

# AQUARES

Interreg Europe



## AQUARES Action Plan of Greece



## 1. PART I – GENERAL INFORMATION

<b>Project:</b>	<b>AQUARES. Water reuse policies advancement for resource efficient European regions</b>
<b>Partner organisation:</b>	Ministry of Environment and Energy, General Secretariat for Natural Environment and Water.
<b>Other partner organisations involved (if relevant):</b>	
<b>Country:</b>	Greece
<b>NUTS2 region:</b>	Greece
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## 2. PART II – POLICY CONTEXT

The Action Plan aims to impact:

Investment for Growth and Jobs programme:	
European Territorial Cooperation programme:	
Other regional development policy instrument:	<b>X</b>
<b>Name of the policy instrument addressed:</b>	
<ul style="list-style-type: none"> <li>Joint ministerial decision No 145116/2011-“Measures, conditions and procedures for the reuse of treated waste water and other provisions”</li> <li>2<sup>nd</sup> review of river basin water management plans</li> </ul>	

### **3. PART III – DETAILS OF THE ACTIONS ENVISAGED**

The selected actions in this action plan, are outputs of the activities carried out during the phase of the exchange experience of the AQUARES project. The tasks were undertaken internally, taking into consideration the good practices identified in other regions of the project and the consultation process with our stakeholders and through the lessons learnt in the workshops, study and site visits and also through private discussions with the experts attended these events.

Many Greek regions, especially its southeastern regions and islands, are under water stress and severe pressure on water resources. This fact is exacerbated by the high demand for water for tourism and irrigation in the summertime. However, effluent reuse is not applied widely. The integration of treated wastewater into water resources management is of high importance, to address the aforementioned problems and meet future demands.

The climate of Greece is sub-humid Mediterranean, with humid and relatively cold winters and dry and warm summers, with an average rainfall of 874 mm/year. Greece is characterized by high temporal and spatial precipitation imbalance, with low precipitation and increased water demands for irrigation and tourism during the summer. Annual rainfall ranges from 300 to 500 mm in southeastern Greece and from 800 to 1200 mm in the northwestern plains of the mainland, while in some mountainous areas it may be above 2000 mm. It is worth mentioning that during dry years, and at the country's hottest and arid regions, the irrigation period may be as long as 6 to 7 months. Effluent from Waste Water Treatment Plants (from now on WWTPs) is an alternative water resource that should be considered in order to catch up with the demand. The water needs of Greek islands are covered either by groundwater, which is rapidly becoming depleted, or through seawater desalination processes, which have high energy and cost requirements.

Since before the beginning of this project, Greece has already been reusing wastewater, on a limited scale as only a few projects of effluent reuse have been implemented, and most of them being pilot projects of crop or landscape irrigation. A very small percentage of treated water is reused "directly", and it is obtained in WWTPs that apply advanced tertiary treatments. However, most of the treated water is reused "indirectly"; as the reclaimed water is discharged into the river, sea and other water bodies. That is the main reason of Greece being at a turning point in order to prioritize and invest in improving the WWTPs and implement tertiary treatment, so that the effluent can be reused for multiple practices, apart from being mixed with the available water bodies.

Taking into consideration the aforementioned situation, this action plan, sets as top priority the efficient management of the measures that have to be considered in order to reduce the water pressure on the resources and the water scarcity. Within the framework of the above, it is intended that the amendment of the legislation, will lead to the achievement of the following goals:

- 1) Address the water scarcity problem during dry months.
- 2) Prevent severe pressure on water resources, especially in the southeastern parts of Greece and in the islands.
- 3) Integration of treated wastewater into water resources management.

## **ACTION 1: AMENDMENT OF THE BASIC POLICY INSTRUMENT, JOINT MINISTERIAL DECISION NO145116/2011-“MEASURES, CONDITIONS AND PROCEDURES FOR THE REUSE OF TREATED WASTE WATER AND OTHER PROVISIONS”**

### **1 - The background**

Greece is a country presenting significant variability in water availability, both regional and temporal. Water scarcity is greater in the eastern part of the mainland and the Aegean islands, where rainfall is lower; it is also greater during the tourist season, when an influx of visitors leads to spikes in water demand, while also coinciding with the increased irrigation water needs. In this context, water reuse can be considered as a key practice that could reduce water scarcity in Greece. However, despite its potential, there is very limited practice of water reuse even though Greek legislation permits several different uses for reclaimed water.

It is estimated that the average daily volume of reused water is about 16,000 m<sup>3</sup>/day, equaling about 10.2 Mm<sup>3</sup>/year. Overall, less than 5% of the treated effluents are being reused in Greece, contributing less than 1% to the total water use of the country. The number of projects implementing water reuse for agricultural irrigation is increasing. However, the administrative burden concerning water reuse in the current socio-economic context is still high. There is a need to revise the regulatory, policy and economic instruments to enable the wider uptake of water reuse in Greece. The currently applicable regulatory framework in Greece is identified by the Joint Ministerial Decision No. 145116, which came into force in 2011. The Greek water reuse legislation defines a comparatively high number of permitted uses of reclaimed water.

Our main goal is to improve water scarcity and pressure in some regions of Greece, who have suffered from drought events due to the absence of rainfalls and excessive extrapolation due to tourism and intensive demand. For this reason, since the beginning of the AQUARES project and during the development of the "Exchange of experience" phase, General Secretariat for Natural Environment and Water has been looking for similar cases in Lodz, Lombardy and Latvia, to study the feasibility of the solutions implemented, in Greece.

After the consultation with the stakeholders, the selected option is the proposal for the amendment of the basic policy instrument, Joint Ministerial Decision No 145116/2011-“Measures, conditions and procedures for the reuse of treated waste water and other provisions”. This Decision aims to promote the recovery of treated wastewater and improve the water balance through the supply of the underground aquifers.

The envisaged action takes inspiration from the following good practices, which were the outcome of the “Exchange of experience” phase, of the AQUARES project. The following practices were selected since they reduce water scarcity, by saving water and contributing to tackle climate change effects, such as drought periods or heavy rainfalls. More specifically, these good practices are:

- “Rainwater reuse for service vehicle washing”, which was implemented in Latvia and reuses rainwater for service vehicle car wash. The method includes the construction of storage tanks and rainwater treatment plants. Then the purified water is reused for washing car equipment.

This technology was the inspiration to include the construction of rainwater storage tanks, in the basic policy instrument, which can be used for multiple purposes, other than washing car equipment.

- “Water reuse at the building level-Condminio di via Sassetti”, which was applied in Lombardy and is based to the philosophy of energy saving reduction in potable water demand.

The aforementioned good practice uses the installation of a recovery system of greywater (water from the shower, washbasins and bidets) and whitewater (rainwater from gutters) which reduces drinking water consumption. Through different levels of filtration and sterilization, water is returned to a state suitable for subsequent reuse, for example for garden irrigation or toilet flushing. The technology guarantees a constant supply of recycled water without complicated operations and performance losses, as happens with other types of systems and allows to obtain a 50% reduction in drinking water consumption.

- “Use of rainwater in the Regional Fund for Environmental Protection and Water Management”, which was implemented in Lodz and uses rainwater form the roof and the hardened area surrounding the building for irrigation of green areas.

The specific good practice uses rainwater from the roof of the building, which is purified on a filter and collected in a concrete tank with a capacity of about 200 m<sup>3</sup>. The collected rainwater is used to water the green areas around the building. The control unit is located on a console in the boiler room, while the pumps supplying the greenery watering system are located in a concrete well. In case of lack of rainwater, the system is supplied with emergency tap water. The control panel monitors the pressure level in the system and in case of opening the solenoid valves before sprinklers, it starts one or two pumps, depending on the current water consumption.

Green building is a strategic step towards sustainable development. Thanks to modern technologies, the building uses less energy and water, is more comfortable, healthier and better serves its users, protecting them from rising energy and water prices.

## 2 – Action

- Project objectives

This proposed action is intended to amend the basic policy instrument to include in it, the concept of “grey water” and the possibilities of its reuse, especially in new buildings, to save drinking water. Treated grey water is a suitable water source for secondary uses at the local level and significantly reduces the wastewater load, offering various environmental and economic benefits. Toilet flushing and landscaping require a tremendous amount of fresh water, which can be safely replaced by treated greywater.

In addition, the second amendment on the basic policy instrument includes the concept of “rainwater recovery”. Rainwater can be collected with suitable storage systems and be used as an alternative water supply source to reduce scheme water consumption. When recovery systems are installed and maintained in accordance with recommended guidelines, rainwater can provide a high quality source of water.

The main goal of the envisaged action is to save water and contribute to tackling the effects of climate change, severe degradation and/or salinization of groundwater aquifers in some parts of the country by over-pumping, and ongoing water scarcity.

- Justification of the initiative: Main challenges and opportunities

The proposed action aims to amend the essential policy instrument to include the concept of “grey water” and the emerging opportunities of its reuse. This action is expected to raise the yearly percentage of waste-water reuse, expanding in parallel the water reuse application, since it will include rainwater recovery, a resource that is underexploited at the moment. This framework will also embody legislative recommendations for rainwater reuse, a measure that promotes one of the fundamental axis of the AQUARES Project, the axis of ecologic innovation. To achieve all these goals, the involvement of the Ministry of Environment and Energy and the General Secretariat for Natural Environment and Water is crucial, not only as of the monitoring Public Bodies responsible for the smooth implementation of the action but for its quality assurance as well. However, it should be mentioned that due to these critical stakeholders' public nature, potential delays may arise, deriving from the intricate bureaucratic system of the state and the structural reforms that have taken place in the public administration since 2010. Nevertheless, these delays are anticipated, and they are not expected to exceed the timeframe of the AQUARES project.

- Lines of action

The amendment of a Joint Ministerial Decision requires issuing of a new one concerning the provisions of interest. Specifically, the lines of action that need to be followed are:

- Formulation of the need to amend the Joint Minister Decision (Proof of concept-Explanatory report). Indication of the points (articles, paragraphs) that concern the specific decision and need to be amended.
- Confirmation that the proposed amendments are within the limits of the legislative authorization.
- Check the impact of the proposed amendment on the Government Budget-Alignment with the state budget equilibrium.
- Inclusion of suggestions by the competent bodies.
- Approval of the proposed amendment by the Minister of Environment and Energy.
- Publication of Government Gazette.

### **3 – Players Involved**

Ministry of the Interior, Decentralisation and Electronic Government  
 Ministry of Economy, Competitiveness and Shipping  
 Ministry of Environment and Energy  
 Ministry of Health and Social Solidarity  
 Ministry of Rural Development and Food  
 General Secretariat for Natural Environment and Water  
 Decentralized Directorate of Water Management

#### **4. – Time Frame**

May 2021-May 2023

#### **5. – Cost**

The cost of the implementation of the action proposed cannot be estimated at this stage of the project, due to the nature of the action. Owing to the fact that the Greek Ministry of Environment and Energy and, in particular, the General Secretariat for Natural Environment and Water, finances the country's development policy with projects that contribute to the sustainable growth of the national economy on a long-term basis, it will exploit internal resources of the Ministry, such as its Legal Department, to undertake and deliver the Amendment of the Joint Ministerial Decision No145116/2011.

#### **6. – Funding Sources**

The cost of the implementation of the action cannot be estimated, as mentioned in the previous section. For this reason, funding sources cannot be identified at the moment.

### **ACTION 2: INCLUDE MEASURES TO PROMOTE THE REUSE OF RECLAIMED WATER, IN THE UPCOMING REVIEW OF THE RIVER BASIN WATER MANAGEMENT PLANS**

#### **1 - The background**

As it is already mentioned in the first action, Greece is a country presenting significant variability in water availability, both regional and temporal. Water scarcity is greater in the eastern part of the mainland and the Aegean islands, where rainfall is lower; it is also greater during the tourist season, when an influx of visitors leads to spikes in water demand while also coinciding with the increased irrigation water needs. In this context, water reuse can be considered as a key practice that could reduce water scarcity in Greece. However, despite its potential, there is very limited practice of water reuse even though Greek legislation permits several different uses for reclaimed water.

In order to address the aforementioned issues and to reduce water scarcity and pressure in some regions of Greece, the following measures are presented.

The most essential part of legislation towards integrated water management in Europe is the Water Framework Directive 2000/60/EC based on the river basin. During its implementation each Member State should prepare a River Basin Water Management Plan accompanied with the Programme of Measures aiming at achieving good quality for all water bodies.

In the upcoming 2<sup>nd</sup> review of the river basin water management plans of Greece, it is proposed to include measures to promote the reuse of treated water.

The selected measures in this action are the outcome of the work carried out during the "Exchange of experience" phase, of the AQUARES project. The following proposed measures were undertaken, based on the good practices identified in other regions



of the project and the lessons learnt in the workshops, study and site visits and through private discussions with the experts who attended those events.

More specifically, the envisaged measures take inspiration from the following good practices:

- “Exemption the additional costs of the water treatments to the farmers”. This action was implemented in Murcia to promote the reusing, by promoting financial incentives. Additional costs of the water treatment are not charged to the farmers who reuse the water.  
This exemption is considered like a grant in order to promote the water reuse which, helps to reduce the overexploitation of the rest of the water sources as, for example, the groundwater, allowing to prioritize this sustainable water source upon other water sources, which are more polluting.
- In addition, inspirational source for one of the following measures is the good practice “Managed Aquifer Recharge (MAR)”, which is implemented in the north of Malta. The initial step of the MAR scheme involves the investigation of the hydro-geological characteristics of the area. This is followed by the design and installation of the MAR scheme. An important component of the project is the monitoring of the water quality and level before and after the implementation of the MAR scheme. Recharge will be carried using high-quality reclaimed water (New Water) obtained from the Polishing plant during periods of low demand for this water. The objective of this project is to improve the status of the groundwater body and make it available for the agricultural sector.
- Another good practice that stands as an inspiration source is “To inventory the water treated as water source available in the hydrographic basin”, which was applied in Murcia. With this practice the water deficit is reduced, the resources increased and the exploitation of water sources, environmentally more vulnerable is reduced. Apart from that, due to the demands of the users, the quality of the water treated increases, as well as, a minimization of the waste produced. Another point is that an optimization of the resources is carried out, providing a better management system.

## 2 – Action

- Project objectives

Given the opportunity of the upcoming review of the River Basin Water Management Plans, this action is proposed to include measures to promote the reuse of treated wastewater. More specifically the proposed measures are:

- Exploration of the possibility of water reuse of urban WWTPs that already apply advanced/ tertiary treatment and do not require an upgrade in their treatment. Tertiary treatment enhances resilience, increases sustainability and improves innovation. It will contribute to known challenges as water management and adaptation to climate change, urban and rural wastewater provision, improvement of resource and energy efficiency, reduction of contaminants of emerging concern and compliance with European legislation and financing.



- Recharge of the aquifer by using treated wastewater, in cases of ground water with poor quantitative or qualitative status. This measure will contribute in reversing the chemical and quantitative impacts derived from human activity on aquifers demands a multidisciplinary approach. In particular, this approach requires, firstly, to update the hydrogeological knowledge of the groundwater systems, which is pivotal for the sustainable use of this resource, and secondly, to integrate the social, economic and administrative reality of the region. The intensive extrapolation of groundwater has had negative consequences for the aquifer in quantitative and chemical terms, leading to its declaration as in poor condition. A solution of recharging the treated wastewater, in cases of ground water with poor quantitative or qualitative status, will have a significant positive impact and contribute to preserving of the aquifer and to protecting the environment.
- Provide financial incentives to water administrators to take the necessary steps to apply water reuse. The opportunities arising from this action are important, because funds will be absorbed in fledging issues and address country's main problems, such as water scarcity, by implementing procedures and constructing infrastructure for water reuse.
- Construction of rainwater collection and utilization tanks (rainwater tanks). The specific measure mainly concerns arid areas, islands with drought and water shortage problems. Additionally, this standard includes the potential of utilizing existing – and old in some cases - rainwater tanks and provides financial and other incentives to promote their use.  
Apart, from eliminating drought events and water shortage problems, this measure will contribute during episodes of heavy rains. It is intended to avoid possible ponding, flooding, humidity and bad odors, producing affections to regular activity in the population. The overall aim is to generate an efficient infrastructure for sustainable surface water drainage that will provide continuity to the natural drainage system and reduce water scarcity and flooding problems.

- Justification of the initiative: Main challenges and opportunities

The proposed action aims to include water reuse measures in the upcoming review of the river basin water management plans. Therefore, the involvement of the Ministry of Environment and Energy, the General Secretariat for Natural Environment and Water, and the Water Use Departments of the Devolved Administrations at the national level have a significant role in the implementation of this action. However, as it is stressed in the corresponding section of action 1, the public nature of these Public Bodies may lead to potential delays, deriving from the state's intricate bureaucratic system and the structural reforms that have been taken place in the public administration since 2010. Nevertheless, these delays are anticipated, and they are not expected to exceed the timeframe of the AQUARES project.

A monitoring framework should be developed in order to consistently ensure the effectiveness of the action and the compliance with the time schedule. The

methodical and effective creation and implementation of the indicators requires the following steps:

- Recognition and acceptance of the need for indicators that measure the efficiency of the action and the compliance with time limits.
- Assembly of a team which will be able to develop and monitor the performance indicators.
- Development of a model where the goals and the strategy will be set.
- Identification of the indicators.
- Development of operational procedures.
- Validation of indicators, processes and procedures.
- Continuous improvement and update of the process.

- Lines of action

The publication of the review of the River Basin Water Management Plans demands a certain procedure, which includes some lines of action and more specifically, the preparation of the 2<sup>nd</sup> Review of the River Basin Water Management Plans, a consultation process and synergies with relevant EU Directives/actions.

The steps of each action are analysed in further detail, in the following sections.

- Preparation of the 2<sup>nd</sup> Review of the River Basin Water Management Plans.

This line includes:

1. The confirmation of the Requirements of Directive 2000/60/EC and objectives of the 2<sup>nd</sup> Revision.

The implementation of the Directive includes the following main components:

- Assessment of the current situation
- Organization of environmental objectives
- Preparation of Monitoring system
- Gap analysis
- Preparation of the Program of Measures
- Preparation of Basin Management Plan of the country
- Implementation of the Program of Measures
- Evaluation of the Program of Measures
- Public consultation and active involvement of stakeholders

2. The summary description of the Management Plan

The River Basin Water Management Plans are the main reporting mechanism of the country to the EU. In the Summary of the River Basin Water Management Plans, authorities of the country, determine the realistic measures that need to be implemented in order to achieve the environmental goals and objectives of the Framework Directive, while justifying any derogation.

3. The Strategic Environmental Impact Study

The Environmental Impact Study includes the following four steps:

- The investigation of environmental issues, though the assessment study on the environmental impact of the proposed plan,

- the consultation with the citizens,
- the integration of the results of the environmental investigation and consultation into the new form of the plan,
- the monitoring of the future effects of the implementation of the plan.

➤ Consultation procedure

Informing the public at all stages of the preparation and implementation of the River Basin Water Management Plans is a requirement of the Framework Directive 2000/60/EC (Article 14), while active participation should be encouraged. All important issues should be discussed with stakeholders, competent authorities and the general public through appropriate consultation actions and participatory procedures.

In the public participation process all those who are related to the good condition of the waters should be invited to participate. More specifically, consultants should fall into at least one of the following categories:

Decision-making entities, administrators, water users or consumers and experts or specialists.

➤ Synergies with relevant EU Directives/actions, relative to:

1. Flood Risk Management Plans
2. Marine Strategy Framework Directive
3. Drought/water scarcity risk management plans
4. Climate change

### **3 – Players Involved**

Ministry of Environment and Energy

General Secretariat for Natural Environment and Water

Decentralized Directorate of Water Management

### **4. – Time Frame**

May 2021-May 2023

### **5. – Cost**

The exact cost of the action cannot be estimated in the current stage of the Project. However, based on the cost of the 1st review of the River Basin Water Management Plans, the cost of implementing action 2 is expected to be around 3.800.000 €, in order to cover the expenses of the review studies.

### **6. – Funding Sources**

The funding sources of the action are expected to be internal resources of the Ministry. This fact is justified due to the delegation of the action to be delivered in the Legal Department of the Greek Ministry of Environment and Energy, which is responsible for the design, amendment, and monitoring of the whole legislative production for topics related to sustainability and environmental policy.

**Date:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Stamp of the organisation:** \_\_\_\_\_