

## WATER RESCUE

Water resources efficiency and conservative use in drinking water supply systems

**Interreg**  
**Greece-Bulgaria**  
**WATER RESCUE**



European Regional Development Fund

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<b>WP</b>	<b>6 Policy Recommendation</b>
<b>Deliverable</b> <i>Tool</i>	<b>6.4.2 Joint Water Quality Policy Recommendation</b> <i>Joint Deliverable</i>
<b>Sub-Deliverables</b> <b>integrated</b>	<b>D.6.1.2, D.6.2.2, D.6.3.2, D.6.4.2</b>
<b>Project Beneficiary</b> <b>No</b>	<b>PB4</b>
<b>Beneficiary</b> <b>Institution</b>	<b>Municipality of Kardzhali</b>

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The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Cooperation Programme Interreg V-A "Greece-Bulgaria 2014-2020".

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## Chapter 1. Introduction: The WATER RESCUE project in brief

### 1.1 The Project in brief

WATER RESCUE project's concept is based on the common cross-border (CB) water management problems in the two international river basin districts (RBDs) shared between Greece & Bulgaria (Struma-Strymonas; Maritsa-Evros). The common CB problems include water resources quality & quantity being at risk due to natural and human activities and climate change conditions. The consequence is that water bodies fail to meet the good ecological status (GES) (recorded in the river basin management plans-RBMP). In particular, drinking water faces significant risks due to the deteriorated water resources quality while at the same time significant water volume is lost in the water distribution networks (WDNs). The project aims at the sustainable and efficient management of drinking water supply by increasing drinking water use efficiency in WDNs and improving water quality in the whole water supply cycle (from the source and back to the environment). Good Ecological Status can be achieved by improving water quality and reducing water abstraction and can be maintained by taking climate change adaptation measures. The project focuses in drinking water supply management suffering from high Non-Revenue Water (NRW) levels and deteriorated water quality jeopardizing the drinking water consumers' safety and health and their quality of life. Urban water volumes end up to the sewerage networks while wastewater treatment plants are a pressure to water resources quality. Surface water bodies are both used for drinking water abstraction and are the final recipient of treated effluents. Thus, their ecological status is affected by both water quantities abstracted and water quality in the whole water supply cycle (from the resource to the water supply and the wastewater treatment plant and back to the environment).

### 1.2 Theme of the Project

WATER RESCUE project is expected to achieve Non-Revenue Water/water losses reduction by upgrading and adapting already developed methodologies, technologies and tools including Water Balance assessment and Performance Indicators, hydraulic simulation models, decision support systems and GIS tools. Additionally, WATER RESCUE is expected to achieve water quality improvement across the entire water supply chain (from the water intake point and the raw water treatment plant, back to the environment after the waste water treatment plant) through constant monitoring of water quality parameters in real time, water quality simulation models (including water age) and automatic chlorination systems on line and in line. Climate change impacts will be assessed to finally propose and adopt measures for climate change adaptation. WATER RESCUE has a clear innovative character since the methodologies and tools are integrated and do not tackle individual problems. It is the first time that integrated methodologies will be adapted to include the entire drinking water supply cycle. These methodologies/tools will serve as Early - Warning Systems both for water quantity and quality. WATER RESCUE results will improve drinking water management. At the same time as drinking water is involved, the consumers' safety and health are safeguarded and their quality of life is improved.

Non-Revenue Water reduction will increase water resources efficiency, since less water will be abstracted from surface and groundwater bodies and reduce energy consumption as water and energy are interconnected in water supply systems (water-energy nexus).

Drinking water quality will be improved through real time monitoring of water quality parameters across the entire water supply chain, from the water intake points, to the water treatment plant and the water distribution network, back to the environment through the wastewater treatment plant. Thus, drinking water quality will be safeguarded from its source up to the consumer's tap. As wastewater effluents return to water resources, their quality monitoring prevents water resources degradation due to this pressure.

Water and energy resources efficiency will be promoted and the ability of the cross-border area to adapt to climate change conditions will be improved as all possible natural and man-made pressures will be evaluated, including climate change conditions. Water saving will be accomplished through water losses reduction and increase of the environmental awareness of the public.

The quality of life is expected to be upgraded with special emphasis to the protection of the natural environment.

Joint policy recommendation guidelines and papers are to be developed. Good governance, transparency and participation of all stakeholders in the design, implementation and monitoring of these policies is expected. Know-how and technology transfer will take place not only among the beneficiaries but also in the stakeholders' network that will be developed.

### 1.3 Project Objectives

The project's main objective is the sustainable cross –border drinking water supply management aiming at water resources efficiency and conservative use through:

1. Adaptation of a joint methodological framework for water resources management (qualitatively and quantitatively) in relation to the climate change and the natural and human activities and reduction of the water resources vulnerability;
2. Increase water use efficiency through the reduction of Non-Revenue Water and water losses in the water supply networks by implementing measures tackling NRW causes;
3. Improve water quality and safety in the whole drinking water supply cycle, from the water resources to the water distribution network and back to the environment through the continuous monitoring of water quality parameters in real time and the in-line disinfection to reduce the risk of low chlorine residuals and excessive concentrations of THMs (toxic substances causing cancer);
4. Increase innovative technologies use through the integrated management of water resources including GIS-based applications; hydraulic simulation models & decision support systems;
5. Development of "green behavior", increase water saving & reduce water consumption through public awareness campaigns.

D6.2\_Joint Water Quality Policy Recommendation Joint Deliverable\_WATER RESCUE

WP	Task	Leader	Duration	European Regional Development Fund																																											
				Nov 2017	Dec 2017	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	June 2018	July 2018	Aug 2018	Sept 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	June 2019	July 2019	Aug 2019	Sept 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020	June 2020	July 2020	Aug 2020	Sept 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	June 2021
WP1: Project Management & Coordination	1.1 Preparation activities	LB	10/11/2017-9/11/2020																																												
	1.2 Project Management																																														
	1.3 Self evaluation																																														
	1.4 Steering committee meetings																																														
	1.5 Audit Costs																																														
WP2: Project Communication & Dissemination	2.1 Project Communication Plan	LB	10/11/2017-9/11/2020																																												
	2.2 Project Website																																														
	2.3 Publication & Dissemination Material																																														
	2.4 Awareness events																																														
	2.5 Final events Awareness Events																																														
WP3: Current Status Analysis & Assessment	3.1 Climate change impacts assessment	PB5	10/11/2017-9/11/2020																																												
	3.2 Water Audit																																														
	3.3 Water quality																																														
WP4: Common Methodology & Tools	4.1 Cross border water resources vulnerability assessment	PB3	10/11/2017-9/5/2020																																												
	4.2 Water use efficiency																																														
	4.3 Water quality																																														
WPS: Pilot Actions	5.1 Ex Ante evaluation	PB2	10/11/2017-9/11/2020																																												
	5.2 Pilot actions implementation																																														
	5.3 Workshops & transfer visits																																														
	5.4 Ex Post evaluation																																														
WP6: Policy Recommendation	6.1 Joint water efficiency policy recommendation	PB4	2/5/2019-9/11/2020																																												
	6.2 Joint water quality policy recommendation																																														

Figure 1.1. WATER RESCUE timetable

## 1.4 The Project structure and timetable

The project consists of six work packages:

- WP1: Project Management and Coordination
- WP2: Project Communication and Dissemination
- WP3: Current Status Analysis & Assessment
- WP4: Common Methodology and Tools
- WP5: Pilot Actions
- WP6: Policy Recommendation

The initial total project duration was 24 months but extension was given and the final total duration is 36 months, from 10/11/2017 to 9/11/2020 (Figure 1.1).

### 1.4 Project Beneficiaries

Lead Beneficiary is the Municipal Water and Sewerage Company of Komotini (Greece); Beneficiary 2 is the Municipal Water and Sewerage Company of Thermi (Greece); Beneficiary 3 is the University of Thessaly-Special Account Funds for Research-Department of Civil Engineering (Greece); Beneficiary 4 is the Municipality of Kardzhali (Bulgaria); Beneficiary 5 is the Municipality of Gotse Delchev (Bulgaria); and Beneficiary 6 is the Municipal Water and Sewerage Company of Thermaikos (Greece).

**Table 1.1.** WATER RESCUE beneficiaries

PB #	PP name	City	Country
PB1	Municipal Water Supply and Sewerage Company of Komotini	Komotini	Greece
PB2	Municipal Water Supply and Sewerage Company of Thermi	Thermi	Greece
PB3	University of Thessaly-Special Account Funds for Research-Department of Civil Engineering	Volos	Greece
PB4	Municipality of Kardzhali	Karddzhalı	Bulgaria
PB5	Municipality of Gotse Delchev	Gotse Delchev	Bulgaria
PB6	Municipal Water Supply and Sewerage Company of Thermaikos	Neoi Epivates	Greece

## 1.5 The present deliverable

### 1.5.1 subject of the present deliverable

The present deliverable refers to the WP6 “Policy recommendation”. WP6 is led by the Municipality of Kardzhali (PB4) and includes the policy recommendation for water use efficiency and for water quality. More specifically the present deliverable 6.2 “Joint water quality policy recommendation” where the policies implemented in both countries are presented, the existing gaps are identified, and the lessons learnt from the pilot actions of the beneficiaries are identified. Finally, the beneficiaries suggest policy recommendations for policy makers and stakeholders regarding water use efficiency.

### 1.5.2 The approach applied developing the present deliverable

PB4, Municipality of Kardzhali, with the assistance of PB3, University of Thessaly, took over the responsibility to prepare the joint deliverable of WP6.2. To do so, a questionnaire has been prepared by PB3 to gather the necessary data. The questionnaire consisted of the following chapters: (a) Policy recommendation objective; (b) Key stakeholders’ list; (c) current policy framework or approach; (d) identified gaps in current policy framework or approach; (e) lessons learnt, lesson from practice; (f) recommendations for policy makers; and

(g) social, economic, environmental benefits. All beneficiaries provided their deliverables to the WP leader, PB4, who properly elaborated the data in order to prepare the joint deliverable.

## Chapter 2. Overview of the Water Quality policy in Europe

### 2.1 Water Framework Directive

The Water Framework Directive 2000/60/EC is an EU directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies. It is a framework in the sense that it prescribes steps to reach the common goal rather than adopting the more traditional limit value approach. The Directive's aim for 'good status' for all water bodies will not be achieved, with 47% of EU water bodies covered by the Directive failing to achieve the aim.

The Directive aims for 'good status' for all ground and surface waters (rivers, lakes, transitional waters, and coastal waters) in the EU.

The ecological and chemical status of surface waters are assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora)
- Hydromorphological quality such as river bank structure, river continuity or substrate of the river bed
- Physical-chemical quality such as temperature, oxygenation and nutrient conditions
- Chemical quality that refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. If even one such concentration is exceeded, the water body will not be classed as having a "good ecological status".

One important aspect of the Water Framework Directive is the introduction of River Basin Districts. These areas have been designated, not according to administrative or political boundaries, but rather according to the river basin (the spatial catchment area of the river) as a natural geographical and hydrological unit. As rivers often cross national borders, representatives from several Member States have to co-operate and work together for the management of the basin (so-called transboundary basins). They are managed according to River Basin Management Plans, which should provide a clear indication of the way the objectives set for the river basin are to be reached within the required timescale. They should be updated every six years.

To facilitate data recoding, each stretch of water is given a "Water Framework Directive ID" ("WFDID" or "Waterbody ID").

### 2.2 Drinking Water Directive

On 16 December 2020, the European Parliament formally adopted the revised Drinking Water Directive. The Directive will enter in force on 12 January 2021, and Member States will have two years to transpose it into national legislation.

The Drinking Water Directive (Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerns the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean.

When translating the Drinking Water Directive into their own national legislation, Member States of the European Union can include additional requirements e.g. regulate additional substances that are relevant within their territory or set higher standards. Member States are not allowed, nevertheless, to set lower standards as the level of protection of human health should be the same within the whole European Union.

Member States may, for a limited time depart from chemical quality standards specified in the Directive (Annex I). This process is called "derogation". Derogations can be granted, provided it does not constitute a potential danger to human health and provided that the supply of water intended for human consumption in the area concerned cannot be maintained by any other reasonable means.



The Directive also requires providing regular information to consumers. In addition, drinking water quality has to be reported to the European Commission every three years. The scope of reporting is set out in the Directive. The Commission assesses the results of water quality monitoring against the standards in the Drinking Water Directive and after each reporting cycle produces a synthesis report, which summarizes the quality of drinking water and its improvement at a European level.

Further principles laid in the Directive are:

- Planning
- Regulation (obligations of the Member States and the Commission)
- Monitoring
- Information and Reporting

## Chapter 3. Current policy framework in Water quality in Bulgaria and Greece

### 3.1 Bulgaria

The state policy on water management aims to achieve and maintain good status of all groundwater, surface and sea water, as a resource of special importance for life on the planet, as well as limiting the harmful effects on human life and health, environment, cultural heritage and economic activity.

At the national level, the water management policy is implemented by the Ministry, assisted by the Water Management Directorate, and at the basin level - by 4 Basin Directorates, with 15 Regional Inspectorates of Environment and Water monitoring and control of wastewater in the boundaries of their respective territorial scope. The water management policy is aimed at the development and implementation of River Basin Management Plans as a basic planning document for integrated water management and the Marine Strategy; providing sufficient quantity and quality of water for the needs of the population, the economy and ecosystems - continuity of water supply and reduction of the quantities of seized and used water for efficiency of water consumption and management as an economic resource; control of wastewater discharges and development of the monitoring system; reduction of adverse climate impacts - assessment of the threat and risk of floods, identification of areas with significant potential risk of floods, development and implementation of Flood Risk Management Plans, taking specific preventive and protective measures and measures for preparedness of the competent authorities and the population; financing of sustainable investments in ecological water supply and sewerage infrastructure.

Water management is carried out in accordance with the legislation of the European Community and national legislation - Law on Environmental Protection, Law on Water, Regulations, National Strategic and Planning Documents - National Strategy for Management and Development of the Water Sector, River Management Plans basins, Flood risk management plans, Marine strategy, national programs in the field of water protection and sustainable development.

Bulgaria is a party to several international conventions in the field of water, including the Convention on Cooperation in the Protection and Sustainable Use of the Danube River, the Convention on the Protection of the Black Sea against Pollution and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

### 3.2 Greece

The policy framework for water quality is based on the Water Framework Directive 2000/60/EC and especially for drinking water on the Drinking Water Directive 98/83/EC and its amendment. Greece, as an EU member state, implements all European Directives. Specifically, the Law 3199/2003 transposed the WFD2000/60 to the Greek legislation and the Presidential Decree 51/2007 was the main legislative tool for its implementation.

Greece, as an EU Member State, implements Drinking Water Directive (98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerning the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is safe and clean. The Drinking Water Directive has been revised on December 2020, which was set in force on 12 January 2021. Member States have two years to transpose the revised directive to their national legislation.

In Greece the legislation in place regarding drinking water quality is the JMD "Quality of water for human consumption in compliance with the provisions of Directive 98/83 / EC of the Council of the European Union of 3 November 1998 as amended by Directive (EU) 2015/1787 (L260, 7.10.2015)". Based on this JMD the

parametric values of chemical and microbiological parameters are set and sampling frequency is determined. The parameters to be monitored are allocated in two groups, group A and group B. The monitoring of these parameters is set according to the water volume produced or the number of people supplied with water. Additionally, at national level the following Ministerial Decisions are in force regarding water quality:

- Ministerial Decision 140384/2011 (Official Gazette of the Greek Republic 2017B/9-9-2011) regarding the Determination of the national monitoring network the quality and quantity of the water systems;
- Ministerial Decision 1811/2011 (Official Gazette of the Greek Republic 3322/30-12-2011) for the determination of the maximum allowable concentrations of pollutants in groundwater;
- Joint Ministerial Decision 51354/2641/E103/2010 (Official Gazette of the Greek Republic 1909B/8-12-2010) for the determination of the Environmental Quality Standards for the concentrations of pollutants in surface waters (according to the Directive 2008/105/EC) and its amendment Ministerial Decision 170766/2016 (Official Gazette of the Greek Republic 69B/22-1-2016);
- Law 3199/2003 "Protection and management of water - Harmonization with Directive 2000/60 / EC of the European Parliament and of the Council of 23 October 2000" (Official Gazette of the Greek Republic 280A/ 9-12-2003)
- Presidential Decree 51/2007 - Establishing measures and procedures for the integrated protection and management of water in accordance with the provisions of Directive 2000/60 / EC "establishing a framework for Community action in the field of water policy" of the European Parliament and of the Council of 23 October 2000.

The Ministry of Health has issued a circular for taking measures to ensure the quality of drinking water in cases of emergencies and natural disasters ΔΥΓ2/οικ. 9283/2014.

### 3.3 Key stakeholders' list

The key stakeholders for drinking water quality in Greece is the Ministry of Health and the Ministry of Environment and Energy through its General Secretariat for natural environment and Water. At regional level, the Water Directorates of the Decentralized Regional Authorities apply the national policy at regional level. The Regional Directorates for Public Health are responsible for the preservation and improvement of the health and well-being of the population. The Directorates of public health are responsible for gathering drinking water quality data from the water services providers. The two biggest water utilities (EYDAP S.A. serving the greater Athens area and EYATH S.A. serving the city of Thessaloniki), all the Municipal Enterprises of Water Supply and Sewerage and the Municipal Water and Sanitation Departments of the smaller municipalities are responsible for the provision of drinking water services to the public. The Hellenic Association of Municipal Enterprises for Water Supply and Sewerage (EDEYA) and the Hellenic Water Association are recognized as national organizations. At European level, the stakeholders that have been recognized include the European Parliament, the European Association of National Associations of Water Utilities (EurEau), Water Europe, DG Environment, the International Water Association (IWA) and the European Environmental Bureau (EEB).

The main responsibilities for water management and water supply and sewerage in Bulgaria are divided between the following institutions:

The Ministry of Regional Development and Public Works is responsible for the overall policy related to the design, construction and operation of water supply and sewerage systems in the country. The Minister represents the state in the water supply and sewerage companies with over 50% state share. The Ministry

also coordinates the activities of water associations and provides methodological guidance on the preparation of master plans for water supply and sewerage.

The Ministry of Environment and Water (MoEW) is responsible for the management and allocation of water resources at the national level. The Minister issues permits for water abstraction of mineral water - exclusive state property. The MoEW is also responsible for the protection of the environment and the implementation of the Operational Program Environment, which finances the water supply and sewerage infrastructure. The Council of Ministers defines the state policy in water supply and sewerage as part of the water policy of the country and the National Strategy for Development and Management of the Water Sector in Bulgaria. The Council of Ministers adopts a Strategy for development and management of the water supply and sewerage sector in Bulgaria for a period of at least 10 years. The strategy defines the main goals, priorities, stages and the necessary resources and sources of financing for the construction

and development of water supply and sewerage systems and to improve the quality of water supply and sewerage services. The policy in the water sector is implemented by: 1. The Minister of Regional Development and Public Works, 2. Municipal councils and mayors of municipalities.

The Ministry of Health is responsible for the control of the quality of water intended for drinking and domestic use, the quality of mineral water intended for drinking or used for prophylactic, therapeutic and hygienic purposes, including bottled mineral water in the commercial network and the quality of water intended for bathing.

The basin directorates perform water management at the basin level. There are four basin directorates: (i) Danube-Pleven Basin Directorate, (ii) Black Sea Basin Directorate - Varna, (iii) West Aegean-Blagoevgrad Basin Directorate and (iv) Eastern Basin Directorate.

Aegean Sea Basin Directorate - Plovdiv. The directorates develop river basin management plans and flood risk management plans. They are also responsible for issuing permits for use and water abstraction, for monitoring compliance with the parameters set out in these permits, for controlling activities in riverbeds and for monitoring the quantity and quality of water. Their water management is based on basin principles.

Water associations are non-profit legal entities. They manage water supply and sewerage systems within a certain territory in cases where the ownership of water supply and sewerage is distributed between the state and one or more municipalities or between several municipalities. If the water supply and sewerage system, which falls within the specified territory, is owned by one municipality, the management is carried out by the municipal council.

The governing bodies of a water association include a General Assembly, which consists of representatives of the state (regional governor) and the municipality (s), with the chairman being the regional governor. In cases where the state and more than one municipality participate in the Water Association, the state is entitled to 35 percent of the votes, and the remaining 65 percent of the votes are distributed among all municipalities in proportion to their population. The necessary funds for the activity of the water associations are provided by the state and the municipalities according to the ratio of their votes.

With regard to the Water Act, water associations are responsible for the preparation of regional master plans and investment programs attached to the plans.

The assignment and approval of these specific Master Plan is done by the Ministry of Regional Development and Public Works. The regional master plans are adopted and approved by the Ministry of Regional Development and Public Works only after they are approved by the respective Water and Sewerage Association or the Municipal Council.

The Water Supply and Sewerage Companies (HCS) (called Water Supply and Sewerage, SCC, VKTV or INFRASTROY in the Central Region) are responsible for the operation, management and maintenance of water supply and sewerage facilities in the settlements, as well as the provision of water supply and sewerage services to consumers. Water supply and sewerage is a commercial, state or municipal company - a legal entity that has concluded a contract with the chairman of the respective water supply and sewerage association or with the mayor of the respective municipality. The term of the contract with Water and Sewerage, concluded in accordance with the Water Act, may not be longer than 10 years, provided that it does not include an obligation for Water and Sewerage to build a new water and sewerage infrastructure; or 15 years if it obliges the WSSC to undertake the construction of new infrastructure. In all other cases, the procedure and the selection of a water supply and sewerage operator, as well as the signing of the contract are carried out in accordance with the Concessions Act.

The municipalities are direct beneficiaries under OP "Environment". The mayor of a municipality develops and implements the policies related to planning, management, construction, reconstruction and modernization of water supply and sewerage networks and facilities, which are municipal property.

The municipal councils control the municipal participation in water supply and sewerage companies (in those companies in which the municipalities have shares). They also endorse municipal development plans and mayoral statements on business plans developed by the WSSC.

The State Commission for Energy and Water Regulation (SEWRC) is responsible for regulating the tariffs, availability and quality of water supply and sewerage services under the Water Supply and Sewerage Services Regulation Act.

The Executive Environment Agency under the Minister of Environment and Water manages the National Environmental Monitoring System. The main responsible water management institutions in Greece and Bulgaria, as EU Member States, overlap, as required by the Water Framework Directive (WFD 2000/60 / EC).

### 3.4 Identified gaps in existing policy framework

-Related to drinking water quality

The legislation for drinking water quality is very strict and water utilities comply with it. It foresees the water quality parameters that have to be monitored regularly and it sets the sampling frequencies. However, the gap identified is that although drinking water quality is achieved for the public, in case of an unexpected event, drinking water quality can be compromised. For example, in case of natural disasters and extreme weather events the legislation has foreseen continuous samplings to ensure drinking water safety. However, the time needed for the sampling and analysis process cannot guarantee the on-time detection of a pollution or contamination event. Therefore, there is a gap related to the preventive measures that water utilities can take in order to timely detect contamination phenomena. However, the identified gaps have to do with proactive measures and early warning systems. For example, in case of natural disasters and extreme weather events the legislation has foreseen continuous samplings to ensure drinking water safety. However, the time needed for the sampling and analysis process cannot guarantee the on-time detection of a pollution or contamination event. Therefore, there is a gap related to the preventive measures that water utilities can take.

Related to disinfection practices

Another identified gap refers to disinfection practices. Normally, water utilities are obliged by law to perform disinfection in drinking water. Disinfection usually takes place in water tanks in such a way that adequate residual chlorine concentration is detected at the dead-ends of the water distribution networks. However, chlorination at the tanks means that high chlorine concentrations are injected to water and the consumers

who are located near the tanks consume higher chlorine concentrations and probably disinfection by-products, while on the other hand the consumers who are located at remote points of the network consume the minimum residual chlorine concentrations. In this way the water utility consumes higher chlorine mass as indicated in several publications. Inline chlorination boosters are used internationally to solve this problem and to achieve a smoother chlorine profile while at the same time less chlorine quantity is used and efficient chlorination takes place. In this way, the formation of disinfection by-products is controlled. In order to timely detect contamination phenomena.

Related to sustainability of water management

Sustainability features in water supply, that is to say, the three-fold goals of economic feasibility, social responsibility and environmental integrity, is linked to the purpose of water use. On the supply side, it is fundamental to enhance operation and maintenance capabilities of water utilities, reducing non-revenue water (NRW), leakages, and energy use, as well as improving the capacity of the workforce to understand and operate the system.

But It is also necessary to ensure cost-recovery through a fair tariff system and “intelligent” investment planning. The gap was identified that full water costing procedure is not directly related to water use efficiency. The adoption of water efficient technology can considerably reduce water consumption. Another gap that funding programmes are not directly related to water use efficiency, was also discovered.

### 3.5 Lessons learnt from practice

During the implementation of the WATER RESCUE project, the beneficiaries implemented pilot actions related to water quality and reduction of water losses. In particular, the pilot activities are related to the monitoring of water quality by appropriate devices and the efficient chlorination of drinking water by means of automated chlorination devices.

A product has also been developed in terms of water quality. In particular, problems with the quality of water resources and the quality of drinking water are presented in this product and measures are given to protect both water resources and drinking water.

With the implementation of the project "Water Rescue" the common cross-border problems with water management in the two international regions of the river basins, shared between Greece and Bulgaria (Struma-Strimona, Maritsa-Evros) were presented. Common problems include the quality and quantity of water resources that are at risk due to natural and human activities and climatic conditions. As a result, the water bodies do not meet the good ecological status (EPA) (recorded in the river basin management plans - RBMP). In particular, drinking water faces significant risks due to the deteriorating quality of water resources, while significant water volume is lost in water distribution networks (WDN). The beneficiaries implemented pilot actions for sustainable and efficient management of drinking water supply by increasing the efficiency of drinking water use in WDNs and improving water quality throughout the water supply cycle - WSC (from source and back to the environment). The volume of coastal water ends up in the sewerage networks, there is pressure on the quality of water resources. Surface water bodies are used to produce drinking water.

Specific conclusions were made for Greece and Bulgaria- the priority gaps to address:

- Absence of specific national or regional policy on water use efficiency;
- Lack of quantitative targets for water efficiency such as for NRW or water losses levels;
- Although the measures included in the Programmes of Measures of the River Basin Management Plans include the reduction of water losses, there are no specific activities described related to water use efficiency;

- Lack of national or regional data on water use efficiency with the exception of scientific studies.



## Chapter 4. Recommendations for policy makers and stakeholders

### 4.1 Recommendations

Policy recommendations regarding drinking water quality include:

- Water quality monitoring practices should be developed according to the needs and characteristics of the water utilities;
- Use the latest scientific knowledge regarding drinking water quality monitoring and chlorination;
- Use the most cost-effective technologies;
- Take measures to reduce drinking water contamination phenomena e.g. establish risk prevention tools such as Water Safety Plans;
- Provide funding for pilot activities related to the continuous monitoring of drinking water from the source to the consumers' taps, installation of inline chlorination boosters, etc.

Systematic measures should be undertaken to reduce losses.

The measures proposed for reducing real/physical losses are as follows:

- Replacement of old water transmission (external) mains.
- Replacement of old water distribution pipelines and the service connections to them
- Timely repair of failures on the water pipelines.
- Systematic detection, localization and repair of leakages (breakdowns)

The activities necessary for reducing commercial losses are:

- Installation of water meters on all water transmission mains after the water sources.
- Installation of water meters on feeding pipes of reservoirs
- Implementation of the programme for verification and replacement of water meters of domestic consumers.
- Detection and interruption of unauthorised water connections.

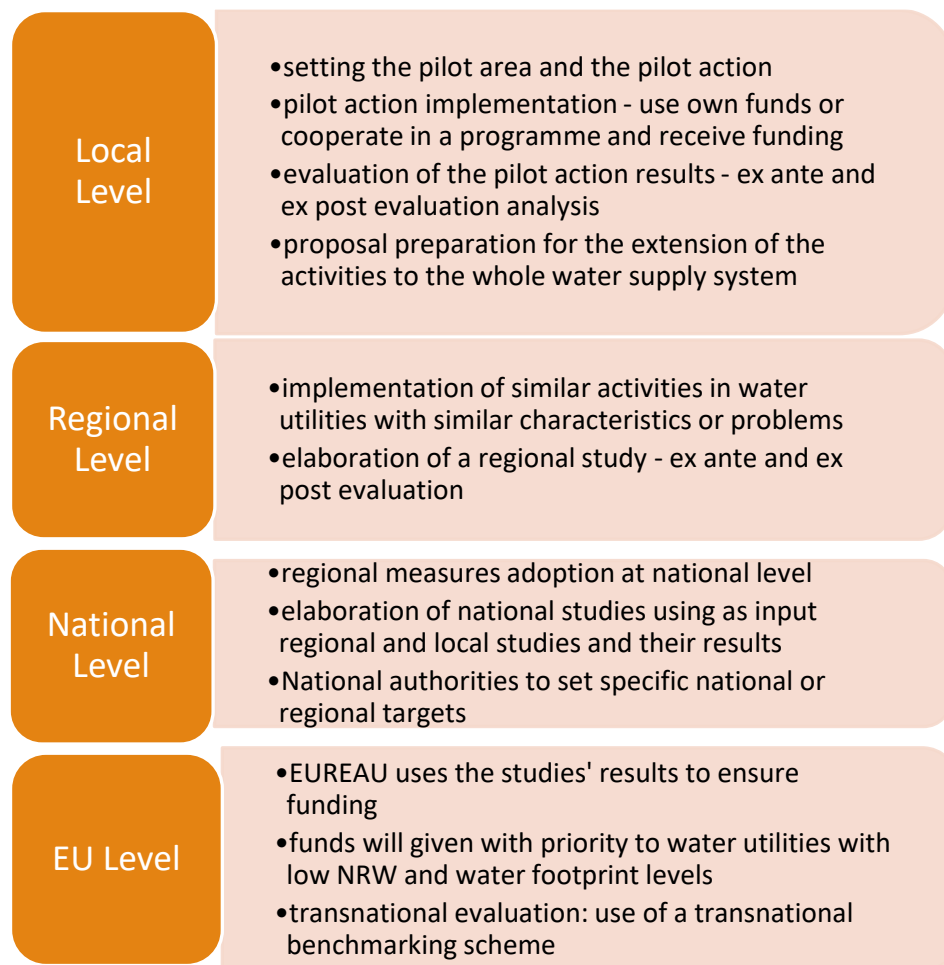
Drinking water quality is monitored through samples and analyses and thus, in case of contamination, the contaminated water is already consumed by the public. Tools and techniques such as online monitoring reduce the time needed to detect any potential contamination. Also, effective and efficient proactive plans such as HACCP or Water Safety Plans are not yet implemented in Greece. Another identified gap refers to disinfection practices. Normally, water utilities are obliged by law to perform disinfection in drinking water. Disinfection usually takes place in water tanks in such a way that adequate residual chlorine concentration is detected at the dead-ends of the water distribution networks. However, chlorination at the tanks means that high chlorine concentrations are injected to water and the consumers who are located near the tanks consume higher chlorine concentrations and probably disinfection by-products, while on the other hand the consumers who are located at remote points of the network consume the minimum residual chlorine concentrations. In this way the water utility consumes higher chlorine mass as indicated in several publications. Inline chlorination boosters are used internationally to solve this problem and to achieve a smoother chlorine profile while at the same time less chlorine quantity is used and efficient chlorination takes place. In this way, the formation of disinfection by-products is controlled.



The distribution of the recommendations among the management levels are shown in the figure 2 below.

The funding sources of the different management levels are as follows:

Local level	Regional resources or national resources and/or own funds
Regional level	Regional Operational Programme or national funds
National Level	National funds, e.g. sectoral from the ministries involved
EU level	from the EU



**Figure2.** Policy recommendations in the form of an action plan for water utilities at local, regional, national and EU level

## 4.2 Challenges

The main challenge of the project implementation is the created joint innovative methodological approaches, technologies and tools with which the beneficiaries to address the problems of drinking water management, taking into account both human and natural pressures, including climate change.

These methodologies, which serve as early warning systems, were tested in pilot areas and identified the results and lessons learned. The results of the water supply had a positive impact and provided guidelines for

solving important common problems with water resources management, to achieve the goals set by the RBMP and to achieve economic and tourism development through improved water quality and quantity.

The added value of the project for the region is the water resources used for drinking and domestic water supply, through efficient use of water resources (reduced NRW) and ensuring water quality throughout the water supply chain. Water efficiency has a positive impact on the environment (not only water, but also energy efficiency, & water footprint).

### 4.3 Social, Economic, Environmental Benefits

Improving the quality of drinking water is of great importance to people as they have access to safe drinking water. Protecting the quality of water resources is closely linked to the benefits for the environment, as water resources are used for many purposes, including entertainment. The economic benefits are related to the reduced resources needed to restore ecosystems and achieve better water quality. As environmental costs are part of the total cost of water, the reduced costs associated with improving the quality of water resources will benefit the public and water consumers in general.

## References

## Appendix A: Beneficiaries' reports

## WATER RESCUE

Water resources efficiency and conservative use in drinking water supply systems

**Interreg**  
**Greece-Bulgaria**  
**WATER RESCUE**  
European Regional Development Fund



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**WP**                      **6 Policy Recommendation**

**Deliverable**                      **6.1.2 Joint Water Quality Policy Recommendation**  
*Tool*                                      *Questionnaire*

**Project Beneficiary**    **PB1**  
**No**

**Beneficiary Institution**                      **Municipal Water Supply and Sewerage Company of Komotini**

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**Name of the organization/institution: Municipal Water Supply and Sewerage Company of Komotini**

**Beneficiary number: PB1**

## 1 Policy Recommendation Objective

For the Municipal Water Supply and Sewerage Company of Komotini (DEYA Komotini) the objective of the policy recommendation is the need for the improvement of an existing policy and the introduction of the use of risk management tools.

## 2 Key Stakeholders List

The stakeholders related to water use efficiency are the following:

- At National level: the General Secretariat for Natural Environment and Water in the Ministry of Environment and Energy, the Ministry of Health and EDEYA
- At regional level: the Water Directorate of the Decentralized Regional Authority of Eastern Macedonia and Thrace and the Directorate of Public Health of the Region of Thrace
- At local level: the water utilities in the Regional Unit of Rodopi.

Below we present a list of the key stakeholders in the area of Rodopi and their email addresses:

**Table 1.** Key stakeholders

	<b>Stakeholder's organization</b>	<b>Email address</b>
Local Level	Iasmos municipality	politis@iasmos.gr
	Arriana municipality, Department of Water Supply	filyra@0924.syzefxis.gov.gr
	Marronia – Sappes Municipality, Department of Technical Services, Environment and Civil Protection	dimostopo@gmail.com
Regional Level	Water Directorate, Decentralized Regional Authority of Eastern Macedonia & Thrace	dy-amt@damt.gov.gr
	General Directorate of Public Health and Social Care, Region of Eastern Macedonia & Thrace	gddy@pamth.gov.gr
	Directorate of Environment and Spatial Planning, Region of Eastern Macedonia & Thrace	dphs@pamth.gov.gr
National Level	Ministry of Health, General Secretariat of Public Health	gddy@moh.gov.gr
	General Secretariat for Natural Environment and Water, Ministry of Environment and Energy	grggper@ypen.gr
	Hellenic Association of the Municipal Water Supply and Sewerage Companies (EDEYA)	info@edeya.gr

## 3 Current Policy Framework or approach

Water resources quality falls under the legislative framework of the Water Framework Directive and the legislative documents transposing the WFD to the Greek legislative framework. Drinking water quality falls under the Drinking Water Directive and the legislation transposing it to the Greek legislative framework. In Greece the most important legislative documents related to drinking water quality are the following:

- ✚ Joint Ministerial Decision (JMD) Γ1(δ)/ ΓΠ οικ.67322/2017 (Official Gazette 3282/B/19-9-2017) "Quality of water for human consumption in compliance with the provisions of Directive 98/83 / EC of the Council of the European Union of 3 November 1998 as amended by Directive (EU) 2015/1787 (L260, 7.10.2015)"
- ✚ Circular (Ministry of Health) Δ1δ/ΓΠ οικ.8565/16-11-2017 on «Taking measures for the assurance of public health after severe weather and flood phenomena”
- ✚ Circular (Ministry of Health) Δ1δ/ΓΠ οικ.16330/28-02-2019 on «Taking measures for the assurance of drinking water quality after intense rainfall and floods”
- ✚ Circular (Ministry of Health) Δ1(δ)/Γ.Π.οικ16518/27.2.2018 on “Monitoring water intended for human consumption”
- ✚ Circular (Ministry of Health) Γ1δ/ Γ.Π. 37193/19.6.2017 on “Residual chlorine at the water intended for human consumption”

In Greece the water utilities have to monitor specific quality parameters at the consumers’ taps regularly, as defined in the legislation. The samplings that have to be taken are determined at the JMD and depend on the water volume abstracted or the number of consumers supplied with water at each water supply zone. The directorates of public health from the regional authorities are responsible for the monitoring of the water quality at the water sources. They report their results to the Ministry of Health. The water utilities report also the results of the water quality analyses to the Ministry of Health, which reports the results for the whole country to the European Commission every three years. Water utilities are obliged by law to perform chlorination to drinking water in such a way that residual chlorine of 0,2mg/L is detected at the most remote parts of their distribution networks.

#### 4 Identified gaps in current policy framework or approach

The gaps identified regarding drinking water quality refer only to contamination events due to emergency situations that cannot be detected timely. There is no policy framework regarding online monitoring, or the development of risk management tools. Water Safety Plans are foreseen for big water utilities as part of the programmes of measures of the River Basin Management Plans.

#### 5 Lessons learnt, lessons from practice

DEYA Komotini has not implemented a pilot action related to water quality and therefore there are no lessons learnt.

#### 6 Recommendations for policy makers

DEYA of Komotini suggests the following recommendations for stakeholders, policy makers and water utilities:

- ✓ Install online monitoring stations at least at water resources providing water intended for human consumption;
- ✓ Educate water utilities staff to use technological advanced tools;
- ✓ Take measures to reduce water pollution specially to surface waters;
- ✓ Take preventive measures to ensure good quality water at water intake points;
- ✓ Fund pilot activities related to water quality online monitoring.



## 7 Social, Economic, Environmental Benefits

The provision of safe drinking water is of great importance for the public health. Thus, all recommendations having to do with the assurance of good quality drinking water, provide social benefits to the public. Water resources quality protection is closely linked to environmental benefits, as water resources are used for many uses including recreational use. Protecting water resources from pollution avoids any financial consequences related to cleaning water from pollutants or paying fees due to pollution caused.

## 8 Comments

No comments.

## Appendix A:

## WATER RESCUE

Water resources efficiency and conservative use in drinking water supply systems

**Interreg**  
**Greece-Bulgaria**  
**WATER RESCUE**  
European Regional Development Fund



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**WP**                      **6 Policy Recommendation**

**Deliverable**                      **6.2.2 Joint Water Quality Policy Recommendation**  
*Tool*                                      *Questionnaire*

**Project Beneficiary**   **PB2**  
**No**

**Beneficiary Institution**                      **Municipal Water Supply and Sewerage Company of Thermi**

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**Name of the organization/institution: Municipal Water Supply and Sewerage Company of Thermi**

**Beneficiary number: PB2**

## 1 Policy Recommendation Objective

The Municipal Water Supply and Sewerage Company of Thermi provides water supply, sewerage and wastewater treatment services to the inhabitants of Thermi Municipality. The objective of the policy recommendation is the improvement of an existing policy. The legislation for drinking water is very strict in Greece and it follows the guidelines set by the European legislation through its Directives.

## 2 Key Stakeholders List

National stakeholders related to water quality are the Greek Ministry of Health and the Ministry of Environment and Energy and especially its General Secretariat for Natural Environment and Water and the Hellenic Association of Municipal Water Supply and Sewerage Companies. Also at national level, the water utilities of the two major cities, Athens and Thessaloniki can be included: EYDAP S.A. and EYATH S.A.

The Water Directorate of the Decentralized Regional Authority of Macedonia and Thrace is the competent authority regarding water issues. Also, the Water Department of the Region of Central Macedonia is a regional stakeholder along with the Directorate of Public Health and Social Care.

At local level, the board of directors of DEYA Thermi, customers, water users, associations of consumers, etc. are stakeholders. All water utilities in the Regional District of Thessaloniki are considered as local stakeholders.

Below there is the list with their email addresses:

**Table 1.** Key stakeholders for water use efficiency

	<b>Stakeholder's organization</b>	<b>Email address</b>
Local Level	EYATH S.A.	info@eyath.gr
	Municipal Water Supply and Sewerage Company of Lagkadas	info@deyalagada.gr
	Municipal Water Supply and Sewerage Company of Pilaia - Hortiati	info@deyaph.gr
	Municipal Water Supply and Sewerage Company of Volvi	info@deyavolvis.gr
	Municipal Water Supply and Sewerage Company of Delta	info@deyadelta.gr
	Municipal Water Supply and Sewerage Company of Thermaikos	logistirio1@deyath.gr
	Municipal Water Supply and Sewerage Company of Chalkidona	halkidona@deyaha.gr
	Municipal Water Supply and Sewerage Company of Oreokastro	deyaoraiokastrou@gmail.com
Regional Level	Water Directorate, Decentralized Regional Authority of Macedonia & Thrace	dy-km@damt.gov.gr
	Directorate of Public Health and Social Care, Regional Authority of Central Macedonia	dykm@pkm.gov.gr

	Department of Environment and Water, Directorate of Development and Environment, Regional Authority of Central Macedonia	danapt@pkm.gov.gr
National Level	Hellenic Association of the Municipal Water Supply and Sewerage Companies (EDEYA)	info@edeya.gr
	Ministry of Health	gddy@moh.gov.gr
	Ministry of Environment and Energy, General Secretariat for Natural Environment and Water	grggper@ypen.gr

### 3 Current Policy Framework or approach

The policy framework for water quality is based on the Water Framework Directive 2000/60/EC and especially for drinking water on the Drinking Water Directive 98/83/EC and its amendment. Greece, as an EU member state, implements all European Directives. Specifically, the Law 3199/2003 transposed the WFD2000/60 to the Greek legislation and the Presidential Decree 51/2007 was the main legislative tool for its implementation. There are other legislative documents related to surface water and groundwater protection such as:

- Joint Ministerial Decision 161690/1335/1997 (Official Gazette 519B/25-6-1997) transposing the Directive 91/676 regarding «the protection on water from nitrate pollution from agricultural use»
- Joint Ministerial Decision (Official Gazette 2017 B/ 09.09.2011) for the establishment of a national monitoring network for the monitoring of the quality and the quantity of water resources
- Joint Ministerial Decision 39626/2208/E130 (Official Gazette 2075/25.9.2009) for the determination of measures for the protection of groundwater resources in compliance with the Directive 2006/118/EC
- Joint Ministerial Decision 51354/2641/E103 (Official Gazette 1909/8.12.2010) for the determination of Environmental Quality Standards for the concentrations of pollutants and priority substances in surface water sources in compliance with the Directive 2008/105/EC
- Joint Ministerial Decision Γ1(δ)/ ΓΠ οικ.67322/2017 (Official Gazette 3282/B/19-9-2017) "Quality of water for human consumption in compliance with the provisions of Directive 98/83 / EC of the Council of the European Union of 3 November 1998 as amended by Directive (EU) 2015/1787 (L260, 7.10.2015)"
- Circular from the Ministry of Health Δ1δ/ΓΠ οικ.8565/16-11-2017 on «Taking measures for the assurance of public health after severe weather and flood phenomena»
- Circular from the Ministry of Health Δ1δ/ΓΠ οικ.16330/28-02-2019 on «Taking measures for the assurance of drinking water quality after intense rainfall and floods»
- Circular from the Ministry of Health Δ1(δ)/Γ.Π.οικ16518/27.2.2018 on "Monitoring water intended for human consumption"
- Circular from the Ministry of Health Γ1δ/ Γ.Π. 37193/19.6.2017 on "Residual chlorine at the water intended for human consumption"
- The Integrated Information System for monitoring water intended for human consumption in Greece, available at: <http://ydor.edeya.gr/dashboard>.

### 4 Identified gaps in current policy framework or approach

In general, the legislation related to drinking water quality is very strict for the water utilities. It foresees the water quality parameters that have to be monitored regularly and it sets the sampling frequencies. However, the gap identified is that although drinking water quality is achieved for the public, in case of an unexpected event, drinking water quality can be compromised. For example, in case of natural disasters and extreme weather events the legislation has foreseen continuous samplings to ensure drinking water safety. However, the time needed for the sampling and analysis process cannot guarantee the on-time detection of a pollution

or contamination event. Therefore, there is a gap related to the preventive measures that water utilities can take in order to timely detect contamination phenomena.

## 5 Lessons learnt, lessons from practice

The pilot action of DEYA Thermi at the context of WATER RESCUE project has to do with the supply and installation of automated chlorination devices in water tanks. Until now, DEYA Thermi used traditional chlorination, supplying the estimated chlorine dose at determined time periods. Automated chlorination devices provide adequate chlorination at the right time taking into consideration the quality parameters of the water. Thus, safe water, adequately chlorinated, is distributed to the people.

## 6 Recommendations for policy makers

Policy recommendations regarding drinking water quality include:

- Water quality monitoring practices should be developed according to the needs and characteristics of the water utilities;
- Use the latest scientific knowledge regarding drinking water quality monitoring and chlorination;
- Use the most cost-effective technologies;
- Take measures to reduce drinking water contamination phenomena e.g. establish risk prevention tools such as Water Safety Plans;
- Provide funding for pilot activities related to the continuous monitoring of drinking water from the source to the consumers' taps, installation of inline chlorination boosters, etc.

## 7 Social, Economic, Environmental Benefits

The benefits are social as people have access to safe drinking water. Environmental benefits are related to the protection of water resources from pollution.

## 8 Comments

No comments.

## Appendix A:



## WATER RESCUE

Water resources efficiency and conservative use in drinking water supply systems

**Interreg**  
**Greece-Bulgaria**  
**WATER RESCUE**  
European Regional Development Fund



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**WP**                      **6 Policy Recommendation**

**Deliverable**                      **6.3.2 Joint Water Quality Policy Recommendation**  
*Tool*                                      *Questionnaire*

**Project Beneficiary**   **PB3**  
**No**

**Beneficiary Institution**                      **University of Thessaly-Special Account Funds for Research-Department of Civil Engineering**

The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Cooperation Programme Interreg V-A "Greece-Bulgaria 2014-2020".

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**Name of the organization/institution: University of Thessaly-Special Account Funds for Research-Department of Civil Engineering**

**Beneficiary number: PB3**

## 1 Policy Recommendation Objective

University of Thessaly is Higher Education institution aiming to promote scientific knowledge through teaching and research, and to contribute to the cultural and economic development of the local community, and the society. It promotes scientific and academic excellence in all fields of expertise and rewards outstanding individual performances, establishing new scientific research units and fostering an environment that supports innovative actions.

Civil Engineering department aims at providing high quality education in the Science of Civil Engineering and form the students with the necessary skills for their future professional activities. At the same time the department performs basic and applied cutting-edge research in the science of Civil Engineering. The research team headed by Professor Vasilis Kanakoudis, performs research activities in the area of water supply systems management, management of water resources, etc.

The objective of this policy recommendation for the University of Thessaly is the suggestion of an action plan for the water quality and safety assurance.

## 2 Key Stakeholders List

The key stakeholders for drinking water quality in Greece is the Ministry of Health and the Ministry of Environment and Energy through its General Secretariat for natural environment and Water. At regional level, the Water Directorates of the Decentralized Regional Authorities apply the national policy at regional level. The Regional Directorates for Public Health are responsible for the preservation and improvement of the health and well-being of the population. The Directorates of public health are responsible for gathering drinking water quality data from the water services providers. The two biggest water utilities (EYDAP S.A. serving the greater Athens area and EYATH S.A. serving the city of Thessaloniki), all the Municipal Enterprises of Water Supply and Sewerage and the Municipal Water and Sanitation Departments of the smaller municipalities are responsible for the provision of drinking water services to the public. The Hellenic Association of Municipal Enterprises for Water Supply and Sewerage (EDEYA) and the Hellenic Water Association are recognized as national organizations. At European level, the stakeholders that have been recognized include the European Parliament, the European Association of National Associations of Water Utilities (EurEau), Water Europe, DG Environment, the International Water Association (IWA) and the European Environmental Bureau (EEB).

**Table 1.** Stakeholders at national, regional and local level and their e-mail addresses

Regional / National / European	Stakeholder's organization	E-mail
National	Ministry of Environment and Energy	secmin@ypen.gr
	General Secretariat for Natural Environment and Water / Ministry of Environment & Energy	grggper@ypen.gr
	Ministry of Development and Investments	public@m nec.gr
	Ministry of Infrastructure and Transportation	y me@y me.gov.gr
	Ministry of Rural Development and Food	info@minagric.gr

	Ministry of Health	minister@moh.gov.gr
	Ministry of Interior	info@ypes.gr, ypourgos@ypes.gov.gr
	Ministry of Finance	ministeroffice@minfin.gr
	Ministry of Digital Governance	info@minagric.gr
	Hellenic Association of Municipal Enterprises for Water Supply and Sewerage (EDEYA)	info@edeysa.gr
	EYATH S.A.	Info@Eyath.gr,
	EYDAP S.A.	pubrel@eydap.gr
	Mediterranean SOS Network	info@medsos.gr
	Hellenic Water Association (HWA)	hwaey@gmail.com
	Hellenic Hydrotechnical Association NGO ( <a href="http://eye.web.auth.gr/">http://eye.web.auth.gr/</a> )	
	Greek Committee for Water Resources Management NGO ( <a href="http://www.waterinfo.gr/eedyp/whatis.html">http://www.waterinfo.gr/eedyp/whatis.html</a> )	
<b>Regional</b>	Region of Thessaly	periferiarxis@thessaly.gov.gr
	Water Directorate, Decentralized Region of Thessaly	dydatonthes@apdthest.gov.gr
	Public Health Directorate, Region of Thessaly	dimyg@thessaly.gov.gr
	Municipal Water Supply and Sewerage Company of Larissa	info@deyal.gr
	Municipal Water Supply and Sewerage Company of Trikala	info@deyat.gr
	Municipal Water Supply and Sewerage Company of Karditsa	deyak3@otenet.gr
	Municipal Water Supply and Sewerage Company of Volos	info@deyamv.gr
	Municipal Water Supply and Sewerage Company of Agia	info@deya-agias.gr
	Municipal Water Supply and Sewerage Company of Almiros	deyaalm1@otenet.gr
	Municipal Water Supply and Sewerage Company of Elassona	info@deyael.gr
	Municipal Water Supply and Sewerage Company of Kalampaka	deya_kal@otenet.gr
	Municipal Water Supply and Sewerage Company of Kileler	deyakileler@hotmail.gr
	Municipal Water Supply and Sewerage Company of Mouzaki	deyamouzakiou@mouzaki.gr
	Municipal Water Supply and Sewerage Company of Palamas	deyapal1@otenet.gr
	Municipal Water Supply and Sewerage Company of Pili	deya-p@otenet.gr
	Municipal Water Supply and Sewerage Company of Riga Fereos	deyaf@hol.gr
	Municipal Water Supply and Sewerage Company of Skiathos	deyask@otenet.gr, deyaskiathos@deyaskiathos.gr
	Municipal Water Supply and Sewerage Company of Skopelos	deyaskop@otenet.gr

	Municipal Water Supply and Sewerage Company of Sofades	deyasof@otenet.gr
	Municipal Water Supply and Sewerage Company of Tempi	deya@dimostempon.gr
	Municipal Water Supply and Sewerage Company of Tirnavos	tydeyat@gmail.com
	Municipal Water Supply and Sewerage Company of Farkadona	deyafar@otenet.gr
	Municipal Water Supply and Sewerage Company of Farsala	deyafars@gmail.com
	Regional Unit of Larissa	antiper.lar@thessaly.gov.gr
	Regional Unit of Karditsa	antiper.kard@thessaly.gov.gr
	Regional Unit of Magnesia	antiper.magn@thessaly.gov.gr
	Regional Unit of Trikala	antiper.trik@thessaly.gov.gr
European	EUREAU (European Association of National Associations of Water Utilities)	info@eureau.org
	Water Europe	info@watereurope.eu
	European Environmental Bureau (EEB)	eeb@eeb.org
	DG Environment	
	European Parliament	

### 3 Current Policy Framework or approach

Greece, as an EU Member State, implements Drinking Water Directive (98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerning the quality of water intended for human consumption. Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption by ensuring that it is safe and clean. The Drinking Water Directive has been revised on December 2020, which was set in force on 12 January 2021. Member States have two years to transpose the revised directive to their national legislation.

In Greece the legislation in place regarding drinking water quality is the JMD "Quality of water for human consumption in compliance with the provisions of Directive 98/83 / EC of the Council of the European Union of 3 November 1998 as amended by Directive (EU) 2015/1787 (L260, 7.10.2015)". Based on this JMD the parametric values of chemical and microbiological parameters are set and sampling frequency is determined. The parameters to be monitored are allocated in two groups, group A and group B. The monitoring of these parameters is set according to the water volume produced or the number of people supplied with water. Additionally, at national level the following Ministerial Decisions are in force regarding water quality:

- Ministerial Decision 140384/2011 (Official Gazette of the Greek Republic 2017B/9-9-2011) regarding the Determination of the national monitoring network the quality and quantity of the water systems;
- Ministerial Decision 1811/2011 (Official Gazette of the Greek Republic 3322/30-12-2011) for the determination of the maximum allowable concentrations of pollutants in groundwater;
- Joint Ministerial Decision 51354/2641/E103/2010 (Official Gazette of the Greek Republic 1909B/8-12-2010) for the determination of the Environmental Quality Standards for the concentrations of pollutants in surface waters (according to the Directive 2008/105/EC) and its amendment Ministerial Decision 170766/2016 (Official Gazette of the Greek Republic 69B/22-1-2016);

- Law 3199/2003 "Protection and management of water - Harmonization with Directive 2000/60 / EC of the European Parliament and of the Council of 23 October 2000" (Official Gazette of the Greek Republic 280A/ 9-12-2003)
- Presidential Decree 51/2007 - Establishing measures and procedures for the integrated protection and management of water in accordance with the provisions of Directive 2000/60 / EC "establishing a framework for Community action in the field of water policy" of the European Parliament and of the Council of 23 October 2000.

The Ministry of Health has issued a circular for taking measures to ensure the quality of drinking water in cases of emergencies and natural disasters ΔΥΓ2/οικ. 9283/2014.

#### **4 Identified gaps in current policy framework or approach**

The legislation for drinking water quality is very strict and water utilities comply with it. However, the identified gaps have to do with proactive measures and early warning systems. Drinking water quality is monitored through samples and analyses and thus, in case of contamination, the contaminated water is already consumed by the public. Tools and techniques such as online monitoring reduce the time needed to detect any potential contamination. Also, effective and efficient proactive plans such as HACCP or Water Safety Plans are not yet implemented in Greece. Another identified gap refers to disinfection practices. Normally, water utilities are obliged by law to perform disinfection in drinking water. Disinfection usually takes place in water tanks in such a way that adequate residual chlorine concentration is detected at the dead-ends of the water distribution networks. However, chlorination at the tanks means that high chlorine concentrations are injected to water and the consumers who are located near the tanks consume higher chlorine concentrations and probably disinfection by-products, while on the other hand the consumers who are located at remote points of the network consume the minimum residual chlorine concentrations. In this way the water utility consumes higher chlorine mass as indicated in several publications. Inline chlorination boosters are used internationally to solve this problem and to achieve a smoother chlorine profile while at the same time less chlorine quantity is used and efficient chlorination takes place. In this way, the formation of disinfection by-products is controlled.

#### **5 Lessons learnt, lessons from practice**

The scientific team elaborated the deliverable 4.3 regarding water quality. Specifically, water resources quality and drinking water quality issues are presented in this deliverable and measures for the protection of both water resources and drinking water are given. During the implementation of WATER RESCUE project, the partners implemented pilot actions related to water quality. In particular, the pilot activities have to do with the monitoring of water quality through proper devices and the efficient chlorination of drinking water using automated chlorination devices.

#### **6 Recommendations for policy makers**

Policy recommendations regarding water quality should ensure the prevention, reduction and management of water pollution from all sources, in all water resources and also give special attention to the water intended for human consumption. More specifically:

- Improve the water quality monitoring network at water resources in order to provide water quality data for all water bodies;

- Develop a water quality monitoring network specifically at drinking water sources and within the water distribution network;
- Set policy objectives and targets to achieve and maintain assigned water quality standards in water bodies, in order to protect designated uses and water-related ecosystems, taking into account water quality requirements for all water uses;
- Assess the investments necessary to achieve the desired level of water quality and to protect and restore water-related ecosystems, taking account of cost effectiveness related to human and ecosystem health benefits;
- Combine regulatory, voluntary and economic instruments to provide continuing incentives for polluters to reduce and control pollution of water resources;
- Establish efficient chlorination systems to avoid hyperchlorination phenomena or water without residual chlorine consumed by the people;
- Water utilities should take proactive measures and develop risk management tools, such as HACCP and WSPs.

In general, the action plan described in deliverable 6.3.1 stands for this case as well. Water utilities should implement pilot activities related to water quality in order to examine the efficiency of the measures taken and then other water utilities facing similar problems should also implement such measures at pilot scale. The studies which will be elaborated at regional level will provide with all the necessary data for the implementation of similar activities at national level. Ex ante and ex post evaluation will provide the lessons learnt and the critical success factors. EUREAU, at European level should seek and ensure funding for these activities as the national studies' results will be used as proof.

## 7 Social, Economic, Environmental Benefits

The improvement of water resources quality brings both environmental and social benefits while assuring drinking water safety bring mainly social benefits of extreme importance. Economic benefits relate with the reduced funds needed for ecosystems restoration and the achievement of better water resources quality. As the environmental cost is a part of the full water cost, reduced expenditures related to the improvement of water resources quality will benefit the public and the water users in general.

## 8 Comments

No comments.

## Appendix A:



## WATER RESCUE

Water resources efficiency and conservative use in drinking water supply systems

**Interreg**  
**Greece-Bulgaria**  
**WATER RESCUE**  
European Regional Development Fund



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**WP**                      **6 Policy Recommendation**

**Deliverable**                      **6.4.2 Joint Water Quality Policy Recommendation**  
*Tool*                                      *Questionnaire*

**Project Beneficiary**   **PB4**  
**No**

**Beneficiary**                      **Municipality of Kardzhali**  
**Institution**

The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Cooperation Programme Interreg V-A "Greece-Bulgaria 2014-2020".

*The contents of this report are sole responsibility of the Municipality of Kardzhali and can in no way be taken to reflect the views of the European Union, the participating countries the Managing Authority and the Joint Secretariat.*

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Name of the organization/institution: Municipality of Kardzhali

Beneficiary number: PB4

## 1 Policy Recommendation Objective

Please select one or more from the below, as the objective of this policy recommendation for your organization:

- (a) There is a need for the introduction of new legislation regarding water efficiency
- (b) There is need for modifications to existing laws regarding water efficiency
- (c) It is a new strategy for government
- (d) It is a change in direction of an existing strategy**
- (e) It is to improve an existing policy or service
- (f) It is to draw attention to a local issue
- (g) Other (please describe)

## 2 Key Stakeholders List

Please provide a list of the key stakeholders at:

- (a) Local or Regional level;
- (b) National level;
- (c) European level.

The list should contain the names of the stakeholders, their positions and their contact details (phone numbers and e-mail addresses).

The main responsibilities for water management and water supply and sewerage are shared among the following institutions:

The Ministry of Regional Development and Public Works is responsible for the overall policy related to the design, construction and operation of water supply and sewerage systems in the country. The Minister represents the state in water supply and sewerage companies with over 50% state share. The Ministry also coordinates water association activities and provides methodological guidance on the preparation of the water supply and sewerage Master Plans.

The Ministry of Environment and Water (MoEW) is responsible for the management and the distribution of water resources at the national level. The Minister issues the permits for water-taking of mineral water – exclusive state property. The MoEW is also responsible for environmental protection and the implementation of the Operational Program Environment, under which water and wastewater infrastructure is funded.

The Council of Ministers defines the state policy in the water supply and sewerage sector as part of the country's water policy and the National strategy for development and management of the water sector in Bulgaria. The Council of Ministers approves a Strategy for development and management of the water supply and sewerage sector in Bulgaria for a period of at least 10 years. The strategy defines the main objectives, priorities, stages and necessary resources and sources of funding for the construction and development of water supply and sewerage systems and for improvement of water supply and sewerage service quality. The policy in the water sector is implemented by: 1. The Minister of Regional Development and Public Works, 2.

Municipal councils and mayors of municipalities.

The Ministry of Health is responsible for the control on the quality of water intended for drinking and household needs, the quality of mineral water intended for drinking or used for prophylactic, therapeutic and hygienic purposes, including bottled mineral water in the commercial network and the quality of water intended for bathing.

Basin Directorates undertake water management at the basin level. There are four basin directorates: (i) Danube Basin Directorate – Pleven, (ii) Black Sea Basin Directorate – Varna, (iii) West Aegean Basin Directorate – Blagoevgrad and (iv) East

Aegean Basin Directorate – Plovdiv. Directorates develop River Basin Management Plans and Flood Risks Management Plans. They are also responsible for issuing permits for water use and abstraction, for controlling the compliance with the parameters set in these permits, for controlling the activities in river beds, and for water quantity and quality monitoring. Their management of water is based on basin principles.

Water Associations are non-profit legal entities. They manage water supply and sewerage systems within the boundaries of a designated territory in the cases where water supply and sewerage system ownership is divided either between the state and one or more municipalities or among several municipalities. If the WSSC system, which falls within the specified territory, is the property of a single municipality, the management is performed by the municipal council.

The governing bodies of a Water Association include a General Assembly, which consists of representatives of the state (District Governor), and the municipality(ies), with the district governor being the chairman. In the cases where the state and more than one municipality participate in the Water Association, the state is entitled to 35 per cent of the votes, and the other 65 per cent of the votes are allocated among all municipalities in proportion to their population. The funds necessary for the Water Associations operation are provided by the state and municipalities according to the proportion of their voices.

Regarding the Water Act, Water Associations are responsible for the preparation of the regional Master Plans and the investment programmes attached to the plans.

Assignment and approval of these specific Master Plans is made by the MRDPW. The regional Master Plans are accepted and approved by the MRDPW only after they are endorsed by the respective Water Association or Municipal Council.

Water supply and sewerage companies (WSSC) (referred to as ViK, VKS, VKTV or INFRASTROI in the Central Region) are responsible for the operation, management and maintenance of water supply and sewerage facilities in the settlements as well as the provision of water supply and sewerage services to consumers. A WSSC is a commercial, state or municipal company – a legal entity, which has signed a contract with the chairman of the corresponding Water Association or with the mayor of the respective municipality. The term of the contract with a WSSC, signed in accordance with the Water Act, cannot be longer than 10 years, provided that it does not include an obligation for the WSSC to build new water and sewerage infrastructure; or 15 years, if it obliges the WSSC to undertake construction of new infrastructure. In all other cases, the procedure and selection of a water operator as well as the signature of the contract is carried out in accordance with the Concession Act.

Municipalities are direct beneficiaries of the OP "Environment". The mayor of a municipality develops and implements the policies related to planning, management, construction, reconstruction and modernization of water supply and sewerage networks and facilities that are municipal property.

Municipal councils control the municipal participation in water supply and sewerage companies (in those companies, in which the municipalities have shares). They also approve municipal development plans and mayor's statements regarding the business plans developed by WSSCs.

The State Energy and Water Regulatory Commission (SEWRC) is responsible for regulating the tariffs, affordability and quality of water supply and sewerage services under the Water Supply and Sewerage Services Regulation Act.

The Environmental Executive Agency under the Minister of Environment and Water guides the National environmental monitoring system.

### 3 Current Policy Framework or approach

Please describe in detail which is the policy framework right now regarding water quality in your region and your country. Please provide any laws (description) or any other policy framework text.

The Water Act (WA): The WA (SG 67/27.07.1999; last proposal for amendment April 2012) is the main legal act in Bulgaria that sets out the relations in the management of water as a nation-wide natural resource.

- New Draft Water Law: Draft Law on amendment and supplements to the Water Act, which has been prepared in April 2012.
- Draft National strategy on management and development of the water sector: It has been elaborated according to the requirements of art. 151 of the WA.
- Environmental Protection Act (EPA): The EPA (SG 91/25.09.2002) is the basic act concerning all environmental components – air, water, soils, ground, landscape, natural sites, biodiversity and their interrelation.

Other relevant policies and regulations are:

- State policy for protection of the environment
- The Regulation of Water Supply and Sewerage Services Act (RWSSSA)

The main Directives of the European Union concerning the water and wastewater sector are listed below (see Appendix 1-3 for more details):

- The Water Framework Directive 2000/60/EC establishing a legal framework to protect and restore clean water across Europe and ensuring its long-term, sustainable use.
- Directive 91/271/EEC on urban waste-water treatment
- Directive 75/440/EEC concerning surface water used or intended for the abstraction of drinking water
- Directive 2006/118/EC concerning the protection of groundwater from pollution and worsening
- Directive 2006/7/EC concerning the quality of bathing water
- Directive 1975/EC concerning the bathing waters quality
- Directive 98/83/EC concerning the quality of water intended for human consumption

- Directive 2006/44/EO on the quality of fresh waters needing protection or improvement in order to support fish life and Directive 2006/113/EO on the quality required of shellfish waters
- Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources
- Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances
- Directive 2006/11/EC on water pollution caused by certain dangerous substances discharged into the aquatic environment of the Community and seven daughter Directives
- Directive 85/337/EEC on Environmental Impact Assessment
- Directive 2004/35/EO on environmental liability with regard to the prevention and remedying of environmental damages
- Directive 90/313/EEC repealed by Directive 2003/4/EC on public access to environmental information
- Directive 2001/42/EC on environmental impact assessment of certain plans and programmes
- Directive 80/777/EC on rapprochement of member states legislations concerning exploitation and selling of natural mineral waters
- Directive 2003/40/EC on making list, concentration limits and requirements for show-cards about the natural mineral waters components and conditions for the use of ozone treated air on natural mineral and sources waters
- Directive 2008/56/EC on EC action framework creation for the maritime environment policy
- Directive 2007/60/EC on evaluation and management of flood' risk
- Directive 92/43/EEC on protection of natural habitations and wild flora and fauna
- Directive 2009/90/EC on determination according to Directive 2000/60/EC of technical specifications for chemical analysis and monitoring of water status
- Directive 86/278/EEC on environment protection and especially of earth after using sludge from waste water treatment in agriculture
- IPPC Directive 2008/1/EC ("Integrated Pollution Prevention and Control") aims to achieve a high level of protection of the environment through prevention and reduction of integrated pollution from a wide range of industrial and agricultural activities. It is the codified version of Directive 96/61/EC of 24 September 1996. The IPPC Directive will gradually be replaced by Directive 2010/75/EU on industrial emissions directive called IED. This new directive brings together in a single text seven separate directives on industrial emissions. IED Directive came into force January 6, 2011 and must be transposed by January 7, 2013
- Directive 2008/98/EC of 19 November 2008 on waste and repealing certain Directives is the relevant Solid Waste Directive mentioned thereafter

The international agreements and conventions in the field of water management and those with water reference in the field of environment protection are:

- Convention for Cooperation for Protection and Sustainable Use of Danube River, ratified in 1999 (SG, no 30 of 1999), enforced on 6.04.1999

- Convention for Protection of Black Sea against Pollution, ratified in 1992 (SG, no 99 of 1992), enforced on 15.01.1994
- Convention for Protection and Use of Cross border Water Streams and the International Lakes, ratified in 2003 (SG, no 86 of 2003), enforced on 26.01.2004
- Convention for Wetlands of International Importance, especially as habitats for water birds (Ramsar Convention), ratified in 1974, enforced on 24.01.1976
- Convention for Environmental Impact Assessment in Cross Border Context, ratified in 1995 (SG, no 28 of 1995), enforced on 10.09.1997
- Agreement between the European Community and the Republic of Bulgaria in relation to the participation of the Republic of Bulgaria in the European Environmental Agency and the European Network for Information and Monitoring, ratified in 2000

#### 4 Identified gaps in current policy framework or approach

Are there any gaps in the current water quality policy that you have identified in your country or region? What are these gaps? Please describe.

It is striking that water losses in the water supply systems of ViK Kardzhali OOD are too high, but not unusual for the water supply in Bulgaria. Losses within that range indicate poor condition of the water supply systems, in terms of their physical state (failures, leaking pipes. etc.), as well as with regard to water metering accuracy (i.e. water produced and consumed).

Based on the assumptions for unauthorized consumption and metering inaccuracies it can be assumed that the actual domestic consumption exceeds the officially billed consumption.

#### 5 Lessons learnt, lessons from practice

From the WATER RESCUE project implementation and specifically your pilot action, there are lessons learnt. Please describe the results from the pilot action and the lessons learnt (e.g. what to avoid, what to pay attention to, etc.)

The flowmeters included in the project will help to locate sections of the water supply system where there is a suspected loss or theft of water, and after their installation very accurately and quickly it will be possible to identify possible accidents in those sections.

#### 6 Recommendations for policy makers

What are your recommendations for water quality for:

- Stakeholders;
- Policy makers and regulators at national and European level;
- Water utilities at regional and national level.

Systematic measures should be undertaken to reduce losses.

The measures proposed for reducing real/physical losses are as follows:

- Replacement of old water transmission (external) mains.
- Replacement of old water distribution pipelines and the service connections to them



- Timely repair of failures on the water pipelines.
  - Systematic detection, localization and repair of leakages (breakdowns)
- The activities necessary for reducing commercial losses are:
- Installation of water meters on all water transmission mains after the water sources.
  - Installation of water meters on feeding pipes of reservoirs
  - Implementation of the programme for verification and replacement of water meters of domestic consumers.
  - Detection and interruption of unauthorised water connections

## 7 Social, Economic, Environmental Benefits

Please provide all benefits: social, economic and environmental, your recommendations will have. Give practical examples how the recommendation will affect the real world. Also, please describe how these recommendations will affect climate change impacts.

Bulgaria, as member of the European Union (EU), is committed to improve environmental quality in order to achieve compliance with the EU Acquis Communautaire. In this respect, Bulgaria has adopted most of the Acquis in the field of environmental protection. The fulfilment of the commitments made by Bulgaria in the negotiation process for Chapter 22 – Environmental Protection, involves the implementation of major investment projects in environmental infrastructure.

Before Bulgaria's accession to EU, part of the funds needed for environmental investments were available through different European programmes (i.e. PHARE, ISPA, SAPARD) or through projects financed by International Financing Institutions (IFIs) (like: EBRD, EIB, WB, etc.). After 1st of January 2007, Bulgaria has continued to receive EU financial support from the Structural and Cohesion Funds (SCF). In order to ensure an efficient absorption and use of EU funds, the Bulgarian Ministry of Environment and Water (MoEW), as Managing Authority for the Operational Programme (OP) "Environment", prepared a strategic document for the programming period 2007 – 2013 developed in line with the Community Strategic Guidelines (CSG); the National Development Plan (NDP); the National Environmental Strategy 2005- 2014; the National Strategic Reference Framework (NSRF); the National Waste Management Programme 2009-2013; the National Strategy for Management and Development of the Water Sector 2004 – 2015; and the programmes for the implementation of the requirements of different "heavy" directives, elaborated in 2003, such as 91/271/EEC concerning urban waste water treatment. On the basis of the analysis of the current situation, the OP "Environment 2007-2013" sets the country priority areas for the environmental sector to be implemented and financed by the European Union through the Cohesion Fund and the European Regional Development Fund. Priority axis 1 concerns the improvement and development of water and wastewater infrastructure in settlements with over 2,000 population equivalent (PE) and in settlements below 2,000 PE within urban agglomeration areas. The priority axis is based on the purpose of Council Directive 2000/60/EC laying down the framework for community activities related to water - Water Framework Directive (WFD) as well as the purposes of Council Directive 91/271/EEC for urban waste water treatment. During the negotiations under Chapter 22, two transitional periods have been negotiated with regard to the implementation of the requirements of Directive 91/271/EEC, which are as follows:

- Till 31 December 2010 – for all agglomerations over 10,000 PE (85 no in total);
- Till 31 December 2014 – for all agglomerations between 2,000 and 10,000 PE (273 no in total).

This requires measures that include:

- Water supply: extension, reconstruction, modernization, NRW reduction programmes, as well as construction of Drinking Water Treatment Plants (DWTP), reservoirs.



- Sewerage: extension, reconstruction and modernization, as well as construction of new sewerage systems including urban Waste Water Treatment Plants (WWTP), septic tanks, soak ways.

According to the Report for Implementation of Directive 91/271/EEC by the end of 2010 issued by the MoEW, there is a delay in the fulfilment of the Directive requirements for agglomerations above 10,000 PE. This imposes to give first priority to the design and construction of sewerage networks and urban WWTP for agglomerations over 10,000 PE.

Joining the EU in 2007, Bulgaria was urged to reform the water sector and adopt stricter regulations and environmental standards. The European Commission requested from Bulgarian an urgent action plan for reform in the water infrastructure sector. As a result, the Ministry of Environment and Water prepared a strategy and completed a map for the water supply and sewage sector development, in coordination with other ministries, regional authorities, municipalities and ViK operators for most efficient planning, anagement and operation of the water infrastructure.

At present, the water operators providing water supply and sewerage services in the country are state, municipal or mixed commercial companies, which face the challenges of the reform launched in the water sector, and triggered by the need to resolve the fragmented ownership of water assets. The reforms in the water sector envisage that the ownership on water infrastructure should be public state and public municipal, while the management of water supply and sewerage system should be performed by the water supply and sewerage associations.

This Master Plan (MP) is the first important step giving the framework for the development strategy of the municipalities in the water supply and sewerage sector for the period 2014-2038. An identification of necessary investment measures to achieve full compliance with relevant EU Directives and other objectives defined in the Terms of Reference is given in the present document, as well as a prioritisation and phasing of these measures in short, medium and long term. Special attention is paid to the preparation of the short term investment programme intended to be financed by the next Operational Programme "Environment 2014-2020".

## 8 Comments

Please provide any comments.

## Appendix A: