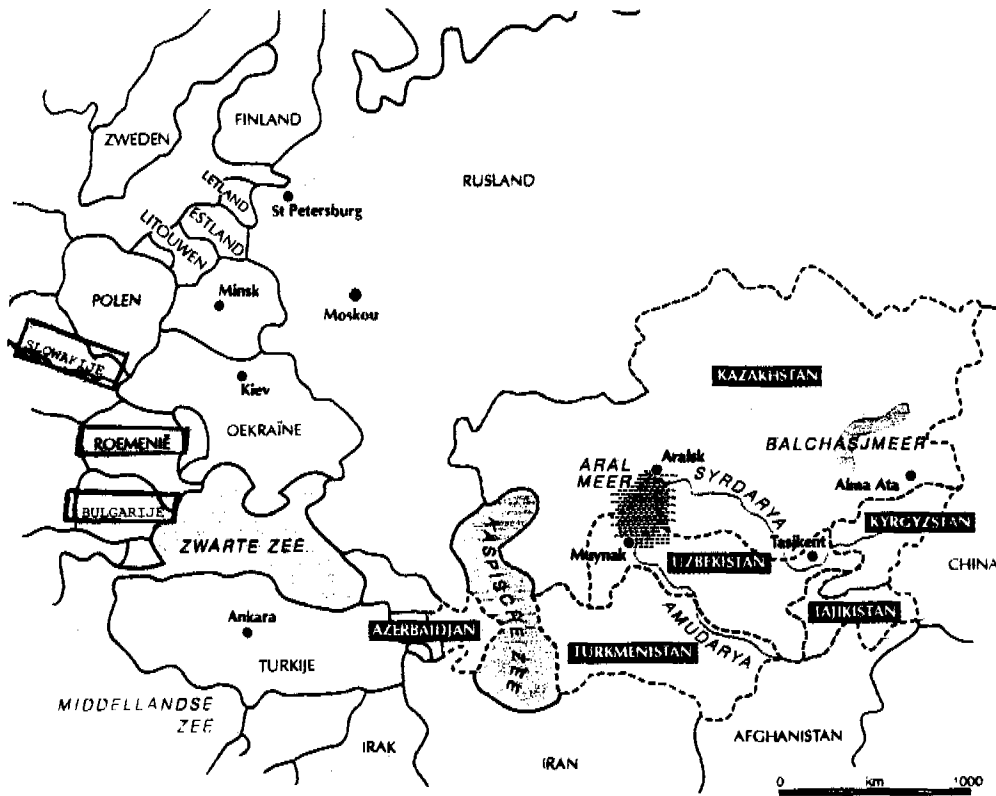


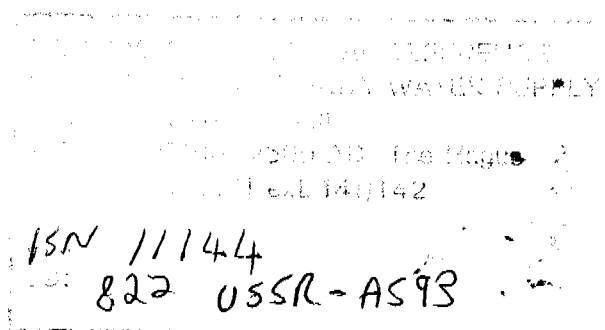
**DRAFT**  
**Drinking Water Supply and Sanitation**  
**in the Central Eastern European (CEE) countries**  
**and the Former Soviet Union (FSU)**



IRC, The Hague  
September 1993

## Table of content

<b>Acknowledgement</b>	ii
<b>1. Executive summary</b>	iii
<b>2. Issues in drinking water supply and sanitation in the CEE/FSU states</b>	
2.1 Introduction	1
2.2 The experience of the Netherlands	1
2.3 The CEE/FSU initiative	2
2.4 Central and Eastern European States	3
2.5 Former Soviet Union	4
<b>3. Country Description</b>	
3.1 Slovak Republic	7
3.2 Rumania	11
3.3 Bulgaria	15
3.4 Kyrgyzstan	19
3.5 Turkmenistan	21
3.6 Uzbekistan	23
<b>Reference list</b>	



## **Acknowledgement**

This study is made possible by a grant from the Netherlands Ministry of Housing, Physical Planning and Environment (VROM).

The paper has been prepared by Maria Sörensson and Han Heijnen on the basis of information available from various national and international agencies, as well through contacts in WHO/Copenhagen and the ngo-conference organized by the International Secretariat for Water in Warsaw in May, 1993.

The work reported herein represents the views of the authors and not necessarily those of the Netherlands Ministry of Housing, Physical Planning and Environment (VROM).

## 1. Executive Summary

The Netherlands **Ministry of Housing, Physical Planning and Environment (VROM)** has contracted IRC International Water and Sanitation Centre, The Hague to study the need for the transfer of information and expertise on water supply and sanitation in these states. An important outcome of the activity should be the formulation of proposals to support follow-up activities for short-term relief and longer-term structural improvement.

Concrete short term measures that could be taken include: rehabilitation and monitoring of water supply schemes, reduction of industrial pollution and discharges of untreated sewage, solid waste management, leakage control and demand management, information exchange and IEC<sup>1</sup>.

In the longer term supportive measures should focus on an improvement of both ground water and surface water sources. Policies and legislation, monitoring of water quality and of agricultural practices, control of point source pollution and public awareness are to be combined into a comprehensive water resources management strategy aimed at economic development within an environmentally sustainable framework.

Netherlands expertise is available for both sets of activities. However, where the direct measures require project identification and execution for immediate relief in combination with financial support that can be executed by Netherlands engineering consultancies, the longer term perspective would benefit from the institutional experience within the Netherlands both in government and its administrative departments, as well as within non-governmental organizations.

Brief summaries of key water and sanitation issues have been appended for two groups of countries: the Central and Eastern European States of Slovakia, Rumania and Bulgaria, and three states in the Southern part of the Former Soviet Union: Kyrgyzstan, Turkmenistan and Uzbekistan.

The document is meant as a briefing paper for the meeting on September 29, 1993 at IRC premises in The Hague. Based as it is on currently available information, it does not pretend to be complete in its detailed assessments. However the trends indicated agree with those found by other agencies.

---

<sup>1</sup>



## **2. Issues in drinking water supply and sanitation in the CEE/FSU states**

### **2.1 Introduction**

In the past few years it has become clear that the Central Eastern European (CEE) countries and the states in the Former Soviet Union (FSU) are facing a great variety of problems also in the area of water resources management, drinking water supply and sanitation. Many years of insufficiently controlled use of pesticides and fertilizer have caused serious deterioration of water bodies. Excessive abstraction of ground water has further led to quantitative deficits in certain areas. Unchecked discharges in industrial areas and absence of sewage treatment plants have further compounded the problems. Still, the problems relating to pollution and their ecological consequences, do not seem worse than in many other places in the world. Often, the issues relating to industrial and waste water discharges are probably comparable to those in Western Europe in the 50's and 60's.

The capacity to deal effectively with water resources management and water supply and sanitation varies a lot among the CEE/FSU countries and even within these countries. Some countries have a fair idea about water quality and quantity. However, finance is lacking to translate the conclusions of this monitoring into concrete improvements. Water resources management, source protection, treatment of water for drinking, and operation and maintenance of water supply distribution systems seem not adequately secured in many countries. At the same time discharge of untreated domestic and industrial waste water and over-abstraction of water for agriculture endangers both the quality and quantity of the commodity "water".

### **2.2 The experience of the Netherlands**

The Netherlands has gained a broad experience in the last two decades with integrated water resources management for ground and surface waters. Political and socio-ecological imperatives have been translated by the Netherlands Drinking Water Sector and the various Netherlands Water Management Boards and Authorities into a management and engineering approach that aimed to regenerate and conserve water bodies using a consistent policy framework and linked to a well-developed warning and monitoring system. It has taken time, but the approach is now bearing fruit and is indeed leading to a qualitative improvement of all our water interests. The water resources management approach chosen reinforced by the continuing efforts under the Netherlands National Environmental Planning (NMP) will be able to ensure continuing care of the precious commodity "water". An important characteristic of the last two decades of Netherlands water management has also been the excellent role played by many non-governmental organizations in awareness raising, in criticizing and in contributing to improved management of the countries water bodies.

The Dutch approach has been complex in that it combined hightech water treatment interventions with environmental protection measures; that it through economic incentives encouraged greater efficiency of industrial and agricultural processes in recycling and re-use; and that it initiated and maintained successful public awareness campaigns.

Apart from the experience gained within the Netherlands, Dutch and multilaterally sponsored development aid has provided a range of Netherlands companies and institutes with extensive experiences in assisting in the water resources development of arid and semi-arid zones, as well as with the provision of adequate water supply and sanitation facilities in countries and regions in development.

### 2.3 **The CEE/FSU initiative**

The purpose of the CEE/FSU initiative is to explore which of these experiences in water resources management, and water supply and sanitation could with benefit be transmitted and adapted to the needs of these countries in transition. It should be noted here that these countries in general have the benefit of qualified professionals to undertake the tasks at hand. However, what is often lacking are funds for improvement, political attention to appreciate the scope of the problem, and an awareness on the part of the general public with respect to their particular role in water supply and sanitation management.

The potential for the transfer and application of Netherlands (-based) expertise and information resources within the states of Central and Eastern Europe and the Former Soviet Union seems warranted.

To study the need for the transfer of information and expertise on water supply and sanitation in these states this report has been drafted on the basis of literature available from various national and international agencies, as well through contacts in WHO/Copenhagen and the ngo-conference organized by the International Secretariat for Water in Warsaw in May, 1993.

For reasons of manageability, it was decided to have this part of the study concentrate on two geographical areas:

- \* Slovakia, Rumania, Bulgaria;  
these areas are probably more developed but suffer from outdated water supply schemes, deficient treatment plants and industrial pollution problems. At the level of urban supplies, sewerage and treatment, industrial effluent, water resources management current Netherlands expertise would probably be useful.
- \* Kyrgyzstan, Turkmenistan, Uzbekistan;  
the countries in the southern part of the CIS is predominantly islamic, with cultural and physical conditions that would be more like Iran, Pakistan and possibly parts of India. Water resources management is even more urgent because of general water scarcity, salinity of ground water, environmental problems caused by large scale irrigation, etc. Resources of any kind to sustain urban water supply are generally insufficient and rural water supply schemes are inadequate. It is considered that Netherlands based expertise and information could be mobilized effectively to support WSS developments in the Southern CIS States.

## 2.4 Central and Eastern European States

### **Urban water supply systems**

Many cities and towns rely on bank-filtered water supplies, which usually consists of tunnels, wells or infiltration galleries placed in coarse alluvium parallel to the banks of a river. Other ground water sources are also used.

Sources are often chemically and bacteriologically polluted. Treatment plants are in many cases not working satisfactorily and so the water that is delivered is not up to the required standard. It is difficult to get spare parts for the aging facilities, which increases the rate of break downs of the facilities. Rehabilitation of the existing plants, including proper disinfection, and a reduction in water losses is necessary to move towards economically viable and sustainable systems.

### **Pollution**

Unchecked discharge of urban wastewater and industrial pollutants are the major point sources for pollution. If water treatment plants exist, their functioning is rarely effective. Often, no treatment is provided for at all. Eutrophication and overloads in nitrogen and phosphorus is the result.

Pollution by agrochemicals is common in all the countries reviewed. Occurrence of high nitrate levels in soil and water is widespread. In the past this has been known to lead to cases of methemoglobinemia.

### **Rural water supply and sanitation**

In rural areas people will rely on wells or streams. Most supplies are chemically and bacteriologically doubtful. High levels of nitrate prevail here as well, with elevated levels of others chemicals as well (e.g. arsenic).

Whereas the urban population is mostly connected to a sewerage system, households in the rural areas have septic tanks or simple pit latrines.

No details are available about solid waste management.

### **Health-related aspects of water**

Surface water sources are in general of unsatisfactory quality and at times heavily polluted. Drinking water can often not be treated up to the required standard. Chronic exposure to a variety of pesticides and heavy metals has been recorded.

Acute diarrhoea and hepatitis A show regular outbreaks in Rumania.

### **Institutional aspects of water**

Institutional arrangements obviously differ from country to country. Similarities include lack of enforcement of existing legislation, lack of coordination among sector partners and low active awareness among consumers/users of water and sanitation issues. The role of NGOs is potentially important.



### **Support measures**

Concrete short term measures that could be taken include: rehabilitation and monitoring of water supply schemes, reduction of industrial pollution and discharges of untreated sewage, solid waste management, demand management, information exchange and IEC<sup>2</sup>. In the longer term supportive measures should focus on an improvement of both ground water and surface water sources. Policies and legislation, monitoring of water quality and of agricultural practices, control of point source pollution and public awareness are to be combined into a comprehensive water resources management strategy aimed at economic development within an environmentally sustainable framework.

## **2.5 Former Soviet Union**

### **Urban water supply systems**

Many cities and towns have outdated water supply systems. Poorly maintained, distributions systems and illegal or improper use of water supply leads to huge water losses. The low price of water furthermore does not offer any incentive to conserve water. Water sources are often chemically and bacteriologically polluted. Treatment plants are in many cases not working satisfactorily and so the water that is delivered is not up to the required standard. Rehabilitation of the existing systems and in particular the replacement of poor quality asbestos pipes is a first step to economically viable and sustainable systems.

### **Pollution**

Pollution by agrochemicals is common in all the countries reviewed. Occurrence of high nitrate and pesticide levels in soil and water is widespread.

### **Rural water supply and sanitation**

In rural areas people will rely on wells or streams. Except in Kyrgyzstan, most supplies are chemically and bacteriologically doubtful.

Rural sanitation is usually very poor or non-existent.

No details are available about solid waste management.

### **Health-related aspects of water**

Surface water sources are in general of unsatisfactory quality and at times heavily polluted. Drinking water can often not be treated up to the required standard.

Hepatitis A is a serious problem in most areas.

### **Institutional aspects of water**

Institutional arrangements obviously differ from country to country. Similarities include lack of coordination among sector partners and the lack of exposure to training and information about "modern" water supply and sanitation technologies and approaches.

---

<sup>2</sup>

Information, Education and Communication

**Support measures**

Concrete short term measures that could be taken include: rehabilitation and monitoring of water supply schemes, demand management, information exchange and hygiene education. In the longer term supportive measures should focus on an improvement of both ground water and surface water sources. Policies and legislation, monitoring of water quality and the status of water supply and sanitation facilities, and public awareness are to be combined into a comprehensive water resources management strategy aimed at economic development within an environmentally sustainable framework.

### **Slovak Republic**

- \* The Danube river plays an extremely important role for Slovakia as water source. This source has been threatened by severe pollution from, among others agriculture, industries and untreated sewage.
- \* Groundwater is the main source for drinking water, however it is unevenly distributed in Slovakia.
- \* A discussion of piped water supply schemes indicate problems with abstraction of water (polluted river sources) and inadequacies in treatment leading to drinking water that is microbiologically and chemically unfit for human consumption. Iron, nitrates and industrial pollution causes most problems.
- \* Water supply and wastewater discharge remain highly subsidized with a centralized national system.
- \* Slovakia lacks standards concerning industrial pollution.

### 3. Country Description

#### 3.1 Slovak Republic

##### 3.1.1 Water resources

###### Surface water

The catchment of the Czecho-Slovak reach of the Danube represents an irreplaceable natural treasure. It provides water resources of relatively good quality for drinking water, for agricultural production and for extensive industry. Though this natural resource is very important, the left bank of the Danube river upstream of Bratislava shows the effect of the Morava waters with its higher mineralization and considerable pollution with sugar factory waste waters. On the right bank pollution from Vienna has been recorded.<sup>1</sup>

The main tributaries of the Danube are the rivers Morava, Vah, Hron and Ipel. The quality regime of the Slovak section of the Morava is continually influenced by pollution sources in Bohemia and Austria (class III-IV).<sup>3</sup>

###### Ground water

Ground water resources are distributed rather unevenly over the Slovak Danube catchment area. Moreover, the location of ground water that could be readily exploited, does not always comply with the areas in which water demands are highest. In some regions there is a shortage of groundwater resources, in others the assessed groundwater reserves are under utilized.

The ground water quality is more stable than that of surface water and it is therefore favoured for drinking water supply.<sup>2</sup>

##### 3.1.2 Pollution of water resources

###### Industrial pollution

The pollution of the Danube is varying, for example, petroleum products are permanently recorded and in the Ziar basin a very high level of fluor has been recorded, occurring in more than 400 compounds. Pollution is caused by Slovak industries as well as from neighbouring countries.

Local point pollution is to a great extent due to lack of effective wastewater treatment plants and ineffective connection of households to central wastewater treatment plants. From Hungarian territory wastewaters from a petroleum industry, bauxite industry and from a paper industry are suspected.

###### Agricultural pollution

Agriculture in Slovakia causes nitrates to be released, which are washed into surface waters or infiltrated into groundwaters. In 1982-1984 the public health service of the Slovak Republic found up to 200mg/l of nitrates in drinking waters and in some regions

---

<sup>3</sup> I very clean water; II clean water; III contaminated water; IV heavily contaminated water; V extremely contaminated water.

more than half of the samples surpassed the value laid down by the standard: 50.0 mg/l. Studies have linked agricultural pollution and the quality of the water resources. The highest nitrate concentrations occur in agricultural drains and the largest amounts of nutrients get into surface waters and ground waters during spring.

Another kind of groundwater and surface pollution is in some cases large-scale animal production (animal farms). The content of ammonia and nitrates in water will be increased, causing the available oxygen to fall. Depending on the arrangements for handling manure and other animal waste, microbiological contamination may also pose a risk to surface waters.

*Contamination of water and soil with agrochemicals and from animal husbandry appears to be of great importance.<sup>3</sup>*

#### Pollution caused by domestic waste

A significant polluter of the Czecho-Slovak reach is Bratislava, with a public sewerage system of a residential area without wastewater treatment. The development of public sewage works in 1985 attained 46.2% of the total number of inhabitants (as expressed as the proportion of users of public sewage works).

The proportion of treated wastewater has an increasing trend, though the treatment efficacy is low. Only 30% of wastewater is treated adequately. The majority of treatment plants are overloaded and their effluent do not meet the required discharge standards.

The sewerage network is one of the main point sources of pollution. Since the urban growth in recent years was not accompanied by simultaneous construction of waste-water treatment plants the public sewerage systems contribute to the considerable deterioration of water quality in the streams. Bacteriological contamination of the whole Czecho-Slovak Danube reach, indicated by coliform bacteria, falls within the range of III and IV class.

### 3.1.3 State of water supply and sanitation

There is no comprehensive picture of the state of water supply and sanitation in rural and urban areas. Piped systems exist in most towns and quite some of the rural areas, especially in the Eastern part of the country.

It is estimated that some 45% of the population is effectively connected to the mains in those areas of Eastern Slovakia not suffering from poor water quality, while around 90% is connected in affected areas. The technical quality of these schemes is not known, although the few schemes discussed (sr,1993) indicate problems with abstraction of water (polluted river sources) and inadequacies in treatment leading to drinking water that is microbiologically and chemically unfit for human consumption. Iron, nitrates and industrial pollution causes most problems.

In the same area the urban population is mostly connected to a sewered system, while households in the rural areas have septic tanks or simple pit latrines. Overall, 46% of the households has sewerage, 38% septic tanks and 16% simple latrines. Again, lack of treatment of sewage is mentioned as an important source for pollution.

No details are available about solid waste management.

#### Funding of water and wastewater systems

About 50% of the drinking water systems are self-sufficient according to the Ministry of Forestry and Water Resources. The waste water system in general does not cover costs and runs at a deficit.

The cost of water and waste water is lower for households than for industry, in 1992 a household paid 1.50 Slovakian korunas per cu.m. while the industry paid kr 5.25. If an industry discharges into a sewer, the sewerage company levies a charge to cover the costs the industry will be required to pay as a fine.

### 3.1.4 **Health related aspects of water**

A number of methemoglobinemia cases have been reported in Slovakia in the past due to the widespread high nitrate levels in soil and water in the country. <sup>4</sup>

No details are available about water and hygiene related diarrhoeal incidence.

### 3.1.5 **Institutional aspects of water**

#### Laws and enforcement

Slovakia has no standard pollution load allocations for industry. Each industry sets up an individual, negotiated agreement on the amount of acceptable pollution loads, depending upon river absorption capacity and type of pollutants. The agreement is made between each industry and the municipal council. In the past, exceptions to the standards could be obtained informally and often were.

#### Control mechanisms

Public water supply is managed by (state?) water companies. The quality of drinking water is checked by the Institute of Hygiene and Epidemiology at regular intervals. The examinations performed include basic microbiological and chemical tests. The results show that the drinking water is prepared and issued according to the recommendations of the WHO.<sup>5</sup>

#### Public awareness and participation

In Slovakia a growing priority is given to economic issues at the expense of environmental issues. Both the public and the politicians are showing less concern for environmental problems. Simultaneously, there is a growing concern for specific issues, like the ozone campaign.

### 3.1.6 **Support measures**

#### Conclusion

Economic concerns are obviously at the forefront in Slovakia. Simultaneously the country is threatened by water resources pollution from the outside as well as from within. The economic cost to the country in terms of health, of the inadequacies in water supply and sanitation is not known but may well be high, especially in the industrial areas in the Eastern part of Slovakia.

Short term measures

- \* Improve water treatment and distribution on the basis of an environmental and financial audit.
- \* Ensure basic waste water treatment for all sewered systems.
- \* Develop an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Assist in utility management, including tariffication and policy development.
- \* Information exchange, short-term training and exchange visits are useful activities in ensuring access by Slovak personnel to ideas and experiences.

Longer term measures

- \* The Slovak republic needs to ensure better protection of ground and surface waters to ensure that the people do not run any health risks drinking and using it. A comprehensive water resources development plan should be considered, aimed at restoring water quality and conserving water within the context of balanced economic advancement, and including appropriate legislation, methods of enforcement, decentralized responsibilities, etc.
- \* A programme to monitor ground and surface water quality, and the state of drinking water supply and sanitation facilities in the country needs to be developed to support decision making on investments.
- \* Information exchange and exchange visits are useful activities that could be brought into twinning arrangements which could be undertaken by Netherlands water companies as well as Dutch cities.

**Rumania**

- \* Demand and supply of fresh water resources in Rumania is not balanced, which leads to some areas having water shortages.
- \* Industry, agriculture and public sewage systems are all contributing strongly to the pollution of the Rumanian water resources.
- \* quality of drinking water is often not acceptable, many treatment systems and distribution networks are defective.
- \* Lack of funds in Rumania is to a great extent hampering the improvement of the water resources and of water supply and sanitation.
- \* Already before the political transition Rumania had an effective environment law, but it was not enforced. The authorities in Rumania are therefore updating the old environmental law and making an additional law which focuses upon enforcement.

## 3.2 Rumania

### 3.2.1 Water resources

Rumania has been described as one of the European countries with limited water resources(1,700 m<sup>3</sup>/inhabitant/year compared to the average of 2600 m<sup>3</sup>/inhabitant/year).

#### Surface water

The freshwater resources of Rumania consist of transboundary rivers, inland waters and groundwater. Storage reservoirs have been built to ensure water supply of the inland waters. These are unequally distributed over Rumania leaving some areas with a water shortage.

Rivers in Rumania showed a progressive decrease in the water quality between 1986 and 1989. Almost 30% of the total length of the rivers are currently polluted. The decrease in quality of the river water reflects shortcomings in technology and organization concerning waste water treatment.<sup>6</sup> The water quality of lakes is good on the whole (according to Rumanian standards).

#### Groundwater

The quality of groundwater is a major reason for concern in Rumania. Ammonia, nitrates, organic substances and pathogenic germs are the main pollutants. This kind of pollution affects all the catchments in the "phreatic aquifers" and is thus a long term health risk to consumers of the water. Most of the inhabitants in peri-urban and rural areas(about 47%) depend on groundwater for their drinking water source.<sup>7</sup> In the rural areas inland more than 70% of the household wells have nitrite concentrations over 100 ppm (maximum admissible concentration MAC 45 ppm) and many sources contain other pollutant concentrations above the admissible level. For example drinking wells have been recorded to be contaminated with crude oil.

### 3.2.2 Pollution of water resources

#### Industrial pollution

The Danube river suffers from both industrial and agricultural pollution. According to surface water testing records, the most critical industries are the chemical-, oil-, petrochemical- as well as the pulp and paper industry.

The discharge and reinjection of saline water from drilling rigs continue to be the major cause of soil and groundwater pollution.<sup>8</sup>

#### Agricultural pollution

Although many large state farms are equipped with some kind of waste water treatment plants, the farms are very often discharging wastes, because of lack of know-how on how to run the treatment plants. The present tendency is to reduce large cattle concentrations in one place. However the problem of pollution will remain because smaller farms are likely not to treat their waste at all.<sup>9</sup>



Pollution caused by domestic waste

The largest population centres discharge their waste water untreated. Use of simple latrines in the rural areas harbours the risk of pollution of water in the household wells.

**3.2.3 State of water supply and sanitation**

Water supply facilities in the towns are not functioning very well, many show deficiencies in water treatment leading to water supply not meeting chemical and bacteriological standards. Water supply systems do not deliver continuously due to lack of drinking water. The latter is sometimes caused by unrepaired damage to the distribution systems (intermittent supply in Slatina for 10 months in 1990/91).

In the rural areas, wells and simple latrines constitute the water supply and sanitation facilities.

No data are available on the state of rural water supply and sanitation.

Solid waste management and sanitary disposal is indicated as a problem in Bucharest.

Funding of water and wastewater systems

Investments in water supply systems have practically stopped because of a lack of funds and because of the fact that state subsidies are very small. Lack of funds hinders the authorities to tackle problems like leakage. Leakage is a great problem of the water supply systems and water losses account for up to 20-40% of the total water supplied.<sup>10</sup>

Romania is getting financial support from international agencies, like USAID, EC and the World Bank, to develop water related projects.

**3.2.4 Health related aspects of water**

Surface water sources are in general of unsatisfactory quality and at times heavily polluted. Drinking water can often not be treated up to the required standard. Chronic exposure to a variety of pesticides and heavy metals has been recorded. Acute diarrhoea and hepatitis A show regular outbreaks.<sup>11</sup>

**3.2.5 Institutional aspects of water**

Policy

The Ministry of Environment (MOE) controls water quality, solid and hazardous waste through its various commissions, programs and 40 Environmental Assessment and Management Agencies. Of the 40 offices, 11 have duties related to river and water body sampling. The tasks of the Environmental Assessment and Management Agencies further include monitoring, inspections, pollution control, laboratory analysis and enforcing water quality regulation.

There is a General Directorate for Water Resources Management and Protection, which has a water strategies and regulations section, and a water conservation and re-use section. These sections provide norms and regulation for the water quality and water use to the

Rumanian water authorities, as well as to the commercial and municipal water companies which supply drinking water.

#### Laws and enforcement

Before the political transition of 1989 Rumania had a legislation concerning environment and water resources, which still is partially at force. In general this legislation was good, except that enforcement of the legislation leaved to be desired. The implementation of the law was very weak, in many cases due to the fact that the responsibility is divided among too many authorities.

The Rumanian legislation on environment is therefore revised through updating the old legislation as well as elaborating a new one. One of the first steps has been to make the Ministry of Environment responsible for organizing, co-ordinating and controlling all activities related to environmental protection. A new Water Law is under preparation, which will cover all aspects concerning exploitation, conservation, management and protection of waters to maintain the ecological balance. The new water law will also define economic instruments in the field of water resources management. <sup>12</sup>

#### Control mechanisms

In Rumania many organizations and authorities deal with management of water resources. Water is considered a national resource and therefore the state shoulders most of the responsibilities. The state company Apele Romane (AR) together with their representatives at the local level, the River Basin Agencies (RBA's), is responsible for the distribution and supply of raw water and protection against overuse of water. Apele Romane is economically independent.

RBA's issue permits and check, in principle twice a month, whether waste water discharges correspond with the limits established in the permit. If the amount of pollutants discharged surpasses the limits, the users have to pay a penalty for each unit of pollution surpassing the norms.

Each new industrial investment project in Rumania requires an Environment Impact Assessment before one can apply for a permit. <sup>13</sup>

#### Public awareness and participation

The environmental awareness of people in Rumania is in general low. Where the people are aware this does not necessarily lead to any involvement as like in Slovakia the main concern of the people is currently their economy.

The Ministry of Education is emphasizing environmental issues in the school curricula.

### 3.2.6 Support measures

#### Short term measures

- \* Rehabilitation of existing schemes (treatment and distribution system)
- \* Enforcing compliance with existing legislation through improved monitoring system combined with funds for repair and maintenance
- \* Develop an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Information exchange, short-term training and exchange visits are useful activities in ensuring access by Rumanian personnel to ideas and experiences.

Longer term measures

- \* The Danube Point Source Pollution project (WASH,1993) has recommended the authorities in Rumania to join hands with the other Danube riparian countries and collaborate on an action plan to gradually reduce the pollution levels. The World Bank and UNDP are supporting similar initiatives (1992)
- \* Rumania will also have to look for foreign assistance, since the economy of Rumania cannot support an investment programme necessary to bring a serious improvement in wastewater treatment.
- \* The Ministry of Environment, Economy and Industries, Trade and Tourism, Transport and Public works should work together to develop a comprehensive strategy for economic development, which considers the environmental/pollution aspects.

**Bulgaria**

- \* There is a general shortage of water in Bulgaria. Many towns and villages only have seasonal water supply.
- \* Surface water requires treatment before being used as drinking water. Treatment is limited. Treatment plants and distribution systems are outdated and only partially operational due to lack of spare parts.
- \* The awareness of environmental issues among the people is low, even though the number of NGOs is relatively high. However, even the NGOs are facing a less interest among their members due to the people's priority of economic improvement.

### 3.3 Bulgaria

#### 3.3.1 Water resources

In general water resources are scarce in Bulgaria. There are a number of places which suffer restrictions of water use, particularly during the summer periods.

##### Surfacewater

The hydrological system in Bulgaria is very complex. It lacks big internal rivers. The water of the Bulgarian part of the Danube river is polluted by its tributaries and by the untreated municipal and industrial waste waters. Contents of oxygen, mineralization, biogenic and toxic substances exceed the standards from time to time.

##### Groundwater

The water used for supply is mostly groundwater, since it has a more reliable quality and does not need any treatment. 68% of the total central water supplies in Bulgaria are groundwater, and 32% are surface water. From the total groundwater extraction, 39% is used for potable water, while the remaining part is used for industrial, agricultural and other activities.

#### 3.3.2 Pollution of water resources

**Pollution loading from different sources**

4

Pollution sources	BOD <sub>5</sub>	SSM	COD	TDS
1. Municipal discharges	39.17	36.33	10.69	21.53
2. Feed lots	30.25	24.72	19.88	9.82
3. Sugar industry	12.08	8.06	33.36	25.72
4. Food industry	5.96	3.87	14.24	8.04
5. Others	12.54	27.02	21.83	34.89

##### Industrial polluters

About 900 industrial factories discharge their waste waters in the tributaries of the Danube river.

##### Agricultural polluters

The big stock-breeding farms, which discharge manure with big quantities of water are the worst agricultural polluters.

---

<sup>4</sup> Suspended solids load(SSM); dissolved solids(TDS)

Pollution caused by domestic waste

Settlements with a population above 50'000 people usually have sewage systems, however only one quarter of these have effective treatment facilities. Most of the equipment in water treatment plants, pumping stations, etc. is outdated.

**3.3.3 State of water supply and sanitation**

Scarcity of water in combination with large water use by agriculture and industries has caused many water supply schemes to go dry for part of the year. Out of 117 towns, only 14 had a year round water supply. In the rural areas the situation is just as bad, with 1100 village out 1190 only being able to rely on a seasonal water supply. The poor state of most supplies causes frequent breakdowns leading to severe water losses (24% upward), thus exacerbating the water supply situation. The losses are mainly due to the poor quality of the existing asbestos cement pipes which are used for the distribution networks.

Most water is disinfected by chlorine, automatic dosage is scarce, and in rural areas chlorination is simply non existent.

Metering and economic pricing is being proposed to manage water demand. Agriculture and industry are encouraged to recycle water and develop their own storage facilities.

Funding of water and wastewater systems

The water companies are freely setting the prices under the supervision of the Ministry of Regional Development, Housing Policy and Construction (MRD). All the water prices are defined by local authorities of the water (supply and sewage companies), on the basis of local circumstances. Metering of the water has been improved in order to make the customers pay.

**3.3.4 Health related aspects of water**

Water sources are in general of unsatisfactory quality and at times heavily polluted. High nitrate levels have been recorded also in drinking water. Although, drinking water is at times of doubtful bacteriological quality, only few proven water related gastro-enteritis epidemics have been recorded(1991).<sup>14</sup>

**3.3.5 Institutional aspects of water**

Policy

The Ministry of Environment is in charge of the coordination of environmental protection activities and pollution control. The ministry is also responsible for monitoring of the drinking water quality and enforcement of quality standards. To its help for implementation of the policies the Ministry have Regional Environmental Inspectorates (REIs). The REIs have as task to carry out supervision of pollution charges and fines, but the MoE has the total responsibility. A National Water Council has been established to control the use of water resources, and to plan legislation. All water users (except private households) should normally obtain a permit from the National Water Council.

### Laws and regulations

On the basis of the legal powers set out in the Environmental Protection Act (1991), the national environmental policy is controlled by the MoE. However the slow process of acceptance of laws in the Parliament is not very favourable to the environment of Bulgaria. There is an urgent need to get new laws of environmental protection accepted, also for water. In general the enforcement of the laws and technical water quality standards seem to be insufficient.

### Public awareness and participation

In general the environmental awareness of the people in Bulgaria is low. However the activities of NGOs are developing fast. There is an indication that the authorities in Bulgaria recognise the NGOs as awareness makers among the public. It should although be mentioned that there is a decrease in the number of NGOs concerned with environmental issues, the reason is likely that the people give higher priority to economical problems than to environmental ones.

To improve the availability of information for decision-makers and the public the NGO Ecoglasnost has initiated a project called Stara Zagora Environmental Action Project. This project will serve as a demonstration project for the national government and other large Bulgarian municipalities in terms of bringing together data collection and monitoring institutions, involving the public in decision-making, setting environmental priorities and making environmental protection investments in a market economy. The results of the project will be disseminated through seminars, media, NGOs, etc.

## 3.3.6 Support measures

Also Bulgaria suffers from lack of finance to replace defective parts and to upgrade treatment and distribution systems. Water scarcity is further compounding the problems of access to safe water.

### Short term measures

- \* Rehabilitation of existing schemes (treatment and distribution system)
- \* Develop an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Information exchange, short-term training and exchange visits are useful activities in ensuring access by Bulgarian personnel to ideas and experiences.

### Longer term measures

- \* Bulgaria has already undertaken steps to reduce water use by industry and agriculture by introducing economic control measures. This should be further encouraged and placed in a comprehensive water resources development plan that also deals with the issue of agricultural pollution.

### Kyrgyzstan, Turkmenistan, Uzbekistan

- \* Most of the people (about 80%) in the cities are provided with piped water supply, while less than 50% of the people in the rural areas have been provided with piped water supply. The remaining people have to rely on unprotected sources like open wells, canals and rivers.
- \* Water is wasted to a great extent due to poorly piped systems and low costing for water.
- \* The costing principles of the water sector are poorly understood and the prices are not matching the actual costs at all.
- \* In Uzbekistan and Kyrgyzstan the pollution is mainly caused by the agricultural production. In Turkmenistan both industry and agriculture are polluting the environment.
- \* In all three countries the responsibility for water supply is divided between a number of Ministries and there is very little coordination between them. This has led to a very poor overview of the countries' water situation and lack of efficient decision-making.
- \* Quality testing for the drinking water is done in all the countries, but the information from these tests are not always reliable. The equipment which is used is often outdated. A major additional problem is the fact that administrators in the Ministries do not manage to make efficient use of the data.
- \* Most people are not aware about how polluted and contaminated their water resources actually are.

### 3.4 Kyrgyzstan

#### 3.4.1 Water resources

##### Groundwater and surfacewater

Most of the water(80-100%) used in the cities is taken from underground sources and the rest is coming from the mountains. In the rural areas 85% of the water is taken from groundwater sources and 15% from surface water sources.

#### 3.4.2 Pollution of water resources

##### Industrial pollution

There is little heavy industry in Kyrgyzstan which has allowed it to escape some of the major pollution problems of its neighbours.

##### Agricultural pollution

Excessive irrigation has led to salinity and water logging in some regions of the country. Other polluting factors within the agriculture are pesticides and fertilizers.

##### Pollution caused by domestic waste

Only 60% of the urban population has access to sewerage. Seventeen cities have sewage treatment plants which in many cases are overloaded since they are usually small. In Bishkek, sewerage is a problem since many of the pipes are in need of repair, and there is no money to replace them.

Rural sanitation is very poor with villages not having access to improved excreta disposal facilities. There is no government budget for rural sanitation.

#### 3.4.3 State of water supply and sanitation

Most of the inhabitants (80%) in the urban areas have piped water supply. However the people in the cities are facing problems especially in the summer when water may not reach everywhere. The cause is the decreasing availability of construction materials (e.g. due to lack of foreign exchange). Lack of construction material to repair and construct water systems leads to intermittent supply, in turn causing negative pressure and intrusion from sewage and other contamination.

For Kyrgyzstan the selection of pipe material for its water systems is a very important issue, due to the country's high risk of earthquakes. The country cannot afford the pipes which they actually need. Kyrgyzstan is therefore still forced to buy asbestos cement pipes even though these crack and water is leaking from them.

Lack of knowledge on how to handle certain pipes, like how to lay and joint PVC pipes is a problem.

Water supply development in rural areas faces yet another problem in that they lack planning to accelerate the service coverage levels.

Monitoring the status of water supply and sanitation is virtually absent.



CEE/FSU Initiative

Training in up-to-date techniques and approaches in water supply and sanitation development is required.

Rural sanitation is very poor with villages not having access to improved excreta disposal facilities. Most of the rural families have a traditional pit latrine made from a wooden slab and superstructure.

#### Funding of water and wastewater systems

Water rates are presently very low. There are plans of increasing the water tariffs.

### 3.4.4 **Health related aspects of water**

Hepatitis A is a serious problem in Kyrgyzstan (23000 cases in 1991) and is considered to be an effect of the interruptions in water supply that occur in the cities sometimes.

Diarrhoea is recorded throughout the country. There are usually 5 to 6 outbreaks a year.

### 3.4.5 **Institutional aspects of water**

#### Laws and regulations

The Ministry of Communal Service is responsible for water supply in the urban areas. The Ministry of Agriculture is responsible for the rural water supply. Both the Ministries are answering to the Ministry of Water Supply and Land Corporation. The Ministry of Health, which is responsible for public health and sanitation in the country, has complained about the number of agencies involved in water supply activities and the lack of coordination.

A state committee is in charge of environmental protection and has the following departments: water resources; air pollution; energy and wildlife protection.

In each city there are water supply corporations that are responsible for construction, operation and maintenance of the water supply and sanitation services. Water quality control is managed through the Water Supply Corporations.

#### Public participation and public awareness

The state committee on environmental protection provides education mainly for children and certain target groups like farmers. Adult education is provided through mass media, TV and radio.

The Ministry of Agriculture provides training on water/air/soil quality testing training, once every two years for 30 people. The Ministry provides also some equipment for water quality testing.

### 3.4.6 Support measures

#### Short term measure

- \* Rehabilitation and augmentation of existing schemes (treatment and distribution system)
- \* Development of an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Developing monitoring capacity for urban and rural water supply and sanitation to support investment planning.
- \* Short-term training and exchange visits in sustainable water supply and sanitation approaches.

#### Longer term measures

- \* Bring water supply and sanitation in one hand and develop a national WS&S development plan.
- \* Development of training and applied research capacity for improved rural water supply and sanitation. Such a capacity would also need to be able to access information and expertise from other similar mountain areas (Nepal, Northern Pakistan)
- \* The World Bank has set aside funds for the development of a sustainable development strategy for water resources management under its Aral Sea Regional Program.<sup>15</sup>

## 3.5 Turkmenistan

### 3.5.1 Water resources

The water in Turkmenistan is very much polluted by agricultural activities and from the industries. An estimation has been made that 40% of the drinking water is highly contaminated and well below the standards adopted by the country.

### 3.5.2 Pollution of water resources

#### Industrial polluters

The waste from the industries in Turkmenistan is a major cause of the pollution of the country's water resources. The Sanitation and Epidemiological Department (Ministry of Health) has the authority to indict industries that pollute or misuse water. However this authority is hardly exercised.

#### Agricultural polluters

Chemicals used in the agriculture are strongly polluting the water resources.

#### Pollution caused by domestic waste

The public sewer systems in Turkmenistan are outdated and in a very poor state. They have recently become serious sources of pollution.

The ineffective sanitation practises pose a serious threat to the health of people in rural as

well as in urban areas.

### 3.5.3 State of water supply and sanitation

Piped drinking water is provided to 76% of the urban population and to 50% of the rural population. The remainder of the people are provided with water from water tankers, dug wells and boreholes. One third of the rural population is left without facilities and they have to rely on unprotected and contaminated sources, like canals, rivers and open wells. The service level depends on the geographic location.

The design factor for water consumption is 260/litres/capita/day in urban areas to 150/ litres/capita/day in rural areas. The actual supply in the urban areas is 470-490/litres/capita/day. This excessive use of water is mostly due to high water losses, such as leakages, small scale irrigation in the cities, excessive waste as well as poor operation and maintenance.

The cause of the leakages is mainly due to the poor quality of the pipes, corrosion and outdated constructions. Another reason for the excessive use is the number of illegal connections.

#### Funding of water and wastewater systems

The costing principles of the water sector are poorly understood at operational level as well as at central planning level, which has a negative effect on the allocation and use of the water. During 1993, the Government has planned to introduce water, sewerage services, electricity and gas free of charge.

### 3.5.4 Health related aspects of water

There is a high incidence of diarrhoea cases recorded in Turkmenistan as well as cases of hepatitis. Both these diseases are associated with to the poor sanitation practises in the country.

### 3.5.5 Institutional aspects of water

#### Laws and regulations

The provision of drinking water supply is the responsibility of a variety of ministries and departments. The geographic location determines which ministry is in charge. There is a lack of coordination between the ministries, which hinder the decision-makers to get an overview of the total water situation in the country. Another problem is that the decision-makers do not make effective use of the data which is being collected from the lowest administrative levels.

The relative isolation of sector professionals from external management techniques and the subsequent tight control over decision making, planning and policy formulation has seriously constrained sector development. However, many of the persons working in the ministries within the water and sanitation sector have a high level of technical and theoretical competence, which would offer a good starting point for training and re-

orientation of sector staff.

#### Control mechanisms

The Ministry of Health (Sanitation and Epidemiological Department) is responsible for testing that the quality of drinking water is within the standards.

#### Public awareness and participation

Very few people are aware about the link between poor sanitation and water-related-diseases. There are hardly any hygiene education programmes in the country, which may explain the lack of knowledge of hygiene related matters.

### 3.5.6 **Support measures**

#### Short term measures

- \* Development of an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Developing monitoring capacity for urban and rural water supply and sanitation to support investment planning.
- \* Short-term training and exchange visits in sustainable water supply and sanitation approaches.
- \* UNICEF has suggested that two pilot studies are undertaken. The aim would be to demonstrate to the government, ways to better plan, implement, manage and use of cost effective technologies and methods in the provision of water supply to **rural** and **urban** populations.

#### Longer term measures

Assist government to improve coordination and policy formulation for the sector. Development of training and applied research capacity for improved rural water supply and sanitation. Such a capacity would also need to be able to access and exchange information and expertise from other countries in similar circumstances.

## 3.6 **Uzbekistan**

### 3.6.1 **Water resources**

The Aral sea, which once was the sixth largest sea in the world, has decreased by 67%. The reason is the excessive irrigation for the cotton production in Uzbekistan. This sea was earlier a crucial source for agriculture and fishing, but today the fishing boats are laying on the dried out sea shores. Another negative effect of the environmental disaster is its impact on the weather. The summers have become warmer, shorter and dryer. The people who live around the Aral sea have to face a number of problems, like a stinking sea which contains high levels of pesticides, that pollute the groundwater the people use for drinking water. To increase the quality of the water the people have, however, found a way to get rid of some of the polluting material. They freeze the water and during this process the polluted particles concentrate in the middle of the ice and the people can separate it from the ice.

The water resources originating from the Caspian sea (Kazakhstan) are also of very poor quality, in this case the pollution is due to oil refineries and petrochemical industries.

### 3.6.2 **Pollution of water resources**

#### Industrial pollution

Industrial wastes are additional causes to the poor quality of the water resources in Uzbekistan.

#### Agricultural pollution

The pollution from the agricultural production is a major problem in Uzbekistan as well as the heavy use of water resources for the cotton fields, which leads to very high residual salt levels. This also has a negative impact on agricultural production. For example in Uzbekistan the farmers use eight times more water to produce a kilo of cotton, compared to what the cotton farmers use in Israel. The farmers in Uzbekistan are also using extremely high dosage of toxic and dangerous pesticides/chemicals on the fields.

#### Household pollution

The majority of the homes in smaller towns, villages and peri-urban areas are not connected to public sewers. Most of the homes have very simple out-door latrines, which consists of a wooden structure built over a two metre deep pit with a crude concrete squatting slab. When a study was done in these areas in 1992, most of the latrines were found to be un-hygienic, poorly constructed and not maintained.

### 3.6.3 **State of water supply and sanitation**

The access to drinking water is varying widely between the rural and urban areas, for example 82% of the urban population are provided with drinking water while only 49% of the rural population have access to drinking water. Those who do not have access to drinking water, rely on unprotected sources like canals, open wells, rivers and water tankers.

The design factor for water consumption is supposed to be 350/litres/capita/day in the urban areas and 125/litres/capita/day in the rural areas. However this is not the case in reality. The actual delivery pattern in Tashkent is 750/litres/capita/day, in rural areas to as little as 10.4/litres/capita/day in Bukhara.

The excessive use of water in the urban areas may be caused by the poor pipes in the outdated systems as well as by illegal connections.

#### Funding of water and wastewater systems

Costing principle are poorly understood at operational as well as central planning level. This has had a negative effect on the funds are allocated and resources utilized. There is no effective use of water for irrigation due to its low cost.

### 3.6.4 **Health related aspects of water**

During the last years in Uzbekistan the number of typhoid cases have been recorded forty

times more than in previous years and cases of hepatitis are recorded seventy times more. The cause of both the diseases are the highly polluted water resources.

### 3.6.5 Institutional aspects of water

#### Laws and enforcement

The responsibility of water supply in Uzbekistan is divided between several ministries and departments and there is hardly any cooperation between them.

#### Control mechanisms

Testing of the water quality is carried out at all administrative levels, but the equipment is poor and lack of reagents especially at the lower administrative levels leads to poor execution of the tests. The results of the test are therefore not reliable.

#### Public awareness and participation

Hygiene education to the public is hardly provided if at all and it is therefore assumed that the awareness of water-related diseases is very limited, as in Uzbekistan's neighbouring countries.

The decision-makers in Uzbekistan are aware about the water problems. However they do not manage to effectively implement protective actions for the water resources.

### 3.5.6 Support measures

#### Short term measures

- \* Development of an approach for implementation for self-sustained improvement of rural water supply and sanitation, including monitoring of status and quality.
- \* Developing monitoring capacity for urban and rural water supply and sanitation to support investment planning.
- \* Short-term training and exchange visits in sustainable water supply and sanitation approaches.
- \* UNICEF has suggested that two pilot studies are undertaken. The aim would be to demonstrate to the government, ways to better plan, implement, manage and use of cost effective technologies and methods in the provision of water supply to **rural** and **urban** populations.

#### Longer term measures

- \* UNICEF suggests that the water supply and sanitation sector in Uzbekistan may start concentrating on policy formulation for the sector as well as strengthening of the coordination between the Ministries.
- \* There is also support needed for preparation of national plans of action and expose the government to appropriate cost effective technologies for both rural and urban areas.
- \* Development of training and applied research capacity for improved rural water supply and sanitation. Such a capacity would also need to be able to access and exchange information and expertise from other countries in similar circumstances.
- \* The World Bank has set aside funds for the rehabilitation of key infrastructure services such as water supply and sanitation.

**Reference list**

1. WASH (1993) Point source pollution in the Danube basin, vol III.
2. WASH (1993) Point source pollution in the Danube basin, vol III.
3. European Centre for Environment and Health, Bilthoven Division. (1993) National Integrated Programme on Environment and Health in the Slovak Republic. Environmental Health Status of Banska Bystrica.
4. European Centre for Environment and Health, Bilthoven Division. (1993) National Integrated Programmes on Environment and Health in Central and Eastern Europe. Human health and the physical environment in Central and Eastern Europe.
5. European Centre for Environment and Health, Bilthoven Division. (1993) National Integrated programme on Environment and Health in the Slovak Republic. Environmental health status of Banska Bystrica.
6. Absil, P. et al (1993) Household water use and municipal waste water discharges along the Danube: Actions for the Municipalities Giurgiu and Vidin. Institute for Environmental Studies, Vrije Universiteit of Amsterdam.
7. Galdean, N. (1993) Some problems of water in Rumania. Paper presented at workshop in Warsaw, Poland, May 1993.
8. Galdean, N. (1993) Some problems of water in Rumania. Paper presented at workshop in Warsaw, Poland, May 1993.
9. WASH(1993) Point source pollution in the Danube Basin. Institutional studies - Bulgaria, the CSFR, Hungary and Rumania.
10. Absil, P. et al (1993) Household water use and municipal waste water discharges along the Danube: Actions for the Municipalities Giurgiu and Vidin. Institute for Environmental Studies, Vrije Universiteit of Amsterdam.
11. Ministry of Health, Rumania. Institute of Hygiene and Public Health (199?), Data collection on water supply and water pollution. Protocol no. 2.
12. Absil, P. et al (1993) Household water use and municipal waste water discharges along the Danube: Actions for the Municipalities Giurgiu and Vidin. Institute for Environmental Studies, Vrije Universiteit of Amsterdam.
13. Absil, P. et al (1993) Household water use and municipal waste water discharges along the Danube: Actions for the Municipalities Giurgiu and Vidin. Institute for Environmental Studies, Vrije Universiteit of Amsterdam.

14. Ministry of Health, Bulgaria. (1992) Data collection water supply and water pollution. Protocol no. 2.

15. International Bank for Reconstruction and Development International Development Association (1993) Monthly operational summary of Bank and IDA proposed projects.