

## **CHAPTER 7 PUBIC CONSULTATIONS**

### **7.1 Introduction**

Many public consultations were held by the EABD and WABD based on the requirements of EU-WFD under supporting by JICA Study Team members. These public consultations were also held as Stakeholder Meetings for Environmental and Social Considerations for the draft RBMPs in the EABD and in the WABD of this JICA Master Plan Study.

### **7.2 Summary of Each Public Consultation**

Summary of each Public Consultation, which was conducted during this Study is shown in Table 7.2.1 by chronological order.

### **7.3 Comments of the Public Consultations and the Recommendations**

#### **7.3.1 Comments of the Public Consultations**

##### **(1) Reflections for the Draft RBMPs**

According to the Article 14 of the EU-WFD, EU member states shall allow at least six months to comment in writing on the RBMP in order to allow active involvement and consultation. This means responsible authorities of Bulgaria for water management shall allow to comment in writing on the RBMP. Also, the public is allowed to have access to the documents and information used in the process of the development of the RBMP.

Based on the above understandings, EABD and WABD has been received the comments from the participants of the public consultations and any persons, who send the comments through web site of MoEW. Also, EABD and WABD have reflecting the some comments to the draft RBMPs. For example, the following water management issues and the ideas for the programs of measures, which were discussed at the public consultations, are reflecting to the draft RBMP.

- Water supply and sewer network issues at small scale settlement areas;
- Sand/gravel extractions from the river beds may cause excessive river morphological chances;
- Groundwater pollution risk issues by the agriculture activities;
- Prioritized rehabilitations of the water supply and sewer networks
- Appropriate design (stage-wise planning) of the WWTPs
- Educations for farmers (pesticide use, etc.), and
- Other local management issues and their ideas for the measures.

## (2) EABD and WABD Performances for the Public Consultations

Both EABD and WABD had conducted each 3 times Public Consultations, except for the 3<sup>rd</sup> Public Consultation for Maritsa River Basin, as one of the requirements of the EU-WFD and of the public participation process for the environmental and social considerations for the draft RBMPs. Concerning the 3<sup>rd</sup> Public Consultation for Maritsa River Basin will be held by EABD on year 2008.

Each Public Consultation includes the following items:

- Opening Speech by Basin Directorate
- Objectives of each Public Consultation by JICA Study Team Member
- Presentation (e.g. water quality issues and their impacts in the river basin, etc.) by technical staff of Basin Directorate, other organizations
- Presentation (e.g. draft proposals of programs of measures for the issues and the impacts, etc.) by JICA Study Team Member
- Questions and answers related to the presentation topics;
- Group discussion (divided into 2 or 3 or 4 groups at each public consultation depended on the participants and based on the location or interests group)
- Short presentations by each group facilitator for the discussion results
- Closing and explanation of the next steps of the RBMP, etc.

Through the series of this implementation of the Public Consultations, the coordination capacities such as progress management of each consultation, facilitator's skill for the group discussion, etc., of both EABD and WABD were improved. These coordination capacities are also important not only to develop RBMP, but also to disseminate the importance of the appropriate water management as well as the roles of Basin Directorate to the stakeholders and the public in Bulgaria.

### 7.3.2 Recommendations for the Public Consultation and Involvement

It is recommended that the followings could be considered for future public consultations and involvements for the finalizing RBMPs in Bulgaria:

- More staff from the Water Directive of MoEW shall participate in the Public Consultations. Because there would be very important chances that the responsible central authorities for water management are able to understand the real water management issues and their local needs, as well as to consider the countermeasures based on the realities, which are discussed at each group discussion sessions of Public Consultations.
- It is very important that continuous implementations of public consultations by the River Basin Directorate with involving more stakeholders and local residents shall be done to formulate appropriate RBMPs and to actualize RBMPs, as well as to improve the river basin management more in Bulgaria.

## **Main Report**

### **Chapter 7**

#### **Tables**

**Table 7.2.1 Summary of Each Public Consultations (1/4)**

Items	EABD	WABD
<b>1<sup>st</sup> Public Consultation</b>		
Date	November 6, 2006	November 2, 2006
Targeted River Basin	Tundzha River Basin	Whole River Basin within the WABD area
Place	City hall of Sliven	A private college in Blagoevgrad
Objectives	Understand the real situations in terms of water related issues and to share the information among the stakeholders especially for Tundzha River Basin	Understand the real situations in terms of water related issues and to share the information among the stakeholders for whole WABD area
Participants	Technical/administration staff including mayor from the organizations such as Sliven Municipality, Yambol Municipality, the MoEW, and Sewerage Company and the other private sector, the other Basin districts, local NGOs, as well as the EABD staff, and others – Total 96 persons	Technical/administration staff from the organizations such as most of the related municipalities, Regional Inspectorate of Environmental and Water, the MoEW, Basin Council, energy company, university, local NGOs, as well as the WABD staff and others – Total 43 persons
Main discussed items/participant's needs (priority problems)	<u>Main discussed items:</u> water supply issues, riverbed contamination, illegal waste dumping, wastewater pollution, riverbed ecosystem disturbance, extraction of sand/gravel, lack of WWTPs, pesticide issues, insufficient water monitoring points, hydropower related issues, forest ecosystem disturbance, drinking water issues, transferable water issues, and reduction method of pollution source. <u>Participant's needs (Priority problems):</u> Ground water pollution by agricultures, sand/gravel extraction from river beds.	<u>Main discussion items:</u> Drinking water quantity/quality issues, lack of wastewater treatment plant, protected areas issues, irrigation water issues, waste issues, mining issues, institutional issues, water pollution in household, and sewerage network issues. <u>Participant's needs:</u> Further considerations of the sewerages, and the WWTP.
<b>Items</b>		
Targeted River Basin	Arda River Basin (1 <sup>st</sup> Public Consultation)	
Date	November 28, 2006	
Place	Varna University of Smolyan Town	
Objectives	Understand the present water issues concerning the Arda River Basin and the schedule for formulation of the RBMP among the stakeholders	
Participants	Technical staff from the EABD, the WABD, the DRBD, and the BSRBD, as well as a Euro Consultant (ARCADIS), and others – Total 48 persons (for group discussion: Total 31 persons)	
Main discussed items/participant's needs	<u>Main discussed items:</u> Surface/ground water quality problems, ecosystem problems, drinking water quality deterioration, erosion due to deforestation, hydro morphological change, lack of sewerages in the populated areas, wastes problems in the dam (e.g. Kardzhali dam). <u>Participant's needs:</u> Further construction of the sewerages, and the WWTP	

**Table 7.2.1 Summary of Each Public Consultations (2/4)**

Items		EABD
Targeted River Basin		Upstream (from the water source to Parvomay town) of Maritsa River Basin
Date		February 22, 2007
Place		Parvomay Municipality Hall
Objectives		Understand the present water issues concerning the upstream of Maritsa River Basin as well as the schedule for formulation of the RBMP among the stakeholders.
Participants		Technical staff from the EABD, RIEW-WoEW in Pazardzhik, Municipalities (Parvomy, Kostenets, and others), an NGO, and others – Total 87 persons were invited, but actually EABD staff plus approximately 30 persons.
Main discussed items/participant's needs		<u>Main discussed items:</u> Discussed issues are very diverse, but mains are Topolnitsa River quality due to wastewater by mineral mining, Insufficient control of sand and gravel mining from the river beds, Lack of WWTP, institutional management issues related to forestry management, insufficient management for Sanitary Protected Area, etc.
Targeted River Basin		Downstream (from Parvomay town) of Maritsa River Basin
Date		April 12, 2007
Place		A Private Hotel of Haskovo Town
Objectives		Understand the present water issues concerning the down stream of Maritsa River Basin as well as the schedule and working program of the RBMP.
Participants		Technical staff from the EABD, Water Company, Irrigation Company, RIEW, Fisheries and aquacultures agencies, Regional Forestry Directorates, mining Companies, and others– Total 80 persons were invited.
Main discussed items/participant's needs		<u>Main discussed items:</u> Insufficient control of sand and gravel mining from the river beds, ground water level lowering, fish resources protection problems (e.g. management of constructed facilities on rivers), water pollution by agriculture activities, lack of flood mitigation measures, and institutional management issues, etc.

2 <sup>nd</sup> Public Consultation		EABD
Targeted River Basin		Arda River Basin (2 <sup>nd</sup> Public Consultation)
Date		May 29, 2007
Place		Kardzhali Hotel of Kardzhali Town
Objectives		<ul style="list-style-type: none"> <li>• Understand the main concepts (program measures, etc.) of the RBMP through presentation of a Dutch case, PHARE project</li> <li>• Discuss the possible measures (possible ideas) for some water bodies in Arda River Basin by the participants.</li> </ul>
Participants		Technical staff from the EABD, the municipalities (Smolyan, Chernoochene, Krumovgrad), RIEW-MoEW in Smolyan and Haskovo, as well as a Euro Consultant (ARCADIS), local media, and others – (for group discussion: Total 31 persons)
Main discussed items/participant's needs		<u>Main discussed items:</u> Problems: Wastewater pollution risk from ore mining, lack of sewerages and WWTPs, and erosion, etc. Possible measures: Completion of the construction of sewerage in the villages, Strengthening the measures against erosion <u>Participant's suggestions:</u> Improving the water quality of Erma River from tailing pond, Forestation of the water bodies, etc.

**Table 7.2.1 Summary of Each Public Consultations (3/4)**

Items		EABD	WABD
Targeted River Basin		Tundzha River Basin (2 <sup>nd</sup> Public Consultation)	Whole WABD Basins
Date		September 4, 2007	September 5, 2007
Place		Tundzha Municipality Hall, Tundzha Town	“American University” in Blagoevgrad
Objectives		<ul style="list-style-type: none"> <li>• Explanations of the ideas for programs of measures of the RBMP</li> <li>• Discuss the possible programs of measures of the RBMP in Tundzha River Basin by the participants.</li> </ul>	<ul style="list-style-type: none"> <li>• Explanations of the ideas for programs of measures of the RBMP.</li> <li>• Discuss the possible programs of measures of the RBMP in whole WABD areas by the participants.</li> </ul>
Participants		Technical staff from organizations such as the municipalities (Elhovo, Yambol, Tundzha, Sliven), RIEW, water supply companies, Local NGOs, Local media, EABD staff (for group discussion: Total 48 persons)	Technical/administration staff from the organizations such as related municipalities, RIEW, the MoEW, metal company, university professors, Local media, and WABD staff (for group discussion: Total 33 persons)
Main discussed items/ Participant’s suggestions		<p><u>Main discussed items:</u> Problems: Solid waste dumping issues near riverbeds, Pollutions caused by untreated industrial water, etc. Possible measures: Strict control and sanctions for illegal solid waste dumping near the rivers. <u>Participant’s suggestions:</u> Strengthening for reduction of industrial wastewaters, Restoration of destroyed dikes for flood prevention, Creation of buffer zones for natural vegetation, etc.</p>	<p><u>Main discussion items:</u> Problems: Industries with no WWTP, Insufficient WWTPs in the big towns, large amount of water losses from water supply systems, etc., Possible measures: Educations for farmers for pesticide use, etc. <u>Participant’s suggestions:</u> Construction of the WWTP and sewer systems at the small-scale settlement as well, more strict sanctions for the violators of the water discharge, etc.</p>
Items		EABD	
Targeted River Basin		Maritsa River Basin (2 <sup>nd</sup> Public Consultation)	
Date		November 20, 2007	
Place		Maritsa Municipality Building (Plovdiv town)	
Objectives		<ul style="list-style-type: none"> <li>• Understand the main concepts (program of measures, etc.) of the RBMP through presentations by EABD.</li> <li>• Discuss the possible measures (possible ideas) for water management issues in the Maritsa River Basin</li> </ul>	
Participants		Technical staff from the EABD, the Municipalities (Maritsa, Parvomay, Simeonovgrad, etc.), RIEW-MoEW, Water companies, local media, and others – (Total 58 persons)	
Main discussed items/participant’s suggestions		<p><u>Main discussed items:</u> Problems: Many destroyed river protection structures, Insufficient sewer systems in small-scale settlement, Serious waste problems in Haskovo area, very few actualizations for new construction of local sewer networks, etc. Possible measures: Strengthening of the river banks by planting trees, Controlled land use for pastures and livestock for preventing floods, etc. <u>Participant’s suggestions:</u> Forestation in the upper reach of the river basins, Development of the sewer systems at the small-scale settlement, etc.</p>	

Table 7.2.1 Summary of Each Public Consultations (4/4)

<b>3<sup>rd</sup> Public Consultation</b>		
<b>Items</b>	<b>EABD</b>	<b>WABD</b>
Targeted River Basin	Tundzha River Basin (3 <sup>rd</sup> Public Consultation)	Whole WABD basins
Date	December 4, 2007	December 10, 2007
Place	Kazanluk Grand Hotel	“American University” in Blagoevgrad
Objectives	<ul style="list-style-type: none"> <li>• Explanations of the draft proposing programs of measures of RBMP.</li> <li>• Discuss concerning the draft programs of measures in Tundzha Basin by the participants.</li> </ul>	<ul style="list-style-type: none"> <li>• Explanations of the draft proposing programs of measures of RBMP.</li> <li>• Discuss concerning the draft programmes of measures in the above basins by the participants.</li> </ul>
Participants	Technical staff from organizations such as the municipalities (Kazanlak, , Elhovo, Sliven), Water Directorate of MoEW, RIEW, water supply companies, Local NGOs, Local media, EABD staff (:Total 55 persons)	Technical/administration staff from the organizations such as related municipalities, RIEW, the MoEW, metal company, university professors, Local media, and WABD staff (:for group discussion: Total 35 persons)
Main Suggestions from the Participants (Ideas for programs of measures, others)	<u>Participant’s suggestions:</u> Training of farmers for appropriate agriculture practices; Restructuring of water management organizations; Construction of sewerage networks and WWTPs in small-scale settlement; Development of a mechanism for the implementation of the “Polluter Pay Principle”; Review the measures for transferring the water from Tundzha River basin to Maritsa River Basin, Step-wise planning of WWTPs, others.	<u>Participant’s suggestions:</u> Drinking water improvement including the Sanitary Protected Area; Cleaning of the river basin; Clear management for sand/gravel extraction; More strict management in the landfill sites; Implementation of more forestation at river basins; Impose illegal tree cutting; Conduct the flood prevention measures; Construction of water supply networks and WWTPs in small-scale settlement; Rehabilitation of water supply pipes; others.





## **CHAPTER 8 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS**

### **8.1 Introduction**

This Chapter describes the main results of the Initial Environmental Examinations (IEE) for each draft RBMP of EABD and of WABD based on the JICA Environmental and Social Considerations Guidelines and the relevant laws/regulations/guidelines of Bulgaria as well as the EU. The draft Environmental Assessment (EA) Report, which the table of contents is based on the EU Directive 2001/42/EC and the manual for Bulgaria is described in the Supporting Report of the Final Report of this JICA Study. Concerning the main results of the Public Consultations for the draft RBMPs are described in another chapter of the Final Report.

Bulgaria side (MoEW of Bulgaria) had an obligation to conduct the draft Environmental Assessment (EA) for the draft RBMPs with JICA Study Team. However, Bulgaria side has actually insufficient human resources for conducting the draft EA and for preparing the draft EA Report during this JICA Study. Therefore, this IEE included the preparation of the draft EA Report, which the preparation method and the table of contents are based on the environmental regulations and guidelines of EU and Bulgaria.

Also, Bulgaria's side must conduct the EA and prepare the EA Report, which shall be based on the EU and Bulgaria's regulations, for finalized RBMPs until year 2009 after finishing this JICA Study. For these situations, JICA Study Team also conducted the preparation of the draft EA Report after confirmation with Bulgaria's side regarding their needs for technical assistances for the EA.

Therefore, the draft EA Report could be used as a draft report for the EA Report for finalized RBMP of EABD and of WABD, which will be formulated by Bulgaria's side in the near future. The contents of the draft EA Report could be gotten feedback and revised by Bulgaria's side when the contents of the RBMPs are finalizing.

### **8.2 Important Law/Regulations and Organizations for Environmental Assessment**

#### **8.2.1 Important Laws/Regulations/Guidelines for Environmental Assessment**

Basic laws, important regulations, and guidelines related to environmental assessment in Bulgaria are as follows:

- Environmental Protection Act (EPA) of Bulgaria (SG No.91/25.09.2002, SG No.96/2002)
- Regulation on the Conditions, Procedure, and Methods for the Environmental Assessment of Plans and Programs (SG No.57/2004)
- EU Directive 2001/42/EC on environmental assessment of plans and programs
- EU Directive 2004/35/EC of April 2004 on environmental liability with regard to the prevention and remedying of environmental damage
- Protected Areas Act, State Gazette No.133 11.11.1998

- Biological Diversity Act, State Gazette No. 77.9.08.2002
- Manual for Environmental Assessment of Plans and Programs in Bulgaria, Sofia 2002

According to the Article 81, Chapter 6 of the EPA of Bulgaria and the discussions with the EIA and EA Department of MoEW, this Study is applied for the “Environmental Assessment (EA)” process in Bulgaria.

Because, it is stipulated by the EPA that the EA shall be conducted of plans and programs which are in a process of preparation and/or approval by central or local executive authorities and the National Assembly. This JICA Study does not include any concrete construction activities, but a master plan study for preparation of the RBMPs, which will be approved by central government of Bulgaria.

Also, the EPA stipulates “environmental impact assessment (EIA)” shall be conducted for development proposals for execution of construction, activities, and technologies listed in Annexes 1 and 2 of the EPA. This Master Plan does not apply for the Annex 1 and Annex 2; therefore, it is not necessary for executing the EIA.

### **8.2.2 Responsible Organizations/Departments for the Environmental Assessment (EA) in Bulgaria**

The responsible organization for appraisal of any environmental assessments (both EIA and EA) in Bulgaria is “Preventive Activities Directorate, EIA and EA Department” of MoEW.

On the other hand, competent authority of the EA for the RBMPs is Water Directorate of the MoEW. Also, the implementation organization of each EA for the RBMP of the EABD is the EABD and for the RBMP of the WABD is the WABD, according to the Water Directive of the MoEW.

However, the above all relevant organizations need capacity development for conducting each task for environmental assessment of the RBMPs. These tasks, which must be based on the requirements of not only the Bulgaria’s relevant regulations, but also the relevant EU directives in conjunctions with the time schedule of the EU-WFD. It will be needed in particular the technical human resources development for technical environmental assessment tasks.

### **8.2.3 Strategic Environmental Assessment (SEA)**

In general, governmental decisions related to environmental and social considerations could be made at the two levels; one is “Strategic level decision”, the other is “Project level decision”.

These earlier decisions are defined as “Strategic decisions”, as opposed to “Project decision”. These strategic decisions can be policies, plans or programs. Environmental assessment on a level of policies, plans, and programs is called “Strategic Environmental Assessment (SEA)”.

This SEA term does not appear in any legal document the EU, but is generally used to refer to the EU Directive 2001/42/EC on environmental assessment of plans and

programs. This JICA Study does not include any concrete construction projects/ activities as well as “Project decision”, but a master plan study for preparation of RBMPs, which will include “Strategic decisions” within the RBMPs.

#### **8.2.4 Necessary EA Report Contents**

Based on “Manual for Environmental Assessment of Plans and Programs in Bulgaria, Sofia 2002”, necessary EA Report contents for a master plan study are as follows:

- 1) An outline of the main objectives of the Plan and the relationship with other relevant Plans and programs
- 2) The current state of the environmental media and factors (ambient air, water, soil, geology, landscape, natural sites (protected areas), mineral resources, biological diversity, and the other natural and socio environmental factors relating to the plan);
- 3) The environmental characteristics of areas likely to be significantly affected;
- 4) The existing environmental problems relevant to the Plan;
- 5) The likely significant effects on the environment;
- 6) The measures envisaged to prevent, reduce, and offset any significant adverse effects on the environment;
- 7) An outline of the reasons for selecting the alternatives;
- 8) The measures envisaged to prevent, reduce, and offset any significant adverse effects on the environment;

A description of the measures envisaged in connection with the environmental monitoring, if necessary; and

A non-technical summary of the environmental assessment.

### **8.3 The Main Objectives and Proposed Programme of Measures of the draft RBMPs**

The draft RBMPs have the following main objectives:

- Formulate an Integrated Water Management Plan (surface water quantity and quality, groundwater quantity and quality) in the EABD and WABD area
- Establishment of water monitoring plan in the EABD and WABD area, and
- Propose programme of measures for water quality management, water supply improvement, and irrigation water management.

The draft RBMPs have the following main proposed programme of the measures, which may affect on the existing environmental and social situations in the Study Area:

- Programme of measures for water quality management (e.g. rehabilitations /installation of some WWTPs)
- Programme of measures for water supply improvement (e.g. rehabilitation of water supply pipes and networks)
- Programme of measures for irrigation water management (e.g. renovation/rehabilitation of intake structures, distribution structures)

## **8.4 The Existing Environmental Problems relevant to the draft RBMPs**

Based on the objectives and contents of the draft RBMPs, the following environmental elements and their existing problems are directly relevant to the RBMPs:

### **8.4.1 Surface Water Pollution**

Surface water pollution is the most important and one of the improvement objectives of the draft RBMPs. According to BOD load analyses by the JICA Study Team, the main present surface water pollution situations are as follows:

#### EABD Area

- The areas around Pazardjik, Plovdiv and Stara Zagora are the highest producers of BOD loads, which followed by the Dimitrovgrad and Haskovo Areas;
- In the Tundzha River Basin, Yambol to Elhovo areas is the highest producer of BOD loads. Sliven and Kazanlak areas also produce high BOD loads from small areas;
- In the Arda River Basin, Kardzhali and Smolyan areas are the highest producers of BOD loads; and
- These tendencies of the BOD load distributions coincide with the current pollution conditions along the Maritsa and Tundzha Rivers, where water quality is generally poor to moderate conditions from the upstream to the downstream.

#### WABD Area

- Blagoevgrad area is the highest producer followed by Pernik, Dupnitsa, Sandanski and Petrich areas;
- In terms of BOD load from unit area, Blagoevgrad, Sandanski, Gotse Delchev areas are the highest density of BOD load, followed by Pernik, Dupnitsa, Bansko and Razlog areas;
- These tendencies of the BOD load distributions coincide with the current pollution conditions along the Struma and Mesta Rivers, and the results of the Risk Analysis for the Surface Water Bodies made by the WABD office of Bulgaria.

### **8.4.2 Ground Water Pollution**

Ground water pollution is also one of the improvement objectives of the RBMPs. Some groundwater pollution risks such as nitrate, harmful heavy metals, and pesticides in

Bulgaria are reported. For example, groundwater nitrate contents of many sampling stations in Bulgaria are exceeding the limit values of Bulgaria.

According to the “Annual State of the Environment 2002, ExEA of Bulgaria”, Eastern Thracian and Burgas hydro-geographical basins are comparatively high contents of nitrate, with some stations are above of the limit. Also, the other points within the EABD area are also exceeding the limits. In the WABD area, the nitrate contents in the 4 stations are exceeding the limits.

In terms of pesticide contents of the groundwater in the Study Area, the values have slightly exceeding of the limit values in 9 stations in the WABD area, the values of the EABD area are below of the limit, according to the ExEA of Bulgaria.

### **8.4.3 Protected Areas Management Issues**

The protected areas management is one of the components of the RBMP based on the EU-WFD. The overall present protected areas and their main management issues are as follows:

#### EABD Area

- Parts of the Central (Tsentralen) Balkan and Rila National Parks, many nature landmarks and protected localities within the EABD area. Some of the management reserves and the other protected areas are situated in the Rhodope Mountain.
- The main protected areas management issues in EABD are i) insufficient conservation activities for important and vulnerable ecosystems, ii) illegal tree cutting activities, iii) forest fire, iv) waste dumping within the protected areas, v) insufficient park management activities based on the legislations.
- EABD has considerably insufficient human resources for management of the protected areas.

#### WABD Area

- The most diverse and many types of protected areas of Bulgaria exist in the WABD area. There are the Pirin National Park, the predominant portion of the Rila National Park and a small portion of the Central (Tsentralen) Balkan National Park, and Rila Monastery Nature Park, as well as managed reserves, numerous natural monuments.
- The main protected areas management issues in WABD are i) illegal tree cutting activities, ii) conflicts with tourism development and activities within the park areas, iii) water pollution within the protected areas, iv) insufficient conservation activities for important and vulnerable ecosystems.
- WABD has insufficient human resources for management of the protected areas.

### **8.4.4 Waste Problems**

The present waste problems in the Study Area also relevant to the RBMPs as one of the main causes of the water pollutions and soil pollution.

There is significant number of landfill sites of extraction industry waste in the areas of the EABD and WABD. The highest environmental pollution risk is mainly by the mine waste and waste dumping related to the metal, uranium, ore extraction, and their processing activities. Most of these facilities are located in the EABD such as river basins of Arda, Topolnitsa, Luda Yana, and Chepelarska. The natural environment within the basins is the most affected by the waste dumping in Topolnitsa and Luda Yana river basins where past and present Copper-ore extraction occurs. Also, landfill sites of uranium-ore extraction mine wastes prevails in the WABD area, where are concentrated in the river basins of Mesta (upper reach), Dospat, and Struma particular in the near Blagoevgrad town.

On the other hand, it is reported that the average quantity of household waste per capita is estimated at 476 kg in Bulgaria. The figures are the highest for the District of Pernik is estimated at 1,568 kg per capita, while these for the District of Plovdiv is 318 kg per capita. The share of the population served by municipal waste collection systems show a tendency of growth in the period 2001-2005 and a rise from 80.2 to 87.8% was reported according to the National Statistical Institute of Bulgaria. The rate is very high for the districts of Smolyan (98.4%) and Pazardzik (97.5%) in the EABD and for the districts of Kjustendil (96.7%) and Blagoevgrad (95.9%) in the WABD.

Nevertheless, there are many waste management issues in the Study Area. For example, it is still observed many illegal waste dumping sites along the many rivers in the Study Area.

#### **8.4.5 Specific environmental issues in the Study Area**

It could be pointed out that the specific important environmental issues in the Study Areas relevant to the draft RBMPs are as follows:

- River bank environmental and morphological degradation due to sand gravel extraction activities, uncontrolled construction activities, and illegal activities such as illegal waste dumping along the rivers,
- Soil quality degradation due to insufficient watershed management, and
- Floods and incidental pollution issues due to insufficient river basin management.

The above all existing environmental problems directly relevant to the draft RBMPs will be worsen obviously, if the RBMPs are not implemented. This is one of the alternatives for considering the environmental assessment as “zero option” in general.

#### **8.5 Outline for Selecting of the Alternatives**

The following case is already considered as an alternative for the environmental and social considerations (IEE Study) for the draft RBMPs.

- Without the implementation of the RBMPs case (Zero option)

If the concrete construction sites, their main functions, and possible pollution substances of the proposing facilities such as new WWTPs, could be identified during the planning process of the finalized RBMPs, the following case could be considered as another alternative for environmental assessment by the Bulgaria’s governments.

- Alternative case on the proposed programme of measures, which composed of the combined cases of the structural measures. (e.g., many small-scale WWTPs construction/operation, or few large-scale WWTPs construction/operation, etc.).

The above three alternatives (i) Zero Option (A-0), ii) Many small-scale WWTPs construction/operation (A-1), iii) Few large-scale WWTPs construction/operation (A-2) could be evaluated for each selected indicators of the assumed impacts based on the available information. The following table is the result of the selections of the alternatives related to the WWTPs.

Selected indicators of the assumed impacts	A-0	A-1	A-2
<b>Social Environment</b>			
Local economy reinvigoration	0	+	+
Maximum use of the existing land resources	+	-	-
Functioning of the existing social infrastructures and services (existing sewer networks and pipes)	-	++	+
Equitable access for the Poor or Ethnic Group for the safe water resources	-	++	+
Equitable economic benefits and damages for the local residents by the facilities	0	?	?
Conservation of the existing cultural heritages	0	-	-
Hazard and accidents related to WWTPs	0	+, -	++, - -
<b>Natural Environment</b>			
Conservation of surface water quantity and quality	0	++, -	++, - -
Conservation of groundwater level or quality	0	++, -	++, - -
Conservation of existing flora, fauna, and biodiversity	0	++, -	++, - -
Conservation of the existing landscape	0	-	- -
<b>Pollution</b>			
Air pollution related to construction of the WWTPs	0	-	- -
Water pollution related to construction of the WWTPs	0	-	- -
Wastes related to construction of the WWTPs	0	-	-
Noise and vibration related to construction of the WWTPs	0	-	- -
Offensive odor related to construction of the WWTPs	0	-	-

Note: "0": No impact, "+": Favorable impact, "++" : Highly favorable impact, "-": Adverse impact, "- -" : Highly adverse impacts, "?": Insufficient information or unknown.

Based on the above results, many small-scale WWTPs (A-1) construction/operation case could be evaluated as optimal case tentatively among the alternatives related to the WWTPs from the environmental and social considerations aspects. This evaluation and the results were based on the available information for each assumed impacts only. The further alternative study will be needed during the finalizing the RBMPs when the exact candidate locations and scales of each WWTPs are identified.

The other possible alternative is the combination of the construction sites of the proposed structure measures such as new WWTPs, which may cause any different levels of the possible environmental and social impacts by the site locations. This alternative could be considered during the finalizing the RBMPs.

## 8.6 Possible Environmental and Social Impacts and Their Evaluations

The possible impacts evaluation surveys based on the scoping are conducted by the following methods:

- Analysis by the relevant documents/data and information;
- Rapid field observations and hearings for the relevant organizations and local peoples;
- Site visits at the identified candidate WWTP sites, which has any possible adverse impacts by the facility construction.

The above site visits were conducted in Kalofer town, Karlovo municipality, and Asenovgrad municipality within the EABD area as well as in Petrich municipality, Gotse Delchev municipality, and Sandanski municipality within the WABD area.

The possible favorable and adverse impacts are summarized in Table 8.6.1. The modified Leopold Matrix is used for impact evaluations, which include many evaluation items such as “magnitude”, “Irreversible or reversible”, and both favorable and adverse impacts by any plan or programme or activities.

The most important survey result is that the draft RBMPs themselves will cause many possible favorable impacts for the Study Areas for many environmental and social elements. On the other hand, the draft RBMPs may cause some possible adverse impacts, even if those magnitudes of the impacts will be low or very low.

Concerning the possible adverse impacts, the following elements were selected.

### Pollution

- Air pollution
- Water pollution
- Waste
- Noise and vibration
- Offensive odor

### Social Environment

- The poor, ethnic people

### Natural Environment

- Flora, Fauna and Biodiversity

The sources (proposing WWTPs, sewer networks, or water supply pipes) and the affected areas of the possible adverse impacts for all the above selected items will be limited. On the other hand, most of the affected areas for the possible adverse impacts could not be identified in this JICA Study phase due to uncertain of the candidate construction or rehabilitation sites of the proposing facilities.

Based on the above understandings, the possible adverse impacts by each selected environmental and social impact are described below:

### 8.6.1 Air pollution

#### Construction Phase of the WWTP, sewer network and water supply pipes

- Most of the candidate WWTP sites are placed near riverbanks where sandy soils are widespread (e.g. Kalofer, Karlovo, etc. at EABD area and Petrich, Gotse



Delchev, etc. at WABD area). Therefore, the construction dust impacts are envisioned especially during summer season;

- Moving, depositing or relocating of the excavated earth and construction wastes by construction or renovation of the WWTP, sewer network, and water supply pipes may cause emissions of dust and Suspended Particulate Matter (SPM) in every construction or renovation site.
- As the site access is possible only by using unpaved roads at Kalofer in EABD area as well as at Petrich and Gotse Delchev in WABD area, the dust emissions are expected to occur the sites.
- Heavy machinery such as pile driver and stationary construction equipment may generate exhaust emissions at all the construction sites of the WWTP.

### **8.6.2 Water Pollution**

#### Construction Phase of the WWTP, sewer network

- Insufficient compliance with appropriate construction methods (e.g. discharges of insufficient treated construction wastewater) for sewer network and water supply pipe rehabilitations may cause water pollution;
- Leakage from the uncompleted sewer networks in most of the Study Area could cause groundwater and surface water pollution, and
- Fuel spills from damaged machinery could severely deteriorate the surface and ground water quality in the construction sites of the WWTPs, if no preventive measures conducted;

#### O/M Phase of the WWTP, sewer network

- Underestimated high water level of the river near the candidate WWTP at Sandanski in WABD area may cause water pollution by overflows of the wastewaters or other pollutants relevant to flood or heavy rains.
- There are operation incidents possibilities such as malfunction in pumping equipment of sewer network (e.g. energy supply interruption) may cause sewage overflow into the ground water at all the sewer network construction and renovation sites.

### **8.6.3 Noise and Vibration**

#### Construction Phase of the WWTP

- Construction equipment and heavy machinery on site of the WWTP may cause noise and vibration problem near the residential sites such as at Asenovgrad in EABD area and at Petrich in WABD areas;
- Noise and vibration may occur during the transportation of heavy trucks from the town center to the construction sites of the WWTP such as at Kalofer in EABD areas and at Sandanski in WABD area.

#### **8.6.4 Offensive Odor**

##### Construction Phase of the WWTP

- There is a possibility that malfunction of the construction large equipment (e.g. fuel spills) may generate offensive odor especially at the residential areas of all the WWTP sites.

##### O/M Phase of the WWTP, sewer network

- Inappropriate sludge drying and treatment equipments on site of the WWTPs may cause offensive odor at the residential areas;
- Malfunction in pumping equipment (e.g. energy supply interruption) of the WWTP or sewer network may cause offensive odor by sewage overflow.

#### **8.6.5 Flora, Fauna, Biodiversity**

##### Construction Phase of the New WWTPs

- There is a possibility that construction of the new WWTPs may disturb the existing flora.

#### **8.6.6 Waste**

##### Construction Phase of the WWTP, sewer network and water supply pipes

- Moving, depositing or relocating of the excavated materials by the construction or rehabilitation of the proposing facilities may cause construction waste problems all the construction sites, if no appropriate measures taken.

#### **8.6.7 The Poor, Ethnic Group**

##### O/M Phase of water supply, irrigation systems

- The installed services for water supply or irrigation systems as well as flood warning system may cause any unbalanced benefits to the poor or ethnic groups.

Concerning the possible impacts for the poor, the main possible affected areas might be small villages at Pazardjik district, where the official unemployment rate is about 14%, in EABD area and at Kyustendil district in WABD area.

Concerning the possible impacts for the ethnic group, the main possible affected areas might be small villages at Sliven district, where “*Karakachani*”(A traditional shepherds group) in EABD area and at Blagoevgrad in WABD area.

## 8.7 Mitigation Measures for Possible Significant Impacts and a Recommended Monitoring/Control Plan

### 8.7.1 Mitigation Measures for Possible Main Adverse Impacts

Based on the possible impacts evaluation surveys, the mitigation methods and measures for the possible adverse impacts for each selected environmental and social element are proposed and summarized in the following table.

Environmental and Social Elements	Possible main adverse impacts	Mitigation measures
Air Pollution	As the site access to candidate WWTPs sites such as Kalofer, Petrich, Gotse Delchev sites are possible only by using unpaved roads, the dust emissions are expected to occur.	All on-site unpaved roads and off-site unpaved access roads shall be stabilized of dust emissions using water ( <i>preventive measure</i> )
	Moving, depositing or relocating of the excavated materials may cause emissions of dust and particulate matter.	When materials are transported, the materials shall be covered to eliminate the emissions ( <i>preventive measure</i> ).
	Heavy machinery and stationary construction equipment may generate exhaust emissions.	To reduce the engine emissions, it shall minimize idling time of the engines ( <i>reduction measure</i> )
Water Pollution	Underestimated high water level of the river near the candidate WWTP such as Sandanski may cause water pollution by overflow of the wastewaters or other pollutants.	Candidate WWTP sites near riverside or flood prone zone shall be created high foundation ( <i>preventive measure</i> )
	Leakage of the unimproved sewer networks could cause underground water as well as surface water pollution	Conduct the quality check of the renovated sewer network to avoid leakage ( <i>preventive measure</i> )
	Fuel spills form damaged machinery usage may deteriorate the surface and underground water quality.	Appropriate use and maintenance of construction machineries to prevent the oil spills ( <i>preventive measure</i> )
Noise and Vibration	Construction equipment and heavy machinery on site may cause noise and vibration problem near the residential sites.	Set construction time schedule, which use heavy machineries for only daytime ( <i>preventive measure</i> )
	Noise and vibration may occur during the transportation of heavy trucks from the town center to the construction site.	Designate the route for heavy trucks to minimize the noise and vibration nuisances ( <i>offset measure</i> )
Offensive odor	Inappropriate sludge drying and treatment equipments on site of the WWTPs may cause offensive odor.	Installation of odor removal equipment at the sludge treatment facilities ( <i>reduction measure</i> );
	Malfunction of the construction large equipment (e.g. fuel spills) may generate offensive odor.	Construction equipment should conduct the maintenance and check ( <i>preventive measure</i> )
Flora, Fauna, Biodiversity	There is a possibility that existing flora may be disturbed by the construction of the new WWTPs.	Valuable flora could be transplanted into another sites, which may have almost same ecosystem ( <i>compensatory measure</i> )
Waste	Moving, depositing or relocating of the excavated materials may cause construction waste problems.	Construction waste disposal sites should be identified and dispose appropriately. ( <i>preventive measure</i> )
The Poor, Ethnic Group	The installed services for water supply or irrigation systems may cause any unbalanced benefits to the poor or ethnic group.	Careful distribution plans for water supply or irrigation systems shall be considered. ( <i>preventive measure</i> )

## 8.7.2 Proposed Monitoring and Control Plan

It is recommended that the monitoring and control plan for the possible main adverse impacts, which is shown in the following table, could be considered at the formulation of the finalized RBMPs.

Environmental and Social Elements	Monitoring or Control Activities	Frequency	Responsible Authority
Air Pollution	Dust emissions level monitoring into the residential areas, where the trucks are passing	Monthly	RIEW
	Air quality monitoring and control in the residential areas	Monthly	RIEW
	Dust level control on the construction site	Daily during the construction	Construction site manager
	Regular checking and monitoring of the equipments and vehicles' engines	Weekly during the construction	Construction site manager
	Observation for control of the speed of the heavy trucks around the residential areas	In the case of many heavy trucks used	Municipality and Traffic police
Water Pollution	Periodic monitoring and inspections of the sewerage systems	Yearly	Municipalities and RIEW
	Monitoring the fulfillment of the requirements as settled in the permits for water discharges into river or other water bodies.	Yearly	EABD and WABD
	Quality assurance monitoring and control (checking) during the renovation of the sewerage and water supply networks.	Weekly during the construction phase	Municipalities
	Control of illegal tapping or intervention into the sewerage systems.	Regularly	Municipalities
	Monitoring the surface and ground water	Yearly	EABD, WABD and RIEW
Noise and Vibration	Noise and vibration levels measuring, at the residential areas, where the trucks are passing	Monthly	RIEW
	Controlling the transportation route and the speed of the heavy trucks.	Regularly	Municipality and Traffic police
Offensive odor	Periodic monitoring and inspections of the sewerage systems.	Yearly	Municipalities and RIEW
	Controlling of illegal tapping or intervention into the sewerage systems	Regularly	Municipalities
	Controlling the unregulated waste disposal	Regularly	Municipalities and RIEW
	Monitoring of the Waste and Sludge situations of the new WWTPs	Yearly	Municipalities and RIEW
Flora, Fauna, Biodiversity	Conduct ecological monitoring, including flora and vegetation field survey	Yearly	RIEW
Waste	Conduct regular construction waste control inspections	Monthly	Municipalities
The Poor, ethnic group	Conduct questionnaire surveys concerning the socio-economic situations including water supply/use situations/issues in the Study Area.	Yearly	Municipalities and National statistical Institute
	Monitoring for the services for water infrastructures and flood systems.	Yearly	Municipalities, MSPDA
	Conduct interview surveys on the public access to clean water and sewerage.	Monthly	Municipalities

## **8.8 Further specific environmental and social considerations for the finalizing RBMPs**

Concerning the specific recommendations for the environmental and social considerations for the finalized RBMPs are as follows:

### **8.8.1 Further important environmental and social consideration surveys for the finalizing RBMPs**

This JICA Study proposed “priority towns” for WWTPs or sewerage improvement are selected mainly based on the reduction rate of BOD load against the Near Future BOD Load scenario.

On the other hand, field surveys or sites visits for environmental and social considerations are in the outsides of the “priority towns” were not enough in this JICA Study stage.

If construction activities of any WWTPs or the other facilities for the structure measures in the outsides the “priority towns” for WWTP will be considered, the following environmental and social surveys will be important and needed:

- Regular water quality surveys: Many outsides of the “priority towns” are relatively good status for water environment. On the other hand, these outsides of the “priority towns” are vulnerable to any adverse natural impacts (water pollution, etc.).
- Socio economic field surveys in the remote area: Because, these many remote areas are located in the outsides of the “priority towns”. Any adverse gaps for the poor, ethnic peoples in the remote areas in terms of socio-economic benefits by implementation of effective water supply plan or flood control plan may expanded, if the implementation measures are not appropriately.

### **8.8.2 Further environmental and social considerations for the finalized RBMPs**

When the exact locations of any WWTPs or the other facilities for the structure measures are selecting, the following present situations of the protected areas and present land uses shall be considered in the finalizing RBMPs:

- EABD area has the parts of the Central (Tsentralen) Balkan and Rila National Parks, and many small-scale scattering natural monuments, which were regulated by Bulgaria Protected Areas Act.
- Also, EABD area has sanitary protected areas (e.g. surface water sanitary protected area near Perushtitsa town) or Natura 2000 protected areas (e.g. bird and habitat conservation area in the north direction of the kalofer town), which are regulated by EU-WFD. The present land use of the EABD in general is predominant for the large-scale agricultural areas.
- WABD has the Pirin National Park, the predominant portion of the Rila National Park and a small portion of the Central (Tsentralen) Balkan National Park, and Rila Monastery Nature Park, as well as managed reserves, numerous natural monuments.

- Also, WABD area has many sanitary protected areas (e.g. mineral water sanitary protected area in the east direction of Petrich municipality) or Natura 2000 protected areas (e.g. bird and habitat conservation area in the east direction of Blagoevgrad town). The present land use of the WABD in general is predominant for forests or unique floristic ecosystems.

The construction sites of new WWTPs or other new water management facilities shall be selected outside or far sites from the above-all protected areas. Also, the mitigation measures (e.g. preventive measures for disturbance of the existing ecosystem) as well as ecological monitoring such as valuable birds or mammal regular observations on inside the protected areas shall be considered.

Furthermore, the above characteristics of the present land uses shall be considered when the site selection of the facilities. The sites shall be selected to prevent from disturbances of present forest ecosystems or present effective agricultural activities.

## **8.9 Conclusion and Recommendation**

It could be concluded that the draft RBMPs themselves will contribute many favorable environmental and social impacts such as water quality improvement, social infrastructure services improvement (water supply network improvement, etc.).

On the other hand, there is a possibility that the construction of the proposing facilities based on the draft RBMPs may cause some slight adverse impacts (temporary water pollution, or dust or noise related to the construction of the WWTP, water pollution related to uncompleted sewer networks, and others) on the existing natural and social environments. Therefore, the mitigation measures for the possible adverse impacts and the recommended monitoring and control plan shall be considered as one of the activities of the finalized RBMPs themselves.

The draft RBMPs includes proposals for development of some physical facilities such as WWTP, but the locations, the scales, and functions of the physical facilities are not identified yet in the draft RBMPs. Therefore, more detail possible environmental and social impacts and their affected areas by the proposing physical facilities could be evaluated and described by Bulgaria's side after finishing this JICA Study.

It is recommended that Bulgaria's side could conduct environmental and social considerations, which will become an Environmental Assessment and based on EU and Bulgaria's relevant regulations, for the finalized RBMPs by referring these environmental and social considerations, which are called as the IEE for the draft RBMPs.

Table 8.6.1 Modified Leopold Matrix for the draft RBMPs (1/3)

Items	Nature of Impacts	Direction	Direct/ Indirect	Duration	Irreversible/ Reversible	Magnitude
<b>Social Environment</b>						
Involuntary Resettlement	Involuntary resettlement by the draft RBMPs does not occur.	-	-	-	-	-
Local economy such as employment and livelihood	It could be expected the productivities of local economic activities will be increased due to improvement of water resources distribution.	Favorable	Indirect	Operation phase of the facilities/systems	Reversible	Medium
Land use and utilization of local resources	Increase in local level employment opportunities such as construction works will be expected.	Favorable	Indirect	Construction phase of the facilities/networks	Reversible	Low
Social and local decision-making institutions	There are very few impacts due to small-scale of proposing facilities or rehabilitation of the existing facilities.	-	-	-	-	-
Existing social and infrastructures services	There are very few impacts (split of communities, etc.) due to the small-scale of proposing facilities/systems.	-	-	-	-	-
The poor, indigenous and ethnic people	It could be expected the social infrastructures and services (sewer networks, etc.) will be improved by the implementation of the RBMPs.	Favorable	Direct	Operation phase of the facilities/systems/networks	Reversible	High
Misdistribution of benefit and damage	The RBMPs will contribute to promote equitable access for the water resources. But the careful distribution plans, which are taking into account of the poor and the ethnic group, shall be considered.	Favorable	Indirect	Operation phase of the facilities/systems/networks	Reversible	Low
		Adverse	Indirect	Operation phase of the facilities/systems/networks	Reversible	Low
Cultural heritage	Any favorable impacts may occur if the proposing measures (e.g. improvement of water supply systems) are conducted appropriately.	Favorable	Indirect	Operation phase of the facilities/systems	Reversible	Low
Local conflict of interests	Very few adverse impacts may occur due to the small-scale facilities/systems. There are very few impacts due to the contents of the draft RBMPs.	-	-	-	-	-

Table 8.6.1 Modified Leopold Matrix for the draft RBMPs (2/3)

Items	Nature of Impacts	Direction	Direct/ Indirect	Duration	Irreversible/ Reversible	Magnitude
Water usage or Water rights and Rights of Common	There are very few specific/customary water rights in the Survey Area, while the water rights will be secured through more appropriate water management.	Favorable	Direct	Operation phase of the systems	Reversible	Medium
Sanitation	It is expected many sanitation improvements in conjunction with the water quality improvement.	Favorable	Indirect	Operation phase of the facilities/systems	Reversible	Medium
Hazard (Risk), Infectious diseases such as HIV/AIDS	Any damage of the floods or drought could be decreased. Concerning the other risks, there are very few impacts.	Favorable	Direct	Operation phase of the facilities/systems	Reversible	Medium
<b>Natural Environment</b>						
Topography and Geographical features	There are very few impacts due to the small scale of the proposing facilities/systems.	-	-	-	-	-
Soil erosion	Very few adverse impacts due to proper locations (not steep site) of the facilities.	-	-	-	-	-
Groundwater	Ground water quality improvement of the Study Area is one of the important objectives of the draft RBMPs.	Favorable	Direct	Operation phase of the systems	Reversible	High
Hydrological situation	Long-term favorable impacts may generated by the implementation of the draft RBMPs.	Favorable	Direct	Operation phase of the systems	Reversible	Medium
Coastal Zone (Mangroves, Coral reefs, Tidal flats, etc.),	There is no coastal zone within the Study Area.	-	-	-	-	-
Flora, Fauna and Biodiversity	Many indirect favorable impacts will be expected in conjunction with the water quality improvement.	Favorable	Indirect	Operation phase of the systems	Reversible	Medium
Meteorology	There is a possibility any adverse impacts on existing ecosystem may occur during the construction of the proposing facilities.	Adverse	Indirect	Construction phase of the facilities	Reversible	Low
Landscapes	Very few impacts due to the contents of the draft RBMPs	-	-	-	-	-
	Very few adverse impacts due to small-scale of the proposing facilities.	-	-	-	-	-
Global warming	Very few impacts due to proposed measures of the draft RBMPs.	-	-	-	-	-



Table 8.6.1 Modified Leopold Matrix for the draft RBMPs (3/3)

Items	Nature of Impacts	Direction	Direct/ Indirect	Duration	Irreversible/ Reversible	Magnitude
<b>Pollution</b>						
Air pollution	Minor temporary adverse impacts such as dust may occur only during the construction of the proposing facilities.	Adverse	Indirect	Construction phase of the facilities	Reversible	Low
Water pollution	Many favorable direct impacts will be expected. Water quality improvement of the Study Area is the most important objectives of the draft RBMPs.	Favorable	Direct	Operation phase of the facilities/systems	Reversible	High
	Temporary adverse impacts (e.g. construction wastewater problems) may occur.	Adverse	Indirect	Construction phase of the facilities	Reversible	Low
Soil contamination	Favorable impacts will be expected in conjunction with the water quality improvement.	Favorable	Indirect	Operation phase of the facilities	Reversible	Medium
Waste	Favorable impacts will be expected if the water management measures, which includes waste mitigation measures, are implemented.	Favorable	Indirect	Operation phase of the systems	Reversible	Medium
	Some adverse impacts such as construction wastes problems may occur.	Adverse	Indirect	Construction phase of the facilities	Reversible	Low
	Minor temporary adverse impacts such as construction noise may occur only in the residential areas.	Adverse	Indirect	Construction phase of the facilities	Reversible	Very low
Ground subsidence	Any impacts may not occur due to contents of the draft RBMPs.	-	-	-	-	-
Offensive odor	Favorable impacts will be expected in conjunction with water quality improvement.	Favorable	Indirect	Operation phase of the systems	Reversible	Medium
	Minor offensive odor problems may occur if no appropriate countermeasures are taken.	Adverse	Indirect	Construction phase of the facilities	Reversible	Low
Bottom sediment	Favorable impacts will be expected in conjunction with water quality improvement.	Favorable	Indirect	Operation phase of the systems	Reversible	Low
Accidents	Favorable impacts will be expected if more appropriate water management conducted.	Favorable	Indirect	Operation phase of the systems	Reversible	Low



## CHAPTER 9 ECONOMIC AND FINANCIAL ANALYSIS

### 9.1 Economic Evaluation

#### 9.1.1 Methodology

Economic evaluation is to be made by the following steps in this kind of project.

- To identify the economic benefit.
- To estimate basic unit value per unit for each benefit item.
- To estimate annual average economic benefit under the “With-” and “Without-Project” concept.
- To identify the economic benefit as differences of damages in “With-” and “Without-Project” conditions.
- To identify economic cost converted from the financial cost for the project.
- To compare the economic benefit with the economic cost of project, and evaluate the project feasibility or viability by means of some indices as the economic internal rate of return (EIRR), the net present value (B – C), and B/C Ratio.

The EIRR is to be calculated using a cash flow of economic cost and economic benefit during the project life. This EIRR is defined by the following formula:

$$\sum_{t=1}^{t=T} \frac{C_t}{(1 + R_e)^t} = \sum_{t=1}^{t=T} \frac{B_t}{(1 + R_e)^t}$$

where,  $T$  = the last year of the project life,  $C_t$  = an annual economic cost flow of the project under study in year  $t$ ,  $B_t$  = an annual benefit flow derived from the project in year  $t$ , and  $R_e$  = the Economic Internal Rate of Return (EIRR) (a discount rate to be used for costs resulted at the same amount of the benefits in terms of the present value).

When the resulted EIRR is the same rate with or higher than the discount rate applied for calculation of present value of both the benefit and cost, the project has a feasibility to execute.

Generally, the economic cost of a project is identified as opportunity cost of capital. In this case, if goods and services would be invested in the project under study, they could no longer be utilized for other projects. This implies that the benefits of the other projects could have been created would be sacrificed. These sacrificed benefits of the other projects are called opportunity cost of the project. The applied discount rate is generally considered as the same rate of the said opportunity cost of capital. Therefore, in a case that resulted EIRR is to be higher than the applied discount rate<sup>1</sup>, it means that the

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<sup>1</sup> The World Bank says, “The discount rate reflects the rate of fall of the value of consumption over time.(William A. Ward and Barry J. Deren, Ed. “*The Economics of Project Analysis -A Practitioner's Guide-*” IBRD Technical Paper).

Regarding the EIRR, the Asian Development Bank (the ADB) says “the projects have viability when the resulted EIRR exceeds the Opportunity Cost of Capital (the OCC). In almost the developing countries, the most likely EIRR

economic reliability of the project is higher than a rate of opportunity cost of capital as the sacrificed benefit of the other project.

The NPV is expressed as “B-C” and defined by the following formula:

$$NPV = B - C = \sum_{t=1}^{t=T} \frac{B_t}{(1 + R_e)^t} - \sum_{t=1}^{t=T} \frac{C_t}{(1 + R_e)^t}$$

It means that, if the present value of the benefit subtracting by the present value of cost would become positive, then the project being under study will have a reliability to execute.

The B/C Ratio is defined by the following formula:

$$B / C = \frac{\sum_{t=1}^{t=T} \frac{B_t}{(1 + R_e)^t}}{\sum_{t=1}^{t=T} \frac{C_t}{(1 + R_e)^t}}$$

It means that, if the rate of the present value of the benefit dividing by the present value of the cost would become more than “1.00”, then the project being under study will have a reliability to execute.

The project life is assumed at 30 years after completion of improvement works for 3 work components as (1) irrigation systems, (2) sewerage systems and (3) potable water supply systems. Cash flow of the economic cost and economic benefit should be made from the first year of the improvement works to the end of each project life.

In this case, annual operation and maintenance cost (O&M Cost) should be taken into account. And, some amount of replacement cost, if any, should also be taken into consideration since some parts of the initial works for the facilities may not be durable during the project life.

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is ranging from 8% to 12%. Therefore, there will be no any issues if the resulted EIRR exceeds the 12 % to execute the projects, but if the resulted EIRR is less than the rate of 12%, it is required some specified explanation concerning the benefits that could not be converted into monetary terms.” (*Occasional Papers -Economic and Financial Appraisal of Bank Assisted Project*” ADB Appraisal Paper No.11, January 1978).

Also regarding the EIRR, the World Bank says, “If the OCC (in other words, “the EIRR”) is resulted at 5 % except the non-commercial projects, it is too low. But if it is resulted at 20 %, it is too much. Usually, the World Bank adopts the rate of 10 %.” (Warren C. Baum and Stokes M. Tolubert, Ed. *Investing in Development -Lessons of World Bank Experiences-*” IBRD, June 1985).

Anyway, unless the amount of cost and benefit are not changed in the same project, always a certain EIRR is to be resulted even if any discount rate is applied. In other words, the EIRR has a meaning to avoid arbitrariness of the B/C ratio.

## 9.1.2 Identification of Economic Benefit

### (1) Irrigation System Improvement

As discussed in the other chapters, it is said that all the water losses in the current irrigation systems are ranging from around 60% to 70%. Among the said losses, it is generally estimated that intake and/or distribution facilities cause around 30% and/or 40%. The irrigation System Improvement is for mitigation of these intake losses and distribution losses.

Here, it is assumed that the said saving water volume of losses may be used for expanded irrigation field. Accordingly, the benefit in the component of Irrigation System Improvement may be assumed as increased productivity of agricultural crops from the newly expanded irrigation field.

From the viewpoint of the above, current productivity of agricultural crops should be estimated first of all. Tables 9.1.1 and 9.1.2 show existing production of the agricultural crops in Bulgaria and a summary of cultivated area by major agricultural crops in recent years, respectively. Rates of the irrigated area against total cultivated area are only around 4% or a little bit more of it. It means that almost of all the agricultural crops are produced in non-irrigated field. In those agricultural conditions, the productivity of crops is as shown in the following table together with weighted average amount of the whole major crops. In the crops, cereals and fodder are not cash crops (locally classified as “industry crops”). So, the weighted average amounts are estimated for the kind as that for the whole crops and that for crops without cereals and fodder.

**Average Productivity by Crops for the Past Several Years**

Kind of Crops	(Lev/ha)				
	2001	2002	2003	2004	2005
Cereal Crops	543	462	526	674	532
Industrial Crops	347	943	685	986	991
Fodder Crops	2,679	2,844	3,434	4,887	4,486
Vegetables	15,795	20,177	17,004	20,609	39,552
Popatoes	3,397	2,550	5,287	5,692	4,900
Fruits	6,742	7,045	9,141	7,859	13,715
Vine	0	6	8	9	8
Overall Weighted Average (Lev/ha)	1,068	1,094	1,179	1,276	1,229
Without Irrigation	Annual Simple Average:				1,186
Weighted Average Except Cereal and Fodder	2,379	2,807	2,298	2,547	2,634
Without Irrigation	Annual Simple Average:				2,596

For estimating the agricultural economic benefit, the other productivity in irrigated field should be estimated. Regarding this, a study result<sup>2</sup> may be available. According to this material, differences of productivity of crops have been made clear as shown in Table 9.1.3. Based on the above data, the productivity of industrial crops (cash crops) can be estimated as shown in the following table.

<sup>2</sup> “Study on Productivity” made by “Irrigation Systems PLC.” 2000.

### Weighted Average Amount of Productivity of Cash Crops with Irrigation

	(Lev/ha)				
	2001	2002	2003	2004	2005
Weighted Average Except Cereal and Fodder with Irrigation	5,723	5,967	4,884	5,414	5,599
	Annual Simple Average:				5,518

Those amounts shown in the above table may be the gross farm gate income of farmers. But actually, the farmers invest their own cost for production as production cost as water cost, labour cost, fertilizer, machine rental fees etc., so the actual farm gate price should be estimated from this gross farm gate amount deducting the said production cost.

The following table shows a summary of farmers' production cost.

### Farmers' Production Cost by Crops

Irrigation Branch	(Lev/ha)				
	Cereal	Industrial Crops	Vegetables	Fruits	Vine
Ruse Branch	862	1,542	4,266	4,266	5,797
Pleven branch	817	2,653	4,813	4,111	5,521
Montana branch	920	2,486	4,924	4,301	4,867
Vratsa branch	920	2,486	4,924	4,301	4,867
Veliko Tarnovo branch	817	2,653	4,813	4,111	5,521
Shumen branch	969	2,549	4,960	4,350	4,942
Burgas branch	969	2,033	4,751	4,270	5,002
Varna branch	980	2,544	4,942	4,366	4,948
Pernik branch	917	2,437	0	3,198	0
Average	908	2,376	4,799	4,141	5,183
Weighted Average Production Cost per Unit Cultivated Area except Cereal and Fodder (Lev/ha)			3,102	at 2000-price level	
	2001	2002	2003	2004	2005
	3,252	3,376	3,566	3,708	3,948

Source: Irrigation Systems PLC.

In this case, following inflation rates are taken into consideration.

### Annual Inflation Rate for Last 5 Years

	2001	2002	2003	2004	2005
Annual Inflation Rate	4.82%	3.81%	5.64%	3.98%	6.45%

Source: NSI.

Based on the above data, actual farm gate price of industrial crops may be estimated as shown below.

### Overall Average Annual Farm Gate Price of Industrial Crops

	(Lev/ha)				
	2001	2002	2003	2004	2005
Annual Farm Gate Price of Industrial Crops	2,471	2,591	1,317	1,706	1,652

As a result, simple average farm gate price of industrial crops are estimated at amount of 1,947 Levs/ha. This amount may be utilized as basic unit of economic unit to be derived from improvement of irrigation systems. After making clear the area of expanded irrigation area (ha) due to improvement of irrigation systems, the economic benefit can be estimated by the expanded area multiplying the said basic unit of 1,947 Levs/ha.

## **(2) Wastewater Treatment System Improvement**

Wastewater treatment system improvement (herein referred to “the Improvement of Sewerage Treatment Facilities and Sewerage Network” consists of (1) improvement of sewer networks and (2) rehabilitation and/or newly construction of wastewater treatment plants.

### **Economic Benefit Derived from Improvement of Sewer Networks**

In current status of the existing sewer networks, it is highly possible that wastewater is leaked from the joint of pipelines in the earth because of deterioration of them, so that groundwater could be polluted seriously. The percentage of the loss in terms of BOD<sub>5</sub> are estimated at about 40% to 60% for the sewer networks in EABD and WABD based on the analysis of the self-monitoring data of some of the existing WWTPs in EABD and WABD (see *Chapter 6.2.2*).

In Bulgaria, the groundwater is used a lot as potable water, so that in case of groundwater being polluted, it is the same meaning that the potable water is damaged. In other words, in case of mitigation of pollution for the groundwater, it becomes a great benefit for the people. Namely, purified groundwater is to be an economic benefit if it can be monetary value.

In both the West Aegean River and East Aegean River basins, unit water consumption volume per household per month is 15.73 m<sup>3</sup> as shown in the table entitled as “Water Consumption of Public Water Users” in *Chapter 2.3*, and household expenditure for water in total with bottled mineral water is already discussed in *Chapter 2.12* as the amount of 27.32 Levs/HH per month as shown in the table entitled as “Expenditure for Water in Grand Total” in *Chapter 2.12*.

Therefore, a unit value of potable water including bottled mineral water is estimated at 1.74 Lev/m<sup>3</sup> as the end value of potable water, and this figure must be the basic unit for ground water purification in the component of the Improvement of Sewerage Treatment Facilities and Sewerage Network.

And, it is assumed a unit value of groundwater as a raw water as 70% of 1.74 Levs/m<sup>3</sup> of the unit value of potable water as discussed above, namely 1.22 Levs/m<sup>3</sup> taking general and administrative cost and overhead cost of water supply companies into account. If the volume of wastewater reduction in groundwater can be estimated, the amount of economic benefit that should be derived from improvement works of drainage networks can be estimated.

Furthermore, improvement quantity of polluted groundwater is estimated by very much conservative way as described in *Chapter 6.2.3 (5)*.

Here, it should be noted that the numerals of 1.74 Levs/m<sup>3</sup> and 1.22 Levs/m<sup>3</sup> are the values of potable water and groundwater as a raw water respectively, but not the prices, charges, and/or tariffs. Therefore, they are not expressed as “the price of potable water” or “the raw water price”.

### **Economic Benefit Derived from Rehabilitation and/or Newly Construction of Wastewater Treatment Plants**

The water quality in many portions of rivers in Bulgaria has to be improved. Construction of the wastewater treatment plants will be needed for making clear surface water (river water).

If the river water is purified due to construction of wastewater treatment plants, it means that clean raw water is kept over the future.

Here, it is assumed a unit value of raw water as 30% of 1.74 Levs/m<sup>3</sup> of the unit value of potable water as discussed above, namely 0.52 Lev/m<sup>3</sup> taking cost for purification, general and administrative cost and overhead cost of water supply companies into account. If the newly treated wastewater volume can be estimated, the amount of economic benefit that should be derived from newly construction of wastewater treatment plants can be estimated.

Here, it should be noted that the numerals of 1.74 Levs/m<sup>3</sup> and 0.52 Levs/m<sup>3</sup> are the values of potable water and raw water respectively, but not the prices, charges, and/or tariffs. Therefore, they are not expressed as “the price of potable water” or “the raw water price”.

### **Other Economic Benefit Derived from the Improvement of Sewerage Treatment Facilities and Sewerage Network**

If the Improvement of Sewerage Treatment Facilities and Sewerage Networks will be executed, a water environment is improved considerably. Therefore, water-related health problems are also expected to be decreased.

#### **(a) Saving of Medical Expenses**

Generally, when people get ill, they should come to medical facilities as hospital, clinic, or sometimes they should stop their working. If they come to such medical facilities, they should pay out some medical expenses, and their income as salaries and/or wages should be decreased depending upon their visiting times or staying days in hospitals.

Due to decrease the suffering rate of health problems, the said payment and/or income loss can be saved, and these effects are also a kind of economic benefit.

Table 9.1.4 shows a summary of status of patients of overall diseases. As shown in Table 9.1.4, the inpatients have recorded ranging from 1.2 million people to 1.6 million people since 2000 to 2005. On the other hand, outpatients have recorded ranging from 6.1 million people to 7.0 million people during the same period. Average times to visit medical facilities of outpatients are 1.5 days (times) per year, and the average staying days of inpatients in hospitals are ranging from 7.9 days to 11.5 days. According to the data and information of medical statistics, cost for examination and expenditure for healthcare are estimated as shown in the following table.



### Cost for Examination Together with Utility Cost of Medical Facilities and Expenditure for Healthcare per Capita

	(Lev/patient, at 2007 price level)					
	2000	2001	2002	2003	2004	2005
<b>Cost of Examination and Utility Cost of Health Facilities (Lev/patient per year)</b>						
Outpatient	131.89	135.73	139.68	143.75	147.93	152.24
Inpatient	6,784.66	6,982.10	7,185.28	7,394.37	7,609.54	7,830.98
<b>Expenditure for Health per Capita in Domestic Household (Lev/capita per year)</b>						
	139.00	150.00	176.00	199.00	226.00	243.56
<b>Medical Expenditure per Patient in Case of Water Born Diseases*</b>						
Outpatient	81.27	85.72	94.70	102.82	112.18	118.74
Inpatient	2,077.10	2,139.63	2,208.38	2,278.01	2,350.66	2,422.36
<b>Unit Expenditure in Case of Water Born Diseases</b>		Outpatient	<b>125.75</b>	(Lev/patient for outpatients)		
		Inpatient	<b>2,565.39</b>	(Lev/patient for inpatients)		

(Remark)

\*Share rate of water-related health problems to the total health problems suffered is assumed at 30% according to the similar projects in other developing countries.

Annual average number of patients is 248.73 people in outpatients and 51.27 people in inpatients. And, share rate of water-related health problems to overall health problems are assumed at 30% according to the similar projects in other developing countries as mentioned "Remark" in the above table.

#### Number of Overall Patients in Bulgaria

	(Patients/1,000 people)						
Patient	2000	2001	2002	2003	2004	2005	Annual Average:
Outpatients	257	255	252	249	243	237	248.73
Inpatients	43	45	48	51	57	63	51.27

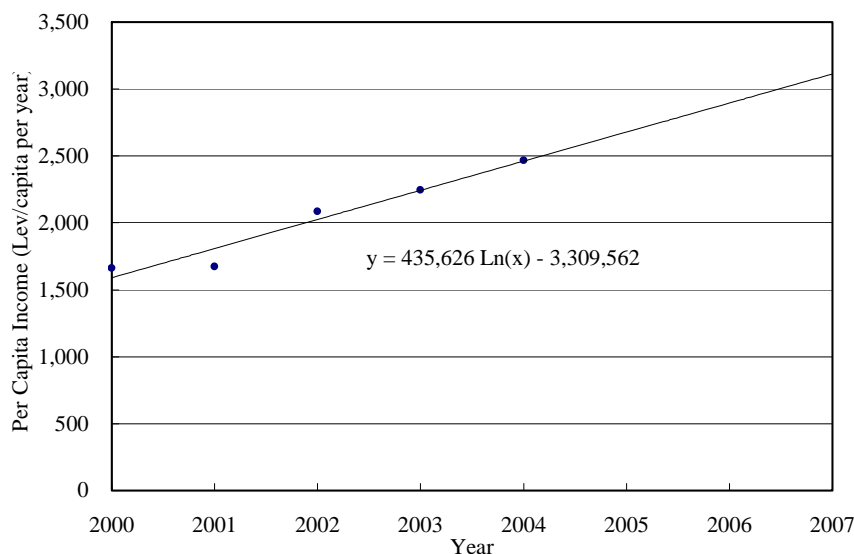
Source: Medical Center of Health Informatics, Ministry of Health.

As discussed until here, the amount of 125.75 Levs/outpatient and 2,565.39 Levs/inpatient are the basic unit for estimation of saving amount of medical expenses as the other kind of economic benefit. Then the economic benefit is estimated based on the service population.

#### (b) Saving of Income Loss

As discussed above, when people should come to the some medical facilities, or should stop their working, their income should be decreased. Of course, some working places will pay salaries and/or wages for the staffs even they can not work because of illness in case that the workers could submit some medical certificate from the medical doctors. But, in this case, employers should pay salaries/wages to their employees without any productive working. So that, these losses are also belong to the income losses of workers.

Table 9.1.5 shows a summary of present status of income per capita in Bulgaria according to statistics. Based on the trend curve shown below, the amount of per capita income level can be estimated as shown in the following table.



### Trend of Per Capita Income in Bulgaria

#### Estimation of Per Capita Income Level in Bulgaria after 2004

(Levs/year)							
2000	2001	2002	2003	2004	2005	2006	2007
1,664	1,672	2,085	2,244	2,466	2,676	2,894	3,111

As a result, the average daily income of people is estimated at 12.96 Levs/capita based on the data as shown in the above table, and this amount may be utilized as a basic unit for estimation of saving amount of income losses.

Persons subject to estimate the income losses are only workable per household. Then, number of workable persons should be made clear. This has already made clear as 1.18 persons per household as shown in the table entitled as “Number of Workers per Household” in *Chapter 2.12* in the total family size of 3.37 persons as shown in the table entitled as “Family Scale by River Basin” in *Chapter 2.12*. By using all the data discussed above and, in case that the service population is cleared, the economic benefit can be estimated.

### (3) Improvement of Water Supply Systems

As shown in the table entitled as “Water Sector Status by Regions and Districts in 2004” in *Chapter 2.3*, the water loss rate including the loss from intake points to purification points are ranging from 23.22% to 79.90%, and 61.59% in average in Bulgaria.

According to the “Water Utility Survey” made by the Study in 2006, almost of all the households living in the West and East Aegean River basins pay out at around 36% of total expenditure for water are for purchasing the bottled mineral water (West Aegean river basin: 40%, East Aegean River basin: 35%) as shown in the table entitled as “Status of Purchasing Bottled Mineral Water” in *Chapter 2.12*.

The amount of payment for purchasing the bottled mineral water is ranging from 11.27 Levs/HH per month in the West Aegean River basin to 9.49 Levs/HH per month in the

East Aegean River basin, and 9.85 Levs/HH per month in average as shown in the table entitled as “Expenditure for Water in Grand Total” in *Chapter 2.12*.

On the other hand, price of bottled mineral water is 0.37 Levs/ ℓ and 370.52 Levs/m<sup>3</sup> (= 0.37 Levs/ℓ × 1,000). Almost of people purchase the bottled mineral water for compensation of shortage of public piped water.

Here, the amount of 370.52 Levs/m<sup>3</sup> can be assumed as basic unit for estimation of economic benefit in the Improvement of Water Supply systems. In this case, the average share rate of expenditure of bottled mineral water to the total water expenditure is assumed at 30% conservatively, and decreased rate of bottled mineral water to consume is assumed at 5% also conservatively.

### 9.1.3 Identification of Economic Cost

Economic evaluation is made in 2 cases as (1) the case of the target year of 2015, the benefit will be derive in full amount in the year 2015 (hereinafter referred to as “the case of the target year of 2015”), and (2) the case of practical case of the year 2021, the benefit will be derive in full amount in the year 2021 (hereinafter referred to as “the practical case of the year of 2021”). The latter one means to be taken the progress of the works because of financial status of the Government into account. And, there are 3 components of water management works as (i) irrigation system improvement works, (ii) wastewater treatment system improvement works and (iii) potable water supply network system improvement works.

Accordingly, the annual disbursement of the project cost is estimate in 2 cases each. For estimation of economic cost, following conditions are taken into account.

#### (1) Irrigation System Improvement Works

##### Assumed Conditions

Engineering Cost:	10.00%	of direct cost.
Administration Cost:	5.00%	of direct cost.
Physical Contingency:	10.00%	of direct cost.
Value Added Tax:	20.00%	of the cost for equipment and materials.
Share Rate of Labors:		
For Construction:	70.00%	of the construction cost.
For Machinery:	20.00%	of the machinery cost.
For Electricity:	20.00%	of the electricity cost.
Shadow Wage Rate of Unskilled Labor:	90.00%	based on domestic samples of construction works.
Rate of Personal Income Tax:	20.00%	according to the Tax Law in Bulgaria.
Corporate Income Tax:	15.00%	according to the Tax Law in Bulgaria.
Standard Conversion Factor for Equipment:	97.17%	based on the statistics on International Trade and Consolidated Government Revenue and Expenditure, NSI.
Price Escalation Rate:	2.91%	based on the CPI, NSI.
Exchange Rates:		
1.00 Bulgarian Lev =	0.5108	Euros according to the FOREX in OANDA.Com as of Aug. 31, 2007.
1.00 euro =	1.9578	Bulgarian Lev (BGN) according to the FOREX in OANDA.Com as of Aug. 31, 2007.
1.00 euro =	157.92	Japanese Yen according to the FOREX in OANDA.Com as of Aug. 31, 2007.

#### Cost Allocation of In the Case of the Target Year of 2015

Table 9.1.6 shows a summary of cost allocation.

#### Cost Allocation of In the Practical Case of the Year of 2021

Table 9.1.7 shows a summary of cost allocation.

Operation and maintenance (O&M) cost is estimated at 5% of direct cost including engineering service cost, administration cost and physical contingency. The following table shows its summary.

### Summary of OM Cost for Irrigation System Improvement Works

(1,000 Lev)

Component	River Basin	O&M Cost	
		In Financial Term	In Economic Term
Component of Irrigation Improvement	West River Basin	4,117	3,346
	East River Basin	22,591	18,335
	Both 2 Basins	26,709	21,681

The O&M Cost shown in the above table should be needed after completion of the whole works. During the construction period, the O&M Cost will be needed in proportion of the investment cost to the total construction cost.

## (2) Wastewater Treatment System Improvement Works

### Assumed Conditions

Engineering Cost:	10.00%	of direct cost in case of WWTP.
	5.00%	of direct cost in case of Networks of Sewer Lines.
Administration Cost:	5.00%	of direct cost.
Physical Contingency:	10.00%	of direct cost.
Value Added Tax:	20.00%	of the cost for equipment and materials.
Share Rate of Labors:	15.00%	of the direct cost.
Shadow Wage Rate of Unskilled Labor:	90.00%	based on domestic samples of construction works.
Rate of Personal Income Tax:	20.00%	according to the Tax Law in Bulgaria.
Corporate Income Tax:	15.00%	according to the Tax Law in Bulgaria.
Standard Conversion Factor for Equipment:	97.17%	based on the statistics on International Trade and Consolidated Government Revenue and Expenditure, NSI.
Price Escalation Rate:	2.91%	based on the CPI, NSI.
Exchange Rates: 1.00 Bulgarian Lev =	0.5108	Euros according to the FOREX in OANDA.Com as of Aug. 31, 2007.
1.00 euro =	1.9578	Bulgarian Lev (BGN) according to the FOREX in OANDA.Com as of Aug. 31, 2007.
1.00 euro =	157.92	Japanese Yen according to the FOREX in OANDA.Com as of Aug. 31, 2007.

### Cost Allocation of In the Case of the Target Year of 2015

Table 9.1.8 shows a summary of cost allocation.

### Cost Allocation of In the Practical Case of the Year of 2021

Table 9.1.9 shows a summary of cost allocation.

Operation and maintenance (O&M) cost is estimated at 7.5% of direct cost including engineering service cost, administration cost and physical contingency for newly construction of wastewater treatment plants (WWTPs), and 1.5% of the cost for rehabilitation of sewerage pipeline networks. The following table shows its summary.

### Summary of OM Cost for Wastewater Treatment System Improvement Work

(1,000 Lev)

Component	River Basin	O&M Cost for WWTP		O&M Cost for Pipeline Networks	
		In Financial Term	In Economic Term	In Financial Term	In Economic Term
Wastewater Treatment System	West River Basin	4,950	3,872	6,707	5,246
Improvement Works	East River Basin	12,942	10,122	18,049	14,116
	Both the Basins	17,893	13,994	24,756	19,361

The O&M Cost shown in the above table should be needed after completion of the whole works. During the construction period, the O&M Cost will be needed in proportion of the investment cost to the total construction cost.

### (3) Potable Water Supply Network System Improvement Works

Potable water supply works are mainly controlled and managed by water supply and sewerage companies (WSSs) in each municipality, and the network systems are usually established in each municipality too. Data have been obtained at a total of 22 WSSs out of a total of 26 WSSs, thus evaluation has been conducted for each WSS.

#### Assumed Conditions

Engineering Cost:	5.00%	of direct cost.
Administration Cost:	5.00%	of direct cost.
Physical Contingency:	10.00%	of direct cost.
Value Added Tax:	20.00%	of the cost for equipment and materials.
Share Rate of Labors:	25.00%	of the direct cost.
Shadow Wage Rate of Unskilled Labor:	90.00%	based on domestic samples of construction works.
Rate of Personal Income Tax:	20.00%	according to the Tax Law in Bulgaria.
Corporate Income Tax:	15.00%	according to the Tax Law in Bulgaria.
Standard Conversion Factor for Equipment:	97.17%	based on the statistics on International Trade and Consolidated Government Revenue and Expenditure, NSI.
Price Escalation Rate:	2.91%	based on the CPI, NSI.
Exchange Rates:	1.00 Bulgarian Lev =	0.5108 Euros according to the FOREX in OANDA.Com as of Aug. 31, 2007.
	1.00 euro =	1.9578 Bulgarian Lev (BGN) according to the FOREX in OANDA.Com as of Aug. 31, 2007.
	1.00 euro =	157.92 Japanese Yen according to the FOREX in OANDA.Com as of Aug. 31, 2007.

### Cost Allocation of In the Case of the Target Year of 2015

Table 9.1.10 shows a summary of cost allocation.

### Cost Allocation of In the Practical Case of the Year of 2021

Table 9.1.11 shows a summary of cost allocation.

Operation and maintenance (OM) cost is estimated at 1.5% of direct cost including engineering service cost, administration cost and physical contingency.

The OM Cost s should be needed after completion of the whole works. During the construction period, the OM Cost will be needed in proportion of the investment cost to the total construction cost.

#### 9.1.4 Economic Evaluation Result of Project and Conclusion

Economic evaluation for whole the Project is made by using a cash stream as mentioned above taking the said conditions and assumption in each component into account. In this case, project life is set at 30 years both for all the components after completion of the works. Discount rate is adopted at 10% for all the components according to the similar project in developing countries based on a recommendation of World Bank (WB) (refer to the footnote 1 above).

Following table shows a summary of evaluation results.

**Summary of Economic Evaluation Results**

Component	River Basin/ Municipality	In the Case of Target Year 2015			In Practical Case of the Year 2021		
		NPV (million Levs)	EIRR	B/C	NPV (million Levs)	EIRR	B/C
Irrigation System Improvement Works	West Aegean River Basin	22	16.37%	1.41	14	15.23%	1.34
	East Aegean River Basin	106	15.77%	1.36	65	14.51%	1.29
	Both 2 Basins	128	15.86%	1.37	79	14.63%	1.30
Wastewater Treatment System Improvement Works	West Aegean River Basin	208	13.94%	1.34	208	14.03%	1.35
	East Aegean River Basin	30	10.21%	1.02	108	10.79%	1.06
	Both 2 Basins	238	11.20%	1.10	316	11.67%	1.14
Potable Water Supply Network System Improvement Works	West Aegean River Basin	339	15.06%	1.39	275	14.98%	1.41
	East Aegean River Basin	1,813	17.80%	1.61	1,454	17.75%	1.63
	Both 2 Basins	2,152	17.19%	1.56	1,729	17.13%	1.58

## **Overall Evaluation**

As shown in the above table, resulted EIRRs of 3 components of (1) Irrigation System Improvement Works, (2) Wastewater Treatment System Improvement Works and (3) Portable Water Supply Network System Improvement Works are higher than the applied discount rate of 10%. It means that all of these works have viability to execute even under so much conservative assumed conditions.

In other words, the improvement of water resources management belonging to the said works implies great values to get returns for the people living there. The people will have more disposable income, and this will contribute to the local economic activity because of increase of their purchasing power.

## **Some Consideration on Wastewater Treatment System Improvement Works**

Generally, a benefit item on the groundwater as a water resource is not included for economic evaluation on the wastewater treatment system improvement project because of lack of data. Therefore, the evaluation result is not so much reliable to execute the project.

However, in this Project, data on wastewater water leakage volume to the ground affecting to pollute the groundwater quality from joints of existing drainage pipeline networks has been gotten during the Study period as discussed in previous sub-clause of 9.1.2 (2), so that it could be included in the economic evaluation as the economic benefit on keeping the quality of groundwater as potable water resource. Estimation of unit value of potable water and raw water for the potable water is for this purpose.

Here, there will be a question on unit value of ground water as raw water. As mentioned in the said previous sub-clause, it is assumed the unit value of raw water as 65% of 1.74 Levs/m<sup>3</sup> of the end unit value of potable water, namely 1.22 Lev/m<sup>3</sup> taking general and administrative cost and overhead cost of water supply companies into account.

There must be one more question on a share rate of groundwater to use as a water resource for potable water. In the economic evaluation for this Project, all the groundwater to be purified by the recommended improvement works is adopted as the economic benefit, but this might be over-assumed. Then, a sensitivity test is made in case of (1) the Benefit: base case together with the Cost: base case, +10%, and +20%, (2) the Benefit: -10% together with the Cost: base case, +10%, and +20%, (3) the Benefit: -20 % together with the Cost: base case, +10%, and +20% by each river basin in the target year of 2015 and in practical case of the year 2021. The following table shows a summary of the results of the said sensitivity test.



### Summarized Results of Sensitivity Test

#### A. In the Case of Target Year 2015

Cost	West Aegean River Basin			East Aegean River Basin			Both the River Basins		
	Benefit			Benefit			Benefit		
	Base Case	-10%	-20%	Base Case	-10%	-20%	Base Case	-10%	-20%
Base Case	13.94%	12.44%	10.86%	10.53%	9.28%	7.95%	11.20%	9.86%	8.46%
+10%	12.58%	11.16%	9.67%	9.39%	8.20%	6.94%	9.99%	8.72%	7.39%
+20%	11.40%	10.05%	8.62%	8.40%	7.26%	6.06%	8.94%	7.73%	6.45%

#### B. In Practical Case of the Year 2021

Cost	West Aegean River Basin			East Aegean River Basin			Both the River Basins		
	Benefit			Benefit			Benefit		
	Base Case	-10%	-20%	Base Case	-10%	-20%	Base Case	-10%	-20%
Base Case	14.03%	12.54%	10.99%	10.79%	9.48%	8.11%	11.67%	10.32%	8.90%
+10%	12.68%	11.27%	9.81%	9.60%	8.36%	7.06%	10.44%	9.16%	7.81%
+20%	11.51%	10.18%	8.79%	8.57%	7.40%	6.15%	9.38%	8.16%	6.87%

Generally, EIRR should be higher than the rate of applied discount rate, namely a rate of opportunity cost of capital, for ensuring the viability of projects. As indicated in the above tables, even in the most pessimistic case under the conditions of the Benefit: -20% and the Cost: +20%, the resulted EIRRs are 8.62% in the West Aegean River Basin and 6.06% in the East Aegean River Basin in the case of target year 2015, and 8.79% and 6.15% respectively in practical case of the year 2021. And, in the case of both the river basins, those are 6.45% in the case of target year 2015, and 6.87% in practical case of the year 2021.

Such international financing institutions as the World Bank recommend that, even in non-commercial projects, the EIRR should be at least 5% above from the viewpoint of Basic Human Needs. All the above results are higher than this hurdle with enough rooms. It means that the Wastewater Treatment System Improvement Works has a viability to execute from the viewpoint of Basic Human Needs too.

The Benefit: -20% and the Cost: +20% is both the negative conditions. Therefore, the most pessimistic case means the same case of the Benefit: -40% with the Cost in base case. In other words, the most pessimistic case means the case of 60% (=100% - 40%) of purified groundwater and others to be adopted as the economic benefit. From this viewpoint, the resulted EIRRs show the Project has viability to execute even in the most pessimistic case in both the river basins, namely under the condition of the Benefit: -40% with the Cost in base case, from the viewpoint of Basic Human Needs.

## 9.2 Financial Analysis

Water management works are purely public works, and not commercial works even collecting some charges from people. So, they are matched for only economic evaluation and not matched for financial evaluation. Therefore, financial analysis is made for several public institutions dealing with water management works for making clear some issues and lessons for the future including tariff systems in this chapter.

### 9.2.1 Financial Status of Public Institutions Dealing with Water Works

#### (1) National Government Finance

Overall status of the finance of the national government has already been discussed in Chapter 2.3.

In addition to the above, it has been cleared the statement of revenue and expenditure of consolidated state budget as shown in Table 9.2.1, and the table hereunder shows a summarized status of expenditures of consolidated state budget by expenditure group of activities. According to Table 9.2.1, after settlement of account, the state budget has surpluses as around 1 million Levs in 2003, 655 million Levs in 2004, and 1,334 million Levs in 2005, even there exists some external loans.

An expenditure group of activity as “Housing, Public Utilities and Amenities, and Protection of Environment” may include a public works as water management. From this viewpoint, as shown in the following table, the amount of expenditure for this group has remained to share only at the level of around 4% only of the total expenditure. Therefore, the Government will be able to afford to expend more for this sector taking the said surplus into account assuming that the said surplus will be kept for the future.

#### Expenditure of the Consolidated State Budget by Group of Activities

Expenditure Items	(1,000 Levs)					
	2003		2004		2005	
	Amount	Share Rate (%)	Amount	Share Rate (%)	Amount	Share Rate (%)
1. General Public Services	1,097,848	7.80%	1,115,159	7.34%	1,268,334	7.60%
2. Defense and Safety	1,787,722	12.71%	1,946,649	12.81%	2,080,281	12.47%
3. Education	1,504,681	10.70%	1,652,291	10.87%	1,814,829	10.88%
4. Health Services	1,697,681	12.07%	1,769,112	11.64%	2,008,604	12.04%
5. Social Insurance	4,805,209	34.16%	5,238,371	34.47%	5,624,861	33.73%
6. Housing, Public Utilities and Amenities, and Protection of Environment	497,337	3.54%	586,271	3.86%	725,775	4.35%
7. Recreation, Cultural and Religious Affairs	286,088	2.03%	303,738	2.00%	348,350	2.09%
8. Economic Activities and Services	1,668,011	11.86%	1,889,647	12.43%	2,121,887	12.72%
9. Expenditure Non-Classified Elsewhere	724,207	5.15%	697,716	4.59%	685,563	4.11%
Expenditure in Total	14,068,783	100.00%	15,198,954	100.00%	16,678,483	100.00%

Source: NSI.

## **(2) Finance of the Ministry of Environment and Waters (MoEW)**

Tables 9.2.2 and 9.2.3 show summary of balance sheet and statement of revenue and expenditure of MoEW for the past 2 years of 2003 and 2004. According to the former table, the budget scale of the Ministry was around at 79 million Levs in 2003 and 116 million Levs in 2004.

Among them, the actual cash flow scale was 93 million Levs in 2003 and 15 million Levs in 2004. But, for the year 2003, additional transfer comes from the national budget with a sum of 69 million Levs. On the other hand, a sum of 40 million Levs was recapitulated to the state budget.

In the revenue side, around 33 million Levs have accounted in the corporate income tax in 2003, but in 2004 it was zero accounted. This is too much fluctuated. If the financing situation of corporations dealing with water works under control of MoEW is always stable to collect the charges, and stable in financing status, the Ministry can constantly collect the corporation tax, so that revenue of the Ministry will be stable too.

## **(3) Finance of EMEPA (PUDOOS)**

The Enterprise for Management of Environmental Protection Activities (EMEPA, locally called as abbreviated name of “PUDOOS”) is established as a legal entity under the Law on Environmental Protection Art 60, Item 1 (published in the State Gazette No.91, September 25, 2002). It is non-profit enterprise in the sense of Art 62, Item 3 of the Commercial Act of the Republic of Bulgaria. The PUDOOS is the legal successor of the former “National Environment Protection Fund”. The Statute of the PUDOOS was adopted by a Decree of the Council of the Ministers No.319 issued on December 29, 2003. Therefore, there exists its financial record from only 2004.

As shown in Figure 9.2.1, environment protection works are financed by PUDOOS in Bulgaria. Financing fund of PUDOOS is based on several kinds of water taxes collected from water suppliers. The fund comes to PUDOOS through MoEW.

Table 9.2.4 shows a summary of its financial status since 2004 to 2006. As shown in the table, the revenues based on the Water Act and the Waste Management Act share in 2004, 2005, 2006 are 61.06% (33.04% based on the Water Act and 28.02% based on the Waste Management Act), 61.90% (40.11% and 21.79%) and 77.43% (59.66% and 17.77%) respectively. It means that the most of funds are coming from the water suppliers as the Irrigation Systems (IS), WSSs and so on.

Missions of PUDOOS are investment for several projects on environment protection based on application of enterprises dealing with environment protection works by means of loans and/or grants. Using the said funds collected, PUDOOS has financed to the projects as shown in columns of “Expenditure (Financing)” in the said table.

Reflecting the funding sources, the amounts of financing are also to the project on water works as 93.90% (0% for “Water Supply/Water Conduit”, 3.95% for “Improvement of the Conditions of Water Resources”, 65.31% for “Conditions of Water Resources”, 23.51% for “Waste Structures” and 1.12% for “Separate Collecting of Waste”) in 2004, 90.52% (12.92%, 5.76%, 50.60%, 16.04% and 5.20%) in 2005, and 96.76% (23.13%, 6.41%, 46.93% and 6.69%) in 2006. These financing trends are rather agreeable from the viewpoint of water works. But it is unable to make firm decision because of still short time after establishment of the enterprise.

#### **(4) Finance of River Basin Directorates**

Tables 9.2.5 to 9.2.8 show a summary of the West Aegean River Basin Directorate (WABD), the East Aegean River Basin Directorate (EABD), the Danube River Basin Directorate (DRBD) and the Black Sea River Basin Directorate (BSBD).

As shown in the said tables, their own revenue sources are quite limited. Almost of fund needed is coming from MoEW as an item of “Transfer” in account. But, this contribution is almost the same level of amount as sums of 500,000 to 900,000 levs during past 4 years even if their scales and coverage territories are different with each other. And these amounts are quite small scale against their duties and missions.

Of course, the Ministry may give more amount fund to each Directorate based on the application and/or action plans of Directorates officially. However, because of lack of enough staffs and competent persons caused by short of fund, they cannot make good action plans to be adopted by the Ministry.

According to information of officials of the Directorates, payment of their salaries and/or wages are sometimes delayed or not made. This should be improved for smooth performance of their duties and missions.

#### **(5) Finance of Irrigation Systems (IS)**

The Irrigation Systems is a public company of 100% state owned enterprise subscribed by MoAF dealing with irrigation water supply works. The Company supplies the irrigation water for 537,000 ha in total (around 98% of whole potential irrigation area in Bulgaria) according to the information from IS.

There are 21 irrigation branches under control of IS, and each irrigation branch consists of several irrigation systems.

Table 9.2.9 shows a summary of financial status of IS for past several years. The MoAF subscribes a capital of around 22 million Levs to 24 million Levs in each year since 2001 till 2005 as shown in the said table.

Scale of assets of IS is around 130 million Levs since 2001 till 2005. However, the actual income level is less than 2 million Levs. And the level of current operating profit ranges from 20,000 Levs in 2001 to 103,000 Levs in 2003. The last operating profit was quite low comparing with the scale of the said total assets as only 46,000 Levs in 2005 (only 0.04% of the total assets in this year).

If the irrigation systems are improved and if the irrigation areas will be expanded as recommended in this Study, the said operating profit will be drastically increased.

## **(6) Finance of Water Supply and Sewerage Company (WSS)**

According to information of officials of MoRDPW, there are 51 major water supply and sewerage companies (WSSs) in Bulgaria. The WSSs are established mainly under control of MoRDPW. However, there are 3 types of the WSSs as (1) full operation by the state (100% owned by MoRDPW), (2) joint operation of the Ministry and each Municipality, and (3) full operation by each Municipality (100% owned by the Municipality) over the nation.

Among them, the Study has collected financing data on 49 firms, consisting of (1) 13 firms of 100% owned by the Ministry, (2) 16 firms of joint operation of the Ministry and each Municipality, and (3) 20 firms of 100% owned by the Municipality.

Table 9.2.10 shows a summary of balance sheets of them together with their service population in their territories.

### **(a) Subscribed Capital**

Sofia WSS PJS Co. (100% under controlled by the Municipality of Sofia) has the largest scale subscribed capital among the 49 firms. However, the amount of assets in total is not the largest scale. Nevertheless, the firm has the largest service population as rounded at 1,150,000 reflecting a status of its territory. Under this situation, the firm's current operation profit is only 1.2% of the total liability (= assets in total) with the amount of 174,000 Levs.

Except Sofia WSS PJS Co., 13 firms of 100% owned by the Ministry and 16 firms of joint operation of the Ministry and each Municipality are the same level in subscribed capital.

Among the firms, the firms with the minimum level of the subscribed capital as only 5 thousand Levs (regulated by the Law concerned) are belonging to the firms of 20 firms of 100% owned by municipality. It means to reflect the financial status of the Municipalities. Their current operation profits are negative in Sermon WSS Co. Ltd. or slightly positive as 1 thousand Levs in Kresna WSS Co. Ltd. or 6 thousand Levs in Stretcha WSS Co. Ltd. By no means can it say that they are commercial enterprises from this viewpoint.

### **(b) Current Operating Profit**

The current operating profit consists of that due to collect charges of water supply services and wastewater collecting services (namely, a charge for use the existing drainage canals because of lack of wastewater treatment plants in current status in almost of their territories).

From the viewpoint of the current operating profit, 34 enterprises (69.39% of 49 firms) registered their current operating profit of less than 1% of the total liabilities (= amount of assets in total), and among them, 11 firms (32.35% of 34 enterprises above) have registered negative operating profits. What is the meaning of management for

commercial enterprises they have made? If they are private companies, they would have already gone bankrupt.

Considerable reasons for the above mentioned financing situation might be (1) unsuitable tariff systems, and (2) low charge collecting rates against bills. For the latter one, water supply systems should be included, so that charge payers should be made sure. Because that, all the level of current operating profit are the same level even they have several hundred thousand service population in 100% state owned enterprises, in joint operation enterprises, and several thousand service population in 100% municipality owned enterprises.

Revision of the tariff systems (or charging systems) may be needed based on the actual expenditure for water. People have paid a sum of 17.47 Levs/HH per month as actual expenditure for public piped water and a sum of 27.32 Levs/HH per month including bottled mineral water in total. Affordability of people to pay (ATP) must exist in-between of 17.47 Levs and 27.32 Levs, and charge collecting systems may be needed improved for avoiding omission of collection of charges. In addition, the water supply systems may be needed as mentioned above, so that charge payers should be made sure as mentioned above.

## 9.2.2 Tariff Systems

### (1) Tariff Systems on Irrigation Water Supply Services

There are 2 tariff systems for irrigation water supply services in Bulgaria as (1) water supply services by gravity, and (2) water supply services by pumping systems. Table 9.2.11 shows a summary of tariff systems for major suppliers as already mentioned above as “the Irrigation Systems” and other suppliers together with 51 small-scale suppliers.

As shown in the table, irrigation water supplied by gravity is charged at 0.08 Levs/m<sup>3</sup> in average. On the other, the irrigation water supplied by pumping system is charged at 0.12 Levs/m<sup>3</sup> to 0.28 Levs/m<sup>3</sup> (0.21 Levs/m<sup>3</sup> in average) with almost twice or 3 times of the charge of gravity supplied water. Following table shows a summary of the tariff systems of irrigation water supply services.

### Summary of Tariff Systems of Irrigation Water Supply Services

Enterprises of Irrigation Water Supply	Unit Price of Irrigation Water			
	Gravity Water Supply		Pumped Water Supply	
	For Agricultural Crops Except Paddy	For Paddy	For Agricultural Crops Except Paddy	For Paddy
Irrigation Systems PLC.	0.0850	0.0165	0.1700	0.0170
Hydro Melioration-Sevlievo PLC.	0.0800		0.2000	
Zeminvest PLC.	0.0600		0.1600	
Other Small Scale Suppliers (Average)	0.0670		0.2113	

As of 2005 (Leva/m<sup>3</sup>)

Source: Ministry of Agriculture and Forestry.

The propriety of these tariff systems cannot hastily be concluded. Leaving that aside, irrigation systems should be improved first of all so that payers of irrigation water charge can be ensured

### (2) Tariff Systems on Potable Water Supply and Wastewater Collection Services

Table 9.2.12 (3 sheets in one set) shows current water price together with charges for wastewater collection services by service providers abbreviated as WSS(s) in the whole nation, and summarized as shown in the following table.

### Summary of Potable Water and Wastewater Collection Services

Classification of Tariff	As of 2005 (Leva/m <sup>3</sup> )							
	Water Tariff			Treatment Surcharge		Drainage Water Tariff		Distribution Water Price to the other WSS Co.
	Industrial Sector	HH	Public User (Governmental Entities, etc.)	Public User/HH	Industrial Sector	Public User/HH	Industrial Sector	
Tariff Level in Simple Overall Average	0.681	0.679	0.865	0.197	0.395	0.131	0.145	0.381

Source: Ministry of Public Works and Regional Development.

In the table, the term “Water Tariff” means the tariff for potable water supply services, the term “Treatment Surcharge” means the additional charge for potable water supply when the water is purified by pollution degree, and the term “Drainage Water Tariff” means the charge for wastewater collection services. And the term “Distribution Water Price to the Other WSS” mean the selling price to the other WSSs. It means that some of them have mutually traded the water with each other.

As shown in the table, the average potable water charge is around 0.70 Levs/m<sup>3</sup> for both the industrial sector and for domestic household (HH). The potable water charges for public users as the Governmental entities are rather higher as 0.87 Levs/m<sup>3</sup> in average too than that for the industrial sector and for HHs.

If the service providers have their own purification plants for potable water, they can set a surcharge entitled “Treatment Surcharge” to the charge for water supply as additionally charges at the amount of 0.20 Levs/m<sup>3</sup> for both the public users and HHs, and at 0.40 Levs/m<sup>3</sup> for the industrial sector both in average as indicated above. However, among 56 services providers, only 41 providers (73.21% to the total number of the service providers) have their own purification plants.

Comparing with those charges for potable water, the charge level of wastewater collection services are far low as 0.13 Levs/m<sup>3</sup> for both the public users and HHs, and as 0.15 Levs/m<sup>3</sup> for industrial sector both in average as shown in the above table.

### **(3) Water Tax**

In addition to the above charges, the government has a water tax system as shown in Table 9.2.13. This tax is levied for all the water use companies including the irrigation water suppliers and WSSs. The companies should pay the tax to PUDOOS as discussed in previous sub-clause through MoEW via each River Directorate, and not by the end users.

The water tax is not paid by the end users, but paid by the companies as mentioned above. However, if the companies pay out this tax, the companies must make addition to the water charge for end users. From this viewpoint, the above mentioned water charges may include the water tax. But, from the tariff systems above, it cannot be made to clear.

Anyway, this tax becomes one of funding sources for PUDOOS, and PUDOOS invest this fund to environment protection projects as discussed in previous sub-clause.

## **9.2.3 Recommendation**

### **(1) Tariff Systems**

According to information from officials of several entities of the Government, tariff systems as mentioned above are decided by the State Energy and Water Regulatory Commission based on applications of the services provider including WSSs, and so on.

The examination of the said application by the State Energy and Water Regulatory Commission seems not to be based on the financial status of the service providers, especially not to be based on cost for works, but based on welfare standard for the people. Of course, this is one of way to decide the tariff systems. However, this welfare standard is not clear too in current situation as far as information being available.

International financing institutions as the World Bank (WB) suggest that projects with collecting some charges should be base on recovery of cost for business. From this viewpoint, the examination of the said application and judgment process of the tariff systems should be made openly based on the financial status of the service providers, especially the cost for business as production, operation and maintenance, etc. Of course, affordability of people to pay (ATP) should be taken into consideration in this case. Regarding this, the WB has also recommended that upper limit of expenditure for potable water and for wastewater treatment services may be within 5% of their income per household. This recommendation can also be taken into account as a reference.



## **(2) Finance of Service Providers**

Current financial status of such services providers as the Irrigation Systems (IS), WSSs, etc. have connection with the said tariff systems. Among the service providers taken in this Study, IS has the largest scale of assets in total as the amount of around 130 million Levs during these years since 2001. However, share rate of the current operating profit are ranging from 0.02% in 2001 to 0.08% in 2003, and last one is only 0.04% in 2005 to the total liability (= assets) with amount of several deca-thousand Levs as 20,000 Levs in 2001, 103,000 Levs in 2003 and 46,000 Levs in 2005 as shown in Table 9.2.9.

On the other hand, the share rate of the current operation profit WSSs is negative as -0.07% to the total liability (= assets) in total in simple overall average as of 2005 as shown in the attached Table 9.2.10.

Repeatedly, by no means can it say that they are commercial enterprises from this viewpoint. For keeping self-supporting financing status as the commercial enterprises, it is expected that the share rates of current operating profit to the total liability (= assets) should be kept at least at around 2% through 5%, so that they can stand by themselves as the commercial enterprises.

If the irrigation systems and potable water supply systems would be improved and if the irrigation areas would be expanded and water supply systems are improved as proposed in this Study, the said current operating profit will drastically increase, so that effect of subscription of MoAF and MoRDPW will be of no avail.

## **(3) Water Pricing Policy**

### **(a) Overview of the Current Status on Water Pricing and Water Consumed**

As stated in the previous sub-clause, almost of 70% of WSSs have registered their operating profits as less than 1.0% of the assets in total, and 32% of them have registered negative operating profits in the current status. Considerable reasons for the above mentioned financing situation might be (1) unsuitable tariff systems, and (2) low charge collecting rates against bills.

From the viewpoint of current tariff systems, the average amount of unit tariff of portable water is 0.90 Levs/m<sup>3</sup> (= 0.70 Levs/m<sup>3</sup> of water charge + 0.20 Levs/m<sup>3</sup> of treatment surcharge in case of purified water in WSSs having purification plants of water) as also stated in the previous sub-clause. In addition to this amount, the people should pay a sum of 0.13 Levs/m<sup>3</sup> for both the public users and domestic households, and 0.15 Levs/m<sup>3</sup> for industrial sector both in average for the wastewater collection services.

On the other hand, according to a result of “the Water Utility Survey” made by the Study the average unit water charge of Public Water Supply System is 0.91 Levs/m<sup>3</sup> in the West Aegean River Basin, 1.03 Levs/m<sup>3</sup> in the East Aegean River Basin, and 1.00 Levs/m<sup>3</sup> in both the basins. These amounts may be reflected the existing tariff systems as mentioned above.

And, the people pay for potable water by the amount of 1.74 Levs/m<sup>3</sup> in total including expenditure for public piped water and bottled mineral water according to the other

result of the said “the Water Utility Survey”. They are paying out at 27.32 Levs/HH per month in total (= 15.75 Levs for public piped water + 11.57 Levs for purchasing bottled mineral water and for the other water sources). In the amount of 11.57 Levs, 9.85 Levs are for purchasing bottled mineral water only with a volume 26.59 ℓ in average. Under this status, they are consuming the water at 156 liters per day per capita (lpc) (= 15.73 m<sup>3</sup>/HH per month of public piped water + 26.59 ℓ/HH per month of bottled mineral water).

According to the statistics, the annual income is 6,356 Levs/HH per annum as of 2004 (= 530 Levs/month) in overall average in the whole nation. And, according to the other result of the said “the Water Utility Survey”, the average income per HH per month is calculated at 592.48 Levs in the West Aegean River Basin, 493.33 Levs in the East Aegean River Basin, and 520.14 Levs in both the basins as of 2006.

International financial institutions as the WB recommend that the upper limit of the amount of expenditure for water services consisting of potable water and sewerage services is 5% of the income in domestic households (affordability of people to pay for water services). From this viewpoint, their current expenditure for services has already been reached to the affordable amount.

Under these situations, the water pricing policy in Bulgaria should be established.

#### **(b) Background and Sample Calculation for Establishing the Water Pricing Policy**

Also such international financial institutions as the WB recommend that the price for water services should be recovered the capital cost for the facilities of water services.

According to the cost estimates, it should be needed at the amount of 637,946,696 Levs in this Project for improvement of existing potable water supply systems in total in four sample municipalities.

If the improvement works will be executed by financing a loan from some donors for the total Project cost under the terms of (1) repayment period: 30 years from commencement of the works, (2) annual interest rate: 2% for the remaining loan amount in each year, (3) annual equal instalment payment method for the principal, (4) grace period: 7 years, (5) commencement of the works: 2011 and (6) completion of the works: 2014, repayment schedule will be as follows:

### Repayment Schedule in Case of Sample Loan Conditions

(million Levs)																	
Year in Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Investment					159	159	159	159									
Repayment of Principal	0	0	0	0	0	0	0	0	0	0	0	28	28	28	28	28	28
Payment of Interest	0	0	0	0	0	3	6	10	13	13	13	13	12	12	11	11	10
Year in Order	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Calendar Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Investment																	
Repayment of Principal	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Payment of Interest	9	9	8	8	7	7	6	6	5	4	4	3	3	2	2	1	1
Total amount of loan:	637,946,696 Levs																
Interest in total to be paid	210,522,410 Levs																
Total fund needed:	848,469,106 Levs (annualized amount of fund needed: 28,282,304 Levs/year)																

As indicated in the above table, the annualized fund needed in total is to be a sum of 28,282,304 Levs/year.

On the other hand, the saved volume of water loss is estimated at 22,061,229 m<sup>3</sup> due to the recommended improvement works. This volume can be supplied for the people additionally to the current supplied potable water. Then, the unit cost can be estimated as 1.28 Levs/m<sup>3</sup> (= 28,282,304/22,061,229).

However, there is current water supplied volume as 31,962,000 m<sup>3</sup> in total of the said sample 4 municipalities. And, this water is supplied by using the existing water supply facilities constructed several decades ago. But, this cost is not available at present. Therefore, it is assumed that the cost of existing water supply facilities is 20 % of the cost of recommended improvement works in this Project, and present salvage value of the facilities is assumed at 10%. Resulted cost may be applied as sank cost for the existing water supply facilities.

Taking the above sank cost, the unit cost of water consisting of (1) newly additional supplied water volume and (2) current water supplied volume can be estimated at 0.76 Levs/m<sup>3</sup> (= [28,282,304 + {637,946,696x20 % x 10%}] / [22,061,229 + 31,962,000]). This amount is the basic unit cost covering only costs for facilities.

In addition to the said basic unit cost, the operation and maintenance cost (O&M Cost) should be added. In this Project, it is assumed that the O&M Cost of 1.5% of the direct cost. So, this percentage is applied to the basic unit cost too. Resulted cost consisting of the basic unit cost and the O&M Cost becomes 0.77 Levs/m<sup>3</sup> (= 0.76x (1 + 1.5%). This cost may be said as “unit purified water cost” as a basis.

The WSSs have not only water supply facilities but also they have administration offices with staffs for general affairs, control and/or administration affairs, accounting affairs, personnel affairs and so on. In this Project, share rate of raw water value of the end value of water is assumed as 30% in the economic evaluation. If the same manner is applied for setting up the unit price of water, the amount of 2.57 Levs/ m<sup>3</sup> is resulted as selling price (= 0.77x100%/30%).

Finally, profit of the companies should be added to the said selling price. Here, if it is assumed at 10% as a profit, final selling price of water becomes at 2.83 Levs/ m<sup>3</sup> (=

2.57 Levs/m<sup>3</sup> x (1 + 10%). This is the final selling price of water in average during several years for balancing with the total cost for reservation of loan amount and all the cost of companies and profit of them. Therefore, it is not the firm gate price to directly sell to the customers. The tariff revision schedule should be set up taking the affordability of people to pay (ATP), and it should be revised step by step so that average amount of revenue becomes to balance with the loan amount as well as to stand the WSSs as commercial enterprises. From this meaning, the said amount of 2.83 Levs/ m<sup>3</sup> may be called as the operation price of criteria to set up the tariff revision schedule for the future.

**(c) Tariff Revision Schedule Taking ATP into Account**

As discussed in the previous sub-clause, income of domestic household is around 520 Levs/HH per month as of 2006. This income level must be increased year by year.

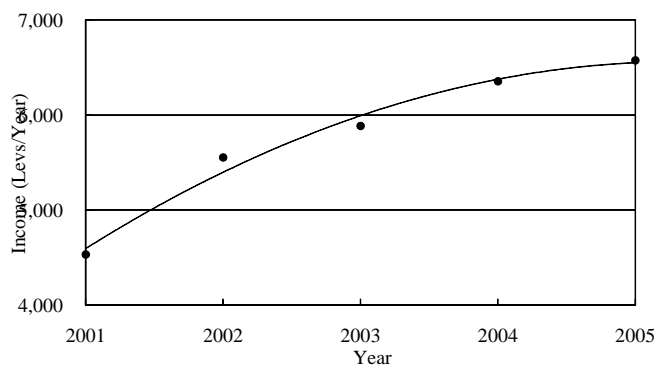
In Bulgaria, income level of domestic household has been increased ranging from 3% to 23% since 2001 till 2005 according to the statistics as shown in the following table.

**Average Household Income in Bulgaria**

	(Levs/HH per annum)				
Year	2001	2002	2003	2004	2005
Income/HH	4,532	5,556	5,887	6,356	6,577
Annual Increase	-	22.59%	5.96%	7.97%	3.48%

Source: Statistical Yearbook of Bulgaria 2005 and 2006.

And the following figure illustrates its trend using the above data.



**Trend of Household Income**

From this data, it can be expected to increase the household income with at least 3% year by year for the future.

And designed consumed water volume is set as 220 ldc at the time of completion of the recommended improvement works in this Project. However, it is rather difficult to reach this designed consumed water volume at once, but it should be reached step by step after completion of the works.

If it is assumed that (1) the unit selling price of water will annually be increased corresponding to CPI (2.91% per annum) until the time of completion of the works, and after that systematic tariff revision will be made, (2) the consumed water volume

will not be changed until the time of completion of the works, and after it will gradually be increased in several years and reached to designed volume of 220 ldc in 2021, (3) share rate of expenditure for water will be 5% to the income level at that time because of ATP, and (4) price level will be changed corresponding with the rate of income level, following projection can be made.

### Trial Tariff Revision Schedule

Year in Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Selling Price of water (tariff, Levs/m <sup>3</sup> )	1.00	1.03	1.06	1.09	1.12	1.15	1.19	1.22	1.47	1.47	1.76	1.76	1.79	1.80	1.82	1.87	1.93
Consumed Water Volume (ldc)*	155	155	155	155	155	155	155	155	164	174	183	192	201	211	220	220	220
Household Income (Levs/HH.month)**	536	552	568	585	603	621	640	659	678	699	720	741	764	787	810	834	859
Expenditure for Water in Total (Levs/HH)***	16	16	17	17	18	18	19	19	24	26	33	34	36	38	40	42	43
Share of Expenditure to Income (%)	2.93%	2.92%	2.92%	2.92%	2.92%	2.91%	2.91%	2.91%	3.59%	3.68%	4.52%	4.61%	4.77%	4.88%	5.00%	5.00%	5.00%

Year in Order	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Calendar Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Selling Water Price (Levs/m <sup>3</sup> )	1.99	2.05	2.11	2.17	2.24	2.31	2.37	2.45	2.52	2.59	2.67	2.75	2.84	2.92	3.01	3.10	3.19
Consumed Water Volume (ldc)*	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Household Income (Levs/HH.month)**	885	912	939	967	996	1,026	1,057	1,089	1,121	1,155	1,190	1,225	1,262	1,300	1,339	1,379	1,421
Expenditure for Water in Total (Levs/HH)***	44	46	47	48	50	51	53	54	56	58	59	61	63	65	67	69	71
Share of Expenditure to Income (%)	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%

(Note) \*: Starting consumed water volume = 156 ldc - (26.59 @/30 days)

(Note) \*\*: Annual increase rate = 3 %, and 520 Levs/HH per month in 2006 is applied as a basis.

(Note) \*\*\*: Average family size = 3.37 persons/HH.

### (d) Check of Operating Profit of WSS Companies (WSSs)

If the operating profit is corresponding to the selling price of water directly, the share rate of operating profit of WSSs will become 1.47 times in 2015 and 3.19 times in 2040 in terms of gross profit on their account book. However, 0.77 Levs/m<sup>3</sup> should be kept aside as reserve for repayment for loan and the expenditure for the O&M Cost, so that the net share rate will be less than the said rates.

Furthermore, the selling price cannot be increased without any restriction because of limitation from the viewpoint of affordability of people to pay for water. To get the said operation price of criteria of 2.83 Levs/m<sup>3</sup>, if it is applied the same manner as discussed in the previous section (3), it should be continued by the year 2053 over the 39 years from the first revision in 2015 as shown in the following table.

### Trial Tariff Revision Schedule to Get Operation Price of Criteria

Year in Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Calendar Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Selling Price of water (tariff, Levs/m <sup>3</sup> )	1.00	1.03	1.06	1.09	1.12	1.15	1.19	1.22	1.47	1.47	1.76	1.76	1.79	1.80	1.82	1.87	1.93

Year in Order	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Calendar Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Selling Price of water (tariff, Levs/m <sup>3</sup> )	1.99	2.05	2.11	2.17	2.24	2.31	2.37	2.45	2.52	2.59	2.67	2.75	2.84	2.92	3.01	3.10	3.19

Year in Order	35	36	37	38	39	40	41	42	43	44	45	46	47	Average
Calendar Year	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	Price
Selling Price of water (tariff, Levs/m <sup>3</sup> )	3.29	3.39	3.49	3.59	3.70	3.81	3.92	4.04	4.16	4.29	4.42	4.55	4.69	2.83

Anyway, the financial status of WSSs for the future must be improved than that in present status because that general and administration cost, overhead cost and profit would have been gotten over the period.

The method discussed above is just an example for setting up the tariff and the tariff revision schedule. It is expected that the methodology and how to consider be taken into account for setting the water price.

#### **(e) Principles for Establishing the Water Pricing Policy**

As discussed above, for establishing the water pricing policy, following principles should be taken into account:

- The capital cost should be recovered by the revenue due to charge collection even taking time for long term including the interest for loan amount in case of financing by some loans.
- To set up the tariff systems, the price of water should be taken the affordability of people to pay (ATP) for water into account. Therefore, the ATP limits the tariff revision schedule.
- To set up the tariff systems, the price of water should be taken the general and administration cost, overhead cost and the profit of enterprises so that they can financially support themselves.

#### **(4) Establishment of New Public Enterprise**

As mentioned above, PUDOOS is a public enterprise for financing to environment protection projects collecting several types of water taxes from the enterprises that use waters for commercial purposes.

Share rate of water taxes to the total funding sources is ranging from 61% in 2004 to 77% in 2006 with amount of 30 millions Levs or more as discussed in previous sub-clause, and PUDOOS are financing for environment protection projects not only of water works but also for air pollution, and protecting for biodiversity and so on by use of this fund.

Regarding this, one of the alternatives is to establish a new Public Enterprise of Water Works, so that the said fund will be able to use for water works only. Its function may be almost the same with current PUDOOS, but this new Public Enterprise of Water Works can invest and finance for the projects for water environmental protection only including sustainable water resources development.

If the irrigation systems and potable water supply systems are improved and if the irrigation areas will be expanded as recommended in this Study and water supply systems are improved as also recommended in this Study, the amount of the said water taxes will be drastically increased. And if these fund can be used for the improvement of the said systems, the amount of the said water taxes will further be increased. This is called as "Extended Reproduction", and the commercial enterprises should consider the Extended Reproduction during their business. The said new Public Enterprise of Water Works will carry out key function of the Extended Reproduction.

The said new public enterprise may include a function of decision of tariff systems, so that the tariff systems can be reflected the financial status of the service providers. Also in this case, the examination of the application from the enterprises to use waters and judgment process of the tariff systems should be made openly based on the financial status of the enterprises, especially the cost for business as production, operation and maintenance, etc. taking affordability of people to pay (ATP) should be taken into consideration.

## **Main Report**

### **Chapter 9**

#### **Tables**

**Table 9.1.1 Agricultural Production in Bulgaria for Past Several Years**

Kind of Crops/Agricultural	(Million Lev)				
	2001	2002	2003	2004	2005
Agricultural Crops	2,952	3,250	3,174	3,443	3,183
Cereal Crops	991	991	900	1,240	924
Industrial Crops	347	444	452	584	629
Fodder Crops	116	143	201	145	145
Vegetables	893	1,125	1,050	944	963
Popatoes	165	132	157	175	118
Fruits	415	381	364	302	361
Vine	0	1	1	1	1
Other Crops	25	33	50	53	43

Source: NSI.

**Table 9.1.2 Current Cultivated Area in Bulgaria for the Past Several Years**

Kind of Crops	(ha)				
	2001	2002	2003	2004	2005
Cereal Crops	1,824,265	2,148,003	1,709,706	1,838,956	1,735,973
Industrial Crops	389,742	471,013	659,632	592,765	635,003
Fodder Crops	43,306	50,213	58,501	29,629	32,212
Vegetables	56,550	55,767	61,762	45,785	24,345
Popatoes	48,448	51,886	29,754	30,676	23,999
Fruits	61,596	54,055	39,764	38,454	26,343
Vine	119,719	109,423	89,736	79,531	76,740
<b>Total</b>	<b>2,543,626</b>	<b>2,940,360</b>	<b>2,648,855</b>	<b>2,655,796</b>	<b>2,554,615</b>
Total Except Cereal and	676,055	742,144	880,648	787,211	786,430
Rate of Irrigated Land (%)	-	-	4.30%	-	4.10%



**Table 9.1.3 Comparison of Production With and Without Irrigation**

	As of 2000 (kg/dca <sup>1</sup> )			
<b>Cereal</b>	Wheat	Maize	Barley	Average
Without Irrigation	323	267	307	Improved
With Irrigation	386	386	386	Rate
Improved Rate	1.20	1.44	1.26	(Times)
<b>Industrial Crops</b>	Sunflower	Tobacco	Sugar cane	Average
Without Irrigation	137	51	1,862	Improved
With Irrigation	200	137	3,171	Rate
Improved Rate	1.45	2.69	1.70	(Times)
<b>Vegetables</b>	Tomato	Pepper		Average
Without Irrigation	438	306		Improved
With Irrigation	3,326	1,939		Rate
Improved Rate	7.60	6.33		(Times)
<b>Fruits</b>	Alfalfa	Apple	Peach	Average
Without Irrigation	327	652	614	Improved
With Irrigation	1,008	1,209	1,309	Rate
Improved Rate	3.09	1.86	2.13	(Times)
<b>Vine</b>	Vine			Average
Without Irrigation	533			Improved
With Irrigation	731			Rate
Improved Rate	1.37			(Times)
<b>Overall Improvement Rate except Cereal and Fodder:</b>				<b>2.13</b>

Source: Irrigation Systems PLC.

<sup>1</sup> The term “dca” means deci-hectare (= 1/10 ha).

**Table 9.1.4 Number of Patients of Overall Diseases in Bulgaria**

		2000	2001	2002	2003	2004	2005
Total Population	0 - 17	1,334,900	1,369,500	1,366,400	1,371,238	1,370,360	1,369,286
	Over 18	6,814,600	6,521,600	6,479,500	6,430,062	6,390,640	6,349,514
	Total	8,149,500	7,891,100	7,845,900	7,801,300	7,761,000	7,718,800
Registered Cases of Diseases in Health Facilities by Age (Total Number of Cases)	0 - 17	4,031,535	4,208,787	4,098,988	4,146,642	4,157,513	4,168,383
	Over 18	6,874,991	6,628,268	6,653,530	6,581,320	6,505,536	6,429,753
	Total	10,906,526	10,837,055	10,752,518	10,727,962	10,663,049	10,598,136
Number of Hospitalized Patients (Discharged and Deceased) in Health Facilities by Age (Number of Inpatients in Total)	0 - 17	193,861	195,162	213,813	218,571	247,651	308,107
	Over 18	987,236	990,765	1,042,744	1,115,127	1,225,980	1,306,206
	Total	1,181,097	1,185,927	1,256,557	1,333,698	1,473,631	1,614,313
Registered Cases of Diseases in Health Facilities as Outpatients by Age (Total Number of Patient-Cases)	0 - 17	3,837,674	4,013,625	3,885,175	3,928,071	3,909,862	3,860,276
	Over 18	5,887,755	5,637,503	5,610,786	5,466,193	5,279,556	5,123,547
	Total	9,725,429	9,651,128	9,495,961	9,394,264	9,189,418	8,983,823
Total Number of Outpatients	0 - 17	1,141,039	1,174,338	1,152,587	1,152,667	1,122,709	1,061,179
	Over 18	5,827,364	5,530,835	5,436,756	5,314,935	5,164,660	5,043,308
	Total	6,968,403	6,705,173	6,589,343	6,467,602	6,287,369	6,104,487
Times of Visits to Health Facilities of Outpatients (days)	0 - 17	3.36	3.42	3.37	3.41	3.48	3.64
	Over 18	1.01	1.02	1.03	1.03	1.02	1.02
	Total	1.40	1.44	1.44	1.45	1.46	1.47
Lengths of Stay in Health Facilities of Inpatients (days)		11.50	11.50	9.20	8.80	8.30	7.90

Source: Medicaal Center of Health Informatics, Ministry of Health.

**Table 9.1.5 Per Capita Income Level in Bulgaria During Past Several Years**

Income Source	2000	2001	2002	2003	2004
Ordinary Income	1,574	1,589	1,985	2,129	2,298
Wages and Salaries	612	631	742	852	924
Other Earnings	83	80	85	82	90
Entrepreneurship	70	66	85	89	90
Property Income	12	11	13	12	17
Unemployment Benefits	18	19	16	11	10
Pensions	337	377	398	439	509
Family Allowance	13	11	10	12	15
Other Social Benefits	19	21	32	27	36
Households Plot	262	238	392	388	372
Property Sale	7	7	9	14	11
Miscellaneous	141	128	203	203	224
Interest Income	55	47	60	52	84
Loans and Credits	30	32	37	58	80
Loans Repaid	5	4	3	5	4
Total	1,664	1,672	2,085	2,244	2,466

Source: Statistical Yearbook of Bulgaria 2005.

**Table 9.1.6 Annual Disbursement of Project Cost for Irrigation System  
Improvement Works in Financial and Economic Terms in the Case of the Target  
Year of 2015**

<b>A. West Aegean River Basin</b>						
Cost Item	Total Cost	2011	2012	2013	2014	
<b>In EURO (€)</b>						
Total Financial Cost excl. Price Escalation	42,061,574	10,515,393	10,515,393	10,515,393	10,515,393	
Total Economic Cost excl. Price Escalation	34,184,935	8,546,234	8,546,234	8,546,234	8,546,234	
<b>In Bulgarian Lev (Lev)</b>						
Total Financial Cost excl. Price Escalation	82,348,570	20,587,142	20,587,142	20,587,142	20,587,142	
Total Economic Cost excl. Price Escalation	66,927,608	16,731,902	16,731,902	16,731,902	16,731,902	
<b>B. East Aegean River Basin</b>						
Cost Item	Total Cost	2011	2012	2013	2014	
<b>In EURO (€)</b>						
Total Financial Cost excl. Price Escalation	230,779,275	57,694,819	57,694,819	57,694,819	57,694,819	
Total Economic Cost excl. Price Escalation	187,300,452	46,825,113	46,825,113	46,825,113	46,825,113	
<b>In Bulgarian Lev (Lev)</b>						
Total Financial Cost excl. Price Escalation	451,821,972	112,955,493	112,955,493	112,955,493	112,955,493	
Total Economic Cost excl. Price Escalation	366,698,698	91,674,674	91,674,674	91,674,674	91,674,674	
<b>C. Both the Basins</b>						
Cost Item	Total Cost	2011	2012	2013	2014	
<b>In EURO (€)</b>						
Total Financial Cost excl. Price Escalation	272,840,849	68,210,212	68,210,212	68,210,212	68,210,212	
Total Economic Cost excl. Price Escalation	221,485,387	55,371,347	55,371,347	55,371,347	55,371,347	
<b>In Bulgarian Lev (Lev)</b>						
Total Financial Cost excl. Price Escalation	534,170,542	133,542,636	133,542,636	133,542,636	133,542,636	
Total Economic Cost excl. Price Escalation	433,626,306	108,406,576	108,406,576	108,406,576	108,406,576	

**Table 9.1.7 Annual Disbursement of Project Cost for Irrigation System Improvement Works in Financial and Economic Terms in the Practical Case of the Year of 2021**

Cost Item	Total Cost	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>A. West Aegean River Basin</b>											
<b>In EURO (€)</b>											
Total Financial Cost excl. Price Escalation	42,061,574	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157	4,206,157
Total Economic Cost excl. Price Escalation	34,184,935	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494	3,418,494
<b>In Bulgarian Lev (Lev)</b>											
Total Financial Cost excl. Price Escalation	82,348,570	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857	8,234,857
Total Economic Cost excl. Price Escalation	66,927,608	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761	6,692,761
<b>B. East Aegean River Basin</b>											
<b>In EURO (€)</b>											
Total Financial Cost excl. Price Escalation	230,779,275	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928	23,077,928
Total Economic Cost excl. Price Escalation	187,300,452	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045	18,730,045
<b>In Bulgarian Lev (Lev)</b>											
Total Financial Cost excl. Price Escalation	451,821,972	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197	45,182,197
Total Economic Cost excl. Price Escalation	366,698,698	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870	36,669,870
<b>C. Both the Basins</b>											
<b>In EURO (€)</b>											
Total Financial Cost excl. Price Escalation	272,840,849	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085	27,284,085
Total Economic Cost excl. Price Escalation	221,485,387	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539	22,148,539
<b>In Bulgarian Lev (Lev)</b>											
Total Financial Cost excl. Price Escalation	534,170,542	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054	53,417,054
Total Economic Cost excl. Price Escalation	433,626,306	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631	43,362,631

**Table 9.1.8 Annual Disbursement of Project Cost for Wastewater Treatment System Improvement Works in Financial and Economic Terms in the Case of the Target Year of 2015**

<b>A. West Aegean River Basin</b>					
Cost Item	Total Cost	2011	2012	2013	2014
<b>In EURO (€)</b>					
Total Financial Cost excl. Price Escalation	619,058,514	170,455,171	206,352,838	206,352,838	35,897,667
Total Economic Cost excl. Price Escalation	484,173,497	133,311,440	161,391,166	161,391,166	28,079,725
<b>In Bulgarian Lev (Lev)</b>					
Total Financial Cost excl. Price Escalation	1,211,998,950	333,718,838	403,999,650	403,999,650	70,280,812
Total Economic Cost excl. Price Escalation	947,919,714	260,998,471	315,973,23	315,973,238	54,974,767
<b>B. East Aegean River Basin</b>					
Cost Item	Total Cost	2011	2012	2013	2014
<b>In EURO (€)</b>					
Total Financial Cost excl. Price Escalation	1,843,789,567	471,441,439	614,596,522	614,596,522	143,155,083
Total Economic Cost excl. Price Escalation	1,441,969,180	368,669,349	480,656,393	480,656,393	111,987,045
<b>In Bulgarian Lev (Lev)</b>					
Total Financial Cost excl. Price Escalation	3,609,789,652	922,992,764	1,203,263,217	1,203,263,217	280,270,453
Total Economic Cost excl. Price Escalation	2,823,101,680	721,784,537	941,033,893	941,033,893	219,249,356
<b>C. Both the Basins</b>					
Cost Item	Total Cost	2011	2012	2013	2014
<b>In EURO (€)</b>					
Total Financial Cost excl. Price Escalation	2,462,848,082	641,896,610	820,949,361	820,949,361	179,052,751
Total Economic Cost excl. Price Escalation	1,926,142,677	501,980,789	642,047,559	642,047,559	140,066,770
<b>In Bulgarian Lev (Lev)</b>					
Total Financial Cost excl. Price Escalation	4,821,788,603	1,256,711,602	1,607,262,868	1,607,262,868	350,551,265
Total Economic Cost excl. Price Escalation	3,771,021,394	982,783,008	1,257,007,131	1,257,007,131	274,224,123

**Table 9.1.9 Annual Disbursement of Project Cost for Wastewater Treatment System Improvement Works in Financial and Economic Terms in the Practical Case of the Year of 2021 (1/2)**

<b>A. West Aegean River Basin</b>									
Cost Item	Total Cost	2011	2012	2013	2014	2015	2016	2017	
<b>In EURO (€)</b>									
Total Financial Cost excl. Price Escalation	619,058,514	137,577,194	180,609,118	180,609,118	43,031,924	25,743,720	25,743,720	25,743,720	
Total Economic Cost excl. Price Escalation	484,173,497	107,598,128	141,254,506	141,254,506	33,656,378	20,136,660	20,136,660	20,136,660	
<b>In Bulgarian Lev (Lev)</b>									
Total Financial Cost excl. Price Escalation	1,211,998,950	269,350,007	353,598,338	353,598,338	84,248,331	50,401,312	50,401,312	50,401,312	
Total Economic Cost excl. Price Escalation	947,919,714	210,656,691	276,549,485	276,549,485	65,892,793	39,423,754	39,423,754	39,423,754	
<b>B. East Aegean River Basin</b>									
Cost Item	Total Cost	2011	2012	2013	2014	2015	2016	2017	2018
<b>In EURO (€)</b>									
Total Financial Cost excl. Price Escalation	1,843,789,567	393,375,309	489,293,932	489,293,932	95,918,623	81,936,941	125,302,591	125,302,591	43,365,650
Total Economic Cost excl. Price Escalation	1,441,969,180	307,599,422	382,632,844	382,632,844	75,033,422	64,098,956	98,023,549	98,023,549	33,924,594
<b>In Bulgarian Lev (Lev)</b>									
Total Financial Cost excl. Price Escalation	3,609,789,652	770,154,113	957,944,552	957,944,552	187,790,439	160,416,962	245,318,665	245,318,665	84,901,703
Total Economic Cost excl. Price Escalation	2,823,101,680	602,221,224	749,122,408	749,122,408	146,901,184	125,493,576	191,911,485	191,911,485	66,417,909
<b>C. Both the Basins</b>									
Cost Item	Total Cost	2011	2012	2013	2014	2015	2016	2017	2018
<b>In EURO (€)</b>									
Total Financial Cost excl. Price Escalation	2,462,848,082	530,952,503	669,903,050	669,903,050	138,950,547	107,680,661	151,046,311	151,046,311	43,365,650
Total Economic Cost excl. Price Escalation	1,926,142,677	415,197,550	523,887,350	523,887,350	108,689,800	84,235,615	118,160,209	118,160,209	33,924,594
<b>In Bulgarian Lev (Lev)</b>									
Total Financial Cost excl. Price Escalation	4,821,788,603	1,039,504,120	1,311,542,890	1,311,542,890	272,038,770	210,818,275	295,719,978	295,719,978	84,901,703
Total Economic Cost excl. Price Escalation	3,771,021,394	812,877,915	1,025,671,893	1,025,671,893	212,793,977	164,917,330	231,335,239	231,335,239	66,417,909

**Table 9.1.10 Annual Disbursement of Project Cost for Potable Water Supply Network System Improvement Works in Financial and Economic Terms in the Case of the Target Year of 2015**

East Aegean River Basin						(Lev)
Cost Item	Total Amount of Project Cost	2011	2012	2013	2014	
<b>Total Financial Cost excl. Price Escalation</b>	6,144,789,838	1,536,197,459	1,536,197,459	1,536,197,459	1,536,197,459	
Price Escalation	1,053,793,322	186,771,111	236,909,496	288,506,909	341,605,806	
<b>Total Financial Cost incl. Price Escalation</b>	7,198,583,160	1,722,968,570	1,773,106,956	1,824,704,368	1,877,803,265	
<b>Total Economic Cost excl. Price Escalation</b>	4,771,392,703	1,192,848,176	1,192,848,176	1,192,848,176	1,192,848,176	
West Aegean River Basin						(Lev)
Cost Item	Total Amount of Project Cost	2011	2012	2013	2014	
<b>Total Financial Cost excl. Price Escalation</b>	1,798,396,328	449,599,082	449,599,082	449,599,082	449,599,082	
Price Escalation	308,413,809	54,662,322	69,336,329	84,437,349	99,977,809	
<b>Total Financial Cost incl. Price Escalation</b>	2,106,810,137	504,261,404	518,935,411	534,036,431	549,576,891	
<b>Total Economic Cost excl. Price Escalation</b>	1,396,444,035	349,111,009	349,111,009	349,111,009	349,111,009	
Both the River Basins						(Lev)
Cost Item	Total Amount of Project Cost	2011	2012	2013	2014	
<b>Total Financial Cost excl. Price Escalation</b>	7,943,186,166	1,985,796,541	1,985,796,541	1,985,796,541	1,985,796,541	
Price Escalation	1,362,207,132	241,433,433	306,245,825	372,944,258	441,583,615	
<b>Total Financial Cost incl. Price Escalation</b>	9,305,393,297	2,227,229,974	2,292,042,367	2,358,740,800	2,427,380,157	
<b>Total Economic Cost excl. Price Escalation</b>	6,167,836,738	1,541,959,185	1,541,959,185	1,541,959,185	1,541,959,185	

**Table 9.1.11 Annual Disbursement of Project Cost for Potable Water Supply Network System Improvement Works in Financial and Economic Terms in the Practical Case of the Year of 2021**

East Aegean River Basin		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	(Lev)
Cost Item	Total Amount of Project Cost											
Total Financial Cost excl. Price Escalation	6,144,789,838	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984	614,478,984
Price Escalation	1,723,302,735	74,708,444	94,763,799	115,402,764	136,642,322	158,499,932	180,993,639	204,141,893	227,963,760	252,478,844	277,707,317	277,707,317
Total Financial Cost incl. Price Escalation	7,868,092,573	689,187,428	709,242,782	729,881,747	751,121,306	772,978,936	795,472,623	818,620,877	842,442,744	866,957,828	892,186,301	892,186,301
Total Economic Cost excl. Price Escalation	4,771,392,703	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270	477,139,270
West Aegean River Basin												
Cost Item	Total Amount of Project Cost											(Lev)
Total Financial Cost excl. Price Escalation	1,798,396,328	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633	179,839,633
Price Escalation	504,339,204	21,864,929	27,734,532	33,774,940	39,991,124	46,388,199	52,971,429	59,746,231	66,718,179	73,893,012	81,276,631	81,276,631
Total Financial Cost incl. Price Escalation	2,302,735,532	201,704,562	207,574,164	213,614,573	219,830,757	226,227,832	232,811,061	239,585,863	246,557,812	253,732,644	261,116,264	261,116,264
Total Economic Cost excl. Price Escalation	1,396,444,035	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404	139,644,404
Both the River Basins												
Cost Item	Total Amount of Project Cost											(Lev)
Total Financial Cost excl. Price Escalation	7,943,186,166	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617	794,318,617
Price Escalation	2,227,661,939	96,373,373	122,498,330	149,177,703	176,633,446	204,888,151	233,965,068	263,888,123	294,681,939	326,371,856	358,983,948	358,983,948
Total Financial Cost incl. Price Escalation	10,170,848,105	890,891,990	916,816,947	943,496,320	970,952,063	999,206,768	1,028,283,685	1,058,206,740	1,089,000,556	1,120,690,472	1,153,302,565	1,153,302,565
Total Economic Cost excl. Price Escalation	6,167,836,738	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674	616,783,674



**Table 9.2.1 Statement of Revenue and Expenditure of Consolidated State Budget by Item in Bulgaria**

		(1,000 Leva)			
		2003	2004	2005	2005
		Revenue/Benefit			
		Expenditure/Finance			
I.	Revenue	13,758,404	15,399,942	17,475,212	14,577,172
	1. Current Revenue	13,758,404	15,399,942	17,475,212	1,765,500
	1.1 Tax Revenue	11,114,124	12,773,972	14,483,931	292,551
	i) Taxes on Profit	1,060,995	938,250	1,022,127	631,879
	- Of which: Tax on Profit	968,387	857,764	932,399	46,273
	- Of which: Tax on Dividends, Liquidation Participation and Income	108,672	766,294	89,728	2,615,397
	ii) Income Tax	1,140,300	1,247,549	1,248,561	1,520,055
	iii) Tax on Insurance and Re-insurance Premiums	24,201	34,513	6,242	875,560
	vi) Value Added Tax	3,100,766	3,891,305	4,798,003	42,610
	v) Excises	1,543,875	1,881,003	2,187,842	685,563
	vii) Custom Duties & Fees	231,276	292,490	371,739	6,101,784
	viii) Revenue of Social Insurance	3,653,580	4,079,462	4,409,610	2,044,696
	Other Taxes	359,131	409,402	439,806	56,616
	1.2 Non-Tax Revenue	2,644,280	2,625,970	2,991,281	16,678,483
	Of which: Domestic Grants, Benefits and Other Graciously Received Sum	311,312	454,643	536,978	1,333,707
	Of which: Foreign Grants, Benefits and Other Graciously Received Sum	14,002	14,204	26,566	
II.	Benefits	297,310	438,764	496,689	
	Total	14,069,716	15,854,585	18,012,191	
		Expenditure/Finance			
	I. Current Expenditures	12,709,786	13,615,348	14,577,172	
	1. Wages and Salaries	1,506,147	1,571,519	1,765,500	
	2. Other Payments to Employees	236,763	261,560	292,551	
	3. Social Insurance Contributions	569,783	541,630	631,879	
	4. Scholarships	45,443	46,040	46,273	
	5. Cost*	2,113,121	2,380,131	2,615,397	
	6. Defence and Safety	1,395,540	1,450,078	1,520,055	
	7. Subsidies	940,122	868,076	875,560	
	8. Expenditure for Membership Dues and Participation	47,822	53,833	42,610	
	9. Interests	723,911	697,429	685,563	
	10. Social and Health Insurance Payments	5,131,135	5,345,051	6,101,784	
	II. Capital Expenditure	1,241,221	1,556,282	2,044,696	
	III. Increase of State Reserve and Purchase of Agriocultural Products	117,776	27,325	56,616	
	Expenditure in Total	14,068,783	15,198,954	16,678,483	
	Surplus	933	655,630	1,333,707	
		Total			
	Total	14,069,716	15,854,585	18,012,191	
	Net External Finance	-1,534	-622,491	-2,410,415	
	Net Internal Finance	-399,433	-1,710,713	-370,240	
	Revenue from Privatization	400,033	1,177,575	1,446,948	

(Note) Incl. Food, Medicines, Bedclothes/ Clothes, Business Trips, Material/ Fuels/Energy, External Services, Current Repair, Expenditure on Education / Research / Books for Libraries, Taxes/Custom Duties/ Fees, Expenditure on Bank and Other Financial Services, and Others.

Source: NIS.

Table 9.2.2 Balance Sheet of the Ministry of Environment and Waters

Assets	2003				2004				Liabilities	2003				2004			
	Budgets & Budget Accounts		Non-Budgets and Accounts		Budgets & Budget Accounts		Non-Budgets and Accounts			Budgets & Budget Accounts		Non-Budgets and Accounts		Budgets & Budget Accounts		Non-Budgets and Accounts	
	Total	Other Accounts & Activities	Total	Other Accounts & Activities	Total	Other Accounts & Activities	Total	Other Accounts & Activities		Total	Other Accounts & Activities	Total	Other Accounts & Activities	Total	Other Accounts & Activities		
A. Non-Financial Assets	67,273	103	21	67,397	81,804	0	21	81,825	A. Capital in Budget Enterprises	71,918	163	232	72,313	110,387	0	-2	10,385
1. Long Term Tangible Assets	52,051	95	21	52,167	66,112	0	21	66,133	1. Fixed (Disposed) Capital	19,434	434	211	20,078	26,072	0	0	26,072
1. Buildings	13,832	0	0	13,832	15,040	0	0	15,040	2. Increase/Decrease of Net Assets from Past Years	7,093	-257	21	6,857	52,214	0	-2	52,212
2. Computers, Vehicles, Equipment	29,509	95	20	29,624	40,583	0	20	40,603	3. Increase/Decrease of Net Assets During the Period	45,392	-14	0	45,378	32,101	0	0	-2,101
3. Economic Stocks & Other LTTA*	4,512	0	1	4,513	6,026	0	1	6,027	B. Liabilities & Revenues for Future Periods	5,429	0	828	6,257	4,679	0	1,395	6,074
4. LTTA* in Process of Acquisition	4,198	0	0	4,198	4,463	0	0	4,463	1. Long Term Liabilities	0	0	0	0	0	0	0	0
II. Long Term Intangible Assets	14,445	5	0	14,449	14,764	0	0	14,764	1. LTL* on Government Security Issues	0	0	0	0	0	0	0	0
III. Short Term Tangible Assets	777	4	0	781	927	0	0	927	2. LTL* on Loans Received	0	0	0	0	0	0	0	0
1. Materials, Production, Goods, Unfinished	777	4	0	781	927	0	0	927	3. Other LTL*	0	0	0	0	0	0	0	0
2. Other Short Term Tangible Assets	0	0	0	0	0	0	0	0	II. Short Term Liabilities	4,693	0	828	5,521	3,739	0	1,395	5,135
IV. Expenses for Future Periods	0	0	0	0	0	0	0	0	1. STL* on Loans & Government Security Issues	0	0	0	0	0	0	0	0
Financial Assets	10,075	59	1,039	11,174	33,262	0	1,373	34,635	2. Liabilities to Suppliers	1	0	0	1	9	0	0	9
I. Shares, Stocks & Other Security Issues	0	0	0	0	20,000	0	0	20,000	3. Advanced Payments Received	0	0	0	0	0	0	0	0
1. Shares & Stocks	0	0	0	0	20,000	0	0	20,000	4. For Pensions, Supports, Subsidies, Scholarships	0	0	0	0	0	0	0	0
2. Government/Municipality Security Issues	0	0	0	0	0	0	0	0	5. Tax, Duty & Fee Liabilities	6	0	0	6	2	0	0	2
3. Bonds & Other Security Issues	0	0	0	0	0	0	0	0	6. Payments Liabilities to SSSF, NHIF & AOPSF*	0	0	0	0	0	0	0	0
II. Financial Taking from Loans	0	0	0	0	0	0	0	0	7. Liabilities to Staff	0	0	0	0	0	0	0	0
1. Long Term Financial Taking from Loans	0	0	0	0	0	0	0	0	8. Liabilities on Loans between Budget Liabilities	4,686	0	828	5,514	3,729	0	1,395	5,124
2. Short Term Financial Taking from Loans	0	0	0	0	0	0	0	0	9. Other Short Term Liabilities	736	0	0	736	939	0	0	939
III. Other Financial Amounts Receivable	8,360	59	0	8,420	12,156	0	0	12,156	III. Provisions & Revenues for Future Periods	736	0	0	736	939	0	0	939
1. Public State/Municipality Financial Amounts	0	0	0	0	1,574	0	0	1,574	2. Revenues for Future Periods	0	0	0	0	0	0	0	0
2. Financial Receivables from Clients	95	0	0	95	0	0	0	0	IV. Financial Resources	5,524	59	0	5,584	4,903	0	0	4,903
3. Advanced Payments	2,741	0	0	2,741	5,678	0	0	5,678	1. Cash Resources	1,715	0	1,039	2,754	1,106	0	1,373	2,479
4. Accountable Persons	0	0	0	0	0	0	0	0	2. Financial Resources in Bank Accounts	1,715	0	1,039	2,754	1,106	0	1,373	2,479
5. Receivables from Loans between Budget Enterprises	0	0	0	0	0	0	0	0	Total Assets	77,348	163	1,060	78,570	115,066	0	1,394	116,459
6. Other Financial Amounts Receivable	5,524	59	0	5,584	4,903	0	0	4,903	Total Liabilities	77,348	163	1,060	78,570	115,066	0	1,394	116,459
Financial Resources	1,715	0	1,039	2,754	1,106	0	1,373	2,479	C. Conditional Assets	1,660	0	3	1,662	2,734	0	3	2,737
1. Cash Resources	0	0	0	0	0	0	0	0	Total Liabilities, LTL: Long Term Liabilities, STL: Short Term Liabilities, SSSF: State Social Security Fund, NHIF: National Health-Insurance/Security Fund, AOPSF: Additional Obligatory Pension Security	15	0	0	15	12	0	0	12
2. Financial Resources in Bank Accounts	1,715	0	1,039	2,754	1,106	0	1,373	2,479	(Note) LTTA: Long Term Tangible Assets, LTL: Long Term Liabilities, LTL: Long Term Liabilities, STL: Short Term Liabilities, SSSF: State Social Security Fund, NHIF: National Health-Insurance/Security Fund, AOPSF: Additional Obligatory Pension Security	0	0	0	0	0	0	0	0

**Table 9.2.3 Statement of Revenue and Expenditure of the Ministry of Environment and Waters 2003-2004**

	Revenue		Expenditure		(Unit: 1,000 BGN)
	2003	2004	2003	2004	2003 2004
Personal Income Tax	93,232	14,695	24,478	35,420	8,386 3,753
Corporation Tax	32,996	0	0	0	1,561 1,555
Tax on Dividends and Liquidation Shares	0	0	0	0	4,276 5,370
Payments for State Social Security	0	0	0	0	96 83
Health Security Payments	0	0	0	0	2,454 2,745
Property Tax	0	0	0	0	1,030 1,192
Value Added Tax (VAT)	0	0	0	0	2,842 3,360
Excise Duties & Taxes on Liquid Fuels	5,825	0	0	0	0 0
Tax on Insurance and Re-Insurance Bonuses	0	0	0	0	490 588
Other Taxes regulated by Corporate Income Tax Act	0	0	0	0	0 0
Duties and Customs Taxes	0	0	0	0	85 162
Other Taxes	0	0	0	0	0 0
Revenues and Income from Property	47,484	9,581	0	0	6,766 13,040
Net Revenues from Sales of Services, Goods and Production	48	9,539	0	0	350 402
Revenues from Renting Properties	0	41	0	0	0 0
Revenues from Interests on Current Bank Account	47,436	0	0	0	0 0
State Fees	755	2,399	0	0	0 0
Court Fees	0	0	0	0	0 0
Municipal Fees	0	0	0	0	0 0
Fines, Sanctions and Penalty Interests	2,706	966	0	0	0 0
Revenues from Foreign Security Institutions	0	0	0	0	0 0
Other Non-Tax Revenues	1,997	155	0	0	0 0
Differences in Current Rates in Currency Operations	1	1	0	0	0 0
Received Insurance Compensation on Long Term Tangible Assets	1,982	11	0	0	0 0
Other Non-Tax Revenues	15	143	0	0	0 0
Paid-in Value Added Tax and Other Tax on Sales	0	-2	0	0	0 0
Revenues from Sales of State and Municipal Property	15	7	0	0	0 0
Revenue from Concessions	0	0	0	0	0 0
Revenue from Licenses	0	0	0	0	0 0
Aid, Donations and Other Gratuitous Funds from the Country	1,453	1,588	219	495	3,833 6,165
Current Aids, Donations and Other Gratuitous from the Country	20	123	477	257	0 5
Current Aids, Donations and Other Gratuitous from Abroad	1,433	1,464	0	0	0 0
Capital Transfers	0	0	0	0	0 0
Increase of State Reserve and Buying Up of Agricultural Products	0	0	0	0	0 0
Reserve for Incidental and Urgent Expenses	0	0	0	0	0 0
<b>Transfer-Recapitulation</b>			-68,754	40,029	
<b>Total</b>	<b>93,232</b>	<b>14,695</b>	<b>93,232</b>	<b>14,695</b>	<b>19,305</b>
Number of Full Time Employers			1,433	1,538	
On Labor Contracts			504	374	
On Official Contracts			929	1,184	
Non-Regularly Employed Staff			0	0	

Source: Ministry of Environment and Water.

**Table 9.2.4 Revenue and Financing Amount (Expenditure) of Enterprise for Management of Environmental Protection Activities (PUDOOS)**

Revenue	2004		2005		2006		2004		2005		2006	
	Amount	Share Rate	Amount	Share Rate	Amount	Share Rate	Amount	Share Rate	Amount	Share Rate	Amount	Share Rate
Transferred funds from the MoEW/ Transfer from Previous Year	20,000,000		15,878,799		-6,429,452		45,386,372		50,826,296		44,566,883	
I. Revenues Based on Laws	67,964,656	100.00%	51,354,089	100.00%	44,987,118	100.00%	-		6,566,733	12.92%	10,307,463	23.13%
1. Water Act (WA)	22,455,716	33.04%	20,597,881	40.11%	26,840,040	59.66%	1,793,013		2,925,892	5.76%	2,856,487	6.41%
1.1 WA - permission taxes	136,617		293,074		282,507		1,793,013		2,863,771		-	
1.2 WA - water consumption taxes	22,083,503		20,175,030		26,243,445		-		-		2,856,487	
1.3 WA - penal decisions	235,596		129,777		314,088		-		62,121		-	
2. Waste Management Act (WMA)	19,044,857	28.02%	11,191,822	21.79%	7,993,215	17.77%	29,643,603		25,716,092	50.60%	6,064,723	13.61%
2.1 WMA - package tax	26,959		11,315,415		10,467,706		11,895,437		3,313,496		6,064,723	
2.2 WMA - penal decisions	19,005,321		43,104		137,003		17,748,166		22,402,596		-	
2.3 Refunded taxes in exporting packaged goods	12,577		-146,905		-249,652		10,669,851		8,153,382		20,915,068	
2.4 Refunded package taxes under Order 372	-		-19,792		-2,361,842		10,208,749		7,782,690		20,411,467	
3. Law on Protected Territories (LPT)	368,245		386,141		-		-		258,889		387,360	
3.1 LPT - revenues	330,533		375,385		-		-		-		116,241	
3.2 LPT - penal decisions	37,712		10,756		-		461,102		111,803		-	
4. Ordinance 257 of the Council of Ministers - tax on motor vehicles	19,836,664		10,985,608		4,766,918		510,476		2,645,245		2,980,543	
4.1 Revenues from taxes	-		11,060,240		4,776,678		-		2,590,015		2,976,793	
4.2 Refunded amounts	-		-74,632		-9,760		-		55,230		3,750	
5. Ordinance 134 of the Council of Ministers	1,054,389		1,424,019		1,644,958		-		-		-	
5.1 Revenues from taxes	-		1,564,194		1,786,378		77,904		1,048,432		333,818	
5.2 Refunded amounts	-		-140,175		-141,420		1,698,895		792,175		1,108,781	
6. Ordinance 137 of the Council of Ministers	2,336,031		1,718,070		2,227,480		1,698,895		222,170		1,108,781	
6.1 Revenues from taxes	-		4,429,873		5,446,069		-		570,005		-	
6.2 Refunded amount	-		-2,711,803		-3,218,589		-		-		-	
7. Law on the Purity of Atmospheric air (LPAA)	2,813,600		4,958,464		-		992,630		2,978,345		0	
7.1 LPAA - revenues	2,810,973		4,950,550		-		440,852		221,904		0	
7.2 LPAA - penal decisions	2,627		7,914		-		440,852		147,180		-	
8. Law on Environmental Protection	55,154		58,868		-		-		74,724		-	
9. Law on Biodiversity	-		1,377		-		-		-		-	
10. Law on Underground Resources	-		31,509		-		110,926		2,045,072		0	
11. Law on Medicinal Plants	-		330		-		110,926		1,528,818		-	
12. Ordinance 230 of the Council of Ministers - processed oil	-		-		1,514,507		440,852		711,369		0	
II. Other Revenue	11,105,676		0		24,695,961		440,852		688,161		-	
Total	99,070,332		67,232,888		69,683,079		37,805,161		22,836,044		16,271,703	
Source: PUDOOS.							83,191,533		73,662,340		60,838,586	

**Table 9.2.5 Statement of Revenue and Expenditure of West Aegean River Basin  
Directorate 2003-2006**

Items	(Unit: Levs)			
	2003	2004	2005	2006
<b>Revenue</b>	12,026	24,670	3,193	15,119
Personal Income Tax	0	0	0	0
Corporation Tax	0	0	0	0
Tax on Dividends and Liquidation Shares	0	0	0	0
Payments for State Social Security	0	0	0	0
Health Security Payments	0	0	0	0
Property Tax	0	0	0	0
Value Added Tax (VAT)	0	0	0	0
Excise Duties	0	0	0	0
Tax on Insurance and Re-Insurance Bonuses	0	0	0	0
Other Taxes egulated by Corporate Income Tax Act	0	0	0	0
Duties and Customs Taxes	0	0	0	0
Other Taxes	0	0	0	0
Revenues and Income from Property	2	77	76	153
Net Revenues from Sales of Services, Goods and Production	2	77	76	153
State Fees	10,883	21,523	1,600	14,966
Court Fees	0	0	0	0
Municipal Fees	0	0	0	0
Fines, Sanctions and Penalty Interests	0	0	0	0
Revenues from Foreign Security Institutions	0	0	0	0
Other Non-Tax Revenues	341	3,070	1,517	0
Received Insurance Compensation on Long Term Tangible Assets	0	2,820	1,312	0
Received Other Insurance Compensations	91	0	0	0
Other Non-Tax Revenues	250	250	205	0
Paid-in Value Added Tax and Other Tax on Sales	0	0	0	0
Revenues from Sales of State and Municipal Property	0	0	0	0
Revenue from Concessions	0	0	0	0
Revenue from Licenses	0	0	0	0
Aid, Donations and Other Gratuitous Funds from the Country	800	0	0	0
Current Aids, Donations and Other Gratuitous from the Country	800	0	0	0
<b>Expenditure</b>	413,338	625,094	551,350	743,564
Salaries and Fees of Staff Employed on Labor and Official Contracts	154,594	277,695	276,777	283,265
Salaries and Fees of Staff Employed on Labor Contracts	35,023	45,969	41,075	37,044
Salaries and Fees of Staff Employed on Official Contracts	67,737	156,986	170,101	177,864
Additional Financial Bonuses and Other Additional Remunerations	51,834	74,740	65,601	68,357
Other Remunerations and Payments for the Staff	3,911	5,605	14,873	19,699
Security Payments by Employer for State Social Security Fund	48,567	93,690	88,715	74,953
Security Payments by Employer for Teacher Pension Fund	0	0	0	0
Health Security/Insurance Payments by Employer	8,910	16,294	16,695	17,468
Other Health Security Payments for Pensioners and Others	0	0	0	0
Payments for Additional Obligatory Security	1,898	5,660	5,568	7,453
Payments for Voluntary Security	0	0	0	0
Maintenance	96,613	163,450	148,722	140,885
Payments on Governmental (Municipal) Security Issues	0	0	0	0
Expenses for Interests on Loans in the Country	0	0	0	0
Expenses for Interests on Loans from Other Countries	0	0	0	0
Expenses for Interests on Loans from International Financing Organizations	0	0	0	0
Expenses for Interests on Loans from Banks and Other International Financing Organizations	0	0	0	0
Expenses for Interests on Bonds Issued and Sold at International Capital Market	0	0	0	0
Other Expenses for Interests	0	0	0	0
Health Security Payments	0	0	0	0
Scholarships	0	0	0	0
Pensions	0	0	0	0
Compensations and Financial Support for Household/Families	0	0	0	0
Subsidies for Non-Financial Enterprises	0	0	0	0
Subsidies for Financial Enterprises	0	0	0	0
Payments for Membership Dues and Participation	0	0	0	0
Given Financial Support for Foreign Countries	0	0	0	0
General Repair on Long Term Tangible Assets	0	0	0	96,400
Acquisition of Long Term Tangible Assets	93,781	57,413	0	103,441
Acquisition of Long Term Intangible Assets	5,064	5,287	0	0
Acquisition of Land	0	0	0	0
Capital Transfers	0	0	0	0
Increase of State Reserve and Buying Up of Agricultural Products	0	0	0	0
Reserve for Incidental and Urgent Expenses	0	0	0	0
<b>Transfer-Recapitulation</b>	401,312	600,307	548,157	726,375
<b>Deficit/Surplus</b>	0	-117	0	-2,070
Number of Full Time Employers	49	47	48	48
On Labor Contracts	20	10	10	10
On Official Contracts	29	37	38	38
Non-Regularly Employed Staff	0	0	0	0

Source: Ministry of Environment and Water.

**Table 9.2.6 Statement of Revenue and Expenditure of East Aegean River Basin  
Directorate 2003-2006**

	(Unit: Levs)			
Items	2003	2004	2005	2006
<b>Revenue</b>	34,797	37,742	7,002	20,213
Personal Income Tax	0	0	0	0
Corporation Tax	0	0	0	0
Tax on Dividends and Liquidation Shares	0	0	0	0
Payments for State Social Security	0	0	0	0
Health Security Payments	0	0	0	0
Property Tax	0	0	0	0
Value Added Tax (VAT)	0	0	0	0
Excise Duties	0	0	0	0
Tax on Insurance and Re-Insurance Bonuses	0	0	0	0
Other Taxes egulated by Corporate Income Tax Act	0	0	0	0
Duties and Customs Taxes	0	0	0	0
Other Taxes	0	0	0	0
Revenues and Income from Property	1	402	177	84
Net Revenues from Sales of Services, Goods and Production	0	401	175	59
Revenues from Interests on Current Bank Account	1	1	2	25
State Fees	34,396	35,340	5,825	20,129
Court Fees	0	0	0	0
Municipal Fees	0	0	0	0
Fines, Sanctions and Penalty Interests	0	2,000	1,000	0
Revenues from Foreign Security Institutions	0	0	0	0
Other Non-Tax Revenues	400	0	0	0
Received Insurance Compensation on Long Term Tangible Assets	0	0	0	0
Received Other Insurance Compensations	0	0	0	0
Other Non-Tax Revenues	400	0	0	0
Paid-in Value Added Tax and Other Tax on Sales	0	0	0	0
Revenues from Sales of State and Municipal Property	0	0	0	0
Revenue from Concessions	0	0	0	0
Revenue from Licenses	0	0	0	0
Aid, Donations and Other Gratuitous Funds from the Country	0	0	0	0
Current Aids, Donations and Other Gratuitous from the Country	0	0	0	0
<b>Expenditure</b>	443,932	801,872	1,553,507	713,068
Salaries and Fees of Staff Employed on Labor and Official Contracts	132,996	302,276	356,285	346,443
Salaries and Fees of Staff Employed on Labor Contracts	17,841	35,625	37,721	27,365
Salaries and Fees of Staff Employed on Official Contracts	68,509	186,922	242,094	247,127
Additional Financial Bonuses and Other Additional Remunerations	46,646	79,729	76,470	71,951
Other Remunerations and Payments for the Staff	5,299	10,500	25,299	27,993
Security Payments by Employer for State Social Security Fund	44,825	105,888	121,018	96,346
Security Payments by Employer for Teacher Pension Fund	0	0	0	0
Health Security/Insurance Payments by Employer	7,590	18,197	21,938	21,706
Other Health Security Payments for Pensioners and Others	0	0	0	0
Payments for Additional Obligatory Security	1,281	4,490	5,493	7,644
Payments for Voluntary Security	0	0	0	0
Maintenance	111,668	237,556	209,855	167,704
Payments on Governmental (Municipal) Security Issues	0	0	0	0
Expenses for Interests on Loans in the Country	0	0	0	0
Expenses for Interests on Loans from Other Countries	0	0	0	0
Expenses for Interests on Loans from International Financing Organizations	0	0	0	0
Expenses for Interests on Loans from Banks and Other International Financing Organizations	0	0	0	0
Expenses for Interests on Bonds Issued and Sold at International Capital Market	0	0	0	0
Other Expenses for Interests	0	0	0	0
Health Security Payments	0	0	0	0
Scholarships	0	0	0	0
Pensions	0	0	0	0
Compensations and Financial Support for Household/Families	0	0	0	0
Subsidies for Non-Financial Enterprises	0	0	0	0
Subsidies for Financial Enterprises	0	0	0	0
Payments for Membership Dues and Participation	0	0	0	0
Given Financial Support for Foreign Countries	0	0	0	0
General Repair on Long Term Tangible Assets	0	0	731,840	10,500
Acquisition of Long Term Tangible Assets	140,273	122,965	9,751	34,732
Acquisition of Long Term Intangible Assets	0	0	72,028	0
Acquisition of Land	0	0	0	0
Capital Transfers	0	0	0	0
Increase of State Reserve and Buying Up of Agricultural Products	0	0	0	0
Reserve for Incidental and Urgent Expenses	0	0	0	0
<b>Transfer-Recapitulation</b>	409,135	763,779	1,546,856	496,775
<b>Deficit/Surplus</b>	0	-351	351	-196,080
Number of Full Time Employers	37	59	57	53
On Labor Contracts	12	7	5	5
On Official Contracts	25	52	52	48
Non-Regularly Employed Staff	0	0	0	0

Source: Ministry of Environment and Water.

**Table 9.2.7 Statement of Revenue and Expenditure of Danube River Basin  
Directorate 2003-2006**

Items	(Unit: Levs)			
	2003	2004	2005	2006
<b>Revenue</b>	279,548	42,457	6,398	6,532
Personal Income Tax	0	0	0	0
Corporation Tax	0	0	0	0
Tax on Dividends and Liquidation Shares	0	0	0	0
Payments for State Social Security	0	0	0	0
Health Security Payments	0	0	0	0
Property Tax	0	0	0	0
Value Added Tax (VAT)	0	0	0	0
Excise Duties	0	0	0	0
Tax on Insurance and Re-Insurance Bonuses	0	0	0	0
Other Taxes egulated by Corporate Income Tax Act	0	0	0	0
Duties and Customs Taxes	0	0	0	0
Other Taxes	0	0	0	0
Revenues and Income from Property	7	33	2,511	460
Net Revenues from Sales of Services, Goods and Production	0	31	2,509	217
Revenues from Interests on Current Bank Account	7	2	2	243
State Fees	277,571	40,936	3,167	5,700
Court Fees	0	0	0	0
Municipal Fees	0	0	0	0
Fines, Sanctions and Penalty Interests	1,650	1,000	0	150
Revenues from Foreign Security Institutions	0	0	0	0
Other Non-Tax Revenues	320	488	720	222
Received Insurance Compensation on Long Term Tangible Assets	0	468	720	222
Received Other Insurance Compensations	0	0	0	0
Other Non-Tax Revenues	320	20	0	0
Paid-in Value Added Tax and Other Tax on Sales	0	0	0	0
Revenues from Sales of State and Municipal Property	0	0	0	0
Revenue from Concessions	0	0	0	0
Revenue from Licenses	0	0	0	0
Aid, Donations and Other Gratuitous Funds from the Country	0	0	0	0
Current Aids, Donations and Other Gratuitous from the Country	0	0	0	0
<b>Expenditure</b>	565,289	905,447	874,312	990,723
Salaries and Fees of Staff Employed on Labor and Official Contracts	191,724	396,109	410,148	449,448
Salaries and Fees of Staff Employed on Labor Contracts	38,661	45,502	32,607	33,474
Salaries and Fees of Staff Employed on Official Contracts	89,579	246,852	295,145	310,131
Additional Financial Bonuses and Other Additional Remunerations	63,484	103,755	82,396	105,843
Other Remunerations and Payments for the Staff	4,330	15,022	27,489	33,603
Security Payments by Employer for State Social Security Fund	59,554	138,367	138,565	123,869
Security Payments by Employer for Teacher Pension Fund	0	0	0	0
Health Security/Insurance Payments by Employer	10,065	23,945	24,588	27,335
Other Health Security Payments for Pensioners and Others	0	0	0	0
Payments for Additional Obligatory Security	1,862	6,301	6,601	10,366
Payments for Voluntary Security	0	0	0	0
Maintenance	136,756	217,930	266,921	247,193
Payments on Governmental (Municipal) Security Issues	0	0	0	0
Expenses for Interests on Loans in the Country	0	0	0	0
Expenses for Interests on Loans from Other Countries	0	0	0	0
Expenses for Interests on Loans from International Financing Organizations	0	0	0	0
Expenses for Interests on Loans from Banks and Other International Financing Organizations	0	0	0	0
Expenses for Interests on Bonds Issued and Sold at International Capital Market	0	0	0	0
Other Expenses for Interests	0	0	0	0
Health Security Payments	0	0	0	0
Scholarships	0	0	0	0
Pensions	0	0	0	0
Compensations and Financial Support for Household/Families	0	0	0	0
Subsidies for Non-Financial Enterprises	0	0	0	0
Subsidies for Financial Enterprises	0	0	0	0
Payments for Membership Dues and Participation	0	0	0	0
Given Financial Support for Foreign Countries	0	0	0	0
General Repair on Long Term Tangible Assets	0	0	0	0
Acquisition of Long Term Tangible Assets	160,998	105,993	0	98,909
Acquisition of Long Term Intangible Assets	0	1,780	0	0
Acquisition of Land	0	0	0	0
Capital Transfers	0	0	0	0
Increase of State Reserve and Buying Up of Agricultural Products	0	0	0	0
Reserve for Incidental and Urgent Expenses	0	0	0	0
<b>Transfer-Recapitulation</b>	285,741	859,718	869,438	942,977
<b>Deficit/Surplus</b>	0	-3,272	1,524	-41,214
Number of Full Time Employers	57	67	65	67
On Labor Contracts	21	7	7	7
On Official Contracts	36	60	58	60
Non-Regularly Employed Staff	0	0	0	0

Source: Ministry of Environment and Water.

**Table 9.2.8 Statement of Revenue and Expenditure of Black Sea River Basin  
Directorate 2003-2006**

Items	(Unit: Levs)			
	2003	2004	2005	2006
<b>Revenue</b>	51,626	12,128	3,440	9,347
Personal Income Tax	0	0	0	0
Corporation Tax	0	0	0	0
Tax on Dividends and Liquidation Shares	0	0	0	0
Payments for State Social Security	0	0	0	0
Health Security Payments	0	0	0	0
Property Tax	0	0	0	0
Value Added Tax (VAT)	0	0	0	0
Excise Duties	0	0	0	0
Tax on Insurance and Re-Insurance Bonuses	0	0	0	0
Other Taxes regulated by Corporate Income Tax Act	0	0	0	0
Duties and Customs Taxes	0	0	0	0
Other Taxes	0	0	0	0
Revenues and Income from Property	4	97	745	583
Net Revenues from Sales of Services, Goods and Production	0	89	744	579
Revenues from Interests on Current Bank Account	4	8	1	4
State Fees	50,881	11,781	2,695	8,764
Court Fees	0	0	0	0
Municipal Fees	0	0	0	0
Fines, Sanctions and Penalty Interests	500	0	0	0
Revenues from Foreign Security Institutions	0	0	0	0
Other Non-Tax Revenues	241	250	0	0
Received Insurance Compensation on Long Term Tangible Assets	241	0	0	0
Received Other Insurance Compensations	0	0	0	0
Other Non-Tax Revenues	0	250	0	0
Paid-in Value Added Tax and Other Tax on Sales	0	0	0	0
Revenues from Sales of State and Municipal Property	0	0	0	0
Revenue from Concessions	0	0	0	0
Revenue from Licenses	0	0	0	0
Aid, Donations and Other Gratuitous Funds from the Country	0	0	0	0
Current Aids, Donations and Other Gratuitous from the Country	0	0	0	0
<b>Expenditure</b>	568,725	1,139,705	767,022	845,643
Salaries and Fees of Staff Employed on Labor and Official Contracts	206,148	357,085	352,353	376,715
Salaries and Fees of Staff Employed on Labor Contracts	45,813	37,824	22,490	25,813
Salaries and Fees of Staff Employed on Official Contracts	92,079	224,857	250,486	254,937
Additional Financial Bonuses and Other Additional Remunerations	68,256	94,404	79,377	95,965
Other Remunerations and Payments for the Staff	12,022	20,261	32,399	33,700
Security Payments by Employer for State Social Security Fund	68,552	126,529	120,491	102,955
Security Payments by Employer for Teacher Pension Fund	0	0	0	0
Health Security/Insurance Payments by Employer	11,623	22,107	22,401	23,962
Other Health Security Payments for Pensioners and Others	0	0	0	0
Payments for Additional Obligatory Security	1,707	5,385	5,332	8,305
Payments for Voluntary Security	0	0	0	0
Maintenance	138,728	481,661	231,646	174,260
Payments on Governmental (Municipal) Security Issues	0	0	0	0
Expenses for Interests on Loans in the Country	0	0	0	0
Expenses for Interests on Loans from Other Countries	0	0	0	0
Expenses for Interests on Loans from International Financing Organizations	0	0	0	0
Expenses for Interests on Loans from Banks and Other International Financing Organizations	0	0	0	0
Expenses for Interests on Bonds Issued and Sold at International Capital Market	0	0	0	0
Other Expenses for Interests	0	0	0	0
Health Security Payments	0	0	0	0
Scholarships	0	0	0	0
Pensions	0	0	0	0
Compensations and Financial Support for Household/Families	0	0	0	0
Subsidies for Non-Financial Enterprises	0	0	0	0
Subsidies for Financial Enterprises	0	0	0	0
Payments for Membership Dues and Participation	0	0	2,400	50
Given Financial Support for Foreign Countries	0	0	0	0
General Repair on Long Term Tangible Assets	0	0	0	0
Acquisition of Long Term Tangible Assets	129,729	126,353	0	99,286
Acquisition of Long Term Intangible Assets	216	324	0	26,410
Acquisition of Land	0	0	0	0
Capital Transfers	0	0	0	0
Increase of State Reserve and Buying Up of Agricultural Products	0	0	0	0
Reserve for Incidental and Urgent Expenses	0	0	0	0
<b>Transfer-Recapitulation</b>	517,099	1,127,577	763,532	811,136
<b>Deficit/Surplus</b>	0	0	-50	-25,160
Number of Full Time Employers	59	58	60	59
On Labor Contracts	24	5	5	5
On Official Contracts	35	53	55	54
Non-Regularly Employed Staff	0	0	0	0

Source: Ministry of Environment and Water.



**Table 9.2.9 Balance Sheet of Irrigation Systems Co.Ltd. (100 % State Owned  
Entetrprise subscribed by the Ministry of Agriculture and Forestry)**

(Note) The Company supplies the irrigation water for 537,000 ha in total (around 98 % of whole irrigated agricultural area). (Unit: 1,000 Levs)

Assets						Liabilities					
	2001	2002	2003	2004	2005		2001	2002	2003	2004	2005
A. Non Subscribed Capital	0	0	0	0	0	A. Own Capital	126,566	126,800	126,271	126,747	112,567
B. Long Term Assets	117,079	115,646	113,891	112,917	100,077	I. Basic Capital	23,111	22,433	24,115	24,222	21,816
I. Long Term Material Assets	117,022	115,595	113,848	112,886	100,048	1. Subscribed Capital	24,086	22,433	24,115	24,222	21,816
1. Buildings, Lands, Forests and Other Permanent Plantations	31,415	27,933	28,835	29,158	28,370	2. Additional Capital	-975	0	0	0	0
2. Machinery, Works and Equipment	84,250	86,997	84,442	83,158	71,143	II. Reserves	102,252	103,223	100,633	100,860	88,466
3. Other Long Term Material Assets	982	386	283	271	236	1. Emission Premia	0	0	0	0	0
4. Expenses on Acquisition and Liquidation of Long Term Material Assets	375	279	288	299	299	2. Reserve for Post-Estimate of Assets and Liabilities (Pre- Estimate Reserve)	27,384	27,373	28,073	26,572	20,895
II. Long Term Non Material Assets	49	43	31	24	22	3. Target Reserve	74,868	75,850	72,560	74,288	67,571
1. Rights of Ownerships	21	0	0	0	0	a. General Reserve (Additional Reserve)	74,827	43	47	57	60
2. Research Activities Products	0	0	0	0	0	b. Specialized Reserve (Reserve by Law)	41	0	0	0	0
3. Software, Patent, License	28	27	17	14	16	c. Other Reserve	0	75,807	72,513	74,231	67,511
4. Other Long Term Non- Material Assets	0	16	14	10	6	III. Financial Result	1,203	1,144	1,523	1,665	2,285
5. Expenses on foundation/ extension	0	0	0	0	0	1. Profit/Loss Accumulated	1,183	1,107	1,420	1,634	2,239
III. Long Term Financial Assets	8	8	8	7	7	a. Non-Divided Profit	1,183	1,107	1,420	1,634	2,239
1. Shares and Stocks	8	8	8	7	7	b. Uncovered Loss	0	0	0	0	0
2. Investment Property	0	0	0	0	0	2. Current Operating Profit/ Loss	20	37	103	31	46
3. Other Long Term Securities	0	0	0	0	0	B. Long Term Liabilities	5	1,832	2,073	1,664	4,579
4. Long Term Payments Due	0	0	0	0	0	I. Long Term Debts	5	0	41	27	2,708
IV. Trade Reputation	0	0	0	0	0	1. Debts to Linked Enterprises	0	0	0	0	0
1. Positive Reputation	0	0	0	0	0	2. Debts to Financial Institutions	0	0	0	0	0
2. Negative Reputation	0	0	0	0	0	3. Debts on Commercial Loans	0	0	0	0	0
V. Expenses on Future Periods	0	0	4	0	0	4. Taxes Postponed	0	0	0	0	2,410
C. Short Term Assets	13,869	15,501	17,253	20,151	25,620	5. Other Long Term Liabilities	5	0	41	27	298
I. Short Term Material Assets	2,184	2,273	2,497	2,869	3,054	II. Incomes for Future Periods and Financing	0	1,832	2,032	1,637	1,871
1. Materials	943	1,322	1,563	1,987	2,025	C. Short Term Liabilities	4,377	2,515	2,800	4,657	8,551
2. Production	637	250	306	143	295	I. Short Term Debts	2,479	2,326	2,800	4,657	8,551
3. Goods	173	134	78	89	65	1. Debts to Linked Enterprises	0	0	0	0	0
4. Young and Small Animals and Animals for Meat	214	206	203	9	9	2. Debts to Financial Institutions	0	0	0	0	0
5. Non-Finished Production	217	254	284	640	659	3. Debts to Suppliers and Clients	215	188	352	1,563	4,098
6. Other Short Term Material Assets	0	107	63	1	1	4. Debts on Commercial Loans	1	0	0	0	0
II. Short Term Payment Due	6,045	7,013	9,083	11,890	18,445	5. Debts to Personnel	1,195	825	800	1,078	1,472
1. Payments Due from Linked Enterprises	0	0	0	0	0	6. Debts to Insurance	349	348	442	577	730
2. Payments Due from Clients and Suppliers	4,913	5,391	6,922	5,966	10,433	7. Tax Debts	457	601	895	1,094	1,212
3. Payments Due on Commercial Loans Granted	0	0	0	0	0	8. Other Short Term Debts	262	364	311	345	1,039
4. Juridical and Sentenced Payments Due	656	1,077	1,463	3,554	4,075	9. Provisions	0	0	0	0	0
5. Taxes on Recuperation	179	230	168	1,846	2,777	II. Incomes for Future Periods and Financing	1,898	189	0	0	0
6. Other Short Term Payments Due	297	315	530	524	1,160	D. Financing	0	0	0	0	0
III. Short Term Financial Assets	0	0	0	0	0	1. For Long Term Assets	0	0	0	0	0
1. Financial Assets from Linked Enterprises	0	0	0	0	0	2. For Current Activities	0	0	0	0	0
2. Bought Back Own Debt Securities	0	0	0	0	0						
3. Short Term Securities	0	0	0	0	0						
4. Precious Metals and Jewellery	0	0	0	0	0						
5. Other Short Term Financial Assets	0	0	0	0	0						
IV. Monetary Sources	5,426	6,017	5,561	5,291	3,981						
1. Monetary Sources in Cash	99	311	493	134	485						
2. Monetary Sources on Bank Deposits	5,327	5,518	5,068	5,157	3,496						
3. Blocked Monetary Reserves	0	188	0	0	0						
4. Money Equivalents	0	0	0	0	0						
V. Expenses on Future Periods	214	198	112	101	140						
<b>Total</b>	<b>130,948</b>	<b>131,147</b>	<b>131,144</b>	<b>133,068</b>	<b>125,697</b>	<b>Total</b>	<b>130,948</b>	<b>131,147</b>	<b>131,144</b>	<b>133,068</b>	<b>125,697</b>

Source: Ministry of Finance.

**Table 9.2.10 Summary of Balance Sheet of Each WS&S Companies at a Grance**

As of 2005 (1,000 Leva)

Name of WS&S Companies	Assets in Total	Liability							Remark (Service Population under the WS&S as of 2005) (Persons)	
		Capital					Capital in Total	Long-Term and Short-Term Liability		Liabilities in Total
		Subscribed Capital	Reserves	Financial Result	Of which: Current Operating Profit/Loss					
					Amount	Share Rate to Assets				
1. Blagoevgrad WS&S Co. Ltd.	17,363	567	13,144	867	159	0.92%	14,578	2,785	17,363	219,629
2. Bourgas WS&S Co. Ltd.	53,422	2,228	42,611	2,155	1,170	2.19%	46,994	6,428	53,422	426,028
3. Dobrich WS&S Co. Ltd.	26,276	715	9,157	-5,535	-582	-2.21%	4,337	21,939	26,276	225,987
4. Haskovo WS&S Co. Ltd.	16,099	339	8,864	203	21	0.13%	9,406	6,693	16,099	208,523
5. Pazardzhik WS&S Co. Ltd.*	7,279	68	3,425	192	192	2.64%	3,685	3,616	7,301	174,834
6. Pleven WS&S Co. Ltd.	26,698	1,932	17,618	836	7	0.03%	20,386	6,312	26,698	315,000
7. Plovdiv WS&S Co. Ltd.	36,069	813	28,178	917	642	1.78%	29,908	6,161	36,069	720,635
8. Dunav Razgrad WS&S Co. Ltd.	12,714	1,105	10,328	198	58	0.46%	11,631	1,083	12,714	133,122
9. Smolyan WS&S Co. Ltd.	10,521	250	7,572	109	106	1.01%	7,931	2,590	10,521	144,309
10. Sofia District WS&S Co. Ltd.	17,731	170	5,183	38	38	0.21%	5,391	12,340	17,731	220,789
11. Stara Zagora WS&S Co. Ltd.	31,752	460	16,170	2,961	348	1.10%	19,591	12,161	31,752	416,338
12. Vidin WS&S Co. Ltd.	4,341	100	2,543	139	21	0.48%	2,782	1,559	4,341	152,237
13. Yambol WS&S Co. Ltd.	10,850	228	8,038	21	12	0.11%	8,287	2,563	10,850	156,631
14. Dimitrograd WS&S Co. Ltd.	3,281	48	1,242	60	26	0.79%	1,350	1,931	3,281	65,175
15. Gabrovo WS&S Co. Ltd.	17,803	370	6,817	-3,411	n.a.	-	3,776	14,027	17,803	101,459
16. Ispereh WS&S Co. Ltd.	2,883	77	1,866	21	21	0.73%	1,964	919	2,883	47,727
17. Kardzhali WS&S Co. Ltd.	13,260	316	8,259	6	4	0.03%	8,581	4,679	13,260	200,438
18. Kyustendil WS&S Co. Ltd.	14,008	192	3,978	-563	4	0.03%	3,607	10,401	14,008	n.a.
19. Lovech WS&S Co. Ltd.	10,354	237	6,537	207	93	0.90%	6,981	3,373	10,354	137,852
20. Montana WS&S Co. Ltd.	13,693	467	10,262	133	128	0.93%	10,862	2,831	13,693	148,096
21. Pernik WS&S Co. Ltd.	18,706	410	13,028	408	329	1.76%	13,846	4,860	18,706	152,403
22. Rousse WS&S Co. Ltd.	19,988	402	9,637	4,007	192	0.96%	14,046	5,942	19,988	275,538
23. Shoumen WS&S Co. Ltd.	25,701	487	11,116	83	83	0.32%	11,686	14,015	25,701	214,880
24. Silistra WS&S Co. Ltd.	8,594	192	5,024	173	85	0.99%	5,389	3,205	8,594	142,786
25. Sliven WS&S Co. Ltd.	25,258	2,744	15,616	368	106	0.42%	18,728	6,530	25,258	234,000
26. Targovishte WS&S Co. Ltd.	9,777	194	6,030	-216	-216	-2.21%	6,008	3,769	9,777	99,205
27. Varna WS&S Co. Ltd.	49,173	1,363	37,799	330	196	0.40%	39,492	9,681	49,173	461,126
28. Vratsa WS&S Co.	9,217	197	6,032	269	142	1.54%	6,498	2,719	9,217	242,975
29. Yovkovtsi WS&S Co. Ltd.	24,181	621	18,741	976	-197	-0.81%	20,338	3,843	24,181	266,229
30. Asparuhov Val WS&S Co. Ltd.	289	15	172	13	5	1.73%	200	89	289	17,501
31. Batak WS&S Co. Ltd.	715	13	460	3	1	0.14%	476	239	715	7,000
32. Belovo WS&S Co. Ltd.*	272	7	206	-10	-11	-4.04%	203	69	272	n.a.
33. Berkovitsa WS&S Co. Ltd.	629	388	138	28	15	2.38%	554	75	629	21,466
34. Botevgrad WS&S Co. Ltd.	3,046	102	2,503	76	-11	-0.36%	2,681	365	3,046	41,203
35. Breznik WS&S Co. Ltd.	672	826	-35	-198	3	0.45%	593	9	602	n.a.
36. Byala WS&S Co. Ltd.*	5,152	312	4,470	72	38	0.74%	4,854	298	5,152	n.a.
37. Dupnitsa WS&S Co. Ltd.	2,219	103	1,977	-592	-170	-7.66%	1,488	731	2,219	52,000
38. Kresna WS&S Co. Ltd.	276	5	237	14	1	0.36%	256	20	276	n.a.
39. Meden Kladenets WS&S Co. Ltd.*	2,226	51	1,349	29	0	0.00%	1,429	797	2,226	n.a.
40. Peshtera WS&S Co. Ltd.	661	19	471	127	9	1.36%	617	44	661	25,000
41. Petrich WS&S Co. Ltd.	761	40	758	-201	-1	-0.13%	597	164	761	65,000
42. Sofia WS&S PJS Co.	14,583	12,228	12	962	174	1.19%	13,202	1,381	14,583	1,149,075
43. Steneto WS&S Co. Ltd.	3,044	40	2,047	639	229	7.52%	2,726	318	3,044	n.a.
44. Stretcha WS&S Co. Ltd.	175	5	138	6	6	3.43%	149	26	175	n.a.
45. Strimon WS&S Co. Ltd.*	138	5	159	-74	-30	-21.74%	90	48	138	n.a.
46. Svishtov WS&S Co. Ltd.	4,791	452	4,014	23	23	0.48%	4,489	302	4,791	50,000
47. Uvecks WS&S Co. Ltd.	2,034	42	1,055	600	91	4.47%	1,697	337	2,034	47,343
48. WSS&Territorial Water Eng. Co. Ltd.*	1,537	75	1,280	-27	-71	-4.62%	1,328	209	1,537	46,055
49. WSS&Thermal Water Co. Ltd.*	89	16	49	-3	-4	-4.49%	62	27	89	17,000

(Note) \* Figures as of 2004 because data being unavailable.

Source: Ministry of Finance and Ministry of Public Works and Regional Development.

**Table 9.2.11 Approved Price of Irrigation Water in 2005**

(Lev/m<sup>3</sup>)

Enterprises of Irrigation Water Supply	Unit Price of Irrigation Water				Main Service Plot
	Gravity Water Supply		Pumped Water Supply		
	For Agricultural Crops Except Paddy	For Paddy	For Agricultural Crops Except Paddy	For Paddy	
<b>Major Suppliers of Irrigation Water</b>					
Irrigation Systems PLC.	0.0850	0.0165	0.1700	0.0170	Whole the nation where the company has the irrigation branch (537,000 ha, around 98 % of total irrigated area)
Hydro Melioration-Sevlievo PLC.	0.0800		0.2000		Sevlievo Town (Around 6,000 ha are covered).
Zeminvest PLC.	0.0600		0.1600		Sofia
<b>Member Companies of Irrigation Water Suppliers Association</b>					
AI Krustio Rakovski			0.2390		Rakovski Village
AI Ludja-Kavarna 2			0.2750		Seltse Village
AI Irechek			0.2800		Irechek Village
AI Nivishta			0.2500		Dushevo Village
AI Voden Sviat			0.2400		Paisii Village
AI Dunav			0.1430		Svistov Town
AI Belgun			0.2700		Belgun Village
AI Elena			0.1780		Vranino Village
AI Lezno			0.2750		Lezno Village
AI Kamchia			0.2100		Planinitsa Village
AI Vurtopa	0.1100				Pisarevo Village
AI Mladovo-NovaZagora	0.0930				Nova Zagora Town
AI Monina Tsurkva	0.1150				Monina Tsurkva Village
AI Korten-Iztok	0.0660				Nova Zagora Town
AI Chaika-99			0.1280		Krapets Village
AI Borets	0.0420				Borets Village
AI Urojai	0.0400				Streitsi Village
AI Stara Reka	0.0250				Biaga Village
AI Rosa	0.0700				G. Beshovitsa Village
AI Boika	0.0800				Lom Cherkovna Village
AI Ruets	0.0620				Ruets Village
AI Shabla-Tiulenovo			0.1390		Shabla Town
AI Batovska Dolina	0.0420				Obrochishte Village
AI Vakilno			0.1430		Krapets Village
AI Bratushkovo	0.1070				Bratushkovo Village
AI Sandanska Bistrisa	0.0700				Sandanski Town
AI Vlahin	0.0800				Krupnik Village
AI Starosel	0.0400				Starosel Village
AI Choba	0.0400				Choba Village
AI Rosa-M	0.0500				Markovo Village
AI Oriagovska Voda	0.0750				Oriahovitsa Village
AI Maritsa	0.0400				Radiovo Village
AI Voden Sviat	0.0900				Voden Village
AI Gerena	0.0500				Dolno Voivodino Village
AI Bliagornitsa-ORI	0.0280				Orizari Village
AI Suedinenie	0.0650				Bulgarevo Town
AI Zlatna Praskova	0.0770				Dragantsi Village
AI Rujitsa-Razboina	0.0650				Rujitsa Village, Razboina Village
AI Voden Rai	0.0400				Pudarsko Village
AI Uspeh-2004	0.0500				Tsar Asen Village
AI Lipa	0.0600				Pravoslaven Village
AI Iskra	0.0400				Iskra Village
AI Porechie Tundja 02	0.0500		0.1200		Pavel Bania Town
AI Sokol	0.0500				Iazdach Village
AI Erja	0.0700				Plodovitovo Village
AI Ormana	0.0950				Panaretovtsi Village
AI Surtsevo	0.0800				Surtsevo Village
AI Gerlovo	0.0700				Turgovishte Town
AI Gorski Senovets	0.0300				Gorski Senovets Village
AI Negovanka 98	0.0691				Mihaltsi Village
AI Nasha Tsel 2003	0.2200				Dolna Lipnitsa Village

Source: Ministry of Agriculture and Forestry.

Table 9.2.12 Current Water Price by WS&S Co. (1/3)

As of 2005 (Leva/m3)

Name of Enterprise on WS&S	Water Tariff			Treatment Surcharge	Drainage Water		Distribution Water Price to the other WS&S Co.	Remarks/Service Area of Domestic HH
	Industrial Sector	HH	Public User (Governmental Entities, etc.)	Public User/HH	Industrial Sector	Public User/HH		
Blagoevgrad WS&S Co. Ltd.	0.562	0.562	0.625			0.060		Blagoevgrad district - Blagoevgrad municipality and Simitli. Quality of drainage water: Pollution degree - 1.
	0.687	0.687	0.937			0.060		Blagoevgrad district - Dolno Tserovo village, Gorno Tserovo village, Poleto village - Pumped abstraction. Quality of drainage water: Pollution degree - 1.
	0.525	0.525	0.687			0.060 0.072		G. Delchev district - Gravity abstraction. Quality of drainage water: 0.060 Leva/m3 - Normal water. Quality of drainage water: 0.072 Leva/m3 - Pollution degree - 1.
	0.687	0.687	0.937			0.060 0.720		G. Delchev district - Pumped abstraction. Quality of drainage water: 0.060 Leva/m3 - Normal water. Quality of drainage water: 0.720 Leva/m3 - Pollution degree - 1.
	0.562	0.562	0.625			0.060		Razlog district - Razlog municipality, Bansko and Yakoruda. Quality of drainage water: Pollution degree - 1.
Bourgas WS&S Co. Ltd.	0.720	0.720	0.780	0.300		0.100		Long distance piped water.
	0.330	0.330	0.780			0.140		Domestic water. Quality of drainage water: Pollution degree - 1.
					0.370			Pollution degree - 1.
					0.430			Pollution degree - 2.
					0.580			Pollution degree - 3.
	0.210	0.210						Varna WS&S Co. from Priseltsi PS.
	0.200	0.200						Varna WS&S Co. from Kamchiya reservoir.
0.350	0.350						Sliven WS&S Co. from Kamchiya reservoir.	
Dobrich WS&S Co. Ltd.	0.780	0.780						Conditionally clean water.
	1.220	1.220	1.300	0.070		0.070		Long distance piped water.
	0.650	0.650						Domestic water (mixed abstraction of gravity + pump).
	0.500	0.500						Domestic water with gravity abstraction only.
					0.150 0.250 0.300			Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Haskovo WS&S Co. Ltd.	1.050	1.050				0.040		Individual Contracts - Pumped abstraction.
	0.220	0.220						Individual Contracts - Gravity abstraction.
	1.250	1.250	1.600			0.050		Long distance piped water.
	0.250	0.250						Domestic water: gravity abstraction.
Pazardzhik WS&S Co. Ltd.	0.910	0.910				0.050		Water comes from Dimitrograd WS&S Co.
	1.440	1.440						Water comes from Kardzhali WS&S Co.
	0.550	0.550				0.100		Low Pressure: Pumped abstraction.
	0.300	0.300				0.100		Low Pressure: Gravity abstraction.
	0.600	0.600				0.100		Septemvri Municipality - Low Pressure piped abstraction.
Pleven WS&S Co. Ltd.	0.800	0.800				0.100		By Dinkata Pamidovo Shtarkelovo WS&S Co. - Low Pressure piped abstraction.
	1.000	1.000				0.100		Septemvri Lesichevo - High Pressure.
	0.900	0.900				0.100		Septemvri Lesichevo - highly-pressurised (Akandzhievo village, Belovo municipality) - Pumped abstraction.
	0.930	0.930	0.070			0.070		Gravity abstraction.
Plovdiv WS&S Co. Ltd.	0.400	0.400				0.070		Mixed abstraction (gravity + pump).
					0.470 0.570 0.680			Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
	0.480	0.480	0.600			0.050		Gravity abstraction.
					0.400 0.600 0.800			Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
	0.830	0.830	0.080			0.075		Gravity abstraction.
Razgrad WS&S Co. Ltd.	1.500	1.500	0.080			1.075		Pumped abstraction.
					0.160 0.280 0.440			Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
	0.930	0.930						Conditionally clean water.
						0.500 0.630		Water distributed to Rousse WS&S Co. Water distributed to Ispereh WS&S Co.
	0.950	0.950	0.450			0.050		Pumped abstraction.
Sofia District WS&S Co. Ltd.	0.650	0.650						Gravity abstraction.
	0.900	0.900	1.150	0.200		0.150		Pumped abstraction. Quality of drainage water: Pollution degree - 1.
					0.300			Pollution degree - 1.
	0.450	0.450	0.650	0.200		0.150		Gravity abstraction. Quality of drainage water: Pollution degree - 1.
					0.300			Pollution degree - 1.
	0.700	0.700	0.950	0.200		0.150		Mixed type of water abstraction (gravity + pump). Quality of drainage water: Pollution degree - 1. Treatment: Pollution degree - 1.
				0.200 0.340		1.280	Individual Contract - Water abstracted by gravity. Individual Contract - Water abstracted by gumping.	

Table 9.2.12 Current Water Price by WS&S Co.(2/3)

As of 2005 (Leva/m3)

Name of Enterprise on WS&S	Water Tariff			Treatment Surcharge		Drainage Water		Distribution Water Price to the other WS&S Co.	Remarks/Service Area of Domestic HH
	Industrial Sector	HH	Public User (Governmental Entities, etc.)	Public User/ HH	Industrial Sector	Public User/ HH	Industrial Sector		
Stara Zagora WS&S Co. Ltd.	1.150 0.750	1.150 0.750		0.150		0.050			Pumped abstraction. Gravity abstraction. Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Vidin WS&S Co. Ltd.	1.030 0.720	1.030 0.720	1.030 0.720			0.140 0.110	0.210 0.110		Pumped abstraction. Gravity abstraction.
Yambol WS&S Co. Ltd.	1.000	1.000	1.000				0.080		
Dimitrograd WS&S Co. Ltd.	0.930	0.930	0.600				0.110	0.120	
Gabrovo WS&S Co. Ltd.	1.050	1.050	1.300	0.200			0.130		Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Ispereh WS&S Co. Ltd.	1.466	1.466	1.466						
Kardzhali WS&S Co. Ltd.	0.830	0.830	0.900				0.060	0.060	
Kyustendil WS&S Co. Ltd.	0.850	0.850	1.250	0.200	0.700	0.100	0.800		Kyustendil Municipality. Bobov Dol Municipality. Treklyano Municipality. Nevestino and Treklyano Municipalities. Boboshevo Municipality Rila Municipality Kocherinovo Municipality
Lovech WS&S Co. Ltd.	0.800	0.800	0.900			0.080	0.080	0.490	Distribute to Dupnitsa WS&S Co. Lovech istrict. 0.080 Cherni Osam WSS (water supply system) of Pleven WS&S Co. 0.071 Cherni Osam WSS of Pleven WS&S Co. 0.160 Zlatna Panega WSS of Pleven WS&S Co. 0.040 Toplya WSS of Troyan WS&S Co. 0.070 Cherni Osam WSS of Troyan WS&S Co. 0.090 Aprilsi WSS of Troyan WS&S Co.
Montana WS&S Co. Ltd.	0.880 0.580 0.420 0.600	0.880 0.580 0.420 0.600	0.980 0.960 0.450	0.030 0.030 0.030	0.030 0.030 0.030	0.160 0.160 0.160	1.160 1.160 1.160		Pumped abstraction. Mixed abstraction (gravity + pump). Gravity abstraction. Conditionally clean water. 0.140 Distribute to Vidin WS&S Co. 0.050 From Srechenska Bara reservoir to Berkovitsa WS&S Co. 0.060 From Srechenska bara reservoir to Vratsa WS&S Co.
Pernik WS&S Co. Ltd.	0.720	0.720	0.820	0.200	0.350	0.150	0.150	0.070	Water purification treatment - Pollution degree - 1. Other WS&S C.
Rousse WS&S Co. Ltd.	0.800	0.800	0.900				0.080	0.100	
Shoumen WS&S Co. Ltd.	1.130 0.420	1.130 0.420	1.200 0.450	0.120		0.100			Pumped abstraction. Gravity abstraction.
Silistra WS&S Co. Ltd.	1.250	1.250	1.250				0.060	0.060	
Sliven WS&S Co. Ltd.	0.920 0.450	0.920 0.450		0.100 0.030		0.080			Mixed abstraction (gravity + pump). Gravity abstraction.
Targovishte WS&S Co. Ltd.	1.250 0.600	1.250 0.600	1.360 0.600				0.080 0.080		Pumped abstraction. Gravity abstraction. <b>Distribute to Sliven WS&amp;S Co. Ltd.</b> 0.100 Gravity abstraction water. 0.140 Pumped abstraction water.
Varna WS&S Co. Ltd.	0.800	0.800	0.900	0.300		0.200	0.200		Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Vratsa WS&S Co. Ltd.	0.980	0.980	0.980	0.120		0.100	0.100		Pumped abstraction. Pollution degree - 1. Pollution degree - 2. Conditionally clean water.
Yovkovtsi WS&S Co. Ltd.	0.900	0.900	1.020	0.460		0.080	0.080		Pollution degree - 1. Pollution degree - 2. Pollution degree - 3. Other WS&S C.
Asparuhov Val WS&S Co. Ltd.	0.840	0.840	0.840				0.800		
Batak WS&S Co. Ltd.	0.540 0.540 0.560	0.360 0.400 0.340					0.030 0.030 0.030		Batak Municipality. Nova Mahala, Fotinovo. Batak Reservoir.
Belovo WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Berkovitsa WS&S Co. Ltd.	0.400 0.650 0.680	0.400 0.650 0.680	0.935 0.935 0.935				0.100 0.100 0.100	0.140 0.140 0.140	Gaganitsa Villedge. Berkovitsa and Kostentsi Villages. Villeges of Balyovitsa, Bistrilitsa, Bokilovtsi, Borovtsi, Zamfirovo, Tsvetkova Bara, Yagodov, Slatina, Komarevo, Parlichevo, Mezdreya, Rashovitsa, Pesochnitsa, and Rakovitsa Quarter.

Table 9.2.12 Current Water Price by WS&S Co. (3/3)

As of 2005 (Leva/m3)

Name of Enterprise on WS&S	Water Tariff			Treatment Surcharge		Drainage Water		Distribution Water Price to the other WS&S Co.	Remarks/Service Area of Domestic HH
	Industrial Sector	HH	Public User (Governmental Entities, etc.)	Public User/ HH	Industrial Sector	Public User/ HH	Industrial Sector		
Botevgrad WS&S Co. Ltd.	0.350	0.350	0.420	0.210	0.210	0.130	0.210		
Breznik WS&S Co. Ltd.	0.150	0.150							Supplied water comes from Pernik WS&S Co.
Byala WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Dupnitsa WS&S Co. Ltd.	0.490	0.490	0.600	0.200		0.090	0.100		
					0.200 0.350 0.600				Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Kresna WS&S Co. Ltd.	0.270	0.270	0.480			0.040	0.060		
Meden Kladenets WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Peshtera WS&S Co. Ltd.	0.530	0.530	0.990			0.110	0.110		
									Budget consumers
Petrich WS&S Co. Ltd.	0.600	0.600	1.100			0.100			Gravity abstraction.
	0.800	0.800	1.100			0.100			Mixed abstraction (gravity + pump).
Sofia WS&S PJS Co.	0.461	0.509	0.522	0.130 0.140	(HH) (Public User)	0.121 0.136	0.140		
					0.200 0.260 0.300				Pollution degree - 1. Pollution degree - 2. Pollution degree - 3.
Steneto WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Strelcha WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Strimon WS&S Co. Ltd.	0.340	0.340	0.350						Gravity abstraction.
	0.600	0.600	0.720						Pumped abstraction.
Svishtov WS&S Co. Ltd.	0.940	0.940	0.940			0.060			
Uvecks WS&S Co. Ltd.	0.320	0.320	0.450			0.050	0.050		
					0.042 0.045				Pollution degree - 1. Pollution degree - 2.
Water Supply, Sewerage and Territorial Water Engineering Co. Ltd	0.310	0.310	0.420			0.100	0.100		Velingrad Municipality.
	0.310	0.310	0.420			0.070	0.070		Draginovo Village.
	0.220	0.220	0.420			0.050			Other Velingrad District.
Water Supply, Sewerage and Thermal Water Co. Ltd	0.260	0.260	0.410			0.020	0.030		
Bratsigovo WS&S Co. Ltd.	0.430	0.430	0.780			0.070			Bratsigovo Municipality and Villeges of Byala, Isparihovo, Kozarsko.
	0.350	0.350	0.780						Villeges of Rozovo, Rovnogor, Zhrebichko.
Kovatchevtsi WS&S Co. Ltd.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Kubrat WS&S Co. Ltd.	1.490	1.490	1.490	0.083		0.083			
Panagyurishte WS&S Co. Ltd.								1.150	Distribute to Strelcha WS&S Co.
Sevlievo WS&S Co. Ltd.	0.500	0.500	0.700			0.100	0.150		Gravity abstraction.
	0.900	0.900	1.400						Mixed abstraction (gravity + pump).
								0.070	Distribute to Lovech WS&S Co.
								0.250	Distribute to Gabrovo WS&S Co.
Barziya WS&S Co. Ltd.	0.400	0.400	0.600						
Zlatni Pyasatsi WS&S Co. Ltd.	1.280	1.280				0.210	0.350		Distribute to Varna WS&S Co.

Source: Ministry of Public Works and Regional Development.

**Table 9.2.13 Water Use Taxation System in Bulgaria**

November 13, 2001.

(Note) This taxes is levied for Water Use Companies Including Water Supply and Sewerage Companies. The taxes should pay by the compnies to the Ministry of Environment and Water.

For Commercial Use

1. Electric Companies

Tax Calculation Formula:  $T = E \times W \times K$

Where, T : The amount of tax

E : Basic price, 0.001 Levs/m<sup>3</sup>

K : Coefficient, Head (m)/450

2. Ordinary Commercial Use

Pirpose of Water Use	Basic Price (E) (Levs/m <sup>3</sup> )	Coefficient (K) by Category		
		Category 1	Category 2	Category 3
(1) Drinking Water	0.02	1	0.5	0.3
(2) Irrigation, Livestocks, Fish Breeding				
(2) - 1 In Case of Surface Water	0.0005	5	1.5	1
(2) - 2 In Case of Groundwater	0.005	5	1.5	1
(3) Cooling Use for Industries	0.0001	4	2	1
(4) Recreation Use (Swimming)	0.04	1	0.5	0.3
(5) Industrial Use	0.008	5	1.5	1
(6) Other Use	0.01	5	3	2

3. Mineral Water (Natural Water) to Be Taken

Pirpose of Water Use	Basic Price (E) (Levs/m <sup>3</sup> )	Coefficient (K) by Category		
		Category 1	Category 2	Category 3
(1) Medical Use (for Rehabilitation, Health Care, and Some Medical Treatment)	0.5	1	0.5	0.3
(1)-a Drinking Use (for the area where the piped water supply system is not facilitated yet)	0.03	1	1	1
(2) Recreation Use (Swimming, Public Bathing, etc.)	0.5	2	1	0.5
(3) Other Use	0.5	3	2	1

4. Other Public Use and Wastewater Discharge

Pirpose of Water Use	Basic Price (E)	Coefficient (K) by Category		
		Category 1	Category 2	Category 3
(1) Recreation Use (Surfing, etc.)	0.1 Levs/m <sup>2</sup>	1	0.5	0.5
(2) Fish Breeding in River	0.01 Levs/m <sup>2</sup>	1	0.3	0.1
(3) Fish Breeding in Sea	0.005 Levs/m <sup>2</sup>	1 (no any category)		
(4) Barrow Pits Along Rivers	0.2 Levs/m <sup>3</sup>	1	0.8	0.5
(5) Wastewater Discharge				
(5) - 1 Category - 1	0.001 Levs/m <sup>3</sup>	1	0.5	0.2
(5) - 2 Category - 2	0.002 Levs/m <sup>3</sup>	1	1	0.5
(5) - 3 Category - 3	0.003 Levs/m <sup>3</sup>	1	1	1
(5) - 4 Not included in Category 3	0.01 Levs/m <sup>3</sup>	1	1	1
(5) - 5 Discharge into the Sea	0.003 Levs/m <sup>3</sup>	1 (no any category)		

Source: "State Gazette", as dated above, Council of Ministers.

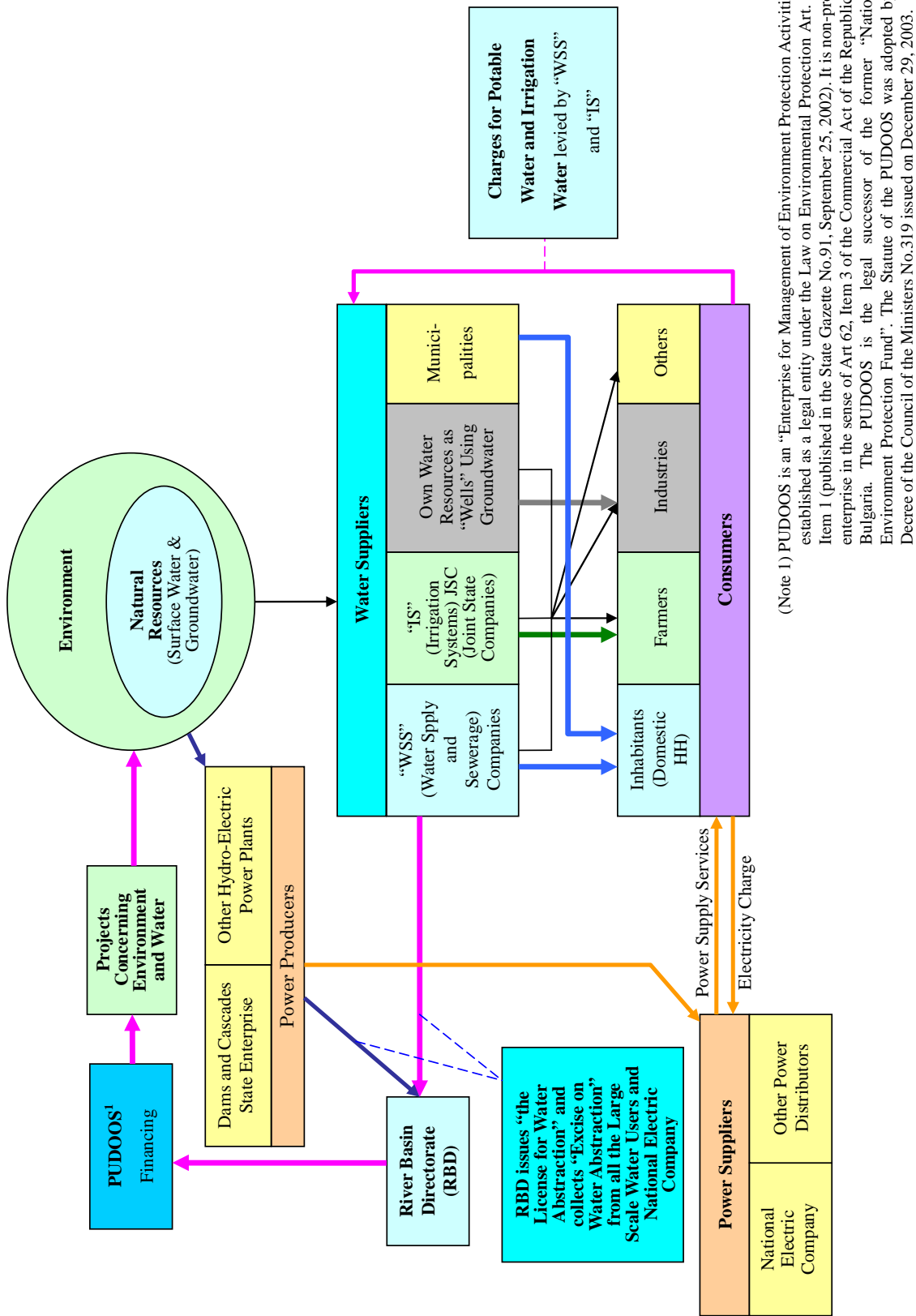




## **Main Report**

### **Chapter 9**

#### **Figures**



(Note 1) PUDOOS is an "Enterprise for Management of Environment Protection Activities" established as a legal entity under the Law on Environmental Protection Art. 60, Item 1 (published in the State Gazette No.91, September 25, 2002). It is non-profit enterprise in the sense of Art 62, Item 3 of the Commercial Act of the Republic of Bulgaria. The PUDOOS is the legal successor of the former "National Environment Protection Fund". The Statute of the PUDOOS was adopted by a Decree of the Council of the Ministers No.319 issued on December 29, 2003.

Figure 9.2.1 Cycle of Tariff Collection Systems on Water Works

## **CHAPTER 10 PROJECT EVALUATION**

### **10.1 Introduction**

The proposed programme of measures are evaluated from technical, economic and environmental aspects. The technical efficiency is evaluated by improvement of water status, reduction of the pollution loads, the economic efficiency is evaluated by EIRR for which the value higher about 10-12% considered to be feasible. Improvement of water quality in river basins evaluates the social and environment benefit.

The programme of measures will improve the water status in the country and enhance the living conditions and feasible as a whole technical, economic, social and environmental as follows:

### **10.2 Technical Aspect**

The proposed structural measures for water quality and quantity improvement include new construction and rehabilitation of wastewater treatment plants, rehabilitation of sewerage networks, rehabilitation of irrigation networks, rehabilitation of domestic water supply facilities. It has thus been judged there are no specific technical difficulties and all the work could be covered by the technology available in Bulgaria.

The proposed non-structural measures include revision of laws and regulations, improvement of organizations and institutions, strengthening of enforcement of regulations, strengthening of organizational collaboration. There would be no difficulties in technical aspects. With regard to the changing of farming practices and renovation of technology for the reduction of agricultural chemicals and fertilizers, support from the EU member countries would be available if there is no enough technical know-how in Bulgaria.

GIS Database and Integrated River Basin Analysis Model developed as the decision support tools for the formulation and implementation of the river basin management plan are based on the state of the art technology. Simulation of water quantity and quality could thus be conducted with a high technical level, and river basin management with the sound technical background could be realized with these tools. The river basin management in Bulgaria is now supported by the high level technology and it is evaluated good results of the Study.

### **10.3 Economic Aspects**

As discussed above, the proposed structural measures for water quality improvement and water quantity improvement have sufficient economic feasibility. This means that the deterioration of water quality and loss of water quantity were giving a huge adverse impact to the national economy of Bulgaria.

For the implementation of each project for water quantity and water quality improvement, feasibility studies should be conducted to confirm the economic feasibility of each project.

## 10.4 Financial Analysis

An expenditure group of activities as “Housing, Public Utilities and Amenities, and Protection of Environment” includes the work for water management. The amount and the share to the total expenditure are 586 million Levs and 3.9% in 2004, and 726 million Levs and 4.4% in 2005. The state budget had surplus at around 655 million Levs in 2004 and 1,334 million Levs in 2005, it is thus deemed possible to increase the state budget for river basin management as “Housing, Public Utilities and Amenities, and Protection of Environment”.

The State Energy decides the tariff systems for domestic water and Water Regulatory Commission based on applications of the services provider including WSSs. The tariff systems are decided not based on the financial status of the service providers, especially no to be based on cost for works, but based on welfare standard for the people. International financing institutions as the World Bank suggest that projects with collecting some charges should be based on recovery of cost for business, thus review of the tariff systems will be deemed necessary. Of course, affordability of people to pay (ATP) should be taken into consideration in this case.

Current financial status of Irrigation Systems, the share of the current operating profit are extremely low at around 0.04% (year 2005) to the total liability (=assets). As the commercial enterprises, it is expected that the share of current operating profit to the total liability (=assets) should be kept at least at around 2% through 5%.

If the irrigation systems are improved and if the irrigation areas will be expanded, and if the potable water supply systems are improved as recommended in this Study, the said current operating profit will be drastically increased and financial status will be improved.

## 10.5 Environmental and Social Consideration Aspects

The draft RBMPs have their objectives for “good status of water environment”, and themselves will contribute many favorable environmental and social impacts such as water quality improvement for surface water and groundwater, sanitary improvement and conservation of flora/fauna and ecosystem due to water quality improvement, social infrastructure services improvement (reduction of high water loss, etc.), local socio economic development due to promotion of effective water uses, and conservation of living environment related to appropriate river management plan and others.

On the other hand, there are possibilities that the construction of the proposing facilities based on the draft RBMPs may cause some slight adverse impacts (temporary water pollution, or dust or noise related to the construction of the WWTP, and others) on the existing natural and social environments. There are also possibilities that any adverse gaps for the poor, ethnic peoples in the remote areas in terms of socio-economic benefits by implementation of effective water supply plan or flood control plan may expanded, if the implementation measures are not appropriately.

Therefore, the mitigation measures for the possible adverse impacts and the recommended monitoring and control plan shall be considered as one of the activities of the finalized RBMPs themselves. The concrete construction locations or scales of the proposing physical facilities are not identified yet in the draft RBMPs stage. Therefore,

Bulgaria's sides could be evaluated more detail possible adverse environmental and social impacts and their affected areas by the proposing facilities after finishing this JICA Study.

It is proposed that Bulgaria's side could conduct environmental and social considerations, which will become an Environmental Assessment and based on EU and Bulgaria's relevant regulations, for the finalized RBMPs by referring the IEE for the draft RBMPs. IEE includes the preparation of the draft Environmental Assessment Report, which is based on the EU and Bulgaria's regulations.



## **CHAPTER 11            IMPLEMENTATION PLAN**

### **11.1 Introduction**

There is a big gap between the actual water status and the water status defined by the EU-WFD. In general the water quality of the rivers is moderate to poor or bad.

In order to improve the physico-chemical and hydro-biological conditions various measures should be required. The required measures are composed of construction of numerous new WWTPs and renovation/expansion of existing WWTPs and renovation sewer networks to protect groundwater from pollution by sewage, control of the discharge of wastewater without treatment or with insufficient treatment as well as the inflow of nutrient into the rivers. Also it is necessary to the pressures from non-point pollution loads from agriculture, especially for reducing nitrogen and phosphorous loads.

At same time it is necessary to reduce the pressures from non-pollution water supply systems and irrigation systems should be renovated to reduce the big loss of water supply systems both for domestic water supply and irrigation water supply because both of the domestic water supply systems and the irrigation water supply systems are deteriorated and need renovation in order to attain sustainable and efficient water use.

In order to attain the good status of water defined by the EU-WFD, a huge numbers of structural measures for water quality improvement and water quantity improvement, and phased implementation will be required and various responsible agencies shall be required for the implementation of the RBMP.

It may be difficult for Bulgaria to attain the target of WFD by 2015, but need to continue two further 6 years to attain the good status of water by 2021 or 2027.

### **11.2 Conditions for Implementation**

The proposed programme of measures among the RBMP to be implemented for EABD and WABD are as follows:

#### 1) Water Quality Management and Improvement

##### Structural measures:

- Construction of new WWTPs (total 23 towns: EABD 17 towns and WABD 6 towns)
- Renovation of existing WWTPs (total 7 towns: EAND 4 towns and WABD 3 towns)
- Renovation/expansion of sewer system: (total 31: EABD 22 and WABD 9 towns)

##### Non-structural measures:

- Cooperation with municipality for water quality management.
- Strengthening of regulation for wastewater from industries and big animal breeding farms.

- Improvement of water quality monitoring for surface water.

## 2) Water Quantity Management and Improvement

### Structural measures:

- Improvement of water supply networks.
- Improvement of irrigation facilities.

### Non-structural measures:

- Review and improvement of water use permission and installation of measurement equipment for optimum water use.
- Monitoring/measurement of water intake volume.
- Improvement of quality of data required for water management.

## 3) River Management

- Strengthening of regulation to control of activities along rivers, including sand and gravel extraction.
- Formulation of flood control and river maintenance plan, and their implementation.
- Formulation of river facility protection plan.
- Coordination with the related agencies based on the management plan.

### **11.3 Organization for Implementation**

Organization for the implementation of the above programme of measures shall be as follows:

- 1) MoEW and RBDs (or proposed new Organization called “State Agency for River Basin Management”) will have responsibility for overall coordination among the related agencies for implementation based on the proposed RBMP.
- 2) Under the current law, MoRDPW and municipalities will have responsibility for construction and renovation of WWTPs and sewer networks.
- 3) Same as 2), MoRDPW and municipalities will have responsibility for improvement of water supply networks under the current law.
- 4) MoAF and Irrigation Companies will have responsibility for improving the irrigation systems. In case of improving the irrigation systems, municipalities and MoRDPW are necessary to cooperate, so that the improvement of irrigation systems will be effective for enhancing the regional economy and improving living standard of the region.
- 5) MoAF is also responsible to maintain flood dikes, most of which are belonged to MoAF,



- 6) MoEW and RBDs (or new organization mentioned above) will have responsibility for formulating the flood control and river maintenance plan. Based on the plan, MoEW and RBDs will have responsibility for regulating the sand and gravel extraction as well as coordination for implementing the mitigation measures for flood control and maintenance of the rivers, and also responsibility for establishment of a good collaboration system with the relating agencies for collection of basic data for river basin management, including NIMH.

#### **11.4 Implementation Plan**

##### **(1) Year 2009 to 2010**

- 1) Based on the selection of the Priority Projects among the proposed structural measures of the programme of measures for management and improvement of water quality and water quantity, conduct preparation works for implementing the Priority Projects including feasibility study, land acquisition, and selection of consultants for detailed design and construction supervision.
- 2) Conduct financial arrangement for construction of the Priority Projects to be conducted from 2011 to 2014.
- 3) Arrange the implementing the non-structural measures for management and improvement of water quality, water quantity and river morphology.
- 4) Conduct necessary studies such as “Study on Flood Control and River Maintenance Plan”.

##### **(2) Year 2011 to 2014**

- 1) Start construction of the projects with the highest priorities groups among the Priority Projects.
- 2) Conduct preparation works for the construction of the rest of the Priority Projects after 2015.
- 3) Start implementation of the non-structural measures for management and improvement of water quality, water quantity and river morphology.
- 4) Conduct preparation including financial arrangement for implementing the programme of measures for flood control and river maintenance, and start implementing them.
- 5) Assess the proposed program of measures and prepare the next RBMP.

##### **(3) Year 2015 to 2021 and 2027**

- 1) Implement the rest of the Priority Projects.
- 2) Continue implementation of the non-structural measures.
- 3) Continue implementation of the flood control and river maintenance.



## **CHAPTER 12 IMPROVEMENT OF INSTITUTION AND ORGANIZATION**

### **12.1 Introduction**

There are significant gaps between the expected image and results of the river basin management and the actual implementation by the existing river basin management systems. These gaps might have caused by several reasons including organizational and institutional reasons as well as insufficient understanding and cooperation from the water users and related agencies, and insufficient budget for the management activities. As the river basin management in Bulgaria has just started from 2002, the current system is still in initial stages and expected to be developed into a better management system in future. Following sub-sections will describe the gaps as well as proposals for the directions of reform measures from the organizational and institutional aspects.

### **12.2 Gaps in the Existing River Basin Management Systems**

The four River Basin Directorates (RBDs) for the district level, and MoEW for the country level have conducted the river basin management in Bulgaria. In spite of the importance of the river basin management especially water management, which is one of the most important resources for the country, there are following gaps between the expected image and results of the river basin management and the actual implementation.

#### **(1) Insufficient Staff and Management Capacities against the Wide Physical Coverage Area and Extensive Responsibilities for the River Basin Management**

The coverage area of the river basin management is very wide, which covers the whole country (about 110,000 km<sup>2</sup>) by the four RBDs. However, the RBDs' main offices are located at Pleven, Varna, Plovdiv and Blagoevgrad only, and the number of the management offices even including their branch offices is very small.

Furthermore, the responsibilities of the river basin management is very wide, which include permission for water abstraction, discharge of wastewater, sand and gravel extraction and construction activities in the river courses, conservation of protected areas as well as controlling and monitoring these activities etc. Flood prevention has also become very important issue in the river basin management.

However the total number of the staff of the four RBDs is only about 250. Including MoEW, the number of staff for river basin management in the country is only about 300 in total.

Comparing to the forestry management, which has about 120 years history and coverage of 1/3 of the country with management staff of about 1,000 in total both for central level and local level, the existing number of the staff of the river basin management is too small and insufficient. It is necessary to increase the staff for river basin management.

## **(2) Insufficient Understanding and Cooperation from the Water Users and Related Agencies**

In order to attain the good status of water, not only well-organized river basin management activities, but also understanding and cooperation from the water users, who abstract water, discharge wastewater, take sand and gravel from the rivers and others, are indispensable.

However, there is lack of information in RBDs about wastewater discharge into the sewerage systems, which are managed by WSSs. This makes difficult to grasp the real pictures of pollution loads from the river basins, and analysis of the mechanism of pollution in the rivers as well as conduct appropriate actions for reducing pollution loads.

There is lack of measured data of water abstraction from the rivers and wells. Self-monitoring of the water abstraction is also not conducted properly. This makes difficulty to grasp the actual conditions of water abstraction in the river basin.

Sand and gravel extraction from the river is one of the big problems. However, it is not clear how much of the quantity of sand and gravel is extracted actually, and how the sand and gravel extraction activities have been conducted. It makes difficulty for managing the river channel from river morphological point of views.

River basin management can be conducted based on the understanding and cooperation from water users as well as people. It is necessary to enhance the understanding and cooperation to river basin management from water users and people. Implementation of the River Basin Management Plan will require the actions from other related agencies such as MoRDPW, MoAF, MoEE, municipalities and WSSs, IS, and National Electricity Company (NEK). Therefore, understanding and cooperation from these agencies to river basin management is also very necessary.

## **(3) Dispersed Responsibility of Management for Water and Floods**

Although water abstraction, wastewater discharge and construction of hydraulic facilities and other water related activities are conducted in the river basins, responsibilities of river basin management are dispersed into RBDs and MoEW under the current Water Act. The Minister of MoEW has responsibilities for the permission of water use by major dams, inter-basin water transfer and abstraction of mineral water, but these activities are conducted in the river basin basis, they also can be controlled and managed by RBDs under communication with MoEW.

Control monitoring of wastewater discharge from industries and animal breeding farms etc. are conducted by the RIEW. In case of breaching the regulation, RIEW has right to control the industries etc., including imposing penalty. However, this activity is really important activity in the river basin management.

In case of flood prevention, it should be consisted of flood mitigation (preparedness) from short-term, mid-term and long-term point of views, flood warning and evacuation, emergency response and recovery actions. The newly created Ministry of State Policy for Disasters and Accidents (MoSPDA) has functions mainly for flood warning, emergency response and recovery. However, there is no clear responsible body, which manages the

flood control and prevention activities including mitigation from total point of view. Therefore, the current flood prevention activities seem to be conducted only by ad-hoc basis up to now.

The above three examples of the dispersed responsibilities of water management makes the water management activities to be complicated. It is better to simplify the responsibilities and to be integrated based on the river basins.

### **12.3 Proposals on the Directions for Improvement of the Organizations and Institutions**

It should be kept in mind that the strengthening of the capacities for river basin management in Bulgaria is prerequisite for fulfillment of the requirements of the EU-WFD as well as for implementation of the proposed programs of measures of the RBMPs in Bulgaria.

For strengthening the capacities for river basin management, it is indispensable to consider the reinforcement of the water management organizations as well as revision of the Water Act and relevant regulations. The proposals of the JICA Study Team on the directions for the improvement of the organization and institution for river basin management in Bulgaria are as follows. .

#### **12.3.1 Directions for Improvement of the Organization**

##### **(1) Increasing the Staff for the River Basin Management**

In order to meet the wide coverage area and extensive responsibilities for river basin management by RBDs, numbers of their staff is necessary to be increased. It is recommendable to conduct the study on the appropriate number of staff for river basin management referring to the other similar management bodies such as the State Agency for Forests (SAF) in Bulgaria as well as the river basin management bodies in the other European countries.

SAF in Bulgaria has the Central Office and 16 Regional Offices, which have the forest management staff of 1065 in total and manage about 1/3 of the territory of Bulgaria.

Another example is the District Governors' Offices in Bulgaria, which have 28 offices with about 1187 staff in the whole country, and have responsibility for cleaning riverbed against floods as well as maintenance of river channel in certain stretches in the country.

Based on these two examples, an order of 1000 staff for the whole country for river basin management may be one of the reference numbers to be considered. Training of the skills of the staff of the River Basin Management Bodies (RBDs and MoEW) is always required especially in the case of increasing the numbers of their staff.

**(2) Placing the River Basin Management Bodies to the Position to Coordinate the Related Agencies for Better Implementation to attain the Good Status of Water**

At present, many agencies are involved in river basin management tasks based on the Water Act. For example, the MoRDPW and municipalities for domestic/industrial water supply, urban wastewater and wastewater treatment, the MoEE for hydropower, the MoAF for irrigation facilities and flood protection dikes. Also, the MoSPDA, municipalities and District Governors has responsibilities against early warning, emergency responses, rescue operations and recoveries against natural disasters including floods and accidental pollutions etc. Therefore, in order to conduct river basin management properly and effectively, the River Basin Management Bodies shall be in the position, which can coordinate with the different players for implementing the programme of measures for improving the condition of the river basins. For this purposes, two alternative ways are to be considered and studied. At this moment the Alternative 1 is recommended, considering the present situation.

**(a) Alternative 1: Strengthening the Functions of the River Basin Management in the Existing Organizational Structures**

Within the existing organizational structures for the river basin management of MoEW System, strengthening of the functions for river basin management bodies will be considered to have better ability for coordinating the different relating agencies for implementing the proposed programme of measures on schedule. In order to this strengthening, not only the strengthening of the staff for river basin management, but also establish better agreement for the cooperation from the different related agencies is necessary to be established and to be implemented. However, as we can see some administrative limits under the current system, it may require strong order from the government for cooperation to the river basin management activities.

**(b) Alternative 2: Establishment of a new “State Agency for River Basin Management”**

Due to the importance of water to the people in Bulgaria, it is worthwhile to consider another alternative way for strengthening the organization for the river basin management. That is establishment of a new “State Agency for River Basin Management” under the Prime Minister or the Council of Ministers.

This new State Agency shall be in the neutral and clear position among the different relating agencies for water, and shall be the top authority for managing the water related activities and prepare basic national strategy and plan for river basin management. Also it shall conduct strong coordination for implementing the necessary programme of measures for Bulgaria to catch up the required schedule from EU to attain the good status of water. Furthermore, the recognition of the river basin management activities among the people in Bulgaria will also be enhanced by the establishment of the new State Agency, which corresponds to the importance of water for the country.

The new “State Agency for River Basin Management “ will be composed of a Central Office and the River Basin Management Directorates. The Central Office will have a function of inter-ministerial coordination, policy making and communicating functions with EU as well as supporting functions for the River Basin Directorates. The strengthened Water Directorate of MoEW as well as the River Basin Directorates shall be the base for the new State Agency.

### **12.3.2 Directions for Improvement of the Institution**

#### **(1) Strengthening the Obligation of the Water Users for Conservation and Improvement of Water and Water related Environment**

In order to improve the conditions of water such as water quality and water quantity, cooperation from water users such as Water Supply and Sewerage Companies, Irrigation Systems Company, National Electric Company, and Dams and Cascades Company, as well as the private sectors such as industries and big animal breeding farms are necessary. Therefore, strengthening of the obligation from the user side to enhance their cooperation will be required as follows.

- 1) Installation of measurement devices for water abstraction for daily measurement and reporting to RBDs to ensure the water abstraction is properly conducted based on the permission.
- 2) Installation of the measurement of the quantity of wastewater discharge and conduct periodical measurement and sampling and laboratory test of the wastewater from sewerage systems as well as industries and big animal breeding farms and reporting the results to RBDs to ensure the wastewater is within the limit of the permission.
- 3) Installation of the treatment facilities for the wastewater from industries and big animal breeding farms. Strengthening the penalty system is also required, which will not allow continuous payment of the penalties instead of installation of the treatment facilities by them.
- 4) Measurement of the quantity of sand and gravel extraction correctly by the company doing extraction, and report and monitored by RBDs, so that to ensure the activities to be conducted within the limit of permission.

#### **(2) Integration of Responsibilities for River Basin Management for Consistent Management for the River Basin**

- 1) In order to simplify the responsibility of water management for consistent management based on the river basins, it is necessary to integrate the responsibilities including permissions and control for water and relating matters to RBDs.
- 2) In the case of inter-basin water transfer, utilization of water of the major reservoirs, and abstraction of mineral water, they can be analyzed and judged on the basis of the river basins by consulting the opinion of the Central Office.

- 3) For monitoring and controlling the wastewater discharge and solid waste dumping along the rivers, it is worthwhile to consider integrating the water sector of the RIEW into RBD to simplify the controlling system.

**(3) Adding Management Functions for River Morphology, Flood Prevention to the River Basin Management**

- 1) In order to manage the river courses in the consistent manner from upstream to downstream, it is necessary for all the river courses to be the state property.
- 2) In order to ensure the discharge capacity of the river channel against floods, it is very important to maintain the river courses. For this purpose, it is necessary to give the right for managing the river courses including river morphology by RBDs. This needs integrated management plan on the river as the basis for the management.
- 3) Preparedness against floods and sediment disaster is to be considered from total point of views, which are composed of flood warning and evacuation system and mitigation measures from short-term, mid-term and long-term point of views. Therefore, in order to conduct systematic implementation of the flood control, strong management based on the integrated flood control plan by RBD is required, and institutional arrangement will be necessary.

**(4) Enhancement of the Cooperation from the Municipalities to the River Basin Management Activities**

- 1) In order to attain the good status of water, people's participation especially cooperation from the municipality offices are indispensable.
- 2) The cooperation can be considered for monitoring activities, implementation of the structural and non-structural measures of the necessary programme of measures for improving the conditions of water and water related environment.
- 3) For people, it is more convenient to go to nearby municipality offices than to go to RBDs, which locate far from the houses. Therefore, in the request of permission of the small matters, it is better to be received the request documents from the people by the municipality offices, and convey them to RBDs.
- 4) Legal arrangement is required to ensure the cooperation from the municipality offices to the above activities. It is recommendable to start such cooperation with some municipalities as the pilot cases, and extend them based on the legal arrangement.



**(5) Utilization of Raw Water Tariff for Effective Implementation of the Programme of Measures**

- 1) In order to accelerate the implementation of the programme of measures for improving the condition of the water and water related environment, it is necessary for MoEW to use effectively the collected raw water tariff on water abstraction and wastewater discharge from the cost recovery aspects for the river basin management.
- 2) If the RBDs can organize small size implementation for improving the water and water related environmental measures by themselves, together with the large size implementation of the programme of measures by other relating agencies such as MoRDPW and MoAF, the implementation of the programme of measures for attaining the targets of the EU-WFD will be accelerated.
- 3) Institutional arrangement will be required for the above effective utilization of the raw water tariff.



## **CHAPTER 13 CONCLUSION AND RECOMMENDATION**

### **13.1 Introduction**

The Study Team supported MoEW and Basin Directorates for the formulation of River Basin Management Plan throughout the Study, and the concrete output of the Study includes the following:

- Through the investigation and evaluation of the present condition related to the river basin management focusing on the water quality and quantity, it has been revealed that there exists a large gap between the current water status in the country and the “good water status” defined by the EU-WFD.
- As a result of the Study, established is GIS Database that is required by EU-WFD. In the GIS Database, core portion covers the whole country, the WFD portion covers EABD, WABD and pilot river basins of DRBD and BSBD, and the local portion covers EABD and WABD. The RBDs are able to conduct the river basin management activities based on the correct GIS Database.
- As an integrated river basin management model, sophisticated model (using MIKE11) and simple model (using MS-Excel) both for water quantity and quality have been developed. Simulation of water quantity and quality could thus be conducted with a high technical level.
- Utilizing these decision and policy support tools, the Study proposed programme of measures mainly for water quantity and water quality improvement
- The proposed RBMPs are not the RBMPs according to the EU-WFD requirements, but basic plans required both for requirements of the EU-WFD and for requirements of the Bulgarian Water Act.

The major water users in the basin districts are hydropower, agriculture, domestic and industrial sectors, and the major pollution sources are wastewaters from urban settlements, industries, animal breeding farms, agricultural lands.

Before the 1990s the country had developed hydropower systems, irrigation systems with little attention to the environmental aspects like river water quality and quantity, environmental flows. A lot of urban settlements and industries discharged their sewerage and wastewaters to rivers without proper treatment. There are 73 existing WWTPs and Currently 25 WWTPs are under construction. The country is controlling the discharge of wastewater from industries, however, most of the existing water related facilities like WWTPs, sewerage systems, domestic water supply networks, and irrigation facilities have become old and superannuated and require urgent renovation or rehabilitation because of their age and lack of proper maintenance works.

In order to attain the good water status and conduct the sustainable use of water resources, the programs of measures require various measures composed of structural and nonstructural measures. The structural measures proposed for the RBMP should be constructed and the existing facilities i.e. water supply facilities and sewerage facilities should be improved or renovated within a limited time. At the same time the proposed non-structural measures should be conducted before the commencement of the RBMP.

For implementation of the structural measures the implementation organization should require to coordinate with various agencies: MoRDPW, MoAF, Municipalities and to get a good cooperation with various implementing agencies.

According to the programmes of measures in the proposed RBMP (Draft), investment of 2.40 billion euros scale amount for the new construction of WWTPs and rehabilitation of existing WWTPs and sewer networks in order to improve the present water quality in the levels of Class III to V to the levels around the middle of Class II and III in EABD and WABD. Water quantity improvement in the EABD and WABD will be realized by the improvement of domestic water supply systems with the investment of 4.00 billion euros scale amount and by the improvement of irrigation facilities with the investment of 270 million EUR scale amount.

The proposed structural measures will be feasible in technical, economical and environmental terms and non-structural measures will be required for proper implementation of the RBMP.

The proposed non-structural measures, e.g. strengthening of regulation, strengthening of monitoring are necessary to improve the parts not covered by the structural measures, to implement the structural measures smoothly and to assure the effect of the structural measures.

### **13.2 Proposal for Implementation of the RBMP**

In order to attain the target of the WFD the government should finalize the RBMP and commenced the implementation of the RBMP in 2010. Although the Study Team has prepared the draft RBMP for EABD and WABD and the government should complete the RBMP for the country. Through the Study we have concluded and recommend the government to take immediate actions and arrangement for the implementation of the RBMP as follows:

- 1) The implementation of proposed programs of measures to attain the good status of water defined by the EU-WFD shall be conducted as the national project for water:

The proposed measures for improvement of water quality, improvement of water quantity management and improvement of river morphology management will be all basic measures for attain the good status of water in the country and shall be conducted as the national project for water.

- 2) For implementation of the RBMP and also for implementation of the requirements of the EU-WFD review of the existing organization for River Basin Management and required necessary arrangement are proposed:

It is recommended to establish an implementation organization having full responsibility and authority to implement the RBMP and attain the target defined by the EU-WFD. The organization as the leading organization shall conduct close coordination with all the related agencies for implementation of the required measures and establish a system for a good coordination with the related agencies.

Also the organization shall conduct close coordination with the EU-WFD and make national strategy for water management.

- 3) The existing River Basin Directorates shall be strengthened and expanded of their responsibility and authority to meet the required functions for the river basin management:

The RBD should be strengthened with their staff, capacity and functions from technical aspects, and provided with necessary number staff, technical training, materials and equipment, office space, necessary amount of budget for operation and maintenance as the managing organization of the river basin. The RBD should have the full responsibilities and authorities to conduct the river basin management and should be added for the functions of managing of river morphology, prevention of flood disasters, control of sediment in the river basin level from river basin management and technical aspects. Also the RBD should establish a system for a good cooperation with municipalities in the river basin district for various river basin management activities as well as a good collaboration with NIMH, which has basic meteorological and hydrological data of the basins.

- 4) The RBD should establish a system of good coordination and cooperation with the related organization and the Municipalities/people in the river basin district:

Establishment of a good coordination system among the related organizations to conduct an efficient management of the river basin and establishment of a good cooperation system between the Basin Directorates and the Municipalities/people in the river basin district for participation in the river basin management activities such as ocular observation, inspection and information to the RBD for timely action.

- 5) The RBD should consider public education for enhancement of public awareness for river basin management and also for required participation to various sectors.

It is recommended for the RBD to hold periodical public meetings with municipalities and people to enhance public awareness for the status of water and river basin.

- 6) The RBD should conduct basic studies for the river basin management as follows:

- It is recommended to conduct the study on “River management Plan” for the basis for prevention of flood damages and controlling sand and gravel extraction as well as improvement of environmental status of water bodies from the view point of river morphology.
- It is recommended to conduct the study on pressures and impacts from discharges or priority substances, which are 33 harmful substances defined by the EU-WFD and heavy metals, and also closed mines in the basin is necessary to protect people from possible hazard caused by discharge of toxic substances.

- To conduct a study on water resources development and river flow regulation, which includes the following items:
  - The detailed and/or localized regime of the river flow, including the more detailed and/or localized water transfer, water use, and environmental flow.
  - The detailed assessment of the needs of additional hydro-technical facilities to be constructed as well as the restarting of construction of the suspended ones to regulate water flow for more efficient use of water resources, as a part of the integrated water management in Bulgaria and to meet the challenges of global climate change.
- 7) The decision support and managing tools of GIS Data Model and integrated water management models should be maintained and updated periodically for effective use for river basin management.

### 13.3 Recommendation

Through the Study, it is recommended that the government should take immediate actions and arrangement for the implementation of the RBMP as follows:

- In order to attain the target of the EU-WFD, the Government of Bulgaria should finalize the RBMP and commence the implementation of the RBMP in 2010. It is recommended to prepare the river basin management plans for EABD and WABD through the utmost utilization of the results of the Study and to prepare the river basin management plans for the whole nation.
- The implementation of proposed programmes of measures to attain the “good status of water” defined by the EU-WFD should be conducted as the national project for water. The proposed measures for improvement and management of water quality and quantity and river morphology management are all basic measures for the attainment of the “good status of water” in the country and recommended to be conducted under the national project for water and not by relevant implementation bodies independently.
- Implementation of improvement of institution and reform is recommended in order to implement the River Basin Management Plan in Bulgaria in accordance with the requirement of EU-WFD, strengthening of organizations both in the central level (Water Directorate of MoEW) and the district level (four Basin Directorates) is indispensable. Through the review of responsibilities of each organization to strengthen the authority, considerable increase (at least double) of the staff in number, the capacity development, and corresponding increase of the budget shall be indispensable. The Bulgarian Government shall conduct further study on the way of strengthening of organizations and establishing of collaboration with other relevant agencies, including NIMH, which has basic meteorological and hydrological data of the basins.
- The RBD should conduct basic studies for the river basin management as follows:
  - The study on “River Management Plan” for the basis for prevention of flood damages and controlling sand and gravel extraction as well as improvement of environmental status of water bodies from the view point of river morphology,

## **Annex A**

Scope of Works for the Study on Integrated Water Management in the Republic of Bulgaria agreed upon between Ministry of Environment and Water and Japan International Cooperation Agency, Sofia, 14 October 2005





**SCOPE OF WORKS  
FOR  
THE STUDY  
ON  
INTEGRATED WATER MANAGEMENT  
IN  
THE REPUBLIC OF BULGARIA**

**AGREED UPON**

**BETWEEN**

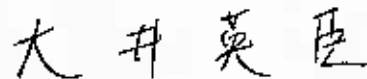
**MINISTRY OF ENVIRONMENT AND WATER  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY**

**Sofia 14 October 2005**



Mrs. Lubka KATCHAKOVA

Deputy Minister  
Ministry of Environment and Water



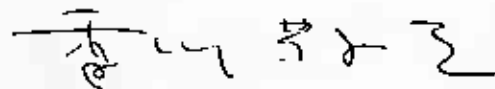
Mr. Hidetomi OI

Leader of Preparatory Study Team  
Japan International Cooperation Agency



Mr. Ivo KONOV

Director, Donor Programmes Directorate  
Ministry of Economy and Energy



Mr. Keizo KAGAWA

Resident Representative  
JICA Bulgaria Office

## I .INTRODUCTION

In response to the request of the Government of the Republic of Bulgaria (hereinafter referred to as “the Government of Bulgaria”), the Government of Japan decided to conduct the Master Plan Study on Integrated Water Management in the Republic of Bulgaria (hereinafter referred to as “the Study”) in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Bulgaria.

Regarding “The Master Plan Study on Integrated Water Management in the Republic of Bulgaria”, JICA dispatched the Preparatory Study Team headed by Mr. Hidetomi Oi to Bulgaria from 20 March to 31 March 2000, and made discussions with the Ministry of Environment and Waters (hereinafter referred to as “the MoEW”) and related ministries and agencies about the Scope of Works of the Study (hereinafter referred to as “S/W”) and exchanged views. Then the S/W was signed between JICA and MoEW on 11 October 2000 in Sofia.

After the signing of the S/W, the negotiation about the Technical Cooperation Agreement between the government of Japan and the government of the Republic of Bulgaria has been continued until on 15 December 2004. The Study, therefore, has been postponed until the conclusion of the negotiation of the Technical Cooperation Agreement.

The current situation surrounding the water management in Bulgaria requires amending of the original S/W, which was discussed between JICA, MoEW and Ministry of Economy and Energy. And they agreed as shown in the following contents on 14 October 2005 (letters with underline).

Following shows the amended S/W of the Study on 11 October 2000.

## II. OBJECTIVES OF THE STUDY

The objectives of the Study are;

- 1 To assist the MoEW in the implementation of the requirements of EU Water Framework Directive (hereinafter referred to as “WFD”) which includes:
  - Preparation of the River Basin Management Plans for the selected Areas
  - Development of GIS, Monitoring Programs and Water Resource Balance for the whole country
- 2 To transfer technology and conduct training on Integrated Water Management to the counterpart personnel in the course of the study.

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### III. SELECTED AREA

The selected areas are East Aegean Sea River Basin District and West Aegean Sea River Basin District shown in Annex I .

### IV. SCOPE OF THE STUDY

Basic strategy and guideline on Integrated Water Resources Management, GIS and Monitoring are for the whole country and in particular for the selected River Basin Districts.

#### *Phase I: Basic Study*

- 1) Consideration of laws and regulations with relation of implementation of the River Basin Management Plan in accordance with Annex VII of EU WFD
- 2) Collection and analysis of related data and information
- 3) Field reconnaissance
  - (1) Hydrological investigation
  - (2) Existing condition of water usage
  - (3) Present condition of existing facilities related to water resources management
  - (4) Water quality investigation for chemical index and biological index
  - (5) Groundwater sources
  - (6) Other relevant investigations
- 4) Assessment, updating and further development of the existing GIS Database considering EU WFD's guideline as well as future utilization for Integrated Water Management.

Notes:

- (1) European Commission: relevant EU legislation and document concerning implementation of the EU WFD. (2000/60/EC)
- (2) MoEW; Draft Concept "Design of Geographic Database (GeoDB) and Geographic Information System (GIS) to assist the creation of Integrated Water Management Plans for the Water Resources Basin Management in accordance with the EU WFD", 2004
- 5) Workshop and Public Consultation for grasping existing problems and directions for improvement of water and its management in accordance with the EU WFD.
- 6) Identification and assessment of constraints related to Integrated Water Management

#### *Phase II: Formulation of River Basin Management Plan*


- 1) Water Demand Projection
  - (1) Setting up of socio-economic framework
  - (2) Domestic water
  - (3) Agricultural and industrial water



- (4) Water balance
- 2) Water Resources Potential Analysis
  - (1) Hydrological analysis
  - (2) Available water resources
  - (3) Water resources potential
  - (4) Water balance
- 3) Water Quality Analysis with relation with the requirement EU WFD
  - (1) Analysis on pollution load
  - (2) Analysis on water quality
- 4) Further Development of the GIS Database
- 5) Basic Strategy and Guideline on Integrated Water Management, GIS and Monitoring for selected River Basin Districts.
- 6) Workshop and Public Consultation on the Basic Policy and Strategy for Integrated Water Management in accordance with EU WFD
- 7) Formulation of River Basin Management Plan for Integrated Water Management
  - (1) Integrated Water Management Plan (surface water quantity and quality, and groundwater quantity and quality)
  - (2) Consideration of Laws and regulation in relation to implementation of EU WFD Annex VII.
  - (3) Establishment of monitoring plan
  - (4) Program of measures scenarios in accordance with EU WFD
- 8) Economic Analysis
- 9) Implementation Plan
- 10) Evaluation of River Basin Management Plan
  - (1) Economic evaluation
  - (2) Financial evaluation
  - (3) Social impact assessment
  - (4) Initial Environmental Evaluation (IEE)
- 11) Preparing Guidelines for Application of Integrated Water Management in accordance with EU WFD.

## **V. SCHEDULE OF THE STUDY**

The Study will be carried out in accordance with the tentative schedule as attached in Annex II .

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## **VI. REPORTS**

JICA will prepare and submit the following reports in English to the MoEW and the MoEE.

1. Inception Report  
Thirty (30) copies will be submitted at the beginning of PHASE I .
2. Interim Report  
Thirty (30) copies will be submitted at the end of PHASE I .
3. Draft Final Report  
Thirty (30) copies will be submitted at the end of the study.  
The MoEW and the MoEE will submit their comments within one (1) month after the receipt of the Draft Final Report.
4. Final Report  
Fifty (50) copies will be submitted after the receipt of the comments on the Draft Final Report.

## **VII. UNDERTAKINGS OF THE GOVERNMENT OF BULGARIA ACCORDING WITH THE AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF BULGARIA SIGNED ON 15 DECEMBER 2004**

1. The Government of Bulgaria shall accord privileges, exemptions and other benefits to JICA study team in accordance with the Agreement on Technical Cooperation between the Government of Japan and the Government of Bulgaria signed on 15 December 2004.
2. The Government of Bulgaria shall bear claims, if any arises, against the member of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the study, except when such claims arise from gross negligence or willful misconduct on the part of the JICA study team.
3. MoEW shall act as the counterpart agency to JICA study team and also as the coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.
4. MoEW, at its own expense, provide the JICA study team with the following, in cooperation with other organizations concerned;

- (1) Security-related information on as well as measures to ensure the safety of the

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JICA study team

- (2) Information on as well as support in obtaining medical service
- (3) Available data (including maps and photographs) and information related to the study
- (4) Counterpart personnel from concerned authorities
- (5) Suitable office space with necessary equipment
- (6) Credentials or identification cards

### **VIII. UNDERTAKING OF JICA**

For the implementation of the study and in accordance with the Agreement on technical cooperation between the Government of the Republic of Bulgaria and the Government of Japan, JICA will provide the following:

1. dispatching study team to the Republic of Bulgaria for the study implementation;
2. providing the Government of the Republic of Bulgaria with equipment, machinery and materials necessary for the study;
3. providing the Government of the Republic of Bulgaria with other forms of technical cooperation as may be decided upon by mutual consent between the two Governments representatives;
4. pursuing technology transfer to counterpart personnel in the course of the study.

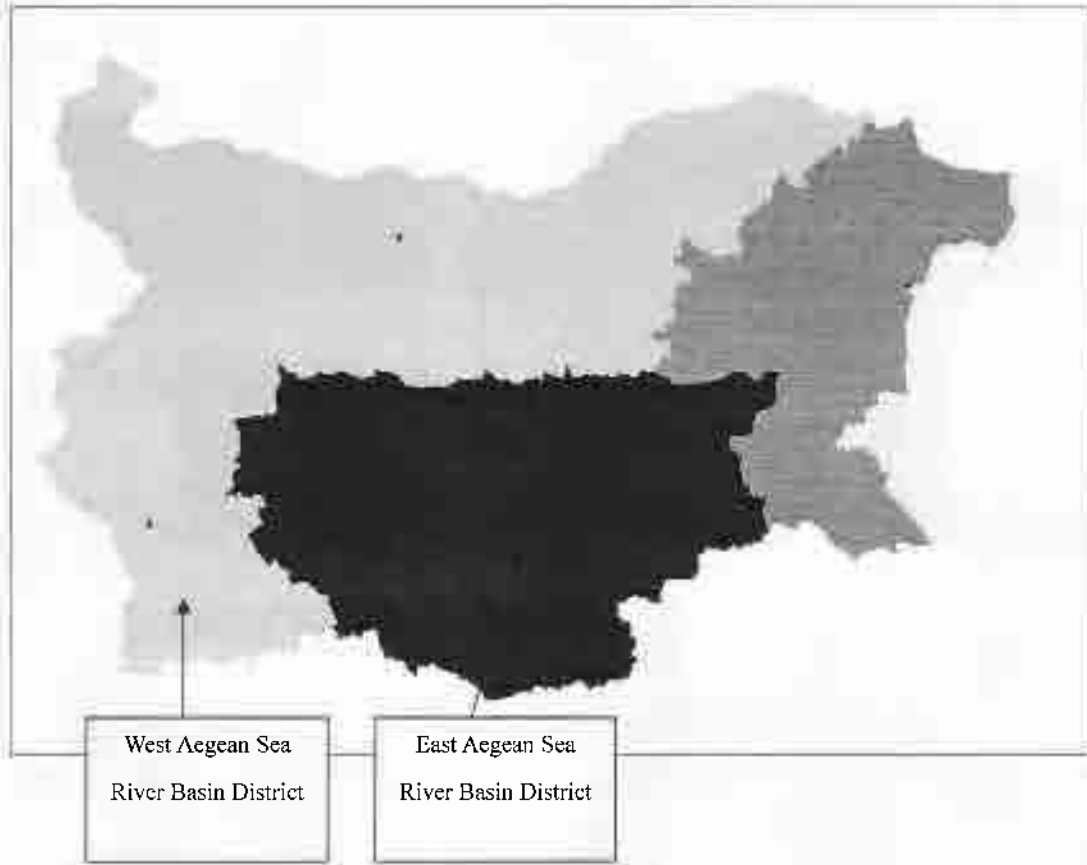
### **IX. CONSULTATION**

JICA, MoEW and the Ministry of Economy and Energy will consult each other in respect of any matter that may arise from or in connection with the study.

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**Annex I**

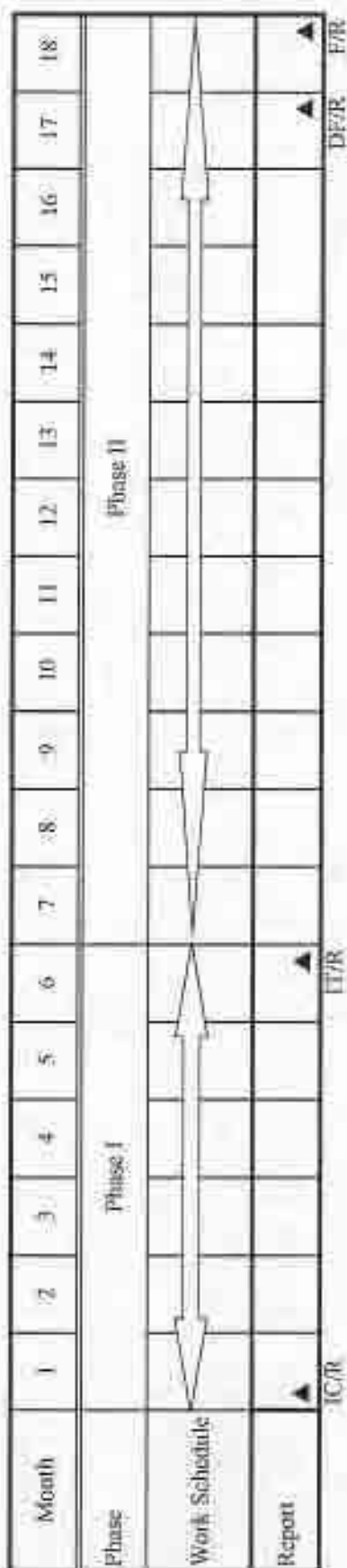
**Selected Area**



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**Annex II Tentative Schedule of the Study**

**Tentative Schedule  
THE STUDY ON INTEGRATED WATER MANAGEMENT IN THE REPUBLIC OF BULGARIA**



NOTE :  
 IC/R : Inception Report  
 IT/R: Interim Report  
 DF/R : Draft Final Report  
 F/R : Final Report  
 \* The steering committee will be held whenever necessary to share the progress of the study



## **Annex B**

Minutes of Meeting on Scope of Works for the Study on Integrated Water Management in the Republic of Bulgaria agreed upon between Ministry of Environment and Water and Japan International Cooperation Agency, Sofia, 14 October 2005



**MINUTES OF MEETING  
ON  
SCOPE OF WORKS  
FOR  
THE STUDY  
ON  
INTEGRATED WATER MANAGEMENT  
IN  
THE REPUBLIC OF BULGARIA**

**AGREED UPON**

**BETWEEN**

**MINISTRY OF ENVIRONMENT AND WATER  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY**

**Sofia 14 October 2005**



Mrs. Lubka KATCHAKOVA

Deputy Minister  
Ministry of Environment and Water



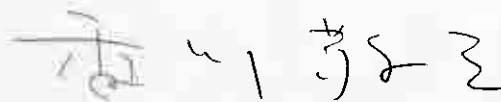
Mr. Hidetomi OI

Leader of Preparatory Study Team  
Japan International Cooperation Agency



Mr. Ivo KONOV

Director, Donor Programmes Directorate  
Ministry of Economy and Energy



Mr. Keizo KAGAWA

Resident Representative,  
JICA Bulgaria Office

This Minutes of Meeting has been prepared for a better and proper understanding of the S/W for the Study on Integrated Water Management in the Republic of Bulgaria agreed upon between Ministry of Environment and Water (hereinafter referred to as "MoEW") and Japan International Cooperation Agency (hereinafter referred to as "JICA") on 14 October 2005.

#### **1. TITLE OF THE STUDY**

The title of the study is "the Study on integrated water management" as described in the S/W.

#### **2. TARGET YEAR**

Target year is 2015 in accordance with EU Water Framework Directive (WFD).

#### **3. SELECTED AREA**

The selected areas are East Aegean Sea River Basin District and West Aegean Sea River Basin District.

#### **4. STUDY PERIOD**

The maximum study period is 24 months. The official study period will be determined in the Inception Report.

#### **5. COMPUTER SYSTEM AND GIS DEVELOPMENT**

Bulgarian side requested JICA to provide computer system, and to develop GIS for the whole MoEW system (MoEW, Executive Environment Agency and the four River Basin Directorates) in accordance with the requirements of the EU WFD. The Team will convey the request to the JICA Headquarters for the final decision.

#### **6. COLLECTION AND ANALYSIS OF RELATED DATA AND INFORMATION**

Data collection and analysis have been in good progress in each River Basin Directorate. These works will continue and will be completed as early as possible so that JICA study may use the result for formulation of River Basin Management Plan from the early stage of the study.

#### **7. IMPLEMENTATION OF GIS DATA BASE**

The works for the two selected River Basin Districts will be done by Bulgarian counterparts with the assistance of Bulgarian engineer(s) who will be hired by JICA.

#### **8. MONITORING SYSTEM**

Monitoring system will be upgraded in accordance with EU WFD. A Proposal for the development of the early warning system for accidental pollution and flood events will be elaborated by the study team.

Guidelines for the planning of monitoring system at national level will be prepared as a joint undertaking of Bulgarian counterparts and JICA study team. JICA study team will contribute based on the experience and knowledge in Japan.

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Monitoring systems of the two pilot river basin districts will be reviewed in detail and improvement will be proposed wherever necessary so as to upgrade the systems in compliance with the requirements of EU WFD.

#### **9. INTEGRATED WATER RESOURCES MANAGEMENT**

The methodology for the development of integrated water resources management (water balance) will be prepared jointly by JICA study team and Bulgarian counterparts for the whole country. The methodology will be implemented in details for the selected River Basin Districts.

#### **10. COORDINATION MECHANISM OF THE STUDY**

In order to support the Study in various ways and to direct the implementation of the study in proper way reflecting opinions of key organizations concerned the Steering Committee will be established.

The Steering Committee will perform the following:

- To review regularly the progress and achievements of the study;
- To exchange views on major issues arising from or in connection with the study;
- To approve the modification to activities depending on the necessity.

The Steering Committee will be called by the Chairperson periodically.

**The members of the Steering Committee will be provisionally as follows;**

**Chairperson:** Deputy Minister, Ministry of Environment and Water

**Bulgarian side:**

Director, Donor Programmes Directorate, Ministry of Economy and Energy

Representative of Water Directorate, MoEW

Representative of Executive Environment Agency

Director of East Aegean Sea Basin Directorate, MoEW

Director of West Aegean Basin Directorate, MoEW

Representative of Danube Basin Directorate, MoEW

Representative of Black Sea Basin Directorate, MoEW

Representative of Ministry of Regional Development and Public Works

Representative of Ministry of Agriculture and Forestry

Representative of National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences

Representative of National Association of Municipalities

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Representative of Bulgarian National Association on Water Quality  
Representative of University of Architecture, Civil Engineering and Geodesy  
Personnel concerned to be decided by Bulgarian side

**Japanese side:**

Representatives of the JICA team  
Representative of the Embassy of Japan in the Republic of Bulgaria  
Representative of the JICA Bulgaria Office  
Personnel concerned to be decided by Japanese side

Persons invited by the Chairperson may attend the Steering Committee meetings.

**11. STAKEHOLDER MEETING**

In accordance with the EU WFD and the Water Act of Bulgaria, MoEW/River Basin Directorates will host and facilitate stakeholder meetings at suitable timing with the aim of sharing the information on progress of the study. JICA will support MoEW to hold stakeholder meetings.

**12. SUPPORT OF CAPACITY BUILDING**

In order to achieve the objective of the study as mentioned in the S/W, JICA will support capacity building of MoEW through the on-the-job training during the study period. The Bulgarian side proposed that counterpart team headed by MoEW will jointly work at all times with the study team as core facilitators and focal points and accept technical transfer. Members of the team are required to be assigned from the selected River Basin Directorates of MoEW, in advance of the commencement of the Study.

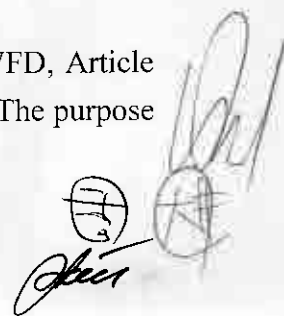
**13. TRAINING OF COUNTERPART PERSONNEL IN JAPAN**

MoEW requested JICA to conduct training of 8 to 10 persons of counterpart personnel in Japan for the effective technology transfer. The Team will convey the request to the JICA Headquarters for the final decision.

**14. SEMINARS AND/OR WORKSHOPS**

Seminars and/or workshops will be jointly held by MoEW and the study team to transfer the technology to the Bulgarian counterparts.

Stakeholder meetings for public discussion will be held in accordance with EU WFD, Article 14 by MoEW and the River Basin Directorates of East and West Aegean Districts. The purpose



includes the followings.

- (1) To inform the stakeholders of the timetable and work program for the study;
- (2) To inform the stakeholders of an interim overview of the significant water management issues identified in the river basin;
- (3) To inform the stakeholders of draft plan

The study team will support the meetings with the preparation of materials concerned, presentation of the issues from a technical aspect and financial means.

#### **15. ENVIRONMENTAL AND SOCIAL CONSIDERATIONS**

The Team explained JICA's Guidelines for Environmental and Social Considerations, and that it will be applied to the study. MoEW understood the policy of JICA guidelines, and agreed in principle to the following responsibilities and requirements

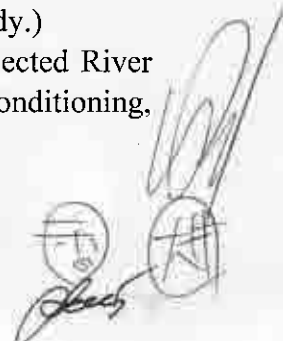
- (1) MoEW shall be responsible for conducting necessary Environmental and Social Considerations in collaboration with the Study team. This shall be corresponding to Environmental Assessment of Plans and Programs, which is designated in Article 81(1)1 of Environmental Protection Act, the Republic of Bulgaria
- (2) The information disclosure on the plans and study reports concerned shall be made in order to ensure the participation and dialogues with various stakeholders, and achieve appropriate environmental and social considerations.
- (3) The above-mentioned responsibilities and requirements will also be applied when Initial Environmental Examination (IEE) is necessary for programs of measures and investment plans designed in the integrated water management plan. The Study team shall provide MoEW with technical support in order to conduct IEE.
- (4) In the course of implementation of the Study, public consultation and discussion with communities and stakeholders shall be held according to Water Act of the Republic of Bulgaria and EU Directive 2000/60/EC. The Study Team shall provide MoEW with technical support in order to hold stakeholders meetings.

#### **16. DISCLOSURE OF INFORMATION**

The disclosure of information such as the study reports is necessary to ensure the participation and dialogues with various stakeholders, in order to achieve appropriate environmental and social considerations.

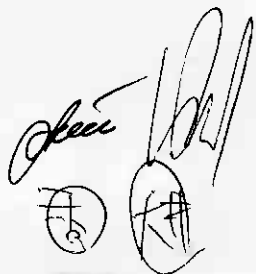
#### **17. UNDERTAKING OF THE GOVERNMENT OF THE REPUBLIC OF BULGARIA ACCORDING WITH THE AGREEMENT ON TECHNICAL COOPERATION BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF BULGARIA SIGNED ON 15 DECEMBER 2004**

- (1) Bulgarian side provides the study team with all available data in the MoEW system (including geographical maps and photographs and information related to the Study.)
- (2) Bulgarian side provides office space in the headquarters of MoEW and the selected River Basin Districts of MoEW with office furniture, Internet equipment, air-conditioning, telephone lines and electricity for the use by the study team.



**18. REPORTS**

The result of the study will be open to the public in order to achieve maximum use of the study results.

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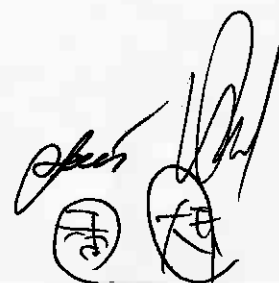


List of Attendants

**A. Bulgarian Side**

**Government**

Mrs. Lubka Katchakova	Deputy Minister, MoEW
Mr. Jordan Dardov	Deputy Minister, MoEW
Mr. Ivo Konov	Director, Donor Programmes Directorate, MoEE
Mr. Vladimir Dontchev	State expert, Water Directorate , MoEW
Mr. Nikola Matev	State expert, Water Directorate, MoEW
Mr. Radoslav Stanolov	Chief expert, Donor Programmes Directorate, MoEE
Mrs. Galina Balusheva	Senior expert, Water Directorate, MoEW
Mrs. Detelina Peicheva	Junior expert, International Cooperation Department, MoEW

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**B. Japanese Side**

**Preparatory Study Team**

Mr. Hidetomi OI	Leader
Mr. Koji SUJINO	River Basin Management
Mr. Tsuyoshi SASAKA	Water Resources Management/ Environmental and Social Considerations
Mr. Toshiro IWAHASHI	Hydrology/Water quality
Mr. Junichi HIRANO	Study Planning

**JICA Bulgaria Office**

Mr. Keizo KAGAWA	Resident Representative
Mr. Hiroyuki NONAKA	Project Formulation Advisor



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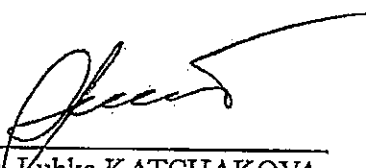
## **Annex C**

Minutes of Meeting on Inception Report for the Study on Integrated Water Management in the Republic of Bulgaria, Sofia, 13 June, 2006




MINUTES OF MEETINGS  
ON  
INCEPTION REPORT  
FOR  
THE STUDY ON  
INTEGRATED WATER MANAGEMENT  
IN  
THE REPUBLIC OF BULGARIA

Sofia  
June 13th, 2006




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Mrs. Lubka KATCHAKOVA  
Deputy Minister  
Ministry of Environment and Water



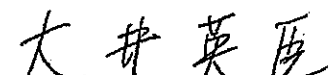
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Mr. SASABE Keiji  
Leader  
JICA Study Team



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Mr. Ivo KONO  
Director, Donor Programmes Directorate  
Ministry of Economy and Energy



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Mr. OI Hidetomi  
Leader  
JICA Headquarters Mission

## 1. Introduction

In accordance with Scope of Work (hereinafter referred to as "S/W") and Minutes of Meetings (hereinafter referred to as "M/M") for the Study on Integrated Water Management in the Republic of Bulgaria (hereinafter referred to as "the Study") agreed upon between the Ministry of Environment and Water (hereinafter referred to as "MoEW") and Japan International Cooperation Agency (hereinafter referred to as "JICA") on October 14, 2005, JICA contracted CTI Engineering International Co., Ltd. (hereinafter referred to as "CTI") to conduct the Study, and dispatched a JICA Study Team (hereinafter referred to as "the Study Team") headed by Mr. SASABE Keiji to Bulgaria from June 5, 2006. The Study Team submitted Inception Report to MoEW on June 6. A series of meeting on the Inception Report was held with the Bulgaria side composed of the Ministry of Environment and Water (MoEW) as well as the representatives of the institutions envisaged to be the members of the Steering Committee.

For confirmation of the understanding of the Inception Report, JICA Headquarters dispatched a mission headed by Mr. OI Hidetomi to Bulgaria on June 10, 2006. The Bulgarian side, the JICA Headquarters Mission and the Study Team held a meeting on June 12, 2006. During the meeting, the Study Team presented the Inception Report and discussions were made by the participants.

Through the series of discussions, several items were clarified and others were discussed in detail as presented in "2. Discussion" below. As a result of the discussion, Bulgarian side accepted the basic concept and approach and plan of operation proposed in the Inception Report in principle.

## 2. Discussion

Major points of the discussion are summarized as follows:

### (1) Objectives of the Study

Bulgarian side requested to clarify the difference between the meaning of the objectives of the study mentioned in the IC/R and that in the S/W signed in October 2005 regarding GIS (Item II of S/W and Item 5. of M/M) and methodology of the water balance analysis (Item 9. of M/M).

Discussion and answers to the above request are described in items (3) and (4) below.

### (2) Management of the Study

After the discussion between both sides, it was confirmed that Steering Committee and Technical Committee would be established.

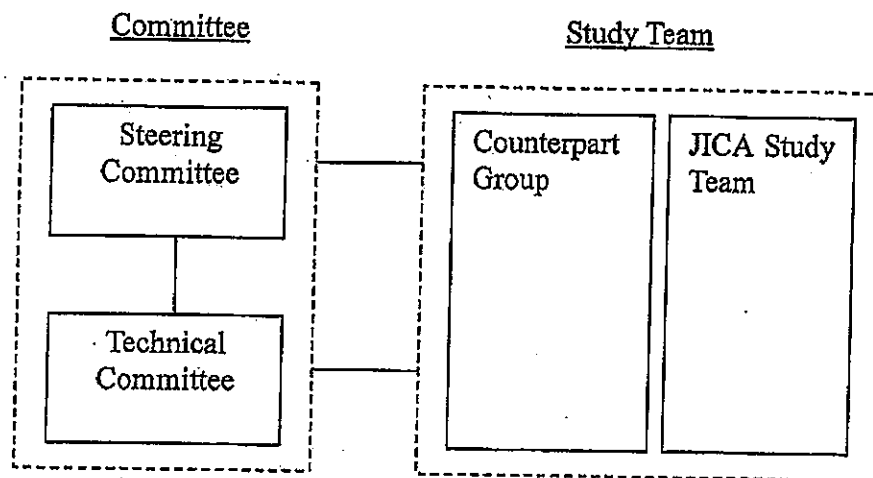
Bulgaria side commented that the Steering Committee would be officially established as soon as possible. It was also commented that though the Steering Committee has not been established yet, representatives from relevant organizations including the EU-WFD Implementation Unit were invited and joined to the series of meetings.

The Study Team clarified the management structure of the Study as follows:



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Management Structure of the Study

**(3) GIS**

Bulgarian side requested the clarification of the difference between the expected outcomes from the GIS work, which were discussed and agreed during the S/W and M/M signed in October 2005, and the scope of the IC/R for the following points.

- According to the objective of the Study in S/W in October 2005, Bulgarian side requested to JICA to develop GIS system for the whole MoEW system including providing computer system and software. However, it is limited to only East Aegean Sea Basin Directorate (EABD) and West Aegean Sea Basin Directorate (WABD) in the IC/R.
- Development of network-based GIS for the whole MoEW system, which aims to share the information with GIS forms between MoEW, River Basin Directorates, and EEA is not included in the IC/R.
- To provide computer system and software related to the development of GIS-DB for the whole MoEW system (Item 5. of M/M in October 2005) is limited to EABD and WABD for standalone GIS-DB without the computer and software for network development.

The Study Team answered as follows:

- The Study will assess the existing GIS-DB of MoEW, the four River Basin Directorates, relating on-going international project and EEA and propose standard format of GIS-DB and required improvement.
- It is the first and fundamental step to develop the standalone GIS-DB based on the uniform format for the core portion that should be shared among MoEW, the four River Basin Directorate and EEA, in accordance with the requirements of the EU-WFD in consideration with different level of needs such as water management and monitoring. The Study will assess the necessity of the network-based GIS as the second step, and will propose the directions for its development including appropriate systems.
- Principally, GIS-DB development or improvement for Danube Basin Directorate (DRBD), Black Sea Basin Directorate (BSBD), MoEW and EEA is

*[Handwritten signatures and initials]*

to be conducted by Bulgarian side referring to the results of the GIS-DB development for EABD and WABD and proposed standard GIS-DB format. It should, however, be decided upon the consultation with the JICA Headquarters to what extent the development of GIS including providing the computer system and software for the whole MoEW system should be added in the Study.

- An example of a concept for stepwise development of network-based GIS is shown in Attachment-2. Further concrete discussion about the GIS system development will be conducted among Study Team and C/P Group through the course of the Study.

**(4) River Basin Management Plan**

The river basin management plan will be prepared in compliance with Annex VII of EU-WFD and Water Act of Bulgaria. Both sides confirmed that the expected outcomes of the study are 1) River Basin Management Plans for the two selected River Basin Directorates; 2) the guideline for the river basin management planning for the remaining two River Basin Directorates considering their characteristics and including methodologies on water resources balance study and monitoring programming; and, 3) the guideline for developing the GIS-DB for the whole MoEW system.

The guideline for the river basin management planning will include those issues required for the cases of inter and inner basin water transfer and methodology of the identification of the characteristics of each river basin district for the water resources balance study.

**(5) Sophisticated Model using MIKE 11**

Bulgarian side commented that the model using MIKE 11 would require a large amount of data, and the model results would not be precise enough if the sufficient data are not available.

The Study Team answered that even in case of insufficient data, accuracy of the model would be tried to be increased by supplemental survey for river cross sections and water quality, try and error calculation with re-check the data and conditions of the river basins.

**(6) River Cross-sectioning Survey for the Modeling using MIKE 11 and Supplemental Water Quality Monitoring**

The Study Team explained the necessity of the cross-sectioning survey and the Bulgarian side is requested to carry out the survey. The Study Team also explained that the Study Team would conduct the supplemental water quality monitoring with the budget of the Study Team.

Bulgarian side commented that according to the M/M of the S/W signed on October 14, 2005, Bulgarian side could provide all the available data in the MoEW system. However, the data, which is not available in the MoEW system including river cross-section data, cannot be provided to the Study Team without payment. Furthermore, Bulgarian side commented that MoEW couldn't conduct the river



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cross-sectioning survey. Outsourcing of the cross-sectioning survey requires financial burden to MoEW. MoEW continues to seek the possible solution at this moment.

**(7) Counterpart to the JICA Study Team**

The Study Team requested the assignment of counterpart personnel according to the proposal given in the Inception Report. In this connection, the JICA Headquarters Mission reiterated JICA's position, referring to S/W (Objectives), that this Study is to be conducted with the initiative of Bulgarian Side with assistance of the Study Team.

Bulgarian side commented that counterparts of some fields are not available from MoEW and the River Basin Directorates due to their limited resources.

In order to keep continuous work with the Bulgaria C/Ps and the JICA Study Team, as a compromise, the Study Team proposed to MoEW to assign counterpart as groups consisting of: water management (water quantity management, water quality management, water law, institution and organization, public participation and flood control); water analysis (water quantity analysis and water quality analysis); GIS; environment and protected area; and, economic analysis.

Furthermore, adjustment of the assignments of the C/Ps is necessary to be discussed during the course of the Study.

**(8) The Alternative Plan of Counterpart Training in Japan**

*The JICA Headquarters Mission explained that JICA cannot conduct the counterpart training in Japan because Bulgaria became a member of DAC after signing of M/M and S/W on October 14, 2005. Both sides agreed that as an alternative plan of the counterpart training in Japan, a survey on river basin management planning process in EU countries would be considered.*

**(9) Public Consultation**

Bulgarian side commented that it is better to conduct public consultations for each river basin instead of each River Basin District level since the characteristics and problems of each river basin are different.

The Study Team commented that the public consultation was the important issue in the EU-WFD and the above intention of the River Basin Directorates would be highly appreciated for the proper implementation of the river basin management plan. The Study Team also mentioned that the River Basin Directorates would be the one who host the public consultations.

**(10) Office for the Study Team**

The Study Team requested office space sufficient for proper implementation of the Study in Sofia and appropriate working space both in Plovdiv and Blagoevgrad.



cc.



## Annex-1

### LIST OF PARTICIPANTS TO THE MEETING

#### <Ministry of Environment and Water>

Mr. Vladimir Dontchev	Director
Mrs. Galina Balusheva	Senior Expert
Mrs. Nevyana Teneva	Chief Expert
Mr. Nikolai Kouyumdzhiev	Water Expert
Mr. Bozhidar Magerov	Senior Expert
Mrs. Detelina Peicheva	Expert

#### <Ministry of Energy>

Mr. Radoslav Stanolov	Chief Expert
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#### <Executive Environment Agency >

Mr. Velcho Kuyumdjiev	Expert
Mr. Doichin Delitchev	GIS Expert

#### <West Aegean Sea River Basin Directorate >

Mrs. Krasimira Tagareva	Director
Mr. Lubomir Markovski	Chief Expert
Mr. Kiril Bojkov	Senior Expert

#### <East Aegean Sea River Basin Directorate >


Mr. Nikola Karnolski	Director
Mrs. Maria Babukchieva	Head of Department
Mr. Martin Marinov	Head of Department
Mrs. Gergana Georgieva	Expert

#### <National Institute of Water Problem >

Dr. Jordan Kosturkov	Head of Department
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#### <JICA Headquarters Mission>

Mr. OI Hidetomi	Leader
Mr. HIRANO Junichi	Study Planning

6 

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**<JICA Bulgaria Office>**

Mr. NONAKA Hiroyuki

Project Formulation Advisor

**<JICA Study Team>**

Mr. SASABE Keiji

Leader

Mr. TANAKA Hajime

Deputy Team Leader/ River Basin Management  
Planner

Mr. FURUKAWA Takashi

Water Quality Management/ Monitoring Planner

Mr. CHOI Jaeyoung

GIS/ Database Specialist

Mr. KITAMURA Tadanori

Hydrological and Hydraulic Modeling Specialist

Mr. OJIMA Ryota

Administrative Coordinator



09.





**List of Participants of Preparatory Meeting (1) on Inception Report at MoEW  
from 10:00 to 16:30 on June 07 2006**

**Participants:**

**<Ministry of Environment and Water>**

Mrs. Galina Balusheva	Senior Expert
Mrs. Nevyana Teneva	Chief Expert
Mr. Nikolai Kouyumdzhev	Water Expert
Mr. Bozhidar Magerov	Senior Expert
Mr. Ivan Stoev	Senior Expert

**<Executive Environment Agency >**

Mr. Velcho Kuyumdjiev	Expert
Mr. Doichin Delitchev	GIS Expert

**<West Aegean Sea River Basin Directorate >**

Mr. Lubomir Markouski	Chief Expert
Mr. Kiril Bojkov	Senior Expert

**<East Aegean Sea River Basin Directorate >**

Mrs. Maria Babukchieva	Head of Department
Mrs. Gergana Georgieva	Expert

**<Danube River Basin Directorate >**

Mr. Petar Dimitrov	Expert
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**<National Institute of Meteorology and Hydrology >**

Dr. Dobri Dimitrov	Deputy Director-General
Mrs. Kamelia Krouwova	Expert
Mrs. Nevyana Todorova	Expert

**<National Institute of Water Problem >**

Dr. Jordan Kosturkov	Head of Department
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**<Executive Agency of Hydromelioration >**

Mr. Dimitar Mladenov	Expert
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**<JICA Bulgaria Office>**



Mr. NONAKA Hiroyuki	Project Formulation Advisor
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**<JICA Study Team>**

Mr. SASABE Keiji	Leader
Mr. TANAKA Hajime	Deputy Team Leader/ River Basin Management Planner
Mr. FURUKAWA Takashi	Water Quality Management/ Monitoring Planner
Mr. CHOI Jaeyoung	GIS/ Database Specialist
Mr. KITAMURA Tadanori	Hydrological and Hydraulic Modeling Specialist
Mr. OJIMA Ryota	Administrative Coordinator

8 

CC

**List of Participants of Preparatory Meeting (2) on Inception Report at MoEW  
from 10:00 to 14:00 on June 08 2006**

**Participants:**

**<Ministry of Environment and Water>**

Mrs. Galina Balusheva	Senior Expert
Mrs. Nevyana Teneva	Chief Expert
Mr. Nikolai Kouyumdzhiev	Water Expert
Mr. Bozhidar Magerov	Senior Expert
Mr. Ivan Stoev	Senior Expert

**<Executive Environment Agency >**

Mr. Velcho Kuyumdjiev	Expert
Mr. Doichin Delitchev	GIS Expert

**<West Aegean Sea River Basin Directorate >**

Mr. Lubomir Markovski	Chief Expert
Mr. Kiril Bojkov	Senior Expert

**<East Aegean Sea River Basin Directorate >**

Mrs. Maria Babukchieva	Head of Department
Mrs. Gergana Georgieva	Expert

**<National Institute of Meteorology and Hydrology >**

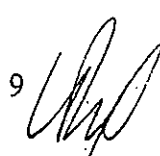
Mrs. Kamelia Krouwova	Expert
Mrs. Nevyana Todorova	Expert

**<National Institute of Water Problem >**

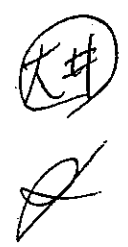
Dr. Jordan Kosturkov	Head of Department
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**<JICA Study Team>**

Mr. SASABE Keiji	Leader
Mr. TANAKA Hajime	Deputy Team Leader/ River Basin Management Planner
Mr. FURUKAWA Takashi	Water Quality Management/ Monitoring Planner
Mr. CHOI Jaeyoung	GIS/ Database Specialist
Mr. KITAMURA Tadanori	Hydrological and Hydraulic Modeling Specialist
Mr. OJIMA Ryota	Administrative Coordinator

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**List of Participants of Preparatory Meeting (3) on Inception Report at MoEW  
from 10:00 to 14:00 on June 09 2006**

**Participants:**

**<Ministry of Environment and Water>**

Mrs. Galina Balusheva	Senior Expert
Mrs. Nevyana Teneva	Chief Expert
Mr. Nikolai Kouyumdzhiev	Water Expert
Mr. Bozhidar Magerov	Senior Expert
Mr. Ivan Stoev	Senior Expert
Mrs. Detelina Peicheva	Expert

**<Executive Environment Agency >**

Mr. Velcho Kuyumdjiev	Expert
Mr. Doichin Delitchev	GIS Expert

**<West Aegean Sea River Basin Directorate >**

Mr. Lubomiz Markovski	Chief Expert
Mr. Kiril Bojkov	Senior Expert

**<East Aegean Sea River Basin Directorate >**

Mrs. Maria Babukchieva	Head of Department
Mrs. Gergana Georgieva	Expert

**<National Institute of Meteorology and Hydrology >**

Mrs. Kamelia Krouwova	Expert
Mrs. Nevyana Todorova	Expert

**<National Institute of Water Problem >**

Dr. Jordan Kosturkov	Head of Department
----------------------	--------------------

**<JICA Study Team>**

Mr. SASABE Keiji	Leader
Mr. TANAKA Hajime	Deputy Team Leader/ River Basin Management Planner
Mr. FURUKAWA Takashi	Water Quality Management/ Monitoring Planner
Mr. CHOI Jaeyoung	GIS/ Database Specialist
Mr. KITAMURA Tadanori	Hydrological and Hydraulic Modeling Specialist
Mr. OJIMA Ryota	Administrative Coordinator

**List of Participants of Preparatory Meeting (4) on Inception Report at MoEW  
from 10:00 to 13:30 on June 12 2006**

**Participants:**

**<Ministry of Environment and Water>**

Mrs. Lubka Katchakova	Deputy Minister
Mrs. Galina Balusheva	Senior Expert
Mrs. Nevyana Teneva	Chief Expert
Mr. Nikolai Kouyumdzhiev	Water Expert
Mr. Bozhidar Magerov	Senior Expert
Mrs. Detelina Peicheva	Expert

**<JICA Headquarters Mission>**

Mr. OI Hidetomi	Leader
Mr. HIRANO Junichi	Study Planning

**<JICA Bulgaria Office>**

Mr. NONAKA Hiroyuki	Project Formulation Advisor
---------------------	-----------------------------

**<JICA Study Team>**

Mr. SASABE Keiji	Leader
Mr. TANAKA Hajime	Deputy Team Leader/ River Basin Management Planner
Mr. FURUKAWA Takashi	Water Quality Management/ Monitoring Planner
Mr. CHOI Jaeyoung	GIS/ Database Specialist
Mr. KITAMURA Tadanori	Hydrological and Hydraulic Modeling Specialist
Mr. OJIMA Ryota	Administrative Coordinator

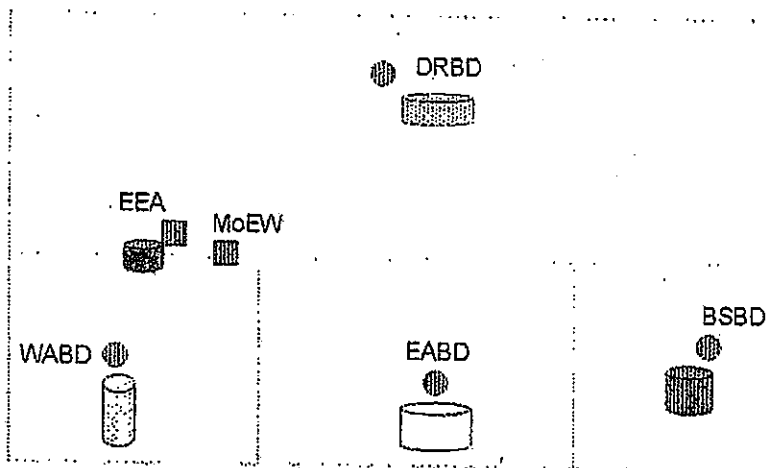


# A Basic Concept of GIS-DB for the MoEW System



## Current Condition

- Different data model and structure of GIS database
- Standalone GIS system (established? - Need detailed and careful assessment)
- Manual transfer of data with different format



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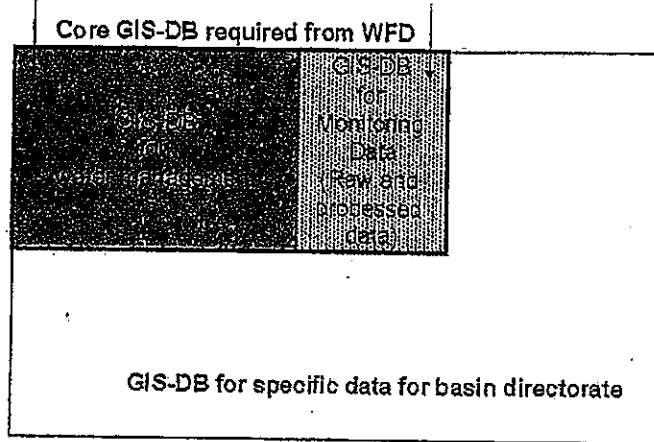
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# Concept of Database Structure (Draft)

- Core GIS-DB which is shared among 4 basin directorates, MoEW and EEA with standard data model and format
- GIS-DB for specific data for basin directorate

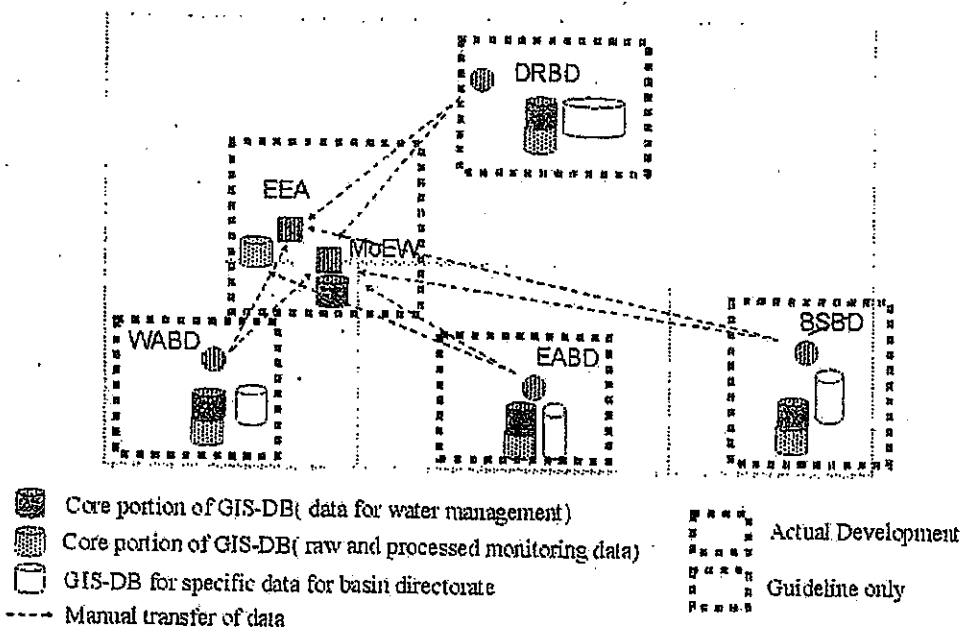
Shared among 4 basin directorates, MoEW and EEA with standard data model and format



## 1st Step

### Standalone System with Standard Data Format

- Same data model and structure in core portion of GIS database
- Standalone system
- Manual transfer of data



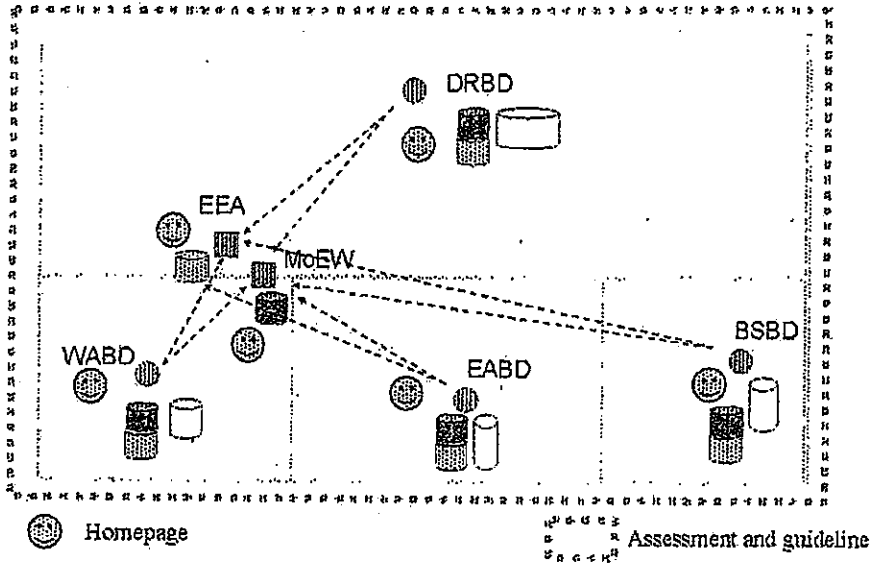
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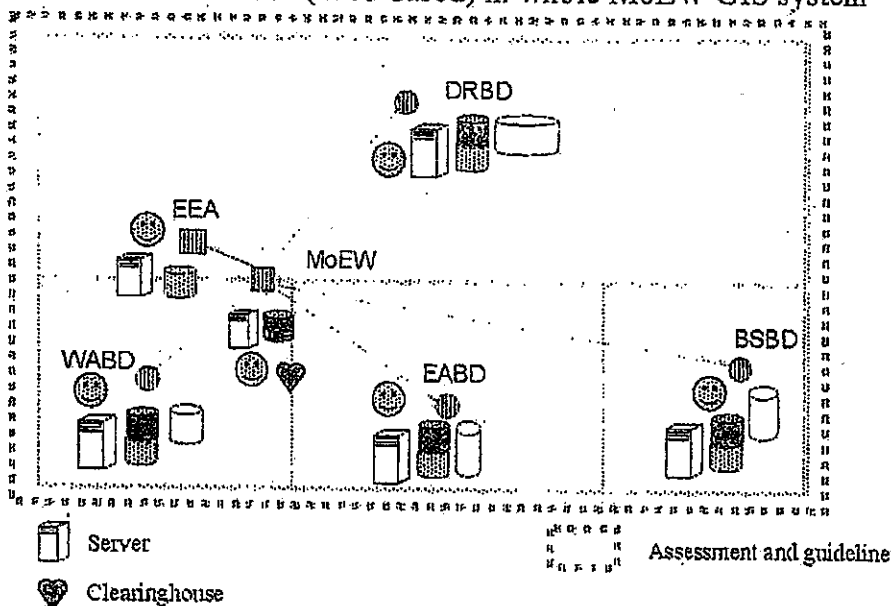
## Standalone + Basic Communication System (Homepage + link)

- Same data model and structure in core portion of GIS database
- Standalone + Basic communication (Homepage + link)
- Manual transfer of data



## Network-based + Advanced Communication System (Web-based GIS)

- Same data model and structure in core portion of GIS database
- Local network-based GIS system with server
- Advanced communication (Web-based) in whole MoEW GIS system



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## **Annex D**

Memorandum for the Study on Integrated Water Management in the Republic of Bulgaria, Sofia, 31 July, 2006 – Subject: GIS equipment and software required for the Study



MEMORANDUM

for

The Study on Integrated Water Management in the Republic of Bulgaria

-Sofia 31 July 2006-

**Subject: GIS equipment and software required for the Study,**

The Study Team agreed to propose a standard format of GIS-DB and required equipment for EABD, WABD and MoEW/EEA in the Minutes of Meetings on Inception Report for the Study agreed upon on June 13, 2006. Accordingly the Study Team has visited the four Basin Directorates and assessed the existing GIS-DB in accordance with the requirement of the EU-WFD, the requirement of the Study on basin management plans and the core portion that should be shared among the MoEW system. The Study Team has proposed MoEW a list of equipment and software and further activities required for GIS-DB of the MoEW system and MoEW has agreed.

1. GIS Equipment and Software:

The Study Team proposed to MoEW a basic plan of software and hardwares required for the Study to conduct the improvement of the GIS-DB including development of water quantity and water quality models for EABD and WABD, and the improvement of the condition related to GIS of MoEW/EEA in the beginning of July. Afterwards the Study Team conducted a series of discussions with EABD, WABD and MoEW on the proposed list of softwares and hardwares. On July 26 the Study Team and MoEW have agreed on the list of softwares and hardwares, which will be proposed for JICA Headquarters to provide to the Study. The list is attached.

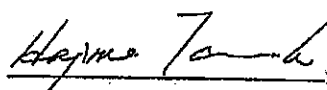
2. Further activities required for GIS-DB of the MoEW system:

As for further activities required for GIS DB of the MoEW system covering the four Basin Directorates, the Study team will conduct discussions with the C/P Group about the GIS system development of the MoEW system, and support MoEW to prepare a proposal for required measures to develop the appropriate system.

 31.07.06.  
Mr. Vladimir DONCHEV

Director

Water Directorate, MoEW

  
Mr. Hajime TANAKA

Deputy Team Leader

JICA Study Team

			MoEW	EEA	DRBD	BSBD	EABD	WABD	Total	Maintenance fee per year in EURO
ESRI	GIS Software	ArcEditor	0	0	0	0	1	1	2	2,600
	GIS Extension for analysts	Spatial Analyst +3D Analyst	0	1	0	0	1	1	3	2,400
	GIS Extension for info sharing	ArcPublisher	1	0	0	0	1	1	3	1,200
DHI	GIS Extension for MIKE11 software	Pollution Load Calculation & Time Series Analysis (MIKE BASIN BASIC)	0	0	0	0	1	1	2	1,700
	MIKE11 software	MIKE11 WQ enterprise	0	0	0	0	1	1	2	4,930
	Hardware +OS +BasicSoftware	PC +UPS + Windows XP Pro + MS Office Pro + AntiVirusSoftware	1	0	0	0	1	1	3	
	Total									12,830

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## **Annex E**

Minutes of Meeting on Interim Report for the Study on Integrated Water Management in the Republic of Bulgaria, Sofia, 24 January, 2007







MINUTES OF MEETING  
ON  
INTERIM REPORT  
FOR  
THE STUDY ON  
INTEGRATED WATER MANAGEMENT  
IN  
THE REPUBLIC OF BULGARIA

Sofia  
January 24, 2007

  
Mrs. Lubka KATCHAKOVA  
Deputy Minister  
Ministry of Environment and Water

  
Mr. SASABE Keiji  
Leader  
JICA Study Team

  
Mrs. Etelka CHERNAKOVA  
Acting Director,  
Donor Programmes Directorate  
Ministry of Economy and Energy

  
Mr. OI Hidetomi  
Leader  
JICA Headquarters Mission

## 1. Introduction

In accordance with the Scope of Works (hereinafter referred to as "S/W") and the Minutes of Meetings (hereinafter referred to as "M/M") for the Study on Integrated Water Management in the Republic of Bulgaria (hereinafter referred to as "the Study") agreed upon between the Ministry of Environment and Water (hereinafter referred to as "MoEW") and Japan International Cooperation Agency (hereinafter referred to as "JICA") on October 14, 2005, JICA Study Team (hereinafter referred to as "the Study Team") conducted Phase I Study from June to November 2006 and has compiled the results of the study in Interim Report. An electronic version of the Interim Report has been submitted to MoEW on December 28, 2006. The Study Team has started second fieldwork, a part of Phase II Study, on January 9, 2007 and submitted to MoEW 15 copies of printed version of the Interim Report on January 11.

A series of meeting on the Interim Report was held with personnel from MoEW, Executive Environment Agency (hereinafter referred to as "EEA"), East Aegean Sea River Basin Directorate (hereinafter referred to as "EABD"), and West Aegean Sea River Basin Directorate (hereinafter referred to as "WABD").

For confirmation of the understanding of the Interim Report, JICA Headquarters dispatched a mission headed by Mr. OI Hidetomi to Bulgaria on January 17, 2007. The members of the Steering Committee, the JICA Headquarters Mission and the Study Team held a meeting on January 22, 2007. The participants of the meeting are listed in Annex-1 of this document. During the meeting, the Study Team presented the Interim Report and discussions were held.

Through the series of meetings, several items were clarified and others were discussed in detail as shown below in "2. Discussion". As a result, the Bulgarian side, in principle, accepted the contents of the Interim Report.

## 2. Discussion

Major points of the discussion are summarized as follows:

### (1) Evaluation of the Capacity of MoEW, EEA, EABD and WABD

The Bulgarian side commented that the Interim Report did not include evaluation on the present capacity of personnel, equipment, finance, etc. and requested to make recommendation on the necessary capacity of MoEW, EEA, EABD and WABD for the planning and implementation of the requirements of WFD for water management.

The Study Team answered that such evaluation and recommendation would be made and discussed in the course of the Phase II Study.

### (2) Evaluation of the Quantity and Quality of Various Data in EABD and WABD

Answering to a comment, the Study Team commented that accumulation of sufficient volume of data with required quality is an important work and the evaluation of the data is indispensable in order to maintain proper data quality. The Study Team and counterparts will evaluate the data during the Study in order to establish the level of correctness and reliability of available data. Technical transfer on the evaluation will accordingly be conducted.

**(3) Groundwater**

The Bulgarian side commented that the Interim Report did not include study for groundwater that was an important component of the river basin management plan and requested that groundwater should be included as a part of the Study. The Bulgarian side confirmed its position that it would be impossible to elaborate the river basin management plans without including the study on groundwater (according to S/W). The Bulgarian side expressed its concern that if such a study on groundwater would not be carried out, this would threaten the outcome of the Study.

The Study Team explained that they concentrated on the study of surface water in the Phase I Study and that the study on groundwater for EABD and WABD would be conducted in the Phase II Study in order to elaborate the river basin management plan. Based on the preliminary analysis on existing conditions made during Phase I Study, the Study Team mentioned that a Japanese expert for groundwater would be necessary in order to satisfy the requirements and the necessity would be discussed with the JICA Headquarters.

**(4) Importance of Hydropower Sector in the Management Plan**

The Bulgarian side commented that the hydropower system especially in the basins of Struma and Mesta was very important considering the present issue of global warming and maximum use of renewable energy resources, and the situation of the halt of two units of nuclear power plant operation from January this year. The Study Team responded that this issue would be important relating to the water balance and would be well considered in Phase II.

**(5) Organizations for Basin Management**

Description on organizations for basin management will be corrected properly during the study in Phase II.

**(6) Collaborated Work**

Representatives from Danube River Basin Directorate (hereinafter referred to as "DRBD") and Black Sea River Basin Directorate (hereinafter referred to as "BSBD") expressed their wish to be involved in the mutual work between the Study Team and the Bulgarian side. The Study Team welcomed the offer and stressed the importance of joint work in the course of Phase II Study.

All the participants agreed necessity of the formulation of working groups for GIS and river basin management planning. The Study Team and the Bulgarian side will discuss the necessary structure of each working group.

**(7) Data expected to receive from the Other Institutions**

The Study Team explained that some data, e.g. data on dams and reservoirs and on irrigation, have not been provided yet. The Bulgarian side mentioned that the Deputy Minister of Economy and Energy would provide support for the required data provision upon receiving a written request from the Study Team.

**(8) GIS Database (GIS-DB)**

The Bulgarian side asked the Study Team whether the level of the developed and implemented GIS-DB in EABD and WABD, as the selected areas, and those of DRBD and BSBD would be different or the same.

The Study Team answered that the GIS-DB of EABD and WABD would be developed through the joint work between the Study Team and the counterparts. The GIS-DB of DRBD and BSBD, however, should be developed and implemented by themselves using the guidelines and a uniform format (matrix) developed by the Study Team in the course of the Study. The Study Team mentioned that the level of GIS-DB would thus be different at the end of the Study.

The Bulgarian side referred to the objectives of the study in the S/W (Development of GIS...for the whole country) and requested to strengthen the part of GIS-DB development in DRBD and BSBD. The Bulgarian side requested that minimum technical transfer on the utilization of guideline and evaluation of the established GIS-DB in DRBD and BSBD should be included in the Study. It was pointed out from the Bulgarian side that application of guidelines to be prepared in the later stage of the Study would be too late and the minimum technical transfer should be carried out starting as early as possible in the Study in order to achieve uniform state of GIS-DB development for the whole country.

The JICA Headquarters mission answered that the request would be conveyed to the JICA Headquarters.

In this connection, the Bulgarian side informed that a working group on GIS-DB including necessary experts from DRBD and BSBD would be established as soon as possible based on the structure to be proposed by the Study Team.

**(9) Network System for GIS**

The Bulgarian side requested the Study Team to prepare TOR, together with the counterparts, for the network system of GIS for the needs of MoEW, EEA and the four basin directorates. This network system will be developed by the Bulgarian side in the future. The JICA Headquarters mission answered that the preparation of TOR would be included in the present Study.

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## Annex-1

### LIST OF PARTICIPANTS TO THE MEETING

#### <Ministry of Environment and Water>

Ms. Lubka Katchakova Deputy Minister  
Ms. Nevyana Teneva Chief Expert  
Ms. Galina Balusheva Senior Expert  
Mr. Bozhidar Magerov Senior Expert  
Mr. Stefan Bogdantsaliev Expert

#### <Ministry of Economy and Energy>

Mr. Radoslav Stanolov Chief Expert

#### <Ministry of Regional Development and Public Works>

Mrs. Stefka Zakharyan Expert

#### <Executive Environment Agency>

Mr. Velcho Kuyumdjiev Expert  
Mrs. Krassimira Avramova Head of Monitoring Department

#### <East Aegean Sea River Basin Directorate>

Mr. Nikola Karnolski Director

#### <West Aegean Sea River Basin Directorate>

Mr. Vladimir Dinov Acting Director

#### <Black Sea River Basin Directorate>

Mr. Ventsislav Nikolov Director

#### <Danube River Basin Directorate>

Mrs. Tzvetanka Dimitrova Director

#### <JICA Headquarters Mission>

Mr. OI Hidetomi Leader  
Mr. HIRANO Junichi Study Planning

cc.

**<JICA Bulgaria Office>**

Mr. KOMORI Takeshi Resident Representative  
Ms. NAGAI Kimino Local Technical Coordinator

**<JICA Study Team>**

Mr. SASABE Keiji Leader  
Mr. TANAKA Hajime Deputy Leader/ River Basin Management Planner  
Mr. FURUKAWA Takashi Water Quality Management/ Monitoring Planner  
Mr. CHOI Jaeyoung GIS/ Database Specialist  
Mr. KITAMURA Tadanori Hydrological and Hydraulic Modeling Specialist  
Mr. Jorgen K. Jensen Water Quality Modeling Specialist



cc.



## **Annex F**

Minutes of Meeting on Draft Final Report for the Study on Integrated Water Management in the Republic of Bulgaria, Sofia, 1 February, 2008





MINUTES OF MEETINGS  
ON  
THE DRAFT FINAL REPORT  
FOR  
THE STUDY ON  
INTEGRATED WATER MANAGEMENT  
IN  
THE REPUBLIC OF BULGARIA

Sofia  
February 1, 2008



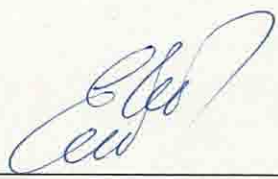
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Ms. Lubka KATCHAKOVA  
Deputy Minister  
Ministry of Environment and Water



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Mr. SASABE Keiji  
Leader  
Study Team  
Japan International Cooperation Agency



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Ms. Etelka CHERNAKOVA  
Head of Department,  
Donor Programmes and International  
Aid for Development Department  
Ministry of Economy and Energy



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Mr. NAGATA Kenji  
Leader  
Headquarters Mission  
Japan International Cooperation Agency

## 1. Introduction

In accordance with the Scope of Work (hereinafter referred to as "S/W") and the Minutes of Meeting on S/W (hereinafter referred to as "M/M") for the Study on Integrated Water Management in the Republic of Bulgaria (hereinafter referred to as "the Study") agreed upon between the Ministry of Environment and Water (hereinafter referred to as "MoEW") and Japan International Cooperation Agency (hereinafter referred to as "JICA") on October 14, 2005, JICA Study Team (hereinafter referred to as "the Study Team") has conducted the Study since May 2006. The Study Team submitted 30 copies of the Draft Final Report to MoEW on January 21, 2008.

A series of technical meetings on the Draft Final Report was held with personnel from MoEW, Executive Environment Agency (hereinafter referred to as "EEA"), East Aegean Sea River Basin Directorate (hereinafter referred to as "EABD"), and West Aegean Sea River Basin Directorate (hereinafter referred to as "WABD").

For confirmation of the understanding of the Draft Final Report, JICA Headquarters dispatched a mission headed by Mr. NAGATA Kenji to Bulgaria on January 24, 2008. MoEW, the JICA Headquarters Mission and the Study Team held a meeting with members of the Steering Committee on the Draft Final Report at Central Park Hotel on January 31, 2008. The meeting was presided by Ms. Lubka Katchakova, Deputy Minister of MoEW. During the meeting, the outline of the Draft Final Report was presented by the Study Team and was discussed by the participants, which are listed in Annex of this document.

Through the technical meetings and the Steering Committee meeting, several items were clarified and others were discussed in detail as shown in "2. Discussion" below. As a result, the members of the Steering Committee, in principle, accepted the contents of the Draft Final Report. Comments on the Draft Final Report shall be submitted to the Study Team by February 15, 2008. The Study Team shall prepare the Final Report considering the comments.

## 2. Discussion

Major points of the discussion are summarized as follows:

### (1) Strengthening of Organization for River Basin Management

MoEW and the Study Team confirmed that the river basin management organization both in the central level (Water Directorate of MoEW) and the regional level (four River Basin Directorates) should be strengthened through, for example, considerable increase (at least double) of the staff number, the capacity development, and corresponding increase of the budget. The way of strengthening the organization will be further studied by the Bulgarian side.

### (2) Future Studies relating to the River Basin Management to be conducted

Some Steering Committee members proposed and MoEW and the Study Team agreed to include in the Final Report a recommendation to conduct a water resources development study (river flow regulation study). The study will consider the regime of the river flow on the territory of Bulgaria, the water transfer and water use aspects. The study will assess the needs of additional hydro-technical facilities to be constructed as well as the restarting of construction

of the suspended ones as a part of the integrated water management in Bulgaria and to meet the challenges of global climate change.

**(3) Study on Integrated Water Management**

MoEW stated that the results of the Study would be considered by the four River Basin Directorates in the forthcoming process of the preparation of the River Basin Management Plans.

**(4) GIS Working Group**

MoEW agreed to the proposal of the Study Team that the GIS Working Group established in the course of the Study should continue its role with the leadership of MoEW in order to maintain and make further development of GIS-DB in a uniform manner. The Study Team stated that it would be included in the recommendation.

## **Annex**

### **LIST OF PARTICIPANTS TO THE MEETING**

#### **<Ministry of Environment and Water>**

Ms. Lubka Katchakova	Deputy Minister
Mr. Vladimir Donchev	Director, Water Directorate
Ms. Galina Balusheva	Senior Expert, Water Directorate

#### **<East Aegean Sea River Basin Directorate>**

Mr. Nikola Karnolski	Director
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#### **<West Aegean Sea River Basin Directorate>**

Mr. Vladimir Dinov	Director
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#### **<Black Sea River Basin Directorate>**

Mr. Ventsislav Nikolov	Director
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#### **<Danube River Basin Directorate>**

Ms. Tzvetanka Dimitrova	Director
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#### **<Ministry of Economy and Energy>**

Mr. Radoslav Stanolov	Chief Expert
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#### **<Ministry of Foreign Affairs>**

Mr. George Panaiotov	Deputy Director, Counsellor, Europe I Directorate
Ms. Natalia Misheva	Second Secretary, Asia, Australia and Oceania Directorate

#### **<Ministry of Regional Development and Public Works>**

Mr. Plamen Nikiforov	Director, Water Supply and Sewerage Directorate
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#### **<Ministry of Agriculture and Food Supply>**

Mr. Rasim Musa	Executive Director, Executive Agency for Hydromeliorations
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#### **<Dams and Cascades, National Electric Company>**

Mr. Ludmil Hadjiev	Chief Engineer
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Mr. Grigorov Civil Engineer

**<Irrigation Systems Company>**

Mr. Alexandar Tzvetkov Executive Director

Mr. Valentin Slavov Head of Department

**<University of Architecture, Civil Engineering & Geodesy>**

Mr. Stefan Modev Associate Professor, Hydraulic and Hydrology Department

**<Institute of Water Problems, Bulgarian Academy of Sciences>**

Mr. Jordan Kosturkov Head of Department, "Problems of Water Resources Quality"

**<JICA Headquarters Mission>**

Mr. NAGATA Kenji Leader

Ms. HATTORI Yoko Study Planning

**<JICA Bulgaria Office>**

Mr. KOMORI Takeshi Resident Representative

**<JICA Study Team>**

Mr. SASABE Keiji Leader

Mr. TANAKA Hajime Deputy Leader/ River Basin Management Planner

Mr. FURUKAWA Takashi Water Quality Management/ Monitoring Planner

Mr. KITAMURA Tadanori Hydrological and Hydraulic Modeling Specialist

Mr. Andrey Borrisov Interpreter

Handwritten signatures and initials in the bottom right corner.