITIES	ROL/m^3		
	Total	Water	Sewerage
Alba Iulia	7 063	5 875	1 518
Arad	9 114	7 010	2 688
Baia Mare	3 285	2 441	1 079
Bistrița	8 766	7 044	2 200
Botoşani	11 899	8 747	4 027
Braşov	9 408	8 308	1 405
Bucureşti	7 227	6 159	1 365
Buzău	5 117	3 728	1 775
Cluj	8 862	7 765	1 402
Constanța	14 649	10 470	5 340
Craiova	8 862	7 765	1 402
Deva	5 692	4 906	1 004
Focşani	13 110	10 630	3 169
Galați	6 061	5 530	679
Giurgiu	5 541	4 059	1 894
Iaşi	14 190	11 152	3 882
Oradea	12 547	9 474	3 926
Piteşti	**5 601**	**3 749**	**2 366**
Ploieşti	4 821	4 314	648
Râmnicu Vâlcea	4 025	3 260	978
Satu Mare	5 195	4 085	1 418
Sibiu	3 831	2 768	1 358
Târgovişte	19 022	16 345	3 420
Târgu Jiu	3 141	2 733	521
Târgu Mureş	11 094	8 080	3 851
Timişoara	10 555	7 698	3 650
Tulcea	6 140	4 841	1 660

Source: former Ministry of Public Administration

6 Economic Costs and Burden Indices

6.1 Operations and Maintenance Costs

In Table 7, the operation and maintenance costs are given for the networks and the treatment plants for the year 2002.

Table 7 Operation and Maintenance Costs (materials, energy, salaries, others) of APA-CANAL-PITESTI in 2002

Cost factor	2002	
	Thousand EURO	Thousand ROL
Material costs	1 175	36 689 668
Energy costs	1 471	45 932 342
Salary costs	2 043	63 793 185
Other costs	897	28 009 049
TOTAL	**5 586**	**174 424 244**

1EURO 2002 = 31,255.25 ROL

In 2003 the total operation and maintenance costs represents the increase of reported costs for 2002 with only 5% due to the fact that the drinking water delivered decrease (from 2002) with around 18.5 % and the number of personnel of APA-CANAL-PITESTI decrease (from 2002) with around 13 % and these will cover 95% from 2003 inflation.

6.2 Investments

Previous chapters described the necessity for rehabilitation of the drinking water and sewerage networks as well as of the drinking water and the wastewater treatment plants. It has been assumed that the total costs of the investments amount to 53 million €, as specified in Table 8.

Table 8 Capital Investments for Rehabilitation (EURO and thousand ROL)

Financial sources	EURO			thousand ROL	
	TOTAL	Drinking water	Sewerage	Drinking water	Sewerage
Grant ISPA	42,060,000	11,918,000	30,142,000	417,163,000	1,054,970,000
IEB Loan	6,511,500	1,953,450	4,558,050	68,370,750	159,317,500
APA-CANAL	4,206,000	1,261,800	2,944,200	44,163,000	103,047,000
TOTAL	52,777,500	15,133,259	37,644,250	529,696,750	1,317,334,500

1EURO = around 35,000 ROL for 2003

The ISPA Grant was approved in October 2003 and it has been assumed that the Loan from Investment European Bank will have 4% interest rate, 5-years grace period and 25 years return period.

7 Affordability of Pitesti Population

The World Bank mentioned in the last report concerning poverty in Romania that the poor population decrease from 36% in December 2000 and 31% in December 2001 to 26% in December 2002 when extreme poverty represent 12.2% from total population.

The income of the Pitesti population presents the same trend as the country and continue thus making more families incapable to perform and fulfill the responsibilities concerning the development of their own members. The living standard in Pitesti has been also affected as a result of the transition period and the condition of the poorest population (jobless and retired population) grew worse.

From the total number of households, 31.2% represent the jobless and retired population in the Pitesti urban area and 38.9% in rural area. Any water tariffs reform has to consider this important segment of customers.

After the 2002 census, in Romania, the average size of a household is 2.79 person in urban areas and 3.01 in rural areas and the total mean income per household (cash plus in kind) represented around 153 EUR/month. This, of course, differs from urban to rural and from prosperous to poorest families.

The National Federation of Public Services Employers citation mentioned that in 2003 the monthly expenses for drinking water and sewerage represent 3% from the average household monthly budget. The World Bank found that people could afford generally 4% to 6% of the household income for water services. Evidence shows furthermore that this norm equally applies to all socio-economic strata, rich and poor. It can be seen that the affordability-norm included in World Bank studies is never exceeded in Romania and Pitesti.

In 2002, the price of heating, electricity, gas, transport, telephone, etc. rise pressure on budget of households and determined the decreasing (even to zero) of the share for purchase of non-alimentary goods.

The lowest income groups from Pitesti area spend around 3.8% from the household monthly budget on water and sewerage services. This suggests that the total water and sewerage bill could be little increase and still remain within the lower limits of affordability (4% from the average household incomes).

8 ASTEC Financial Model

Tariffs of drinking water and sewerage treatment will have to be adapted to cover all investment costs, financing costs and operations and maintenance costs caused by the new investments in the drinking-water production & treatment and sewerage collection & treatment.

For the Pitesti case study a financial model ASTEC was used. The model requires Excel software with Solver installed and Excel enabled to run macros. Eight worksheets of the model are displayed for use, while a number of sheets containing side-calculations are hidden. The model allowed a number of loops during optimization. For the Pitesti case study 10 to 15 loops were utilized. The precision of the model (maximum allowed difference between costs and revenues in case of cost recovering scenarios) was selected 0.1% or 0.5%.

The ASTEC model allows clustering of commodity charges. For the Pitesti case study service users that have the same commodity charge was chosen in the same "cluster". Users belonging to the same cluster had the same commodity charge after the model finished the optimization process.

The basic input data included in the ASTEC financial model are presented in Table 9, Table 10 and Table 11

Table 9 Specification of Service Users and General Data

Name of the Service User category	No. of entities	The service	Baseline annual water use per entity (m^3/year)	Water commodity charge (1000 ROL/m^3)	Baseline annual discharge as % of water use	Baseline annual discharge per entity (m^3/year)	Wastewater commodity charge (1000 ROL/m^3)
Household A, unmetered (Pitesti)	21,799	Water & Sewer	165	6.462	77%	127	5.236
Household A, metered (Pitesti)	37,759	Water & Sewer	140	6.462	77%	108	5.236
Household B (Pitesti)	491	Water	165	6.462		0	
Household C (villages)	3,721	Water & Sewer	160	6.462	77%	123	5.236
Household D (villages)	509	Water	160	6.462		0	
Industry E (Refinery)	1	Water	1,420,000	6.462		0	
Economic units	2,594	Water & Sewer	3,116	6.462	77%	2,399	5.236
Leakage[1] and storm water[2]			[1)] 5,735,000			[2)] 500,000	

Table 10 Variable Costs in 2003

COSTS	Costs 2002 (1000 EURO)		Costs 2003 (1,000 ROL)		Water* invoiced (million m^3)	Sewe-rage* water invoiced (million m^3)	Costs 2003 per m^3 (ROL)	
	Labor cost	Materials, energy, maintenance, etc. costs	Labor cost	Materials, energy, maintenance, etc. costs			Labor cost	Materials, energy, maintenance, etc. costs
1	2	3	4	5	6	7	8	9
TOTAL from which:	**2,043**	**3,543**	**67,047,200**	**116,274,218**	-	-	-	-
drinking water supply system	***1,430*** (70% from total)	***2,480*** (70% from total)	***46,933,040*** (70% from total)	***81,391,953*** (70% from total)	**19.2**	-	**2,444**	**4,239**
sewerage system	***613*** (30% from total)	***1,063*** (30% from total)	***20,114,160*** (30% from total)	***34,882,265*** (30% from total)	-	**13.5**	**1,490**	**2,584**

Note:

1 EURO 2002 = 31255.25 ROL

* data use in ASTEC model for 2003

column 8 = column 4 / column 6

column 9 = column 5/ column 7

Table 11 Fixed Costs and Grants

	Drinking water	Wastewater
Treatment for drinking water (cost)	44,163,000	
Pumps (cost)	68,370,750	
Distribution pipeline (grant)	417,130,000	
Sewerage (grant)		600,000,000
WWTP (grant)		454,970,000
Machinery, equipment (cost)		21,638,000
Sewerage (cost)		81,409,000
WWTP (cost)		153,317,500

For the drinking water and sewerage systems, administrated by APA-CANAL-PITESTI, the following scenarios "building blocks" was used for Pitesti application of the ASTEC model:

- *Switching from unmetered consumption to metered consumption* for those households (HHs), which lack metering at present. This will very likely result in decreased consumption and subsequently decreased commodity charge payment for them. Examination of subscenarios: how will the installation of meters be financed: grant or loan. If financed by loan, costs to be recovered by HHs through fixed tariffs or commodity charges or not at all.
- *Past investment costs* are sunk (no repayment obligation on them).
- *Calculation of variable costs* of water service. 1. This was done by taking the annual level of specific categories of variable costs and dividing them with the level of water *consumption;* 2. Alternatively, was divided them with the level of *production*, which is higher than consumption, therefore variable costs in this scenario are also allocated to leakage, therefore the costs of leakage need to be redistributed among SUs.
- *Redistribution of the costs of leakage* 1. Based on consumption 2. A higher ratio of costs to be born by households in the suburbs and villages due to higher leakage per HH there. In case investments reduce leakage of water, related adjustment of the quantity of leaked water is needed (this makes sense when the costs of leakage are identified and redistributed among SUs, operating costs will decrease due to less leakage).
- *New investments* into both the water service (treatment, pumps, pipelines) and wastewater service (network, equipment and treatment). Examination of the role of ISPA grants on the financial accounts and the level of tariffs in case of cost recovering scenarios. Examination was performed of the effect of commercial loans (instead of ISPA grants) on the level of tariffs.
- When *investments* are financed from loans: *repayment* in 10 years (because it may not be possible to receive a commercial loan for more than 10 years) or repayment during the lifetime of the equipment.
- Distribution of investment costs among SUs based on the volume of consumption, or based on a percentage algorithm. This in combination with an assumption that tariff are set to just recover the costs (FCR)
- Examination of scenarios of full cost recovery with or without marginal cost pricing; marginal cost pricing without full cost recovery.

In the ASTEC model for Pitesti no effluent charge scenario was elaborated because the wastewater discharged into the river (after the treatment plant) do not exceed the pollution limits and the investment hypothesis simply is used to maintain the current system. With the model the Scenario A, Scenario B, and Scenario C scenarios are elaborated and each scenarios for S1, S2, S3, S4 and S5 situations, as follow:

Scenario A

S1	Baseline tariffs and water use, sunk investment costs
S2	New investments, ISPA grants
S3	New investments, ISPA grants, FCR
S4	New investments, ISPA grants, FCR, op.cost savings

S5	Scenario S4 + reallocate leakage and maintenance costs

Scenario B

S1	Scenario A(S5) + 3 million m^3 decrease in leakage due to investments in the distribution network
S2	New investments, without ISPA grants, repayment through the lifetime, no full cost recovery
S3	New investments, without ISPA grants, repayment through 10 years, no full cost recovery
S4	New investments, without ISPA grants, repayment through the lifetime, full cost recovery
S5	New investments, without ISPA grants, repayment through 10 years, full cost recovery

Scenario C

S1	Baseline, sunk investment costs
S2	Baseline, sunk investment costs, switch to metering in HH A
S3	Baseline, sunk investment costs, switch to metering in HH A, no grant
S4	Baseline, sunk investment costs, switch to metering in HH A, no grant, HHs pay for it through fixed tariff
S5	Baseline, sunk investment costs, full cost recovery with marginal cost pricing

In the ASTEC model, the three scenarios that were described above were implemented. For each scenario five situations for APA-CANAL-PITESTI was given and the results obtained (cash-flows, profit and losses and the balance sheet) are in terms of: drinking water and wastewater tariffs, drinking water consumption and wastewater discharges, revenues of drinking water services and wastewater services, balances of drinking water service accounts and wastewater service accounts and balance of drinking water and wastewater service accounts. For example, in Annex 1 are presented the results obtained for Pitesti with ASTEC model for Scenario A.

As can be seen from the tables included in Annex 1, the financial effects for APA-CANAL-PITESTI are the largest under the effect of metering and investments (from loans and grants) that will decrease the consume and discharge of water, will decrease leakage and will diminish the operation and maintenance costs.

Tariffs of drinking water and sewerage treatment will have to be adapted to cover inflation and all investment costs, financing costs and operations and maintenance costs caused by the new investments (from ISPA grants, already approved, from IEB loan and from the company self financing) in the drinking-water production & distribution and sewerage collection & treatment.

The tariffs have to be set at a level that allows for financial sustainability. APA-CANAL_PITESTI will have to get enough revenues from their operations that they can pay the debt service from the investments and still have enough cash balances to run their business and to have a proper cushion against uncertainties.

9 Tariff and Charges Reforms

The tight State and local-authority budgets make it difficult to implement the construction programmes for rehabilitation of obsolete drinking water facilities, sewerage and wastewater treatment plant. Available ISPA aid is not even sufficient to solve the problems of identified hot spots, and demand an additional domestic contribution is unable to afford.

For Pitesti and surrounding villages the company APA-CANAL-PITESTI is responsible for the drinking water production and distribution and the wastewater collection and treatment. This company should ensure water services for sustainable development of Pitesti area and has to preserve the water quality of Arges river for downstream water users (Bucharest). For these reasons APA–CANAL-PITESTI is facing to solve the following issues:

Issue 1 Water production and consumption

The demand for drinking water for household and socio-economic units is still at a very high level and this is, in fact, due to:

i) water losses in the obsolete distribution network, and

ii) water wastage by the consumers caused by:

   (a) not enough individual water meters, and

   (b) the bad state of in house plumbing

The results of water wastage and losses are a correspondingly supplementary production and distribution of drinking water and excessive volume of diluted wastewater generated by the user. Therefore, it is needed a correspondingly oversized drinking and sewerage network and treatment facilities and consequently unnecessary investments. When starts the process of metering the flats in apartment blocks the hot and cold water consumption decreased significantly (in some cases by 40%).

The reduction of drinking water production caused by drinking water wastage and losses should be a priority in rationalization of drinking water use in Pitesti. To solve this problem it is necessary to:

i) Rehabilitate the drinking water supply system. This implies the rehabilitation and upgrading of drinking water supply system and in house installations. The results will be in joint benefits for reducing losses and improving reliability which will increase the value of service and the willingness to pay more for that service;

ii) Extend the installation of individual water metering;

iii) Develop economic incentives to encourage owners of buildings and flats to repair their water infrastructure. For instance if a person will improve his water infrastructure to be allowed 1) to deduct the expenditures from his municipal tax bill or 2) to have access to some subsidy or soft loan.

Issue 2 Management system

APA-CANAL has in plan to increase the performance of the company and for these have to:

i) Extend the activities inside and around the city;

ii) Increase the quality of drinking water and wastewater discharges into the river Arges;

iii) Externalize some activities (install and maintenance of water meters, etc.)

Issue 3 Water tariffs

Water tariffs for APA-CANAL are subject of depreciation by inflation and by augmentation of electricity tariff. To update water tariffs APA-CANAL has to fulfill a long procedure each time without to have the possibility to cover the economic losses until the new tariffs has been approved. To avoid this situation, APA-CANAL intends to propose for approval a formula for automatic calculation of water tariffs. Once the formula is approved, the water tariffs can be easy updated.

Issue 4 Economic sustainability

Economic sustainability of MU is poor. It is very difficult to raise the capital needed for development. Therefore, there is a severe problem throughout Romania in the financing of environmental infrastructure projects from local budgets. This problem extends to the co-financing of ISPA supported projects; the 25% minimum that is required is still beyond the direct funding capacity of local budgets. On the one hand, there are difficulties in raising tariffs owing to limited affordability to pay and on the other hand, private finance is limited.

So far, Pitesti Municipality Council is allowed to issue bonds on the internal financial market up to 20% of the budget value. In the future, more than the ISPA grant mechanisms should be initiated and completed with alternative mechanisms such as:

i) state-guarantee soft loans combined with revolving funds;

ii) financial contracts in public-private partnership;

iii) mixing up with other international financial assistance programs;

iv) softening the venture capital input from business sector, assigned to environmental protection, including public utilities;

v) better planning the new investments by grouping of projects by hydrographic basin basis.

Phasing in these financial instruments will be gradual and will take time.

Annex 1

ASTEC Model Results for Pitesti, Scenario A

1 Water tariffs (Commodity charges in 1000 ROL/ m^3)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	6.46	6.46	7.30	7.30	7.34
Household A, metered (Pitesti)	6.46	6.46	7.28	7.30	7.37
Household B (Pitesti)	6.46	6.46	7.30	7.30	7.37
Household C (villages)	6.46	6.46	7.28	7.30	7.37
Household D (villages)	6.46	6.46	7.30	7.30	7.39
Industry E (Refinery)	6.46	6.46	7.30	7.30	7.38
Economic units	6.46	6.46	7.28	7.30	7.37

2 Wastewater tariffs (Commodity charges in 1000 ROL/ m^3)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	5.24	5.24	5.59	5.57	5.31
Household A, metered (Pitesti)	5.24	5.24	5.56	5.58	5.32
Household B (Pitesti)					
Household C (villages)	5.24	5.24	5.56	5.24	5.32
Household D (villages)					
Industry E (Refinery)					
Economic units	5.24	5.24	5.56	5.58	5.32

3 Water consumption (m^3/entity/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	165.00	165.00	164.17	164.18	164.30
Household A, metered (Pitesti)	140.00	140.00	136.63	136.53	136.95
Household B (Pitesti)	165.00	165.00	160.05	160.05	159.68
Household C (villages)	160.00	160.00	156.15	156.94	156.51
Household D (villages)	160.00	160.00	155.20	155.20	154.72
Industry E (Refinery)	1,420,000.00	1,420,000.00	1,377,398.36	1,377,435.35	1,373,741.84
Economic units	3,116.00	3,116.00	3,040.95	3,038.85	3,048.04

4 Wastewater discharge (m^3/entity/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	127.05	127.05	126.41	126.42	126.51
Household A, metered (Pitesti)	107.80	107.80	105.20	105.13	105.45
Household B (Pitesti)	0.00	0.00	0.00	0.00	0.00
Household C (villages)	123.20	123.20	120.23	120.85	120.51
Household D (villages)	0.00	0.00	0.00	0.00	0.00
Industry E (Refinery)	0.00	0.00	0.00	0.00	0.00
Economic units	2,399.32	2,399.32	2,341.53	2,339.91	2,346.99

5 Water consumption (m^3/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	3,596,835	3,596,835	126.41	126.42	126.51
Household A, metered (Pitesti)	5,286,260	5,286,260	105.20	105.13	105.45
Household B (Pitesti)	81,015	81,015	0.00	0.00	0.00
Household C (villages)	595,360	595,360	120.23	120.85	120.51
Household D (villages)	81,440	81,440	0.00	0.00	0.00
Industry E (Refinery)	1,420,000	1,420,000	0.00	0.00	0.00
Economic units	8,082,904	8,082,904	2,341.53	2,339.91	2,346.99

6 Wastewater discharge (m^3/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	2,769,563	2,769,563	2,781,762	2,792,639	2,781,938
Household A, metered (Pitesti)	4,070,420	4,070,420	4,164,915	4,241,295	4,162,806
Household B (Pitesti)	0	0	0	0	0
Household C (villages)	458,427	458,427	469,070	470,257	468,830
Household D (villages)	0	0	0	0	0
Industry E (Refinery)	0	0	0	0	0
Economic units	6,223,836	6,223,836	6,368,322	6,485,110	6,365,085

7 Revenues of water services (Commodity charges in 1000 ROL/ m^3)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	23,242,748	23,242,748	26,133,724	26,117,199	26,286,236
Household A, metered (Pitesti)	34,159,812	34,159,812	37,575,940	37,652,756	38,089,807
Household B (Pitesti)	523,519	523,519	573,613	573,566	577,618
Household C (villages)	3,847,216	3,847,216	4,231,954	4,265,213	4,289,916
Household D (villages)	526,265	526,265	576,622	576,575	582,023
Industry E (Refinery)	9,176,040	9,176,040	10,054,064	10,053,254	10,134,561
Economic units	52,231,726	52,231,726	57,455,122	57,572,577	58,241,470
TOTAL	123,707,326	123,707,326	136,601,039	136,811,140	138,201,631

8 Revenues of wastewater services (Commodity charges in 1000 ROL/ m^3)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	14,501,432	14,501,432	15,397,920	15,357,636	14,644,586
Household A, metered (Pitesti)	21,312,720	21,312,720	22,105,842	22,153,233	21,176,106
Household B (Pitesti)	0	0	0	0	0
Household C (villages)	2,400,325	2,400,325	2,489,649	2,354,474	2,384,930
Household D (villages)	0	0	0	0	0
Industry E (Refinery)	0	0	0	0	0
Economic units	32,588,006	32,588,006	33,800,721	33,873,184	32,379,055
TOTAL	70,802,482	70,802,482	73,794,133	73,738,527	70,584,677

9 Balance of water service accounts (1000 ROL/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	-787,707	-2,961,127	15,184	-3,902	-4,927
Household A, metered (Pitesti)	-1,157,691	-4,351,961	-74,905	27,017	22,428
Household B (Pitesti)	-17,742	-66,696	90	13	130
Household C (villages)	-130,384	-490,135	-8,436	3,060	2,527
Household D (villages)	-17,835	-67,046	90	13	132
Industry E (Refinery)	-310,980	-1,169,028	1,573	232	2,288
Economic units	-1,770,156	-6,654,323	-114,532	41,310	34,298
TOTAL	-4,192,495	-15,760,317	-180,936	67,744	56,874

10 Balance of wastewater service accounts (1000 ROL/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	3,218,232	-857,673	32,397	-10,393	-11,822
Household A, metered (Pitesti)	4,729,828	-1,260,520	-44,129	16,591	15,283
Household B (Pitesti)	0	0	0	0	0
Household C (villages)	532,692	-141,965	-4,970	-153,111	1,722
Household D (villages)	0	0	0	0	0
Industry E (Refinery)	0	0	0	0	0
Economic units	7,232,098	-1,927,385	-67,475	25,368	23,373
TOTAL	15,712,850	-4,187,543	-84,177	-121,545	28,556

11 Balance of drinking water and wastewater service accounts (1000 ROL/year)

Service user category	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Household A, unmetered (Pitesti)	2,430,525	-3,818,800	47,581	-14,295	-16,749
Household A, metered (Pitesti)	3,572,137	-5,612,481	-119,034	43,608	37,711
Household B (Pitesti)	-17,742	-66,696	90	13	130
Household C (villages)	402,309	-632,100	-13,406	-150,051	4,248
Household D (villages)	-17,835	-67,046	90	13	132
Industry E (Refinery)	-310,980	-1,169,028	1,573	232	2,288
Economic units	5,461,942	-8,581,709	-182,007	66,678	57,671
TOTAL	11,520,355	-19,947,860	-265,113	-53,801	85,430

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DANUBE
REGIONAL
PROJECT

September 2004

ASSESSMENT AND DEVELOPMENT OF MUNICIPAL WATER AND WASTEWATER TARIFFS AND EFFLUENT CHARGES IN THE DANUBE RIVER BASIN.

Volume 2: Country-Specific Issues and Proposed Tariff and Charge Reforms: Romania – Summary

UNDP GEF

WORKING FOR THE DANUBE AND ITS PEOPLE

UNDP I GEF
DANUBE
REGIONAL
PROJECT

AUTHORS

Dr. Victor Platon
George Dulcu

PREFACE

The Danube Regional Project (DRP) consists of several components and numerous activities, one of which was "Assessment and Development of Municipal Water and Wastewater Tariffs and Effluent Charges in the Danube River Basin" (A grouping of activities 1.6 and 1.7 of Project Component 1). This work often took the shorthand name "Tariffs and Effluent Charges Project" and Phase I of this work was undertaken by a team of country, regional, and international consultants. Phase I of the UNDP/GEF DRP ended in mid-2004 and many of the results of Phase I the Tariffs and Effluent Charges Project are reported in two volumes.

Volume 1 is entitled *An Overview of Tariff and Effluent Charge Reform Issues and Proposals*. Volume 1 builds on all other project outputs. It reviews the methodology and tools developed and applied by the Project team; introduces some of the economic theory and international experience germane to design and performance of tariffs and charges; describes general conditions, tariff regimes, and effluent charges currently applicable to municipal water and wastewater systems in the region; and describes and develops in a structured way a initial series of tariff, effluent charge and related institutional reform proposals.

Volume 2 is entitled *Country-Specific Issues and Proposed Tariff and Charge Reforms*. It consists of country reports for each of the seven countries examined most extensively by our project. Each country report, in turn, consists of three documents: a case study, a national profile, and a brief introduction and summary document. The principle author(s) of the seven country reports were the country consultants of the Project Team.

The authors of the Volume 2 components prepared these documents in 2003 and early 2004. The documents are as up to date as the authors could make them, usually including some discussion of anticipated changes or legislation under development. Still, the reader should be advised that an extended review process may have meant that new data are now available and some of the institutional detail pertaining to a specific country or case study community may now be out of date.

All documents in electronic version – Volume 1 and Volume 2 - may be read or printed from the DRP web site (www.undp-drp.org), from the page Activities / Policies / Tariffs and Charges / Final Reports Phase 1.

We want to thank the authors of these country-specific documents for their professional care and personal devotion to the Tariffs and Effluent Charges Project. It has been a pleasure to work with, and learn from, them throughout the course of the Project.

One purpose of the Tariffs and Effluent Charges Project was to promote a structured discussion that would encourage further consideration, testing, and adoption of various tariff and effluent charge reform proposals. As leaders and coordinators of the Project, the interested reader is welcome to contact either of us with questions or suggestions regarding the discussion and proposals included in either volume of the Project reports. We will forward questions or issues better addressed by the authors of these country-specific documents directly to them.

Glenn Morris: glennmorris@bellsouth.net
András Kis: kis.andras@makk.zpok.hu

Executive Summary

The *Country Profile Report – ROMANIA; National Profile for Drinking Water and Wastewate*r was drafted within the framework of the project "*Assessment and Development of Water and Wastewater Tariffs and Effluent Charges Designs for Nutrient Reduction in the Danube River Basin (DRB)* ". The main purpose was to give an overview of the organization and functioning of the management units in the Romanian water sector (Danube basin), regulatory framework, service users etc. in order to improve both water resource management generally and protection of water bodies from nutrification and hazardous substances. In this respect, the paper explored the use of water and waste-water service tariffs and effluent charges, fines and incentives as a tool for nutrient reduction. The paper ends with policy issues that will need solutions and policies for suggested reforms.

The first section of the paper illustrates the main features of the Romanian water resources, administrative structures, demand for raw water etc. In Romania, the natural raw water resources, while technically utilizable, cannot be used without making certain significant investments in complex development water works of the hydrographic basins and in treatment installations because:

- one of the most important water resource, the Danube river, can be used in a small extent, due to its eccentric position, at the Southern limit of the territory;
- the inland rivers are unequally distributed all over the territory, significant areas remaining with insufficient resources, presenting at the same time important flow variations in time and space;
- the pollution of certain inland rivers, exceeds the admissible limits, which makes difficult and sometimes even prohibitive their use.

From the data presented resulted that municipalities are one important water polluter. The situation is significant where localities are situated up stream and down stream of a river that is the only water source.

The second section illustrates the legal situation regarding water laws and regulations. There are described laws of the water sector, in Romania, the institutional framework; major RUs in the water sector , Water Permitting mechanism etc. In Romania, raw waters are considered a natural resource that is managed by a public body. The water users are municipalities (trough MUs), industry that it is not linked to a municipal network and has its own water source, agriculture for irrigation and other users. Municipal W&WW operators have to observe water laws that are general for all users. The legal framework is very important for municipalities especially in this period when the whole environmental "acquis" was transposed in Romania. As a consequence for municipalities, the targets of water infrastructure development programmes are, to a large extent, externally determined by the EU laws. Some estimates say that only for the water sector, Romanian municipalities will have to invest around 9 billion €, in order to implement all EU laws.

The third section deals with issues related to the water used by localities: production and consumption of drinking water, metering and leakage of drinking water, wastewater from localities etc. So, from the 22.4 million inhabitants, living in Romania, only 14.7 million persons (65% of total) have drinkable water supplied by public service; of this amount 11.3 million persons are in the urban area (76.9 %) and 3.4 mil. in the rural area (23.1 %). In the last 25 years, there was an increase in the number of households connected to the network from 29% to 65% of the population.

The fourth section analyses the situation regarding the mechanism of pricing water and wastewater; there are illustrated the pricing mechanism for raw water abstraction, tariffs for drinking water, tariffs for wastewater. In Romania, economic instruments for water management and protection include fixed service charges (drinking water treatment and distribution, and sewage network and waste-water treatment), various water charges, taxes, penalties and allowances (bonus). The major aim is to have a rational and economical management of waters to ensure that users respect the quality limits for water

discharges, to prevent the depletion of the water resources and to avoid quality damage, and resource conservation. There are used the next pricing instruments:

- *Prices for raw water* - are the same throughout Romania but differ in accordance with the source of water (e.g., inner rivers, the Danube, or groundwater) and the category of users (industries, households, power plants, farms, fisheries, etc.);
- *Tariffs* - are levied on water pollution to reduce suspended and oxygen-depleting substances in river flows using limits set by the law. If the limits are exceeded, fines or penalties are levied;
- *Fines* are levied for violation of the laws, standards, regulations;
- *Penalties* are levied for discharging larger amounts of pollutants or abstracting higher amount of water than the quantities established by WMau.
- *Bonuses* are granted by National Authority Romanian Waters to water users that take measures to protect waters and discharge less pollutants that the level granted by WAau; the bonus could be up to 10% of the raw water bill in one year.

The fifth section analyses the W&WW infrastructure: infrastructure for drinking water, infrastructure for wastewater, opportunities for investment in W&WW infrastructure in urban and rural areas. In 2001, in Romania, drinking water networks have had a length of 39104 Km and a capacity for producing drinking water of 10.5 million m^3/day. Across regions drinking water network are even distributed without big discrepancies. In 2001, in Romania were identified 1141 facilities for the treating the wastewater, out of which 313 for treatment of wastewater from localities. From 313 only 162 were properly operated (see Table 15).

From the total number of 602 wastewater treatment plants ineffectively operating , 61.5% are from the industry sector, 25.1.0% from localities and 13.5% from agriculture. There are 47 towns, including important urban centers as Bucureşti, Craiova, Drobeta-Turnu-Severin, Brăila, Galaţi, Tulcea, that do not have wastewater treatment plants and eliminate used waters in the nearby rivers. In the period 1997-2001 it has been registered an increase of the sewage network with 1,088 Km.

The sixth section deals with issues related to the financing W&WW services in Romania as: financing the current activities of drinking water and wastewater services, financing the investment in W&WW infrastructure, W&WW investment co-financed with foreign aid. In Romania, financing local services could be made in several ways, involving only local authorities and/or MU:

- Granting subsidies trough the local budget for 100% of expenditures (the case of road maintenance and green areas, parks etc.);
- Granting subsidies that cover a part of the cost of the service (heat and public transport); subsidies could be granted directly to the service provider or to some social groups with low revenues (mainly for public transportation and heating in winter period).
- Tariffs and charges that cover the running costs (mainly the W&WW services);

For W&WW services there is neither grant nor subsidy available from central government to cover current costs (the same situation is for waste management). MUs should cover their expenditures only from tariffs and charges.

According to the law , tariffs should also provide a share for a development fund and a small benefit for MU. Owing to the fact that in most of cases Local Councils want to keep tariffs down, many MU are in red, registering loses. When the situation is aggravated by inflation or increase of the price for other utilities and the power utilities threaten to switch off the power, Local Councils agree for an increase of the tariffs and charges. In cases when a formula was agreed, then the increase of the tariffs is made automatic. W&WW operators receive and have received grants only from EU trough ISPA instrument. ISPA is addressing issues in the field of transport and environment (water and waste management). Up to present, 33 ISPA Financing Memorandums have been signed by Romanian authorities, with a total amount of 1,6 billion euro, representing 70% of the EU contribution for the

period 2000-2006. There are more than 20 W&WW projects financed under ISPA. The amount of the W&WW projects financed by ISPA is more than 680 million €. The strategy for ISPA was to begin with larger cities with a population bigger than 250000 inhabitants and later on to continue with small cities. As the ISPA financing covers only 75% of the investment and 25% have to be local contribution, all municipalities have to find ways to cover their share. For this loans from EBRD and EIB have been used in many cases.

The seventh section is dealing with Management Units (MUs) **(t**ypes of management units and their operation, trends in formation and consolidation of MUs). For instance in 2001, public services of communal husbandry was offered by a number of 556 MUs, subordinated to the local public administration authorities or operating with private capital; there were registered 74 Autonomous Regie and 482 commercial companies (Limited Liability Companies, stock companies etc.). Considering the participation with capital, commercial companies could be divided into the next categories:

- 216 commercial companies with 100% capital owned by the local authorities;
- 30 commercial companies in which local public authorities have contributed with more than 50% capital;
- 236 commercial companies where local public authorities have contributed with less than 50% capital.

The transposition of EU legislation will have an important effect on creation of new MUs. Agglomeration of localities that have a population equivalent bigger that 2000 inhabitants have to build W&WW networks, according to the latest estimate of the 11 branches of NARW. There are 2609 agglomeration with more than 2000 inhabitants:

- 2,346 agglomerations with a population between 2,000 – 10,000 inhabitants;
- 111 agglomerations with a population between 10,000 – 15,000 inhabitants;
- 131 agglomerations with a population between 15,001 – 150,000 inhabitants.;
- 21 agglomerations with a population with more than 150000 inhabitants.

Combining small localities for the creation of W&WW networks will be a complicated problem. Out of the 2609 agglomerations, 453 agglomeration have sewage systems and 340 agglomeration have wastewater treatment plants. Out of these only 11 wastewater treatment plants and two sewage systems are in compliance with EU legislation

The eighth section includes the main policy issues identified. Romania's water system is broadly developed and we could say that quantitatively, the water resources are sufficient to cover the national water demand. In particular, hydro structures have spare capacity and are generally sufficient to manage floods and droughts. One important problem arise from the fact that there are geographical differences of the rivers' debit and significant seasonal variations: there are seasons with high precipitation level and other season when the rain is missing for long periods. Owing to this peculiarity in Romania many reservoirs have to be developed in order to retain water.

The paper identifies three issues (1) water consumption and waste-water generation; (2) Level of municipal water tariffs and (3) economic sustainability of the water utility. To solve these issues the authors proposed several solutions.

The paper ends with Annexes and Bibliography.

Case study: **Drinking water and sewerage systems of Pitesti, Romania**

(Executive Summary)

City Pitesti, located at 120 km West of Bucharest, is the capital of the Arges district and is located at the confluence of Arges and Doamnei rivers. Drinking water treatment and distribution, wastewater collection and treatment for Pitesti fall under the responsibility of APA-CANAL-PITESTI. At present, neither the drinking-water treatment installation nor the wastewater treatment installations operate to international standards. In addition, the water distribution network and the sewerage systems need substantial rehabilitation. The existing installations and pipe works are old and much equipment is in need of modernization and/or replacement. Given the importance of providing adequate water and wastewater services, both to the population and industries, APA-CANAL-PITESTI has undertaken initiatives towards rehabilitation of the installations.

APA-CANAL-PITESTI is a Romanian juridical person, registered in the Commercial Register and has a status as commercial company on shares, with an unique share holder – Pitesti Local Council, which approves the Rules of Organizing and Operations. The company signed in 2001 with the Local Council Pitesti one Concession Contract which has as object of activity the concession of the public service of local interest referring to the activity of drinking water production, transport and distribution, as well as the wastewater and storm water collection, transport and treatment. The contract was signed for a period of 20 years. According to the contract stipulations, all the actives in the Local Council property used for drinking water supply, transport and treating wastewater collection, transport and treatment are given for administration to the contractor.

The company performs services for around 207,000 inhabitants and the important economical agents in the Pitesti city area, the surrounding villages (Albota, Maracineni, Bascov, Stefanesti, Bradu) and the area Platforma Cotmeana. The drinking water produced in 2002 was 30035 thousands m^3 (invoiced 76%) and around 27428 thousands m^3 (invoiced 70%) in 2003. The metering activity covers 92.9% from the water delivered but for dwellings only 63.4%.

The average level in 2003 of the water & sewerage tariffs of APA-CANAL are 6,462 ROL/m^3 and 5,236 ROL/m^3 and are the same for population and economic units & industries. The tariff for drinking water is the tariff for cold water. The tariffs in 2003 charged by APA-CANAL-PITESTI were in the lower range, compared to other Romanian cities. In the chapter 6.1 the operation and maintenance costs are given for material costs, energy costs, salary costs and other costs and in chapter 6.2 is detailed the total costs of the investments amounted to 53 million €, for rehabilitation of the drinking water and sewerage networks as well as of the drinking water and the wastewater treatment plants. Financial sources are: the IEB loan, the ISPA Grant that was approved in October 2003 and the contribution by APA-CANAL-PITESTI.

Tariffs of drinking water and sewerage treatment will have to be adapted to cover all investment costs, financing costs and operations and maintenance costs caused by the new investments in the drinking-water production & treatment and sewerage collection & treatment.

For the Pitesti case study a financial model ASTEC was used and three scenarios were implemented. For each scenario, five situations for APA-CANAL-PITESTI was given and the results obtained (cash-flows, profit and losses and the balance sheet) are in terms of: drinking water and wastewater tariffs, drinking water consumption and wastewater discharges, revenues of drinking water services and wastewater services, balances of drinking water service accounts and wastewater service accounts and balance of drinking water and wastewater service accounts.

As can be seen from the results obtained with the ASTEC model, the financial effects for APA-CANAL-PITESTI is under the process of metering and revamping investment (from loans and grants) that will decrease the consumption of drinking water and discharge of wastewater as well, will decrease leakage and will diminish the operation and maintenance costs.

Dr. Victor Platon
George Dulcu