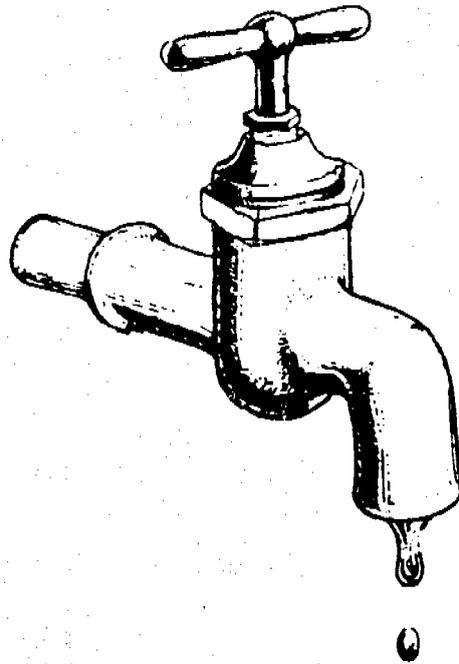




Water Supply and Sanitation in Bulgaria, the Czech Republic, Romania and the Slovak Republic



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ANNEXES

- Annex 1** Exposure Visit and Seminar Water, Sanitation and Environment
- Annex 2** List of participants from Bulgaria, Czech Republic, Romania and Slovak Republic

Currency Equivalents:

- 1 Dfl = 15.5 Sk (Slovakia)
- 1 Dfl = 715 Lei (Romania)
- 1 Dfl = 15 Kc (Czech Republic)
- 1 Dfl = 0.72 Leva (Bulgaria)

Preface

In order to alleviate problems in states in Central and Eastern Europe (CEE) and the former Soviet Union (FSU) regarding quality and quantity of drinking water, the Netherlands Ministry of Housing, Physical Planning and Environment (VROM) has in 1992 taken the initiative to identify areas and means for the transfer Dutch expertise for this purpose.

VROM has contracted IRC International Water and Sanitation Centre (IRC) in The Hague to study the need for the transfer of information and expertise on water supply and sanitation. In this respect a background paper has been prepared by the IRC which details the prevailing water and sanitation conditions in a number of CEE and FSU states. This document was discussed in September 1993, in a meeting attended by representatives of Dutch consulting organizations.

In order to amplify the insights gained IRC contracted Mr A.G.N Jansen from Aquanet to carry out a fact-finding mission to Slovakia and Romania in the period January 16-29, 1994.

In Slovakia the mission discussed urban and regional water supply and wastewater issues with representatives of the Ministry of Land Economy, the Waterworks and Sewerage Company of Bratislava town and the West Slovakia Waterworks and Sewerage Company. Furthermore a field visit was carried out to water and sanitation works in Gabčíkovo and Dunajská Streda in West Slovakia. In Romania the mission focused its attention on rural water and sanitation issues, amongst others through discussions with the authorities of the villages Vidra and Fundulea and field visits to these localities. Through discussions with the Bucharest Waterworks and Sewerage Company the preferences of this utility for co-operation with the Netherlands have been identified.

The study on the Czech Republic was conducted as a desk-top study in IRC in June 1994 by Mr. Petr Martinek, M.Sc. from the EPCEM-course as his internship assignment under the guidance of IRC. In his country Mr. Martinek is working at the Czech Ecological Institute.

The study on Bulgaria has been completed by the Bulgarian delegation participating in an exposure visit and seminar organized in the Netherlands in September, 1994. It was compiled by Mr. George Karaguiozov, head of Water Department in the Ministry of Environment, Mr. Nikolai Kujumdzev, from the same organization and Mr. Miroslav Bankov, director of the Petkov Municipal Water Supply and Sanitation Company.

This report contains the reports of the mission to Slovakia and Romania, desk study on the Czech Republic and the desk study on Bulgaria. They have been taken as they have been presented by their authors, including the country specific conclusions and recommendations. The report on the Bulgaria does not have conclusions nor recommendations as the authors did not provide them. However, they said after the seminar in discussion with the editor that the recommendations presented in the seminar were those they considered to be the most suitable actions in Bulgaria too.

The report has been supplemented to include the results of the seminar of the exposure visit to Dutch sector experiences and seminar organized for representatives of the four countries

and their hosts in the Netherlands in September 1994. The results have been taken and written as they came out during the seminar from the participants (delegates from the four countries). The facilitators of the seminar were Mr. Heikki Wihuri and Mr. François Brikké, both from IRC International Water Supply and Sanitation Centre. The sessions were chaired by Mr. A.G.N. Jansen from AQUANET and Mr. Kees van der Heijden from European Centre for Environment and Health, WHO.

The report has been edited by Mr. Heikki Wihuri who also wrote Chapter 7, Conclusions and Chapter 8, Recommendations.

Executive Summary

The most eminent common feature of the four countries is the difficulty to change the mode of operation of the sector from a centrally managed plan economy to the market/market oriented economy of the post socialism era in which the countries now are experiencing. The debate to which extent to privatize, as also the institutional form/forms to be chosen, is still going on.

The difficulties in the national economies of the countries are also reflected in the financing of the sector. The sector is still in need of budgetary support as the too low tariffs can not be raised at once to a level which fully covers the capital and the recurrent costs. The ability of the state and/or the local government to subsidize the sector is diminishing rapidly. It appears obvious that external financing is needed to bridge over the most critical period of the coming few years.

Environmental issues are becoming a topic of general discussion in the four countries. Until now the initiatives of citizens/ citizen groups have often been politically toned, may be sometimes also taken as politically toned, serving other purposes than environmental concern only. However, protection of the water resources is needed as many indicators point out pollution and imminent danger of pollution. The roles of various actors in the environmental protection is still in formulation as well.

The role of planning in the new social environment has changed. The old centralized planning for provision of services conducted by the central government does not apply any more and the experience gained during the past is no longer valid. Especially the lack of experience in financial planning is a major problem. The choice of technology has new dimensions as well. The technical knowhow level appears to be generally good but due to historical reasons experience in "western" technology is limited.

The traditional development cooperation approach is not applicable when planning of cooperation between the Netherlands and the four countries, Bulgaria, the Czech Republic, Romania and Slovakia. The countries are all developed ones, but having a different recent history than the "western" industrialised countries. The cooperation has to be partnership where both parties are active contributors to a common goal.

It is not wise to rush into project nor programme cooperation without first creating an enabling atmosphere. This can be achieved through exchange of experiences by conducting seminars/workshops where experts work together introducing their colleagues to new ideas through presenting their experiences on key issues. The seminars/workshops can be conducted as separate events or in connection of a larger/longer programme. In the latter case they would be the initiation and final formulation phase of a project or a programme.

The scientific or professional associations of the sector are the best channels to exchange experiences. Addressing the sector professionals and also the decision makers through their own associations renders a possibility to discuss various issues without the hierarchy limitations of the sector organizations/institutions.

It might also promote the sector development if decision level (political) representatives were invited to the Netherlands for an exposure visit and seminar.

The cooperation should be continued after the seminars by arranging various kinds of training opportunities both in water supply and sewerage subsectors.

Extended time-span support to the sector should as well be channelled through the water supply and wastewater associations. The form could be that of twinning. It would most likely be very effective as the countries concerned are countries in transition and already have a highly educated technical sector cadre which lacks experience in acting in a market economy environment.

A special case is environmental protection and especially the source protection. How to organize the support and how to raise awareness at the political level and the population in general needs further studies and consultations.

Project form support to the sector is also a possibility. There is a need for this. To establish an autonomous/ independent water company and to run it for a short period could be an useful pilot or example which in practise demonstrates how to manage, operate and maintain financially feasibly and sustainably a waterworks in the prevailing environment. It would be necessary to make the required funds available for both the software and the investment. The investment capital should be provided in the form of a long term loan (probably a soft loan). The technical assistance component could be either a grant or a soft loan.

The financing of the cooperation proposed above could be divided amongst various external support agencies depending on their specific capabilities and interests. The shared financing, however, creates a need for an coordinating body to avoid duplication or gaps in the process. The soft components could be funded from the Dutch bilateral cooperation funds of VROM and/or DGIS, or by WHO, and the investments by EBRD, PHARE or WB.

1. Introduction

The societies in the four countries discussed are all in a phase of transition where the old centralized socialist structures have fallen apart and a new governmental structure has been introduced. The responsibility of arranging water supply and sanitation facilities to the population is now being seen as a local level obligation and reorganization of the utilities has just taken place. The exact roles and the legislation to facilitate and support the new configuration are still being prepared.

In Slovakia and in the Czech Republic the situations are similar for historical reasons. However, it appears that the privatization process has progressed slightly more rapidly in the latter country. The top priority in Slovakia seems to be to find optimal solutions for the management of water supply and sewerage utilities. In the Czech Republic water supply and sewerage companies have already been formed and the majority of them have been transformed in such a way that the municipalities are running and owning them.

In Romania the water supply and sewerage systems are operated by so called autonomous "Regia", which come under Local Authorities. Their nature differs somewhat from those in the three other countries discussed here as they are autonomous, but not independent entities.

The technical level of the utilities in the four countries has been handicapped by a lack of reinvestment in the past. The original standard may have been satisfactory but the age of the plants as well as lack of funds to repair and to augment them have caused the level of services deteriorate. However, the situation is not the same throughout these countries. It varies from country to country and from utility to utility. A common feature is an almost total lack of the latest sophisticated electronic equipment.

Previous governments placed no emphasis on environmental protection in any of these countries. The main, and maybe only, worry was production. This has resulted in environmental problems being very common in all the countries. In Bulgaria and Romania the main cause of problems is agriculture. In the Czech Republic and Slovakia industrial pollution is of major importance, however, agriculture is a factor which cannot be forgotten either.

It is certain that the development in Bulgaria, the Czech Republic, Romania and Slovakia will follow their own country specific courses. However, they can all benefit from support of the experience in the Netherlands, where similar environmental problems have been encountered and combatted already for decades. The transition of the societies in the four countries to a democracy renders a possibility for a new approach in the sector. Also here support can be given as the role of utilities, now as economic units, call for different management. The experience in the Netherlands could assist in the development of effective and efficient operation of the utilities

By: George Karaguiozov
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 Miroslav Bankov

2. Bulgaria

2.1 General

Bulgaria is one of the smaller south-eastern European countries in terms of area (43 000 sq. miles) and population (8.5 million). It belongs to the group of former socialist countries in transition. Sixty-eight per cent of the whole population live in towns. Nearly 3 million residents live in 12 cities, each with population of over 100 000 inhabitants.

The country lies within three drainage basins, which flow into the Danube, the Aegean Sea and the Black Sea. Its water resources per capita are estimated to be 2400 cubic meters per year, less than half the European average. Eighty-five per cent of water is from surface water sources. Drinking water is primary from ground water sources, but 30% of it is surface water. Per capita consumption is 116 litres per day. There is considerable waste of water resources both by water suppliers, through losses in the network, and through inefficient end use. The country has 2045 dams build with a useful volume of 6 billion m³ and 18 major lakes.

Bulgaria has one of the largest potentials for mineral water in Europe having over 600 springs with a total flow of 2600 l/s. Unfortunately only 30% of them are in use for spas, green house heating and drinking.

Bulgarian water resources balance by water source and by type of use (in mln m³/annually, regular year, most recent estimates)

<i>Type of use</i>	<i>Ground water</i>	<i>Surface water</i>	<i>Total</i>
1 Drinking water (total) used by:	1.219	0.510	1.779
households	0.666	0.348	1.050
industries	0.414	0.065	0.529
agriculture	0.139	0.061	0.200
2 Irrigation (conventionally clean water)	0.188	3.012	3.300
3 Industry (conventionally clean water)	0.126	2.789	2.915
4 SUBTOTAL (main type of use) = 1 + 2 + 3	1.533	6.311	7.944
5 Other types of use (energy, production, fish-farming and draining)	0.165	2.915	3.080
6 TOTAL = 4 + 5	1.698	9.226	11.074

The average annual run-off from internal rivers is 20,7 billion cubic meters, falling to 10,5 billion m³ in a dry year. Total groundwater resources are estimated at 3 billion m³. Annual abstraction is around 1,7 billion m³.

2.2. Situation in the water supply and sanitation sector

2.2.1 Institutional aspects

The institutional framework can be broken down into five activities each having its own responsible line organization. These are:

- central government;
- quantitative management;
- monitoring and regulation of water quality;
- supply of water and sewerage services;
- investment planning and implementation.

The Committee for the Protection of the Environment was created in 1976 and renamed as the Ministry of Environment (MOE) in 1990. In 1991 it achieved a full ministry status under the Environmental Protection Act in 1991 which prescribed its rights and duties. The Ministry is organised as follows: a Central Office in Sofia, a Laboratory and a Information Centre in Sofia and 16 Regional Environmental Inspectorates in the Regions. It is headed by the Minister.

MOE is responsible for environmental protection, conservation and rehabilitation for water, air land and the soil. Its responsibilities for water are:

- preparation of national environmental policy and strategy, legislation and regulation;
- development and setting of ambient and effluent water quality standards in co-operation with relevant ministries;
- development of emission licensing/permit procedures and pollution charges and penalties;
- monitoring and enforcing the ambient and effluent standards of surface and ground water through its regional environmental inspectorates;
- managing the Environmental Protection Fund;
- undertaking environmental research and carrying out projects to assess environmental impacts and preparation of periodic environmental reports.

The surface waters are monitored in about 412 points in 15 main river basins, Danube river and Black Sea. The length of the rivers is 19761 km. MOE monitors 50% of it.

The Ministry is not responsible for drinking water quality.

Ministry of Regional Development (MRD) implements the state policy in the Regions including regional development, regional and local government, housing policy, public utilities and municipal services, investment design and construction. MRD controls and owns the 28 state Water Companies. It doesn't control directly the 14 municipal companies, which are owned and controlled by their respective municipalities. MRD has historically been the main source of finance for the sector, but MRD funding has now largely dried up. Funding is now almost entirely channelled through the municipalities from the state budget.

The historical mode of operation of the state water companies has been central command and control of their operations. This is now changing. The companies have been transformed into sole proprietorships. New managers have been appointed under contracts that include performance targets. Two thirds of the managers have been appointed under competitive tendering.

Two institutions are involved in the management of water resources:

- National Council of Waters (NCW);
- National Institute of Meteorology and Hydrology (NIMH).

NCW is responsible for the quantitative management of all surface and groundwater resources in Bulgaria. It is a collective body of the Council of Ministries (COM). Its responsibilities are to:

- develop a national strategy and programs for the use and management of water resources;
- elaborate and formulate legislation on the use and management of water resources;
- prepare the national and regional water balances and forecasts;
- allocate surface and groundwater resources to sectors;
- monitor water consumption of the sectors and enforce compliance with allocations;
- issue permits for all water abstractions and impose penalties;
- issue permits for hydrogeological surveys.

NCW does not have the capability to measure surface and groundwaters and relies upon NIMH to provide it with information on the surface water resources. NIMH is the only body in Bulgaria which measures the country's water resources and makes data available in monthly bulletins. It is part of the Bulgarian Academy of Sciences and it has 232 surface and 525 underground hydrometric measuring stations which form the National Hydrological and Hydrogeological Network. Information on water resources is passed regularly to NCW which uses it for water resources management.

NIMH also provides data to MOE, National Electricity Company (NEC) and Ministry of Agriculture. The Committee of Geology plays a minor role in the monitoring of water resources, having a groundwater register.

The Ministry of Health (MOH) monitors and enforces drinking water standards. It samples drinking water supplies of surface and underground sources and carries out a basic sanitary analysis every 15 days. A more complex analysis is performed every three months.

There are 28 State Water Companies (RWC) and 14 Municipal Water Companies in Bulgaria. The State Water Companies provide the majority of water supply and wastewater services in the country. RWCs were set up on a Regional basis to serve multiple municipalities and they were only responsible for operating and maintaining their water supply, sewerage systems and treatment plants, which are state owned assets. They supply potable water to three main consumer groups - households, industry and agriculture. The relative shares of consumption of potable water is 61%, 28% and 11% respectively. Together with the 14 municipal Water Companies they supply 98% of the population with water.

The majority of RWCs' raw water comes from their own dams, catchments and wells. Some of them also receive raw water from large dam complexes operated by NEC's Dams and Ministry of Agriculture's Irrigation Systems Division. RWCs also operate a substantial number of reservoirs to regulate the supply to meet the demand. The companies are owned and controlled by the Ministry of Regional Development (MRD). In 1991 RWCs were transformed and set up as Sole Proprietor Limited Liability Companies under the 1991 Trade Act.

The Ministry has subsequently taken steps to make companies more autonomous and accountable without restructuring the sector. The Government of Bulgaria has proposed a restructuring strategy whose main elements are:

- transferring ownership of water and sewerage fixed assets from the state to the municipalities;
- establishing contractual relationships between the companies and the municipalities for the operation and maintenance of the systems;
- diverting the ownership of the companies to the private sector;
- establishing a regulatory regime for quality and quantity resource management, tariffs and service standards.

The 14 Municipal Water Companies (MWC) serve single municipalities and are owned by them. The largest municipal company is the Sofia Water Company which serves Sofia. Like the state water companies they only operate and maintain water supply and sanitation systems, and their assets are owned by the municipalities. Their capital investment is planned, financed and implemented by their municipalities.

The Ministry of Finance (MOF) is responsible for budgeting allocations for recurrent and capital expenditures in the sector for both the Central and the Local governments. It plays a critical role in investment selection. Applications for investment financing originate from a wide variety of institutions - MOE, MRD, Ministry of Agriculture, Ministry of Industry, municipalities and large state-owned enterprises. Because of the financial squeeze MOF has prime responsibilities for investment selection in the sector.

The sector is undergoing major restructuring. Present aspects of the sector organisation include:

- * abstraction is licensed but free of charge;
- * supply of water and sewerage services is undertaken by 28 state and 14 municipal water companies. Other companies provide design, construction and contracting services;
- * monitoring of the ambient water quality and quantity is undertaken by a number of different organisations. Ambient quality is maintained through fines, although enforcement is weak and fines are at low levels. Monitoring of effluent water quality is undertaken by the Ministry of Environment.
- * monitoring of drinking water quality is undertaken by the Ministry of Health;
- * water tariffs are set by the water companies. There is considerable variation in tariff levels. Tariffs are generally too low to realise an adequate return on assets. In some cases they cannot cover operation costs;
- * The sector relies on state financing of new investments but this is not enough.

2.2.2 Present status of drinking water supply

Water supply to the settlements is provided from 9688 sources including 10 dams, 146 direct catchments, 6748 drainage and water catchments and 2784 wells. Four thousand four hundred and twenty-two out of 5383 towns and villages are supplied with water or 82.1% of the total inhabited areas, where 98.2% of the Bulgarian population is concentrated. Due to water shortages, inadequate storage capacity of the reservoirs, and excessive irrigation and industrial use of drinking water, water supply restrictions are imposed in a number of areas - either seasonal (in 143 cities and 1103 villages) or on a permanent basis (26 cities and 280 villages). The annual water consumption is estimated of 1729 billion m³.

There are 421 water supply systems of various size. Reservoirs for 2235 billion m³ has been constructed for daily adjustments between the water demand and supply. The sector operates 22338 km of main pipe lines 17458 km of which is constructed of asbestos-cement and stoneware pipes, 4362 km of steel pipes, 270 km of cast iron and 299 km of other (PVC and concrete). The length of the distribution networks is 42810 km, 34413 km of which is of asbestos-cement and stoneware pipes, 4740 km of steel pipes, 1201 km of cast-iron and 1956 km of PVC and concrete. In other words, 81.3% of the networks are constructed from asbestocement and stone ware pipes, 11.2% of steel pipes, 4.7% of PVC and concrete and only 2.8% of cast iron pipes.

Ten water purification plants operate in the territory of the country.

The table illustrates the water use and type of users in Bulgaria in 1990

Water use in Bulgaria by type of users - 1990

TOTAL	Million cubic meters Percentage change 1985-90	7,744	22.2%
DOMESTIC	Million cubic meters Percentage change 1985-90	1,050	65.1%
INDUSTRIAL	Million cubic meters Percentage change 1985-1990 Percentage of total	3,394	38.6% 43.8%
IRRIGATION	Million cubic meters Percentage change 1985-1990 Percentage of total	3,300	1.5% 42.6%

2.2.3 Present status of sewerage/wastewater treatment

There are 237 towns in Bulgaria. They are inhabited by 68% of the population. The sewer network including the collectors is about 7718 km of which 7328 km are in the towns and 390 km in the villages. The settlements provided with a sewer network, regardless of the efficiency, amounts to 279 including 187 towns or 79% of the towns and 92 villages or 5.25% of the total number of settlements.

A sewer network is constructed only along 13% of the streets in the country. In towns with a sewer systems it covers 57% of the length of the streets.

There are 52 community wastewater treatment plants (WWTP) with a total capacity of 1.5 million m³/d as well as 8 seasonally operated facilities of 0.5 million m³/d. About 75% of all plants meet the standards, but are not fully loaded because of incomplete gas and sludge treatment facilities. There are 28 WWTPs more which are not fully completed, but 2,5 billion Leva is needed to pay for completion.

There are 4450 registered industries producing wastewater. Some 1851 of them do not need effluent treatment. There are 2148 industries provided by effluent treatment equipment. In 1990, 1703,7 million m³/year of wastewater was discharged into streams, some 556,9 million m³ not complying the standards.

For around 1452,4 million m³/year are treated in local wastewater treatment plants, where by 596,9 million m³ comply with standards. Within the industries, the share of wastewater generation of the chemical and petrochemical industries is the greatest, accounting for about 274,6 M m³/year.

Estimated data on waste water discharge in 1991 is presented below.

Key data on waste water discharge in Bulgaria, 1990

<i>INDICATORS</i>	<i>Quantity M m³</i>	<i>Percent of total</i>
Wastewater discharged in rivers, total of which:	1,703.7	100.0
● in compliance with quality standards	1,146.7	67.3
● not in compliance with quality standards	557.0	32.7
Wastewater from non-domestic sources, of which:	1,452.5	100.0
● directly discharged in rivers	761.8	52.4
● treated in local plants	690.7	47.6
● in compliance with quality standards	597.0	41.1
Industrial plants, discharging wastewater, of which:	4,450	100.0
● requiring treatment facilities	2,599	58.4
● with treatment facilities	2,118	47.6
● without treatment facilities	481	10.8
● not requiring treatment facilities	1,851	41.6
Large animal farms, of which:	571	100.0
● with treatment facilities	47	8.2
● mechanical treatment	22	3.8
● biological treatment	25	4.4
● without treatment facilities	524	91.8
Municipal wastewater treatment plants, of which ¹	60	100.0
● considered satisfactory	45	75.0

¹ Includes 8 seasonally operated plants

2.3 Inventory of problems in the sector and priorities for international cooperation

Although about one third of the country faces water shortages, there are high water losses. Non-revenue water averages 40%, but exceeds 50% in some RWCs. Reducing non-revenue water is critical to improving operating efficiency and cost recovery and alleviating water shortages. Nevertheless, satisfactory "diagnosis and cure" is hindered by the fact that most production is unmetered. While defining a national strategy for reducing water losses, there is therefore a need to install master meters on all production facilities. According to the preliminary analysis, 70-90% of losses are physical losses attributable to the water network, which consists of 80% asbestos-cement pipes. Problems are three fold; first, the quality of the pipes and rings is poor. Second, civil works were not carried out according to acceptable standards (e.g., pipes are beyond their use life, which is 25-30 years even for good quality asbestos-cement pipes). Network renewal was largely halted in 1989 when budgetary resources declined. Companies now lack the capital necessary (about US\$ 25 million p.a.) to finance the 1600 km pipe in need of replacement each year.

High standards are set for drinking water and the quality is acceptable in many areas. However, excessive levels of nitrates are widespread in drinking water. In localised areas there are problems of heavy metals contamination and there are very localised problems of excessive levels of arsenic and/or lead affecting around 0.6% of the population.

In contrast with the socialist period, RWCs now set their own tariffs in accordance with MRD guidelines reflecting emerging local cost differentials. Before 1990, the unified household tariff was Leva 0.1 m³ and 0.4 m³ for industry. Among RWCs in April 1993, water tariffs ranged from Leva 0.95 to 7.6 per m³ (US \$.04 - .30 m³) for households and Leva 1.63 to 10.4 (US \$.06 - .40 m³) for industries. Water tariffs rose on average by about 100% in real terms in 1991 based on a sample of RWCs and since then continuing large nominal increases by most RWCs appear to have kept real prices roughly stable. Despite the increases, the majority of RWCs maintain low water tariffs - generally below 3 Leva/m³ for domestic water (US\$.11/m³ - .7% of GNP per capita). Tariffs remain affordable with the average water bill representing less than 1.4% of the lowest old age pension. Since these services were substantially underpriced during the socialist period, recent tariff increases barely enable RWCs to cover minimum operating costs and generally reflect no investment or network renewal costs. Low prices are also partly explained by the fact that RWCs are relatively debt free as existing infrastructure was largely financed from the central budget without affecting tariffs. Finally, tariffs are kept at a minimum by pressure from municipalities and consumers, who complain about the general impact of price adjustments in the economy and the fact that water tariff increases have exceeded inflation yet not resulted in service improvement. Underpricing results in over consumption and deterioration in infrastructure and services.

Water and sewerage system inefficiencies are partly a legacy of central planning which begins to manifest itself in a market economy. Up until now, water supply investments have been centrally planned, financed, and executed by the MRD while sewerage investments are planned by the Ministry of Environment and financed by budget transfers to municipalities. Investment costs were not recovered from consumers. Centralised decision-making together

with the lack of market-based criteria to guide investment selection or competition among alternative users of capital led to allocative inefficiencies.

Institutionally-fragmented investment planning (e.g., MRD for water, Ministry of Environment and municipalities sewage treatment) and budget finance also led to a supply driven approach. Proposed investments were not always viewed from the perspective of an integrated network, nor were they planned from the institutional standpoint of the companies that would operate and maintain them. This often resulted in over-design of facilities, design inconsistencies and inefficient processes, including high energy costs. Dependence on annual budget allocations led to long and uncertain construction periods and cost escalation. With budget constrained, the MRD estimates that there is a backlog of uncompleted work valued at Leva 11.2 billion (US\$ 432 million). If cost minimisation/ efficiency concerns are to dominate the future, investment planning should increasingly be carried out by RWCs, which should as well operate and maintain the facilities and to recover the costs through tariffs. Given their lack of experience, a gradual transition and intensive staff training is needed.

As a part of the stabilisation program, tight fiscal policies are being pursued, including reduction in the distribution of subsidies and compression of state recurrent and investment expenditures. The share of capital expenditures in the national budget has been dwindling over time as shown in following table.

Investment as a share of total budget expenditure

	1987	1988	1989	1990	1991*	1992*	1993
Total expenditure MLV ¹	21545	22064	22912	23972	53352	55143	
Capital Expenditures MLV ¹	2299	2062	2164	1407	2378	1516	6500
Share of capital	11%	9%	9%	6%	4%	3%	
Estimated inflation			3.6%	30%	295.6%	80%	n.a.

* estimated

** planned

¹ MLV=million Leva

The capital expenditures recorded in this table are direct capital expenditures by the government. They fail to capture capital expenditures from other sources such as state enterprises and extra-budgetary funds as well as capital expenditures, from the contribution of the state budget to the municipal budgets. Actual capital expenditures are higher. In 1992 total capital expenditures financed by municipalities amounted to 1,2 billion Leva or almost as much as capital expenditures financed by the State budget. In 1992 approximately LV 800 M was spent in water sector, essentially for the financing of treatment plants and from the following sources:

	<i>MLV¹</i>	%
Subsidy from State municipalities	520	65.5%
State budget for capital investment	152	19.5%
Extra budgetary Irrigation Fund	80	10.5%
Extra budgetary Environmental Fund	30	4.0%
Industries from own funds	10	1.0%
Water companies from own funds	2	-
TOTAL	794	100%

¹ MLV=million Leva

2.4 Environmental legislation

The state of the environment has significantly deteriorated in Bulgaria in over the last forty-five years. The most severe problems are air and water pollution and land contamination, primarily generated by heavy industry. The worst problems are localised in specified areas, labelled "hot spots" where pollution causes important health hazards to the population. About 12% of Bulgaria's population lives in hot spots.

Environmental legislation in Bulgaria dates back to the 1960s and the most important laws are:

- The Law on the protection of Air, Water and Soil Pollution, 29.12.1963 and its implementing regulation November 24, 1964.
- The Law on the Protection of Nature Environment, June 16, 1967 and its implementing legislation April 10, 1969.

This legislation has been subsequently amended and augmented by more than 120 laws. For water the most important law is the 1969 Water Act which is still in force.

Three classes of surface water have been established in Bulgaria. They are:

- class I - drinking water for food industry and saving pools
- class II - recreation use and fish farming
- class III - irrigation and industrial use.

Enforcement of the ambient water and effluent standards relies on fines and civil penalties for non-compliance.

The Government intends to reformulate environmental legislation, to provide a framework in tune with the needs of a market oriented economy. Actions recently taken include the passing of the 1991 Environmental Protection Act and its amendment in 1992.

This Act establishes the principles of user charges and pollution charges. "The person polluting the environment and using natural resources shall pay charges for the contamination and usage of these resources." Funds will be credited to the account of the municipality on which territory the pollutant or the user is located.

2.5 The role of the NGOs in protection of the environment

The beginning of democratic processes in the country after 1989, the change of the political system and the aggravated situation of the environment in some regions in Bulgaria, resulted in a boom in formation of new ecological parties, movements, foundations, associations and unions. Now there are about 150 NGOs for protection of the environment in the country.

Their activity and number are indicative of the evolution in the public awareness in a part of the population. But still the increased awareness of the society to the environmental problems is not supported by real knowledge of the problems and the activities necessary for solving them.

Some NGOs gained public support for their actions, which aimed, through a strong social pressure, to repeal or change governmental decisions. These actions were used for purely political aims, and not for solving of the problems of the environment.

Efficiency of the NGOs activities is hampered by the lack of co-ordination within a given, NGO, as well as between the NGOs and the state institutions. Two national meetings of NGOs for Protection of the Environment showed that the lack of confidence and experience obstruct them in becoming a real power in solving the environmental problems in Bulgaria.

MOE realises the importance of participation of the society and in particular that of the NGOs in the efforts to solve the problems of the Environment. MOE has a special department "Information and Public Awareness". In co-operation with the PHARE-EC programme, a project for establishment of an Information Centre in the Ministry has been worked out since the end of last year. The objectives of the project are not only to deliver detailed and sufficient information, but to organise activities with the public as well, such as seminars and training courses, educational programmes etc.

3. Czech Republic

3.1 General

The Czech Republic is a continental, Central-European state. It covers 78.864 km² and it has about 10.3 million inhabitants. The capital of the country is Prague which is the biggest city with about 1.2 million inhabitants. Historically, the Czech Republic can be divided into Czech lands: Bohemia in the west, Moravia and Silesia in the east, the border between them running ultimately on the watershed to the North and Baltic Seas and south to the Black Sea.

3.2 Situation in the water and sanitation sector

3.2.1 Institutional aspects

The Czech Republic became an independent state only in 1993 when what used to be Czechoslovakia was divided. Up to that point the administration of water services in the Czech and Slovak parts of Czechoslovakia were identical. This is why the organisation of the sector in both these new countries is still very similar.

The present organisation in the sector is rather complicated and some important shifts of responsibilities between ministries are expected very soon (probably from the Ministry of the Environment to the Ministry of Agriculture). Therefore only basic institutional structure without details will be described.

Three ministries are presently involved in the water supply and sanitation sector. The Ministry of Environment undertakes the role of a central water management body. The Ministry's main field of interest is the protection and care of surface and ground water -both quality and quantity- in the nature, especially in aquifers, river beds, lakes and reservoirs. The Ministry of Agriculture is responsible for drinking water supply and sanitation and the Ministry of Health is responsible for health aspects of water supply, meaning the quality of drinking water in particular.

In the event of any new development, usually on a larger scale, the Ministry of Economical Policy and Development and the State Fund of the Environment (which is actually a part of the Ministry of the Environment) could be involved as well.

The operational matters are accomplished by various organisations, presently mostly responsible to any of these ministries. However, some of these organisations are on the nomination for privatisation and some of them have been already partly privatized.

Subordinated to the Ministry of the Environment are the Water Research Institute, the Hydrometeorological Institute, the Environmental Inspection (one branch is responsible for surface and ground water quality and is allowed to impose for violation of water law) and 5 river basins authorities. The river basins authorities are responsible for the management of

watercourses and for surface water supply. In addition they collect charges for discharge permit administer the registration of discharges.

Thirty-five Waterworks and Sewerage Companies, which are directly responsible for water supply, sewerage and wastewater treatment were responsible 1992 to the Ministry of Agriculture. Similar companies in Prague and Brno were responsible to municipalities. Some of these companies have been privatized and they are now owned and managed as share companies (the municipality is in this case one of the important share-holders), the majority of them have been transformed in such a way that they are now owned by the municipality and not by the state any more. This was laid down according the law of former Czech National Council 302/1992 in which is stated that "water supply, sewage and sewage water treatment is the responsibility of municipalities".

Hygiene Stations of different sizes and status are responsible to the Ministry of Health. One of the responsibilities of the stations is to verify water quality. The National Institute of Public Health creates the scientific base for them to work.

3.2.2 Present status of drinking water supply

The number of inhabitants utilizing the public water supply reached in 1992 8.71 million, i.e. 84.5% of citizens. In the same year the total installed production capacity amounted $64.1 \text{ m}^3 \cdot \text{s}^{-1}$, the total length of networks equalled 45,779 km. The data include also minor water supplies provided by parish authorities. The remaining 15.5%, living mostly in rural areas are supplied individually from their own wells. A more detailed overview about public drinking water supply networks gives the following table 1.

Table 1: Public drinking water supply networks in municipalities - according to size classes of municipalities

Size class of municipalities (permanently living inhabitants)	Number of municipalities in size class	Number of inhabitants in size class (thousands)	Number of inhabitants supplied from drinking water supply network (thousands)	Share of inhabitants supplied from drinking water supply network (%)	Number of municipalities with drinking water supply network
>100 000	7	2 401	2 357	98	7
50 000-99 999	16	1 127	1 093	97	16
20 000-49 999	38	1 128	1 070	95	38
10 000-19 999	78	1 104	1 070	91	78
5 000-9 999	134	933	802	86	131
2 000-4 999	346	1 049	671	64	294

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1991
 In 1992 all the public water facilities produced 1,173 mln m^3 of drinking water, from which 845 mln m^3 was invoiced and paid for. A detailed structure of water usage for public supplies in 1992 is schematically presented in table 2.

Table 2: Water usage for public supplies in the Czech Republic

Sources of water for public mains-off-takes - 1 173 mln m ³ 100 %				
Ground water - 497 mln m ³ 42%		Surface water - 676 mln m ³ 58%		
Processed (treated) water 865 mln m ³ (6 mln inhabitants) 74%		Non-processed (non-treated) water, only hygienically secured 308 mln m ³ (2.71 mln inhabitants) 26%		
Invoiced water total 845 mln m ³ 72%				Non-invoiced water ¹ 330 mln m ³ 28%
Invoiced domestic water 506 mln m ³ 43%	Invoiced water for agriculture 27 mln m ³ 2%	Invoiced water for industry 194 mln m ³ 17%	Invoiced water for other consumers 118 mln m ³ 10 %	

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1992

During recent years water consumption has dropped and thus the demand for drinking water has declined. Apart from the stagnation of industrial production, this is caused to quite a large extent by rising water prices. Next table 3 shows evolution in water production and consumption in recent years.

Table 3: Selected information about the operation of public drinking water supply network (including water piping being in possession of municipalities)

Indicator	Unit	Year				
		1985	1989	1990	1991	1992
Water produced	mln m ³ .year ⁻¹ %	1162.2 100	1250.5 107.6	1256.1 108.1	1210.2 104.1	1172.9 100.0
Water invoiced	mln m ³ .year ⁻¹ %	841.7 100	929.4 110.4	936.5 111.3	867.0 103.0	845.1 100.4
Specific water consumption per inhabitant from water produced	l. person ⁻¹ .day ⁻¹ %	387 100	401 103.6	399 103.1	383 99.0	369 95.3
Specific water consumption per inhabitant from water invoiced	l. person ⁻¹ .day ⁻¹ %	280 100	298 106.4	298 106.4	274 97.8	266 94.9

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1992

¹ This indicator include not only losses in pipes but also so called overall payment of some organisations and non-legal consumption. According some estimations up-to 15% of water produced can be "lost" in such a way (e.g. in Prague). However this can be only very roughly estimated.

The following table 4 shows the development in water and waste water pricing during the last years. The water and wastewater fees used to be very highly subsidized from the state budget². In 1991 the prices were increased considerably for the first time and this trend continues till now when the fees reached a level which practically reflects the cost of the services. The table is combined for drinking water fee and wastewater fee because the wastewater fee is usually calculated from the amount of drinking water used and real discharge is usually not measured. Only some, usually big, enterprises pay according the real amount of water discharged and pollution produced. This system can vary slightly in different places.

Table 4: Evolution of water and wastewater fees in last years (in Czech Crowns)³

<i>Period</i>	<i>Price for domestic use</i>			<i>Price for commercial use</i>		
	<i>Drinking water fee</i>	<i>Wastewater fee</i>	<i>Type of price</i>	<i>Drinking water fee</i>	<i>Wastewater fee</i>	<i>Type of price</i>
Before 31.12.1990	0.60	0.20	fixed	3.70	2.35	fixed
1.1.1991- 30.6.1992	1.50	1.50	maximal	4.50	3.50	maximal
1.7.1992- 31.8.1992	1.50	1.50	maximal	agreed		
1.9.1992- 14.5.1993	5.00	4.00	maximal	agreed		
From 15.5.1993	factually controlled prices ⁴					

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1992

The drinking water quality is in the Czech Republic assessed according the CSN (Czech State Norm) 75 7111 "Drinking Water" valid from 1991 which is based on criteria of WHO formulated in 1984 in "Guidelines for Drinking Water Quality". The norm contains 89 indicators of different importance. They can be divided according the hygienic and health relevance into three groups:

1. The most relevant indicators
 - limiting values of acceptable risks (LVAR)
 - maximum limiting values (MLV)

² For example even in 1992 the subsidy for operation of public water supply reached the level of 1,900 mln Kc.

³ 1 Dfl was in 1994 about 15 Kc

⁴ This means, very roughly explained, that users have to pay real expenses of utilities, which are naturally various in different places (it depends on many local factors as for example on the quality of water used as a source to produce drinking water). The concerned water company, which is naturally in certain place in monopolistic position, has to prove its expenses to produce a unit of water and demand only limited profit. The price can be still partly subsidised from local budget and exceptionally from the state budget. However the trend is very clear - consumers have to cover the costs of services.

2. The hygienically relevant indicators

- LVAR
- MLV
- limiting values (LV)

3. All indicators

- LVAR
- MLV
- LV
- indicating values (IV)
- recommended values (RV)

In connection with the application of the new CSN 75 7111 concerning drinking water, the quality of supplied drinking water was in 1991 evaluated in detail from a collection of 443 sources with treated water (i.e. 71% of the total produced water) and without detail from 2,800 sources providing only the hygienic secured water (29% of the produced water volume). The analyses were made by the Waterworks and Sewage Enterprises, the data were elaborated in Hydroprojekt Praha in collaboration with Water Research Institute TGM Prague. The results of the evaluation are summarized in the following table 5.

The quality of water used for individual drinking water supply of inhabitants in places where piped public water supply is not built is considerably worse than it is in piped water supply (as shown in previous table). According to the data which is available, only 5% of citizens who are not supplied from public water supply pipes have drinking water fulfilling the criteria of the CSN 75 7111. It means that more than 1.5 million of Czech Republic inhabitants must use hygienically unsatisfactory water from their local sources (either public or private wells). The reason for it is that the wells are shallow and therefore the water can easily be polluted. The causes of this pollution are as follow: agriculture (fertilizers, pesticides), fall-out mostly from combustion of solid fuels, influence of polluted surface waters, influence of sewage in villages with unsatisfactory or missing sewerage and violating of the regime in water protection zones. However, checking of these sources and thus the knowledge about the real quality of water is very low. In many places people do not know the real state of the water quality and do not perceive the necessity to improve the situation.

Table 5: Quality of drinking water produced in the Czech Republic

Group of water quality indicators	Water capacity not fulfilling the criteria		
	Total water produced	Treated water ⁵	Only hygienically saved water ⁶
Most relevant indicators (LVAR, MLV)	5.2%	4.4% ⁷	7.3%
Hygienically relevant indicators (LVAR, MLV, LV)	21.4%	22.3% ⁸	19.4%
All indicators (LVAR, MLV, LV, IV, RV)	33.9%	37.5% ⁹	25.0%

Group of water quality indicators	Proportion of citizens with permanently unsuitable water supply			Proportion of citizens with occasionally unsuitable water supply		
	Total water produced	Treated water	Only hygienically saved water	Total water produced	Treated water	Only hygienically saved water
Most relevant indicators (LVAR, MLV)	2.3%	1.9%	3.3%	17.1%	21.1%	8.0%
Hygienically relevant indicators (LVAR, MLV, LV)	11.3%	11.6%	10.8%	50.6%	66.6%	14.2%
All indicators (LVAR, MLV, LV, IV, RV)	18.6 %	20.8 %	13.8 %	47.6%	61.7%	15.6%

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1992

3.2.3 Present status of sewerage/wastewater treatment

The number of inhabitants who live in houses connected to public sewers reached in 1992 6.7 million, i.e. 72%. Houses of 5.3 million inhabitants were connected to sewage treatment plant. The total length of networks equals 17.771 km. A more detailed overview about public sewerage systems is given in the following table 6.

In 1992 in total 824 million m³ of wastewater went through the public sewerage systems. A total of 643 wastewater treatment plants (113 only mechanical with a capacity of 397,300 m³.day⁻¹ and 530 mechanical/biological with capacity 2,392,5 m³.day⁻¹) treated 890 million m³ wastewater (including rain water). Of the mentioned quantity 474 million m³, i.e.

⁵ A part of this evaluation was also estimation of costs needed to improve the present unsatisfactory situation (price level 1992).

⁶ 600 new treatment plants would be necessary to improve the existing water quality. Estimation of costs involved reached level about 5,400 mln Kc.

⁷ 4,500 mln Kc (about 300 mln Dfl) would be necessary to improve fulfilment from present 95,6 % to 99 %

⁸ 5,500 mln Kc would be needed to improve fulfilment from 77.7 % to 95 %

⁹ 1,500 mln Kc would be needed for reconstruction of present water treatment plants and 4,700 mln Kc for new technological steps to improve fulfilment of all indicators from present 62.6 % to 88 %.

53% were treated satisfactorily. A detailed structure concerning wastewater and its treatment is given in the following table 7.

Table 6: Public sewerage networks in municipalities - according to size classes of municipalities

<i>Size class of municipalities (permanently living inhabitants)</i>	<i>Number of municipalities in size class</i>	<i>Number of inhabitants in size class (thousands)</i>	<i>Number of inhabitants using sewerage system (thousands)</i>	<i>Share of inhabitants using sewerage system (%)</i>	<i>Number of municipalities with sewerage system</i>
>100 000	7	2 401	2 240	94	7
50 000-99 999	16	1 127	1 063	94	16
20 000-49 999	38	1 128	1 000	89	38
10 000-19 999	78	1 104	913	83	78
5 000-9 999	134	933	649	70	129
2 000-4 999	346	1 049	437	42	242

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1991

Table 7: Structure of wastewater released into water courses and into public sewer systems in the Czech Republic

Release into surface water in total - 1 033 mln m ³ 100 %			
Domestic wastewater 487 mln m ³ 47%	Industrial and other waste water 337 mln m ³ 33%	Ballast water 209 mln m ³ 20%	
Wastewater released into sewerage systems (invoiced) 824 mln m ³ 80%		Ballast water released into surface water (non-invoiced) 209 mln m ³ 20%	
Wastewater treated with sufficient effect 479 mln m ³ 46%	Wastewater treated with insufficient effect 411 mln m ³ 40%	Non-treated wastewater 199 mln m ³ 14%	
Treated domestic wastewater 374 mln m ³ 36%	Treated industrial and other wastewater 267 mln m ³ 26%	Treated ballast and rain water 249 mln m ³ 24%	Non-treated wastewater 199 mln m ³ 14%

Source: Drinking Water Supply and Sewerage Systems in the Czech Republic 1992

Annual organic pollution expressed in BOD₅ released into public drainage was in 1992 200,000 t; production of industrial enterprises was about 85,000 t BOD₅ of this. Working sewage treatment plants removed about half of it. Annual production of the sludge (expressed as dry matter) was 140,400 t; 79,500 t was dumped, the rest was used mostly in agriculture.

3.3 Inventory of problems in the sector and priorities for international cooperation

Main problems in the sector

Like in every sector in every country problems can be found also in the water supply and sanitation sector in the Czech Republic. They can be found on different levels. Some of them are common for the whole society like for example present shortage of financial resources. Some of them are specific for the whole sector like the rather complicated system of duties and responsibilities. Some of them relate to either with drinking water treatment or wastewater treatment and finally some of them relate to some region only or even with only a particular water treatment plant. However, it is usually quite complicated to determine the most serious problems. It depends very much on criteria used and on a point of view of the specialist trying to judge the situation. Consequently the problems found by different authors are often dissimilar¹⁰. In this paper problems are more listed than weighed because the importance of them very much vary from region to region and from time to time and a more detailed elaboration would not be relevant in this paper.

3.3.1 Problems in the sector common for the whole national economy

A. Shortage of financial resources (for new investments as well as maintenance of existing infrastructure)

Even if macro-economical indicators of the Czech Republic are in comparison with other CEE countries quite satisfactory (e.g. in 1993 surplus in national budget) it has been reached only due to sharp budget limitations. Moreover long-term neglecting of maintenance and development of infrastructure now demand even higher resources than would have been necessary in case of proper evolution in the past.

B. Outdated infrastructure

Outdated infrastructure in the water and sanitation sector does not only lower the quality of treatment process but it needs often more inputs (energy, chemicals), which have negative environmental effects.

¹⁰ The following chapter as well as the whole paper was written in the Netherlands without any special mission in the Czech Republic. The inventory of problems is made according previous working experience of the author (who is from the Czech Republic) or they are selected from literature available. Thus the list may be not complete. However at least the main problems should be included.

C. Poor public awareness and a low priority concerning environmental issues¹¹

It is rather difficult to adopt unpopular measures necessary to improve functioning of the sector without public opinion to support the process.

D. Lack of coordination of external assistance

In the Czech Republic as well as in other CEE countries increasing interest of western institutions trying to help to develop a functioning, democratic and prosperous system can be observed. Unfortunately the results do not correspond fully to the effort and money spent up till now because some of these activities address similar issues without any coordination and sometimes even without knowing about each other.

3.3.2 Problems specific for the sector

A. Sometimes there is no effective coordination among all bodies responsible including lack of information about the work and the results of others

B. Lack of sophisticated analytical instruments, chemicals, computers, software etc. (this is caused mostly due to a lack of resources and sometimes also because of limited knowledge about the things concerned). It is possible to find organizations which are very well equipped but it is more an exception.

C. The work in the sector has not been very attractive due to rather low average salaries. It is difficult to attract highly qualified staff. However the theoretical knowledge of the staff is not the main problem. The main problem is that the staff, and the managerial staff in particular, miss practical experience from commercially operated water or sewerage utility. It can be understandable but improvement is, especially in this transformation period, very important.

3.3.3 Problems in the sphere of drinking water supply

A. The share of inhabitants supplied from a drinking water supply network in different regions is unequal and in some regions insufficient. The situation usually has some historical reasons related to the former system of a planned economy.

B. Some sources of groundwater are overloaded and do not have sufficient capacity for dry periods (e.g. during 1988-1992). In such years about 1,000 villages are affected.

C. The water supply networks have not been properly maintained and reconstructed and the quality of the new water supply infrastructure used to be rather low. It leads now to high leakages.

¹¹ However this statement is valid only partly. Some people are actually aware of the environmental problems but the other, economical issues are just more pressing.

- D. The quality of water used for individual drinking water supply of inhabitants in places where piped public water supply is not available is very unsatisfactory.
- E. The quality of water from drinking water supply network does not completely fulfil the prescribed criteria.

3.3.4 Problems in the sphere of sewage systems and wastewater treatment

- A. The share of inhabitants using public sewerage systems in different regions is unequal and often insufficient.
- B. In some regions, the number of people supplied from public water pipes is considerably higher than the number of people living in houses connected to public sewerage systems (in extreme cases up to 25 %).
- C. Similarly to water supply network also sewerage systems are often overused and need reconstruction and repairation.
- D. Wastewater treatment does not exist in many places even with the sewerage network. If there are treatment plants, they do not usually satisfy present demands.
- E. Industrial wastewater treatment or pretreatment plants are often primitive and are operated ineffectively.
- F. Chemical composition of sludge usually does not allow its use (e.g. in agriculture) and it must be dumped.

3.3.5 Regional problems

According to the evaluation of water treatment plants and drinking water quality mentioned in 4.2 above a list of priorities in reconstruction or building of water and sewerage plants was created. The Ministry of Health and the Ministry of Agriculture maintain the up-to-date version.

For example in 1992 the construction of sewerage water treatment plants in the following towns was considered to be the most urgent: Pardubice, Uhersky Brod, Frydek-Mistek, Trinec, Uherske Hradiste, Sternberk, Hradec Kralove, Kolin, Kyjov and Studenka.

3.4 Priorities for international cooperation

The main role of the external support should not be to help directly but to perform the role of facilitator or intermediary between the Eastern and Western countries and institutions. There are three main ideas for the kind of support which the western countries could provide:

- A. providing training (for management and staff employed in the sector)
- B. sending experts from Western countries to Eastern countries
- C. finding money for investments (either donors or lenders)

All these approaches can be applied also in the Czech Republic.

A. Providing training and exchange of information

The western society faced very similar problems already more than 20 years ago and succeeded to a certain extent to solve them. Now it should be the main priority to find appropriate ways how this gained knowledge can be spread into the Eastern Europe. This can have different forms - from single workshops and seminars to formal twinning projects between water and sewerage utilities from different countries. The organisations and specialists interested would have to be found.¹² Some of the most important themes or questions which can be discussed are listed below. However, it would be desirable to address in the cooperation all the problems listed in chapter 4.2.

Main themes for training cooperation:

- water savings
- reduction of energy consumption
- sludge disposal
- priority of investments
- privatisation and optimal organisational structure
- charges and fines concerning water supply, sanitation and water pollution
- new technologies
- revitalisation of river systems
- optimal division of tasks among governmental, public, private and non-governmental organisations¹³.

B. Sending experts from Western countries (the Netherlands) to Eastern countries (the Czech Republic)

This approach, which can be very efficient in developing countries, should be used in the Czech Republic only exceptionally. Problems in Eastern Europe are not unique in a technical sense and usually it is possible to find specialists who know local conditions and who are able to find solutions. An advantage of local experts is also the much lower cost for their salaries. It is also the reason why such western experts, trying to find in few days solutions of huge, usually complex problems, are not very welcome in the Czech Republic because people think that finances used to pay them (even from external sources) can be

¹² In the Czech Republic one important constraint must be mentioned - not very satisfactory knowledge of foreign languages even among the high managerial staff. It requires either to arrange translation or to be very careful by choosing of specialists.

¹³ The present situation in the Czech Republic is rather confusing: On the one hand many activities which are for example in the Netherlands done by consultancies are in the Czech Republic done by miscellaneous governmental or semi-governmental organisations. On the other hand exaggerated privatisation can have sometimes adverse effects.

spent more efficiently. The more appropriate ways of "exploitation" of western experts were mentioned under point A.

C. Finding money for investments (either donors or lenders)

The costs of cleaning up the environment in CEE countries are enormous and the Czech Republic belongs to the countries with the most deteriorated environment in Europe. In principle, the money could perhaps be borrowed because the Czech Republic belongs among the leading states in the eastern Europe and its credibility among the international finance institutions is quite high. However, it would not be a very wise decision. The environment as well as water and sanitation sector is an integral part of society and however important part it is, loans should be taken primarily for animating economy and industrial modernisation. Moreover the available sources must be proportionally distributed among different compartments of the environment - there is not only water pollution but also air pollution, insufficient waste management, and so on. The loans should be taken only in exceptional cases - if any problem is very urgent (e.g. threat of adverse health effects), other sources are not available and preferably, if such investment is cost-effective (for example reduction of surface water pollution can reduce costs for drinking water purification).

It is doubtful whether the Czech Republic can attract donors because countries facing much worse problems are found even in the East-European region. Nevertheless this issue should be further investigated as well.

3.5 Conclusions

The water supply and sanitation sector like the whole society in the Czech Republic is in a transformation period. The long term objective of this effort is to develop reliable, cost-effective and efficient water supply and sanitation system fulfilling present environmental and economical demands. A similar period occurred some decades ago in the majority of industrially developed western countries. Experiences gained in West-Europe during this time can be presently very useful in the Czech Republic.

The situation in the sector in the Czech Republic is neither satisfactory nor catastrophic. The majority of inhabitants are supplied from public drinking water supply network (in big towns nearly 100%, in rural areas around 50%). The quality of drinking water does not represent an urgent health threat, however 33.9% does not fulfil all criteria of the Czech State Norm concerning drinking water quality. About 70 % of the inhabitants live in houses connected to public sewers and sewage and working sewage treatment plants remove about half of organic pollution released into it.

The main problems which undermine good performance of the sector can be found on different levels. The overall shortage of funds often does not allow the use of advanced technologies and attract staff of desirable quality. However, the main problem, which can be

solved with foreign assistance, is insufficient practical experience from a commercially operated water or sewerage utility.

3.6 Recommendations

The most appropriate sort of support in this stage would be provision of training and exchange of information (knowledge and know-how dissemination). It can have different forms - from single workshops to formal twinning projects between water and sewerage utilities. This approach does not require too much finance from either of the parties concerned.

This paper can serve as a main source of information concerning water supply and sanitation in the Czech Republic. However in order to be able to react in a concrete situation proper follow-up on the actual conditions in the sector should be maintained due to the very rapid change. Creation of contacts between interested parties in the Netherlands and in the Czech Republic should be continued as well.

The cooperation actions for the Czech and Slovak Republics could partly be combined. Laws and organisations concerning water supply and sanitation are in both countries due to common history very similar and it could be an appropriate way how traditionally good contacts among specialists from former Czechoslovakia can be maintained. Moreover it can substantially lower necessary expenses. However, the sovereignty of the two states and its implications should be kept in mind.

Based on a paper by
Mr. A.G.N. Jansen
with inputs by the
Romanian delegation

4. Romania

4.1 General

The population of the Romania is 22.7 million people who live in 260 towns and 13.000 villages. About 54% of the people population can be classified as urban. In the last decade the growth rate of the population in the urban areas has increased more than 3 times compared with the rural areas. The estimates predict that Romania will have 25.0 million inhabitants by the year 2020 and about 30 million in 2050.

Next to the capital town of Bucharesti (over 2 million people) there are 19 large towns (population between 100.000-300.000), 22 medium sized towns (50.00-100.000) and 45 small towns (20.000-50.000).

Romania possesses almost all types of water resources, whose potential can be estimated at 136 billion cm, divided, as follows:

- from interior rivers 40.0 billion cm,
- from natural lakes 1.0 billion cm,
- from underground sources 10.2 billion cm,
- from the Danube 85.0 billion cm (share).

The resources from Black Sea and salted lakes are not taken into account yet.

The analysis of these resources has to pay attention to some specific aspects.

Due to the geographical position and the relief Romania has great variations of its temperat-continental climate. The result of this situation is that Romania has a different hydrographic network: the lengths and the discharges of about 200,000 km of rivers differ very much from a zone to another. Using the term of "specific flow" ($l/s \text{ km}^2$) we can see on the map of Romania that this flow diminishes from West to East, the zones short water being: Bârlad, the tributaries of Prut, Northern Bărăgan and Dobrogea.

To the variation of Romania's rivers discharges can be recorded from an year to another as well as during the same year, the relation between maximum flows in rainy times and medium multi-annual flows has values between 12,5 (the Mureş river) and 27 (the Someş river) and other values of 80 (the Buzău river) and 1000 for rivers with receiving basin under 1000 sq.km.

It is obvious that most of the Romania's rivers have a torrential character, and that leads to periods with low and very low flows, when the water supplying for users is really difficult,

and to periods with high flows as well, which cause floods, material damages and losses of human lives.

The result of this situation is that, in order to assure water for the planned demand, it is necessary to re-arrange the water flows, by creating the water volumes in artificial lakes during rainy periods and using them during drought, and where this is not possible the solution is to transfer water from rich basins to poor ones.

All these considerations mean that the water management in Romania can be made only by establishing some fundamental, national and regional guidelines for a durable unitary, balanced and complex management of water and by reducing the destructive over water.

4.2 Institutional aspects

The Romanian Ministry of Water, Forests and Environmental Protection is responsible for the quality control and the use of water sources. The Water Department of this Ministry is amongst other things in charge of hydro(geo)logical monitoring of water sources, while the Environment Department co-ordinates the elaboration of quality norms.

The Romanian Water Authority, which is sub-ordinated to the Environment Ministry and which has branch offices in the countries' 15 hydrographic basins, is operationally in charge with water management issues.

At the national level the responsibility for water supply, sewerage and wastewater treatment rests with the Ministry of Public Works and Regional Planning.

Operation and maintenance of water supply, sewerage and wastewater treatment systems is ensured by specialized enterprises, so-called autonomous "Regia", which fall under the local authorities. Presently all 260 towns have public water supply and sewerage systems, while 202 towns are connected to wastewater treatment plants. Only 15% of the rural villages is connected to a piped water supply system.

The Health Ministry, through its local services, is responsible for the control of the quality of drinking water. This concerns notably urban water supplies; control of wells in rural area is not undertaken systematically and the knowledge about the quality of rural water supplies is only partial.

4.3 Present status of water supply in Romania

In Romania approximately 14 million people are served by piped water supply (i.e. coverage of 62%). Water is being supplied to 260 towns and 2060 villages. This implies that about 10940 rural communities (or 85% out of the total number) are supplied by individual wells.

Surface water is the main source for the production of drinking water (52 %, out of which 19% from impoundment reservoirs), besides groundwater (48%, out of which 3% from springs).

The total installed production capacity amounts to 110 m³/sec (or 3.5 billion m³/year).

The total length of the networks equals 29.300 km.

The development of (piped) water consumption by domestic consumers and industry over time reads as follows :

<i>Year</i>	<i>Water use (billion m³)</i>
1980	1.36
1985	1.72
1988	3.40
1991	2.85

The decline of the water consumption in recent years is due to the economic recession.

Although no clear cut figures were readily available to the mission, it followed from the various discussions that the percentage of unaccounted for water will range between 35 and 40%. This is mainly caused by the bad condition of the distribution networks, of which the age on average varies between 25-30 years, while 10% (3000 km) of the network is 40-50 years old.

Out of the total amount of piped water supplied, about 48% is used for domestic consumption and the remainder for other (notably industrial) purposes.

The specific domestic water consumption averages 240 l/c. day.

Data provided by the Hygiene and Public Health Institute show that in 1988 about 90% of the private wells in rural areas contained more than 50 ppm nitrates (sometimes even more than 1000 ppm). Each year about 40 cases of methaemoglobinaemia are reported, with 6 fatal cases in 1989.

Regarding piped water it showed that in 1991 about 15% out of 137.000 samples taken at various sources did not comply with national standards; this was also the case with 4% of 1.1 million samples which were taken from the distribution network in that year.

4.4 Present status of sewerage/wastewater treatment in Romania

About 9.1 million people (41% of the total population living in 258 cities and 287 villages) are connected to the sewers, which are of the mixed type and operate under gravity flow. Annually about 2500 million m³ wastewater is being collected. The total length of the sewerage network equals 9.500 km.

About 1900 million m³/annum (or 75% of the total volume) of seweraged wastewater is treated in 204 domestic wastewater treatment plants, which are of the mechanical or mechanical/biological type.

Furthermore there exist 3800 industrial wastewater treatment plants which treat about 800 million m³ wastewater per annum.

As an example of the sanitation arrangements at communal level the case of the Constantza city with a population of 350,600 in the Danube delta area is presented below.

The sanitation activity in the city of Constantza is assured by the Autonomus Regia for Sanitation (R.A.G.C.) subordinate to the local authority. R.A.G.C. Constantza is organised as an enterprise with financial autonomy, non-subsidized, with the following main characteristics:

1. The nature of the capital	state capital
2. The capital	680 million Lei (400 th)
3. Number of employees	580
4. Main Activities:	a. street sanitation b. collection, transport and neutralization of the waste; c. graveyard's management; d. metal, textile and wood manufacturing; e. road transport (for merchandise, passengers, deceased).
5. Annually income 1994	2.000 million Lei (1.500 th.\$)
6. Parck: sanitation cars transport cars equipments	43 15 10

The main activity of R.A.G.C. Constantza is the activity of sanitation, consisting of:

1. Street sanitation	105 streets, with a total daily surface of one mil. q.m.
2. Waste activity	400 th. inhabitants representing: a. 600 tons (1.800m ³) b. 156 thousand tons (470 thousand m ³) annual ey.

The street sanitation activity is made on the base of the monthly city hall's order, and the tariff of the working is decided by negotiation between partners.

Waste collection activity is based on the contracts established between the Autonomus Regia and its partners:

a. the block of flats, organized as lodger association, with two times a week collection;
b. households, with one time a week collection;
c. enterprises, public institutions, depending on necessity.

The partners are collecting the wastes in specialised vessels:

a. container of 0,11 m ³ with manually discharge;
b. container of 1,10m ³ with mechanized discharge;
c. container of 3,50m ³ with mechanized discharge.

The structure of the specialised parck is as follows:

Type of the car	ROMAN	LIAZ	ROMAN
Country	ROM.	CSSR	ROM.
Year of manufacture	1984-1990	1992	1993
Number	27	10	6
Capacity (q.m.)	10,5	16	12
Compression K _c (med.)	1,4	1,4	1,4
Compression system	translation	rotation	rotation
Type of container	0,11	0,11 1,10	0,11 1,10 3,50

The waste collection is realized on the basis of contracts the partners, in accordance with the graphic established between R.A.G.C., those days of the week which decided by mutual agreement.

Each specialized car is working in a well defined district of the city. The transport of the waste collected from the city is to a distance of 12 - 15 km. to the neutralisation discharge (sanitary landfill). The waste neutralisation activity consist in storage, levelling, mincing and pressing the waste in a continuous surface.

Because of the long time of exploitation (more of 30 years), without improvements and modernisations of the technology in all this time, this dip has become a real problem to the environment.

That's why the county and local authorities decided to arrange a new sanitary landfill area; the arrangement will be started before the end of this year.

The new waste tip will be situated in the neighbourhood of the old one, and it will be very modern, much bigger (for 30 years of normal exploitation) and built according to the most developed technology in the world, by a Romanian - French joint - venture company.

On the whole, the technology for collection, transport and neutralization of the waste in the city of Constantza, may be considered well-done but with some particularities which represent in the point of view of the present - day administration of the Autonomus Regia and also of the local authorities, primary objectives for modernisation, service quality increase, optimisation.

4.5 Transition of the water sector

Until recently urban water supply and sanitation services in Romania used to be provided by State run district service departments. Under the Law on the Restructuring of State Economic Units (February 1990) this task was taken over by public service enterprises, the so called Regia Autonoma "Apele Romane". It is envisioned that the ownership of these enterprises is transferred to the municipal governments in the near future. Local government would then become responsible for defining the policies under which the utility is to operate, while the management of the utility should preferably be autonomous in the actual running of the enterprise on a daily basis.

On average the public service enterprises in Romania face great difficulties to recover recurrent cost expenditures from tariff revenues. As in the former political system, they still depend heavily on district governments for investments to rehabilitate, replace and extend production and distribution facilities.

The financial resources at district level are scarce in the meantime, which is expressed by the fact that country wide a large number of water and sanitation projects (294) have remained incomplete.

4.6 Water supply and sanitation in Fundulea

The population of Fundulea, a small village in Calarasi county near Bucharest, amounts 6270 people. The majority of the people are employed in agriculture, while the State owned Research Institute for Cereals and Industrial Crops also provides employment.

Out of the total of 2700 households, 320 families are accommodated in flats, while 2380 families live in individual dwellings. The average household size varies between 2-3 people.

The average income amounts Lei 70.000/cap/month.

Infant mortality was reported to amount 176/1000, while respiratory diseases rank highest on the list of illnesses.

The municipal budget equalled Lei 32 million in 1993, out of which half was spent on the operation of the hospital and the other half on wages for the municipal workers, road maintenance (the majority of the roads are unpaved), public lighting, telephone and electricity.

Regarding water supply it followed from the discussions that there exist 3 piped (ground water) systems in the village, all together supplying water to 570 households; the remainder 2130 households each have an individual well.

Of the 3 piped systems one is being operated and maintained by the municipality (serving 127 households), another one by a workers association of the former sugar beet factory (serving 138 households) and the 3rd one by the Research Institute for Cereals and Industrial Crops (serving 305 households). It is planned that the system operated by the workers association will be extended with a branch (700 m, 1.5 " dia) in order to connect another 100 households with public taps; a budget amounting Lei 18 million (government subsidy) has recently been approved for this purpose. Consumers connected to the piped system are charged for their water consumption. The State owned Research Institute for Cereals and Industrial crops e.g. charges Lei 84/m³ and is thus able to cover operation and maintenance cost of the system, including the monthly payment to Apele Romane for the abstraction of groundwater (Lei 160.000/month)

Except from the system operated by the Research Institute for Cereals and Industrial Crops, which delivers a good quality of water, analysis taken by the health authorities show that the water supplied through the other 2 systems does not comply with the national quality standards (as regards bacteriological and inorganic parameters). Disinfection of the water is not done properly and regularly.

According to analysis performed by the health authorities from Calarasi the quality of water from the open shallow wells (depth -20 mtr) does not, in all respects, comply with the national standards. Nitrate contents were, however, were reported not to be problematic

(20 ppm against the national standard of 50 ppm). The hospital in Fundulea, which serves a regional purpose, has nevertheless made mention of 2-3 cases of methaemoglobinaemia (blue babies).

In view of the pollution of the phreatic water and thus of the shallow wells, it is the preference of the municipal authorities to have a centralized water supply system which would serve the entire village population. State budget, allocated via the county council, should provide for the required financial resources in this respect. If sufficient funding would not become available, then priority is given to improving water supply of the hospital and the school in Fundulea.

The workers houses of the Research Institute for Cereals and Industrial Crops are connected to a sewer system and a mechanical/biological treatment plant. All other houses in the locality are provided with latrines. The desire of the municipality is to have the entire village population connected to a sewerage system.

4.7 Water supply and sanitation in Vidra

Vidra, a small village in Ilfov county near Bucharest, has 8422 inhabitants. Out of the 2655 households, 36 households live in a number of flats and the remainder in individual houses.

The majority of the population is employed in agriculture, with a lot of vegetable produce being sold in Bucharest.

The average income is about Lei 150.000/cap/month. Compared with Fundulea, the general outlook of Vidra is much better.

In 1993 the municipal budget amounted Lei 28 million. The municipal budget for 1994, which the municipality has proposed to the council of Ilfov county, amounts to Lei 300 million, to be spent on repair of roads, rehabilitation of the townhall and the design of a piped water supply system.

There is 1 piped system in the village serving the 36 households living in flats and the Institute for Vegetable Research. The system comprises 4 wells, a reservoir and a distribution system. Also the hospital has its own water supply system, while the remainder of the population rely on individual shallow wells (depth 6-12 metres).

According to the health authorities of Bucharest the quality of the piped water in Vidra is adequate. The quality of the well water was reported to be very poor. Excessive nitrate contents of the water has resulted in 2 fatal cases of methaemoglobinaemia. Also from a bacteriological point of view the water is not reliable. The health authorities also have reported that 1 case of an eye disease was related to the presence of a parasite (not specified) in the well water.

The workers' houses of the Institute for Vegetable Research and the hospital are connected to a sewer system which discharges in a Imhoff tank. From the field visit it was apparent that this system was in a poor condition and (most probably) by-passed.

The mayor of Vidra has reported that, based on law nr. 69 regarding local administration, the village of Vidra is legally independent; financially this municipality, however, still relies on state/county budget allocations. Under the new law on local tax administration, which is expected to be approved soon, the village would be in the position to collect local taxes and thus become financially independent. The mayor was determined to improve the village water supply and finance a new piped system from the local tax revenues. In this respect the municipal council has recently agreed that the design for such system should be made.

The mayor was keen to receive Dutch support in establishing the appropriate village level organization, to become responsible for the technical and finance administrative aspects of water supply operations.

4.8 Public works utility of Ilfov County

January 1994 the council of the county of a Ilfov has established a regional Public Works Utility. According to its director general this utility will be available for the 38 villages and 1 city in the county (300.000) as for the design, implementation and operation and maintenance of systems for water supply, sanitation, solid waste, heating etc.

Financial resources for the utility will be derived from the county budget (which is, and most probably will remain, a very meagre resource, i.e Lei 1.5 billion for public works expenditures in the county in 1993). The utility will be responsible for spending of this money in the county.

Furthermore the utility may, in a contract arrangement with the municipalities, undertake design, construction and operation and maintenance of municipal services infrastructure.

The director general was not (yet) able to depict the organizational set up and the operational strategy of the utility to perform the said responsibilities.

4.9 Bucharest waterworks and sewerage company

This municipal utility provides drinking water to the 2.3 million inhabitants and a number of industries in Bucharest. The installed production capacity is 1.45 million m³/day.

Water of less quality (capacity of 0.2 million m³/day) is supplied to other industries through a separate system.

Surface water (rivers Arges and Dimbovita) constitutes, apart from groundwater (712 wells in 4 wellfields), the main source (90%) for the production of drinking water. The utility has planned to construct a raw water storage reservoir with a detention time of 2 days to increase the reliability of the water supply. In order to create a strategic reserve it is furthermore planned to increase the installed groundwater production capacity.

The separate industrial water supply system is fed from 2 lakes near Bucharest.

Presently 2 water treatment plants are operational.

The technology applied in the water treatment plant near Dimbovita river includes sedimentation, coagulation, flocculation, (partly) slow sand filtration and (partly) rapid sand filtration. The slow sand filtration part of the system dates from 1885. The treatment plant near the Arges river is overloaded for 15-20%. To increase the treatment capacity a 3rd plant is presently under construction.

The reservoir capacity of 280.000 m³ is insufficient and requires extension. Presently 35.000 m³ additional capacity is under construction in the south part of the city.

The pumping stations operate at low efficiency with considerable head loss. The water utility intends to install variable speed pumps.

The condition of the distribution network is rather bad with reported physical leakage of up to 50%. About 30% of the entire network is due for replacement. The 70.100 connections include 4.500 commercial premises, 11.000 flats and 54.600 individual houses. Only 20% of the watermeters function.

Average domestic consumption was reported to be 250 l/cp. day.

The wastewater of the city is collected in a (combined) sewerage system. A treatment plant is under construction.

Cooperation programmes between the Bucharest Waterworks and Sewerage Company and donor agencies/investors cover:

- * Feasibility study for rehabilitation of the entire water supply system (World Bank-JICA co-financing; start February 1994);
- * A small joint venture with Compagnie General des Eaux has been established in 1993; one of the first tasks concerns the development of a mathematical model for the water supply network;
- * Discussions with EBRD are ongoing regarding investments for rehabilitation of the distribution network, improvement of pumping efficiency and metering of the water connections.

The management of the water utility has stated not to be in the position to provide further details, including figures on the financial operations, without the prior consent of the city administration.

This would require the submission of a formal letter of interest to the city administration beforehand, proposing subjects to be covered under an eventual co-operation programme with The Netherlands.

Tentatively the management of the water utility has, however, expressed its interest to co-operate in the following fields:

- * Transfer of knowledge regarding advanced surface water treatment technologies (combined granular activated carbon and sand filters);
- * Appropriate alternatives for ductile iron tubes in the distribution network;
- * Re-design of the sewerage network, of which the present capacity is not sufficient to accommodate peak rainfall;
- * Assessment of the present quality of the wastewater; it is expected that actual loading of the treatment plant will differ from the design parameters (based on 1970 data).

4.10 Conclusions

Throughout the discussions the lack of capital has been mentioned as one of the most important impediments for improving the water supply and sanitation conditions in Romania.

The technological capacity to design and implement these systems is locally available; PROED S.A. and ARCIF S.A. for instance are local consultancy firms with experience in amongst others the water supply and sewerage sector (also abroad).

Sector re-organization is ongoing, with delegation of powers and responsibilities (also financial) from the central/county authorities to the municipalities. Local administrations seem eager to take up these responsibilities and independently manage their own water and sanitation affairs. Given their socio-economic status some municipalities will be in a better position to achieve this goal (Vidra) than others (Fundulea).

A Public Works Authority has recently been established in Ilfov county, amongst other to support of water and sanitation development in this region. The capabilities of the utility to draw-up strategic and investment plans need to be developed.

To improve water supply conditions in smaller cities/villages like Vidra and Fundulea requires abandoning the present system of shallow wells which are very much prone to pollution and thus constitute a public health risk. Individual deep wells or piped supplies are adequate solutions. Nationwide the required investments for this purpose are substantial.

Given the financial constraints of the country it is not likely that the State will be able to support these investments on a large scale in the short or even longer run. Improvements therefore will very much depend on the initiatives taken at the local level.

The operational and financial performance of urban water utilities requires improvement. Better service delivery and cost recovery seem key issues in this regard. This cannot, however, be done without substantial investments for rehabilitation and augmentation of the present services.

4.11 Recommendations

In view of the discussions held with several parties the mission recommends the following activities to be covered under a cooperation programme between the Romanian and Dutch water sectors:

- * Support the municipalities in establishing adequate local organizations which would become responsible for the operation and maintenance of village level water supply and sanitation. In view of the keen interest expressed by its mayor, it is suggested that the village of Vidra might be selected as a pilot location in this context. Experiences gained could be disseminated to other municipalities through workshops;
- * Strengthen the capabilities of the Public Works Authority of Iflova county to draw up strategic and investment plans regarding regional (rural) water supply and sanitation development. Experiences gained could be disseminated to other regional utilities through workshops;
- * Transfer Dutch knowledge regarding advanced drinking water treatment technologies to the Waterworks and Sewerage Company of Bucharest (the mission is of the opinion that local expertise is available to cover the other areas of co-operation suggested by the Bucharest water utility as outlined under para 3.9).

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with inputs of the
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5. Slovak Republic

5.1 General

The population of the Slovak Republic amounts to 5.3 million people living in 2834 towns and villages. About 55 % of the population can be classified as urban; they live in 72 communities larger than 10.000 people. About 1 million people live in Slovak Republic's 6 largest cities, i.e. Bratislava (440.000), Kosice (240.000), Banska Bystrica, Nitra, Presov and Zilina, the latter 3 cities with a population ranging between 90.000 and 100.000 inhabitants.

The territory of the Slovak Republic has a basin area of 48.950 km². In the mean year 36.37 billion m³ of precipitation falls in Slovakia, run-off represents 12.59 billion m³ of water. To improve the run-off conditions 50 reservoirs and weirs have been built and are under construction.

5.2 Institutional aspects

The Ministry of Environment in Slovakia is responsible for all legislative aspects regarding water; it is furthermore responsible for monitoring the quality of ground and surface water, the licensing of raw water abstractions for the production of drinking water, the licensing of wastewater discharges, the approval of the construction of water supply and wastewater treatment works as well water resources planning. The Environment Ministry operates through 38 district and 125 sub-district offices in the country.

The recently formed (1992) Ministry for Land Economy is responsible for operational matters regarding water management. The 4 water authorities under this Ministry, which are organized along river basins (Danub, Vah, Hron and Bodrog/Hirnad), are responsible for maintaining water flows, the management of water structures and the monitoring of water quality, water abstractions and wastewater discharges.

The five Waterworks and Sewerage Companies also come under this Ministry. They are responsible for water supply, sewerage and wastewater treatment throughout the country, i.e.:

- Waterworks and Sewerage Company of Bratislava town;
- West Slovakian Waterworks and Sewerage Company, Bratislava;
- Central Slovakian Waterworks and Sewerage Company, Banska Bystrica;
- North Slovakian Waterworks and Sewerage Company, Zilina and;
- East Slovakian Waterworks and Sewerage Company, Kosice.

The supply region of each regional water company (VAK) is subdivided in 5-13 districts.

The Health Ministry is responsible for the supervision of the quality of the drinking water, the elaboration of drinking water quality standards and the monitoring of water related infectious diseases. This Ministry operates through 38 district offices, each one has a laboratory to perform routine analysis. In addition 4 laboratories are available to carry out further, more complicated analysis.

5.3 Present status of water supply in Slovakia

In Slovakia approximately 4 million people are served by piped water supply (i.e. coverage of 76%); in cities with a population over 10.000 people the coverage ranges between 80-90% (Bratislava: 99%). The total number of connections amounts 86.260, out of which the majority (74.440) is metered, often however, in bulk (group of households in a block).

Groundwater is the main source for the production of drinking water (85%; 980 pumping stations), besides surface water (15%; 5 reservoirs and 121 river water intakes). About 80% of the well fields are reported to be surrounded with protection zones.

The total installed production capacity amounts 28.3 m³/sec (1213 plants), including a treatment capacity of 7.5 m³/sec (115 plants).

The total length of the networks equals 23.776 km, while the reservoir capacity amounts 1.5 million m³.

The water demand has increased in the period 1980 - 1990, but shows a decline in recent years, due to amongst other things to the economic recession, gradual installation of individual meters for households and increases in water fees. In 1992 about 595 million m³ drinking water was produced out of which 450 million m³ was sold, leaving 145 million m³ unaccounted for (24%). The latter figure illustrates the need for rehabilitation and renewal of transport and distribution mains (50-60% cast iron, 15-30% steel and 20-30% plastic) of which the average age varies between 20-35 years.

The division of water delivery over the several water consumption categories reads as follows:

Domestic users	60%
Industry	17%
Agriculture	3%
Other	20%

The specific domestic water consumption averages 179 l/c. day.

It is estimated that at any point of time about 20-25% of the supplied water does not comply with all the prescribed national water quality standards (pertaining to bacteriological, organic and inorganic parameters).

5.4 Present status of sewerage/wastewater treatment in Slovakia

About 2.7 million people (51% of the total population living in 270 communities) are connected to the sewers, which are of the mixed type and operate under gravity flow (with intermediate pumping stations, when needed).

Annually about 560 million m³ wastewater is being collected, consisting of:

Domestic wastewater	215 million m ³
Industrial wastewater	245 million m ³
Rainwater	100 million m ³

The total length of the sewerage network is 6.767 km.

A total of 181 wastewater treatment plants (157 mechanical/ biological and 24 mechanical installations) treat 500 million m³ wastewater per annum. It is estimated that 50% of the plants are overloaded while overall the treatment efficiency varies between 65-70% (BOD5 removal). Most of the sludge (80%) is being used in agriculture (some sources refer to 50% being used).

In 1990 wastewater discharges in Slovakian rivers totalled 1259 million m³, consisting of:

Effluent from treatment plants	508 million m ³
Untreated wastewater through sewers	50 million m ³
Others (mostly from industrial origin)	701 million m ³

5.5 Transition of the water sector

According to the constitution the responsibility for water supply and sanitation rests with the local bodies. It is anticipated that in due time the ownership of the, presently State owned, water and sanitation assets will be transferred by law to these local bodies (the so-called transformation stage). The opinions differ if this will take place already this year or in the next year, depending on the fact whether the transfer of assets will be at in the same time also as the gas and electricity sectors or not. It is subsequently up to the local bodies (municipalities) to decide in what way the water supply and sewerage systems will be

operated (the so-called privatization stage). This could take the form of establishing privately and/or publicly owned companies, organized on a municipal and/or regional basis, to become responsible for the proper delivery of these services.

The valid proposal for privatization of the water supply and sanitation sector indicates that the water supply and sewerage authorities would be transformed to stock companies owned by associated communities or a company owned community. The transformation is planned to take place as a non-cash transfer. Many things are at stake here including economies of scale, setting of tariffs (which will become free), quality surveillance of the drinking water produced, employment conditions, maintenance and investment prospects etc. Seeking the optimal solution is undoubtedly one of top priorities in the minds of the parties concerned.

5.6 Waterworks and sewerage company of Bratislava

This State owned company, established in 1886 and employing 870 employees, daily supplies about 265.000 m³ drinking water to the 440.000 inhabitants (almost 100% connections) and industrial consumers of Bratislava. River bank filtration (Danube river) is being applied as a technology for the production of drinking water. The quality of the water is good, only in some places treatment is required (iron and manganese removal). The company operates a network of 1175 km, 106 pumping stations and 27 water reservoirs with a total capacity of about 230.000 m³. All drinking water connections (26.000) are metered in bulk or at individual households.

The unaccounted for water is 20-25%; about 30% of the distribution network is due for replacement.

Daily about 255.000 m³ of sewage is being collected in the municipal (mixed) system with a length totalling 900 km. The wastewater is pumped to the 3 mechanical biological treatment plants (total capacity 1.6 million i.e.!) through 4 pumping stations. About 98% of the population was reported to be connected to the sewerage system.

The water supply and wastewater charges for domestic consumers have increased from Sk 0.6 /m³ in 1989, to Sk 3/m³ in 1992 and presently amount Sk 6/m³. Water and wastewater charges for industrial connections are based on bilateral agreements.

The annual turnover of the company equals Sk 400 million. Tariff revenues cover operational cost expenditures and replacement investments, but extension of the water/sewerage systems requires a State subsidy.

The company's policy is to gradually reduce the number of staff through automation of the operations. The assets of the company were reported to constitute a book value of about Sk 9.5 billion.

5.7 West Slovakia waterworks and sewerage company

The company, with 3000 employees, supplies water to about 1.2 million people (the total population in the supply area amounts 1.7 million). The company is organized along 12 operational units, out of which 11 are responsible for the provision of water and sanitation services in the respective districts.

One of these units, visited by the mission, covers the Dunajska Streda district, which operates 22 water supply systems providing water to 37 communities including 3 towns (totally 80.000 people). This unit is also responsible for the operation and maintenance of 4 wastewater treatment plants.

The district laboratory performs the usual microbiological, organic and inorganic analysis of the water and wastewater. More sophisticated analysis are supported by the laboratory at the headquarters in Bratislava.

The 12th unit operates 4 regional water supply systems which extend all over West Slovakia and support water supply to many villages and cities where water resources are locally not sufficient. The regional systems are fed by 6 large capacity groundwater production plants (with a total capacity of 4.7 m³/sec or 150 million m³/year) and consist of large diameter (1200 mm) transport mains. The largest plant is situated in Gabčíkovo with a present installed capacity of 1040 l/sec (13 wells of 80 l/sec production capacity each).

The entire supply area of the West Slovakian Waterworks and Sewerage Company approximates 120x120 km.

The company operates 51 wastewater treatment plants; this number includes 4 mechanical installations and 47 mechanical-biological plants out of which 19 plants are equipped with sludge digesters and gas utilization equipment.

The (social) tariff for domestic consumers equals 7 Sk/m³ (i.e 4 Sk for water supply and 3 Sk for wastewater). The tariff charged to industrial consumers is higher and depends on contracts between the Waterworks and Sewerage Company and the industry concerned (the minimum is however Sk 9.5/m³, that is Sk 5.25 for water and Sk 4.25 for wastewater).

The annual income from water sales equals Sk 900 million (Sk 509 million charged for water supply and Sk 413 million charged for wastewater collection/treatment).

The tariff revenues allow for coverage of operational cost and replacement investments. Investments for extension of the system however require State support (Ministry of Land Economy). This flow of subsidy is declining: In 1993 Sk 460 million was available for capital investments out of which the State has contributed Sk 303 million. This year the Government's share has declined to Sk 38 million.

The assets of the company were reported to constitute a book value of Sk 10 billion.

5.8 Priorities for co-operation

5.8.1 General

From the discussion with representatives of the Ministry of Land Economy, the Bratislava Waterworks and Sewerage Company and the West Slovak Waterworks and Sewerage Company it followed that the Slovakian partners are eager to establish a co-operation programme with the Netherlands water sector.

The mission was, however, also informed that about 20 previous missions had already visited Slovakia before, unfortunately without any noticeable follow up. The Ministry of land Economy has suggested that results of the proposed co-operation between the Netherlands water sector and the utilities in Bratislava and West Slovakia could stand as a model for other municipal and regional water utilities in Slovakia.

5.8.2 Assistance for transformation/privatization

In view of the process described under para 2.5 above the Waterworks and Sewerage Company of Bratislava would welcome the advice of Dutch utility experts regarding the requirements of a commercially operated municipal water utility. Questions relate to the optimal legal basis, organizational structure, adequate financial and investment planning, enhancement of creditworthiness, tariff policies, the organization of consumer and public relations. The company's management was moreover interested to study the structure of appropriate lending organizations in The Netherlands (i.e. Waterschaps Bank).

The West Slovak Waterworks and Sewerage Company is seeking the advice of Dutch utility experts regarding the optimal organization of water supply and sewerage/treatment services at the regional level. It is felt that "atomization" of the regional water supply, that is the creation of many smaller utilities, would adversely influence the present economies of scale, endanger sound operation and maintenance, retard investments, distort social tariff policies (i.e through the current cross-subsidization principle) and endanger adequate quality control. The option of transferring the State owned company into a publicly owned limited liability company, according to the Dutch model, sounds interesting to the Slovakian partners and they are eager to be informed about the ins and outs of such a model.

5.8.3 Sector development

Although the situation has improved in recent years, employment in the Slovakian water and sanitation sector was traditionally not very appealing in view of the better remuneration in other industrial sectors.

The quality of the labour force is therefore an issue. Moreover the present employees, however good their theoretical background might be, require to be exposed to the practices of a sound, commercially operated water and sewerage utility, in order to improve on performance.

During the discussions the Slovakian partners have therefore expressed their interest in a model for professional training which is currently operational in the Netherlands water sector.

Given the fact that in the future eventually more water utilities will eventually be established in the West Slovakian region, the added value of a supporting and co-ordinating body is realized. The Slovakian partners were aware of the existence of waterworks associations in the German Federal Republic (BGW-Federal Association of the Gas and Water Industry) and Austria (OWWV-Osterreichischer Wasserwirtschaftverband). In the framework of a co-operation programme with the Netherlands water sector it was proposed that the organizational set up, tasks and modus operandi of the Netherlands Waterworks Association (VEWIN) would be studied and serve as a basis for developing a model for the Slovakian water industry.

5.8.4 Legislative aspects

From discussions with the West Slovak Waterworks and Sewerage Company the mission came to understand that a new water law has been prepared by the Environment Ministry, which will replace the existing law of 1973. The draft law will be subject to comments by parties concerned, including the water utilities. The West Slovak Waterworks and Sewerage Company would like to receive Netherlands assistance in reviewing the law and make recommendations.

The Waterworks and Sewerage Company of Bratislava has shown a keen interest in the transfer of Dutch experience regarding the organisational framework and legislative aspects of groundwater protection. Upon inquiry the Slovak partners stated that sufficient geohydrological expertise was locally available regarding the design of protection zones.

5.8.5 Technical aspects

The management of the West Slovak Waterworks and Sewerage Company would appreciate to share Dutch expertise regarding the automation of regional water supply services and to improve the efficiency of wastewater treatment operations.

The mission has visited the wastewater treatment plant which serves the city of Dunajska Streda. This mechanical-biological plant was completed 1992 (investment cost: Sk 240 million) and designed for 80.000 i.e. During the visit staff highlighted some serious design errors, amongst others resulting in turmoil water passing the overflow weirs of the aeration tank.

The staff of the Waterworks and Sewerage Company of Bratislava has requested the co-operation with Dutch parties in the building of local knowledge regarding 3rd stage wastewater treatment technology. Removal of nitrate and phosphate from the wastewater will be required by law from 2005 onwards.

5.9 Recommendations

The Slovakian counterparts have been informed that the results of this mission will serve as input for a document which will be prepared by IRC International Water and Sanitation Centre in The Hague, The Netherlands; this document is planned for discussion during an international workshop tentatively scheduled for September 1994. It is anticipated that also representatives from the Slovak Republic will be invited to attend the workshop, together with representatives of the Netherlands Ministry for Housing, Physical Planning and Environment (VROM) and bi/multilateral donor agencies.

The mission recommends to start up a co-operation programme between the Netherlands and the Slovakian water sectors.

In order to establish initial contacts between relevant counterparts it is suggested that a delegation of Slovakian representatives of the Ministry of Land Economy, the Bratislava Waterworks and Sewerage Company and the West Slovakian Waterworks and Sewerage Company would visit Holland during 1 week. The objective of this visit would be to facilitate contacts between relevant parties and expose the Slovakian delegation to the organisational set up, management and operations of water sector of the Netherlands.

Subsequently exchange visits could be carried out by Dutch and Slovakian water experts in order to co-operate on the subjects highlighted under paragraph 2.8 above, i.e.:

- * transformation/privatization;
 - requirements for commercially operated urban water utilities,
 - optimal organization of regional water/wastewater operations.
- * sector development;
 - training of middle/higher level water supply and wastewater technicians,
 - development of a model for a waterworks association.
- * legislative aspects;
 - review of the draft water law,
 - organisational framework/procedures for groundwater protection.
- * technical aspects;
 - 3rd stage wastewater treatment (nitrate/phosphate removal),
 - automation of regional water supplies,
 - improvement of wastewater treatment operations.
- * workshops for disseminating gained knowledge and experience to other water/wastewater utilities in Slovakia.

6. Exposure Visit and Seminar of Invited Experts from the Four Countries

6.1 Framework and programme of the event

An exposure visit and a seminar was arranged from October 3-14, 1994 to start a dialogue with the sector representatives in the four countries, Bulgaria, the Czech Republic, Romania and Slovakia and the Netherlands, on how to best cooperate in order to promote the sector in all the countries concerned. An essential part of the event was the opening session, where the country delegations presented the state of art of the sector in their country, prior to being exposed to a number of presentations and site visits in the Netherlands. The presentations formed a basis for the following programme and gave an insiders view to the audience. They revealed the differences and similarities and added to the literature and short mission based information collected in advance.

The purpose of the visits and the presentations was to present, as an example of a different history, of how the sector is organized and functioning in the Netherlands. This in order to provide a context for the discussions in the seminar, which followed.

The programme of the exposure visit component of the event consisted of the following:

- * Visit to a regional water supply system, Gelderland Water Company, with presentations on organizational, managerial and financial aspects including public relations activities.
- * Visit to an internationally oriented consultancy company, DHV, with presentation of computer aided planning.
- * Visit to a wastewater treatment plant, Delfland Water Board, with a presentation on regional wastewater collection system.
- * Visit to a big local water supply company, Water company Europort, with a presentation on a municipally owned water company.
- * A case study/workshop on the theme management aspects of a local water supply company, emphasizing cooperation between sectors and different levels of actors.
- * Visit to the ministries of sector, VROM - public water supply in The Netherlands and National Water Board - role of the National Water Board in the Netherlands.
- * Visit to see the regional control mechanisms, RIZA.
- * Visit to a sewage treatment, sludge incineration and solid waste management organization, Hollandse Eilanden en Waarden, Dordrecht.
- * Visit to an internationally oriented consultancy company, IWACO, with a presentation on their approach to the CEE countries.
- * A workshop on environmental degradation and mitigation with a role play around an actual pollution case in the Netherlands.

The emphasis in the Dutch presentations during the programme was in managerial and organizational aspects of the sector in a market economy with a social control.

6.2 The seminar

The seminar was a two-day event which started with presentations of the country delegations. The presentations were describing the sector status with a reflection of the exposure visits and the presentations of Dutch-based experiences. Following a presentation of the PHARE project (Assistance for economic restructuring in the countries of Central and Eastern Europe), in which the financing policy and possibilities were introduced, the seminar divided into two working groups. The first group concentrated on institutional and technical issues and the other one on managerial and financial issues of the sector in the four countries. The purpose of the group work was on the one hand to find out the needs, possibilities and priorities for cooperation as well as benefits of transfer of Dutch-based experience and knowhow. On the other hand the purpose was to create a learning possibility to the Dutch participants. For this purpose representatives from the Dutch water sector were invited to the seminar.

The groupwork used a shortened and modified ZOPP method to analyze the problems, determine the priorities and to find solutions/fields of cooperation. After the group work the seminar drew up conclusions together.

6.3 Problem analysis, set of priorities and possible solutions

The two groups concentrated in country-wise search of core problems. The problems found by the participants were the following:

PROBLEMS

Bulgaria:

1. Institutional and technical issues
 - Limited corporate autonomy and commercial orientation of the RWCs and local authorities
 - Poor efficiency of RWCs' operation and cost recovery
 - Deteriorated environmental urban conditions causing health problems and threat to water resources
2. Managerial and financial issues
 - New water act is not yet operational
 - Financial dependency on state budget
 - Restrictive financial policy
 - Lack of finances for investments

The Czech Republic:

1. Institutional and technical issues
 - Lack of protection zones of surface and ground water sources
 - Improper sludge disposal
 - Outdated drinking water and sewerage legislation

2. Managerial and financial issues
 - Limited experience in market economy conditions of management of the stock water companies
 - Poor public relations technique in regional water companies
 - Lack of long term planning and investment policy
 - Lack of resources for investments

Romania:

1. Institutional and technical issues
 - Poor state of existing drinking water supplies
 - Inefficient administrative organisation of the sector
 - Lack of measuring equipment for water produced/sold
2. Managerial and financial issues
 - Lack of experience of managing a water company in a market economy
 - Poor financial management
 - Poor strategic and operational management
 - Missing integrated water resources management
 - Poor information management systems
 - Very limited financing possibilities

Slovakia:

1. Institutional and technical issues
 - Difficulties in transforming/privatization process
 - Inadequate protection of water sources
 - Lack of automation in water production and distribution
2. Managerial and financial issues
 - Unexperienced financial planning
 - Lack of finances in capital market
 - Unbalanced cash flow
 - Lack of public relations experience
 - Missing logistics of management process

The priorities, when tackling the problems, were then formulated by the participants:

PRIORITY ACTIONS

Bulgaria:

1. Institutional and technical issues
 - Decentralization of the WSS sector
 - Commercialize the services
 - Granting of autonomy to the water supply & sewerage utilities
 - Making technically feasible plans/ data and parameters for new technology
 - Introducing effective control mechanisms

2. Managerial and financial issues
 - Approval of new water act
 - Granting of financial autonomy to water/sewerage companies
 - Price liberalization
 - Finding of external financing

The Czech Republic:

1. Institutional and technical issues
 - Establishing twinning relations between water utilities for training of personnel and exchanging of experiences
2. Managerial and financial issues
 - Exchange of experts
 - Arranging of training courses in the country and sending participants to courses abroad
 - Participation in the PHARE programme

Romania:

1. Institutional and technical issues
 - Rehabilitation of the existing drinking water supply systems
2. Managerial and financial issues
 - Improving the management skills through international assistance
 - Pilot project in integrated water resources management
 - Expanding automatic data processing in management
 - Acquiring of external long term loans for improvements

Slovakia:

1. Institutional and technical issues
 - Utilization of external experiences and knowledge for transformation and creation of new laws
2. Managerial and financial issues
 - Importing foreign knowhow and external financing
 - Training of sector personnel in financial, logistical, and public/consumer relations matters

The groupwork ended in a session where the seminar participants drew the problems together into solutions/ideas.

PRIORITY ACTIONS

Priority actions agreed upon included:

1. Practical level support to improve management and legislation.
2. Training/support in financing arrangement and loan acquisition
3. On-the-job training and internships to managerial and technical staff by external (Dutch) sector organizations
4. Training of trainers of sector management skills, emphasis on practices in market economy
5. Waterworks/utilities and sewerage/waste management association cooperation between Dutch and Bulgarian/Czech/ Romanian/Slovakian associations
6. Formulation of pilot scale projects to introduce new technology, modern management and resource protection.

7. Conclusions

The desk studies, missions and the seminar have created a reasonable fair understanding of the sector status in the four countries. The most common feature is the difficulty to change the mode of operation of the sector from a centrally managed (plan) economy to the market/market oriented economy of the post socialism era which the countries now are experiencing. The debate on how far to privatize, as also the institutional form/forms to be chosen, is still going on.

The legislative base is still in formulation and the speed with which the process is progressing varies from country to country. The legal framework needs modernization as it originates from the period of centralized socialist governments. It is to be noted, however, that the starting level has been different in the four countries, depending on the history and the natural conditions of them. Most likely the countries will develop different country specific approaches too.

The difficulties in the national economies of the countries are also reflected in the financing of the sector. The sector is still in need of budgetary support as the too low tariffs cannot be raised at once to a level which fully covers the capital and the recurrent costs. The ability of the state and/or the local government to subsidize the sector is diminishing rapidly. Reinvestment to the sector has virtually stopped. At the same time, collection of water/ sewerage fees is encountering difficulties as the clients, mostly industrial and institutional, cannot pay due to lack of funds. These financial constraints have caused the service level to drop in spite of the general demand for better services. The degree of decline is varying between the countries but the trend is the same in all of them. It appears obvious that external financing is needed to bridge over the most critical period of the coming few years.

Collection of water/sewage fees is further hampered by technical deficiencies. Lack of individual metering of consumption is a problem that makes it virtually impossible to target the invoices so that it would enhance saving of water. Water meters seem to be missing to a great extent. The billing procedure is to a great extent still manual due to lack of automatic data processing equipment and software. The water and sewerage utilities are overmanned as the automatization has not progressed and the lack of the latest technology is prohibiting the development in all the countries discussed here.

The above details serve as examples describing the technical difficulties in managing, operating and maintaining the facilities.

Environmental issues are becoming a topic of general discussion in the four countries. Until now the initiatives of citizens/ citizen groups have often been politically tinted, maybe sometimes also taken as politically motivated, serving other purposes than environmental concern only. However, protection of the water resources is needed as many indicators point to pollution and imminent danger of pollution. The roles of various actors in the environmental protection is still in formulation as well.

The role of planning in the new social environment has changed. The old centralized planning for provision of services conducted by the central government does not apply any more and the experience gained during the past is no longer valid. There are indicators which point to need for an exchange for an experiences and systematic training as the necessary planning at various levels of the sector call for new skills for the various actors in the sector and clarification of the roles. Especially the lack of experience in financial planning is a problem which has to be overcome to improve the economic situation of the sector. The choice of technology has new dimensions as well. As the market is opening up it is now possible to apply technical traditions and solutions formerly out of reach. The technical knowhow level appears to be generally good but due to historical reasons experience in "western" technology is limited.

8. Recommendations for Future Sector Cooperation

8.1 Short term cooperation

The traditional development cooperation approach is not applicable when planning of cooperation between the Netherlands and the four countries, Bulgaria, the Czech Republic, Romania and Slovakia. The countries are all developed ones, but having a different recent history than the "western" industrialised countries. The cooperation has to be partnership where both parties are active contributors to a common goal.

The conclusions of the preceding chapters suggest a number of supporting activities, which could be initiated rapidly already in 1995 without risking the efficiency of external intervention and its compatibility with the national policy of each cooperating country. These actions would be directed towards laying of the foundation to a long term cooperation. Both the short term and the long term activities could be fruitful to both the cooperating partners as there are numerous lessons to be learned from both parties. The situation in which the four countries now find themselves renders an unique opportunity to benefit from experiences of the countries in transition and to see where Dutch based expertise may be useful.

It is not wise to rush into project or programme cooperation without first creating an enabling atmosphere. This can be achieved through exchange of experiences by conducting seminars/workshops where experts from both the Netherlands and Bulgaria/ the Czech Republic/Romania/Slovakia work together introducing their colleagues to new ideas through presenting their experiences on key issues. The topics could include new management techniques, financing, auditing, personnel politics, management information systems, training needs analysis, automatic data processing, integrated water resources management, systematic maintenance, leak detection techniques, waterworks process technology, wastewater purification technology, wastewater purification process technology and environmental protection/ source protection. The seminars/workshops can be conducted as separate events or in connection of a larger/longer programme. In the latter case they would be the initiation and final formulation phase of a project or a programme (chapter 6, recommendations 2,4 and 5).

Water supply and sewerage management are separated in the four countries. This is also the case in the Netherlands. However, it might be proper to create increased linkages between the two sides of the sector as they have shared interests. The heads of various partners and actors in the sector should thus know the special needs of the other side to improve performance (chapter 6, recommendation 1)

The scientific or professional associations of the sector are the best channels to exchange experiences. To address the sector professionals and also the decision makers through their own associations renders a possibility to discuss various issues *without the hierarchy* limitations of the sector organizations. The associations are natural channels for dissemination of new ideas and opening them for discussion (chapter 6, recommendation 5).

Bulgaria and in Romania could be the first countries where the seminars should be organized, as the representatives from the two countries specifically expressed their interest for this kind of activity during their two week stay in the Netherlands. Then the two other countries could follow, as appropriate, and finally a seminar in the Netherlands to reach a wider audience here.

It might also promote the sector development if decision level (political) representatives were invited to the Netherlands for an exposure visit and seminar like the one arranged in 1994. However, the length of the event must be reduced to one week as this is probably the maximum time this level personnel can be away from their posts (chapter 6, recommendation 1).

8.2 Long term cooperation

The cooperation should be continued after the seminars by arranging various kinds of training opportunities both in water supply and sewerage sub-sectors (chapter 6, recommendations 2, 3 and 4). These could have their syllabi formulated using the experience gained through the seminars and conducting a proper needs assessment. However, judging by the information collected to date, it appears that an emphasis might be proposed on managerial and financial aspects of the sector. The training could include for example short intensive courses, on-the-job training, internships and post graduate courses.

Extended time-span support to the sector should as well be channelled through the water supply and wastewater associations (chapter 6, recommendation 5). The form could be that of twinning. It would most likely be very effective as the countries concerned are countries in transition and already have a highly educated technical sector cadre which lacks experience in acting in a market economy environment.

A special case is environmental protection and especially the source protection. The mechanisms and knowhow appear limited in the four countries. Support to this activity, which is suffering partly due to the limited financial potential of the countries, is desperately needed (chapter 6, recommendation 1). The need extends from legislative issues to practical preventive and curative skills. How to organize the support and how to raise awareness at the political level and the population in general needs further studies and consultations.

Project form support to the sector is also a possibility (chapter 6, recommendation 6). There is a need for this. To establish an autonomous/independent water company and to run it for a short period could be an useful pilot or example which in practise demonstrates how to manage, operate and maintain financially feasibly and sustainably a waterworks in the prevailing environment. It would be necessary to make the required funds available for both the software and the investment. However, the investment capital should be provided in the form of a long term loan (probably a soft loan). Otherwise the option would not be a realistic one. The technical assistance component could be either a grant or a soft loan. An initial stage of a pilot project should be a preparatory phase, during which amongst other things the

procedures of different funding agencies are introduced to the recipient (chapter 6, recommendation 2).

The financing of the cooperation proposed above could be divided amongst various external support agencies depending on their specific capabilities and interests. The shared financing, however, creates a need for an coordinating body to avoid duplication or gaps in the process. IRC is capable and suitable to act in this role as it is an independent, neutral, non profit organization which already has the needed contacts. The soft components could be funded from the Dutch bilateral cooperation funds of VROM and/or DGIS, or by WHO, and the investments by EBRD, PHARE or WB.

**Exposure Visit and Seminar
Water, Sanitation and Environment**

Programme

3/10/94

9.00-12.30	Arrivals, registration & accommodation in Park Hotel
13.00	Lunch at IRC
14.30	Welcome session at IRC of participants and hosts. Presentation of the programme of the visit
17.00	Expectations of participants
19.00	Social event

4/10/94

Opening discussion at IRC Theme: Sector Status and Experience

9.00 - 9.15	Opening
9.15 - 9.45	Presentation by Bulgarian participant
9.45 - 10.15	Presentation by Czech participant
10.15 - 10.30	Coffee
10.30 - 11.00	Presentation by Rumanian participant
11.00 - 11.30	Presentation by Slovakian participant
11.30 - 12.00	Water law in practice in the Netherlands
12.00 - 12.30	Water and sanitation management
12.30 - 14.00	Lunch
14.00 - 14.30	Investment policy and tariffs
14.30 - 15.00	Information sources in the sector
15.00 - 15.15	Coffee
15.15 - 15.45	Waterboards and elections
15.45 - 16.15	Closing remarks

5/10/94

Morning	Visit: Regional WS system, Gelderland Lunch
Afternoon	Regional WS system cont.

6/10/94

9.30-11.00	Visit: Water treatment plant, Delfland, Lunch
Afternoon	Big local water supply, Watercompany Europoort

7/10/94

Morning Evaluation of the 4 days (30 min) Case study/workshop,
theme: management aspects of a local water supply company, emphasizing
cooperation between sectors and different levels
Lunch

Afternoon Case study/workshop, continued

15.30 - 17.00 Milieukontakt Oost Europa

8-9/10/94

Weekend free

10/10/94

9.00-10.00 Visit: Ministries of sector VROM - Public water supply in The Netherlands
10.30-12.00 Rijkswaterstaat "Role of National Water Board"
Lunch on way to next visit

Afternoon Visit: Control mechanisms, RIZA

11/10/94

Morning Visit: Sewage treatment and management, Hollandse Eilanden en Waarden,
Dordrecht
Lunch

Afternoon Visit: sludge incineration, HEW (continued)
15.00 - 17.00 Visit: IWACO

12/10/94

Morning Visit: Environmental degradation and mitigation.
Role play around an actual pollution case in NL.
Lunch

Afternoon Role play continued

13/10/94

9.00 - 9.15 Introduction
9.15 - 9.45 Presentation from Bulgarian delegation with comments on the updated
background document (20 + 10 min)
9.45 - 10.15 Presentation Czech Republic delegation with comments on the updated
background document (20 + 10 min)
10.15 - 10.30 Coffee
10.30 - 11.00 Presentation Romanian delegation with comments on the updated background
document (20 + 10 min)
11.00 - 11.30 Presentation Slovakian delegation with comments on the updated background
document (20 + 10 min)
11.30 - 12.00 Presentation EBRD

12.00 - 12.30 Presentation European Union/PHARE
12.30 - 14.15 Lunch
14.15 - 15.45 Division in 3 groups Group discussion facilitators from IRC
15.45 - 16.00 Coffee
16.00 - 17.00 Presentations of groups (flipcharts) (20 min per group)

13/10/94

17.00 - 18.00 Summarizing - What is the state of the art of the sector in the countries? What possibilities for cooperation between the countries are there? How?
18.00 - 19.00 Cocktails

14/10/94

9.00 - 10.00 Reflect back on the 2 weeks
10.00 - 11.00 Twinning experiences of NL
11.00 - 11.30 Coffee
11.30 - 13.00 What will happen after this exposure visit? Short-term & long-term
Official closing and thanking

13.00 - 14.00 Lunch

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