



## 1st Report on the Collection of Case Studies and Analysis of Experiences and Good Practices

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## CASE STUDY 1



## “The Restoration of Lake Karla, the Construction of a Forgotten Project”



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## **CASE STUDY 1**



### **“The Restoration of Lake Karla, the Construction of a Forgotten Project”**

#### **Problems:**

- The lake was dried completely
- Attributed as rural land to local residents,
- Lack of irrigation water
- Intensive pumping of groundwater
- Decline of the aquifer
- Ground cracking
- Soil salinization from sea
- Eutrophication of Pagasitikos bay
- Shortage of water supply,
- Changes in flora and fauna
- Drying sources and soils.

#### **Needs:**

Restoration of the hydraulic and biotic systems of the lake using the original design (1960), a reservoir storage and flood control.



## **CASE STUDY 1**



### **“The Restoration of Lake Karla, the Construction of a Forgotten Project”**

#### **Objectives :**

- Replacement of the water supply of the city of Volos with surface water
- Reduction of irrigation wells which caused ground cracks and soil salinization from sea.



#### **Goals:**

- Enrichment of the aquifer,
- Irrigation with surface (lake) water,
- Improvement of the environment,
- Creation of an important wetland in the center of Greece.

## **CASE STUDY 1**



### **“The Restoration of Lake Karla, the Construction of a Forgotten Project”**

#### **Outcomes:**

- The water supply of the city of Volos from lake surface water and irrigation reaches 60%,
- The reduction of irrigation wells is also important
- Rich habitats have increased
- Enriched populations of flora and fauna
- The enrichment of the aquifer
- The retreat of the front in the ground seawater
- Beneficial effect of microclimate



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## **CASE STUDY 1**



### **“The Restoration of Lake Karla, the Construction of a Forgotten Project”**



Map of the Region



Pumping Station in Petra



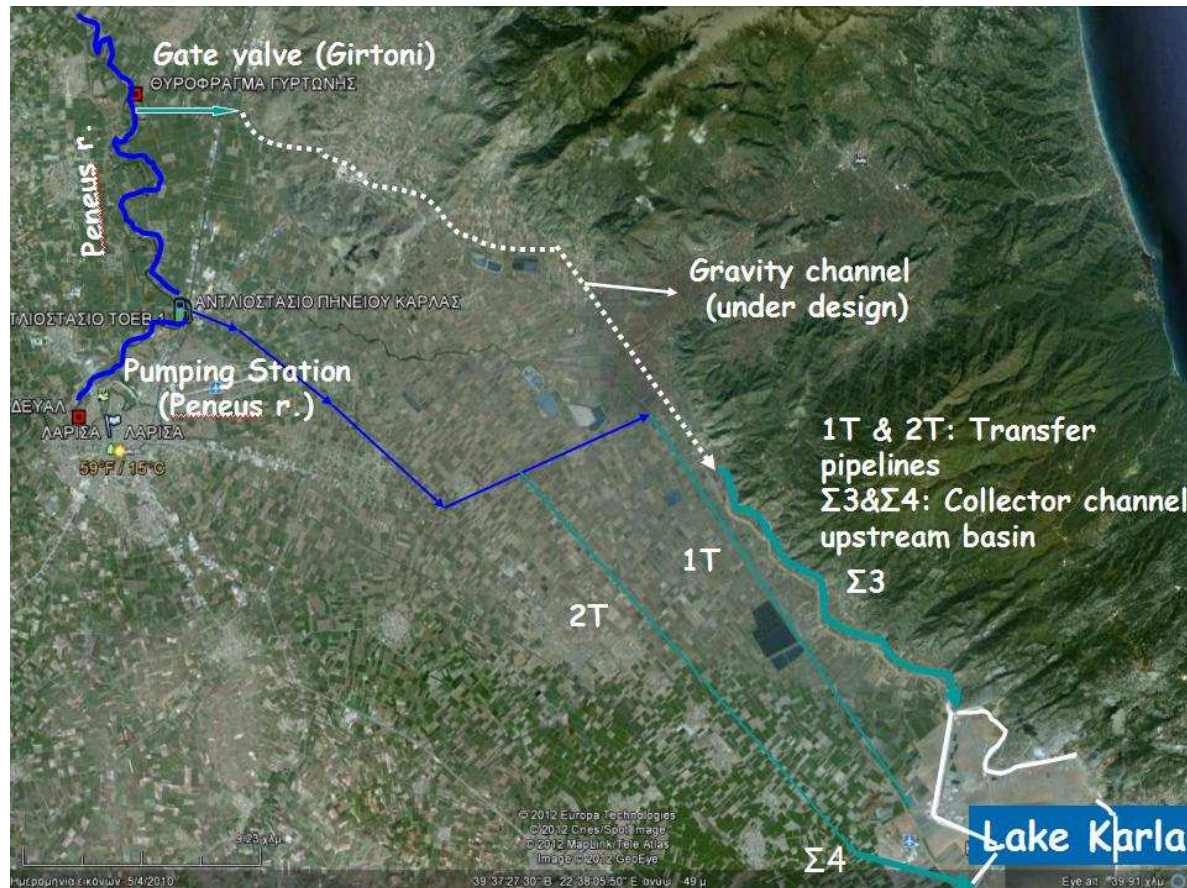
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## CASE STUDY 1



### “The Restoration of Lake Karla, the Construction of a Forgotten Project”



The Hydraulic System  
between Pinios River  
and Lake Karla



## CASE STUDY 1



### “The Restoration of Lake Karla, the Construction of a Forgotten Project”



Transfer Pipeline 2T

A Living Wetland



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## CASE STUDY 2



### “Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”



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## **CASE STUDY 2**



### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**

#### **Problems:**

- wet seasons had not been considered in the calculation of flood benefits
- failure of geological investigations.
- lack of studies' consistency
- burdening of the project
- doubling of construction time
- doubling of construction costs.

#### **Needs:**

- Urgent need for irrigation water made the construction of the dam pressing, while, choosing another site was also a time consuming and expensive process.



## **CASE STUDY 2**



### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**

#### **Objectives :**

To re-apply hydrological and geological simulation with optimum hydraulic behavior of the stream and bedrock bearing dam.



#### **Goals :**

were the construction of a safe and efficient dam and reservoir.



## **CASE STUDY 2**



### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**

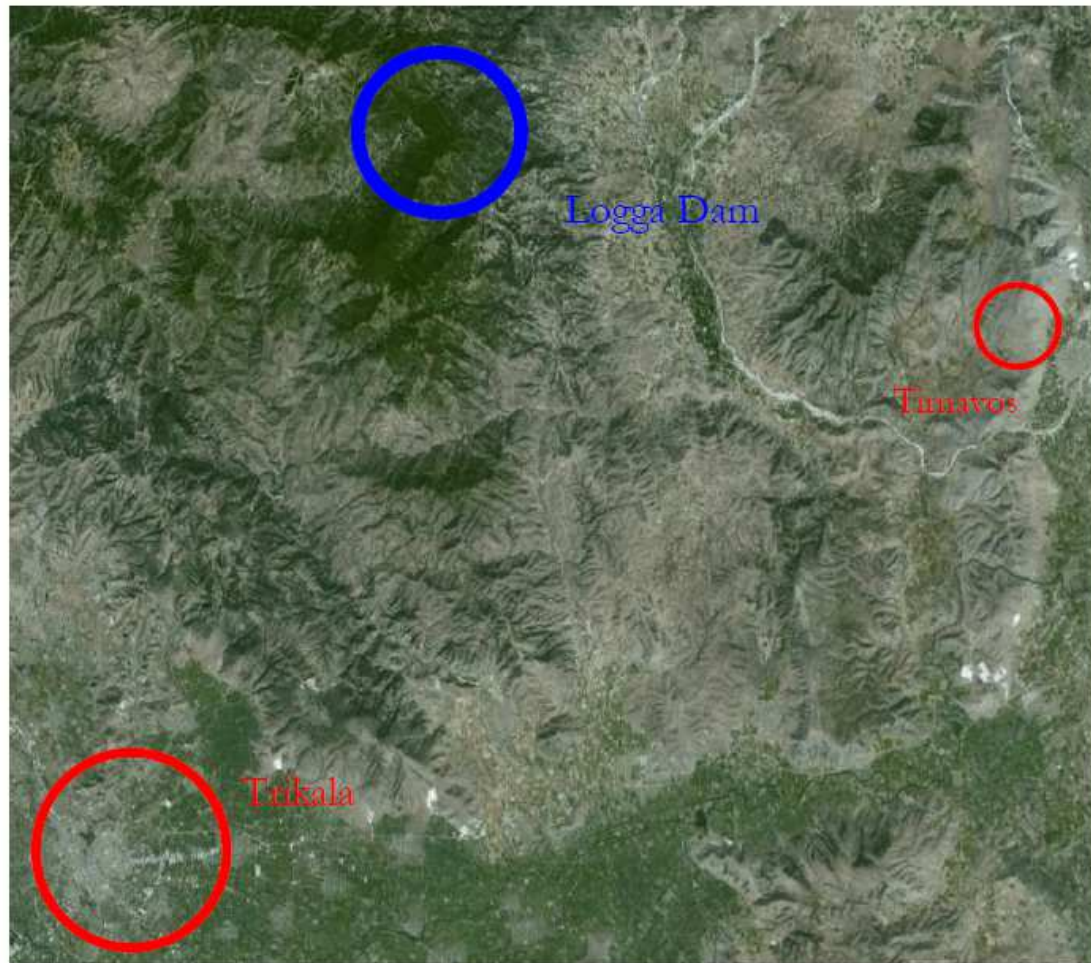
#### **Outcomes :**

- Significant contribution to the irrigation of the downstream region,
- the Dam Logga is still very important for water management in Thessaly.
- The wetland habitat is excellent, playing a significant role in the area's microclimate.
- The intelligent approach of hydrological and geological parameters

## **CASE STUDY 2**



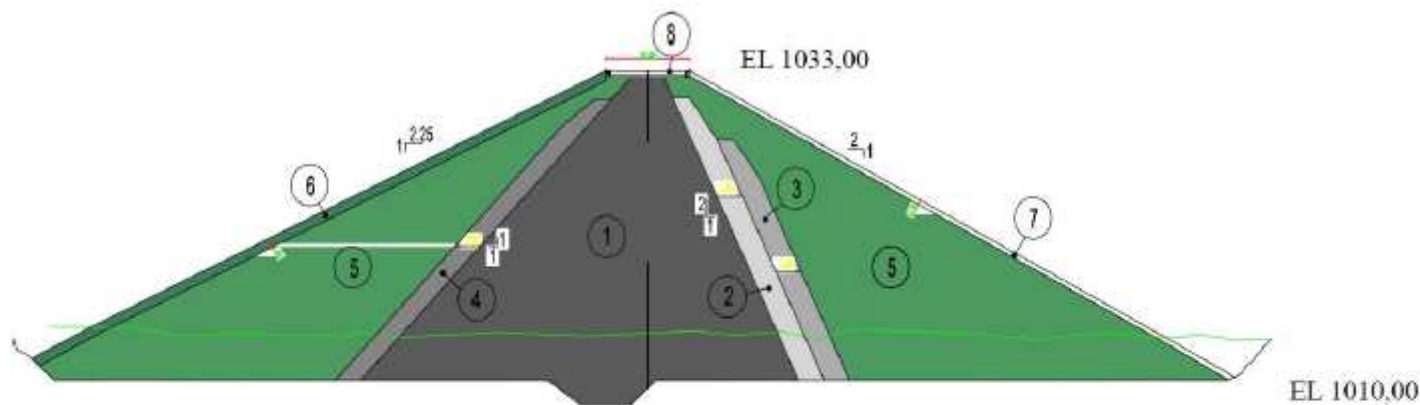
### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**



Map of the Region

## **CASE STUDY 2**

### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**



**Master Section of  
Dam Body**

- 1. Impermeable Core
- 2. Fine Filter
- 3. Coarse Filter
- 4. Transition Zone

- 5. Support Body
- 6. Upstream Slope Protection
- 7. Downstream Slope Protection
- 8. Road Surface

Height of Dam: 23m  
Length of Crest: 250m  
Elevation of Crest: 1,033m  
Dam Volume: 128,000m<sup>3</sup>  
Lake Volume: 250,000m<sup>3</sup>  
Lake Surface: 80,000m<sup>2</sup>



## **CASE STUDY 2**



### **“Re-Planning the Dam Logga during Construction Phase with Updated Hydrological Data and Additional Geological Investigations”**



**1st Year of Operation**



## **CASE STUDY 3**



### **“Advanced Flood Management in the Artificial Lake of Smokovo”**



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## **CASE STUDY 3**



### **“Advanced Flood Management in the Artificial Lake of Smokovo”**

#### **Problems:**

- Dry embankment due to the long exposure.
- The decade of the 00s was a wet season.



#### **Needs:**

- Thus there was a need for safe first flooding of the reservoir.



## **CASE STUDY 3**



### **“Advanced Flood Management in the Artificial Lake of Smokovo”**

#### **Objectives:**

Precise monitoring of important parameters of stability (sedimentation, infiltration, pressure) to allow the operation in real time.



#### **Goals:**

Safe and efficient dam and reservoir.

## **CASE STUDY 3**



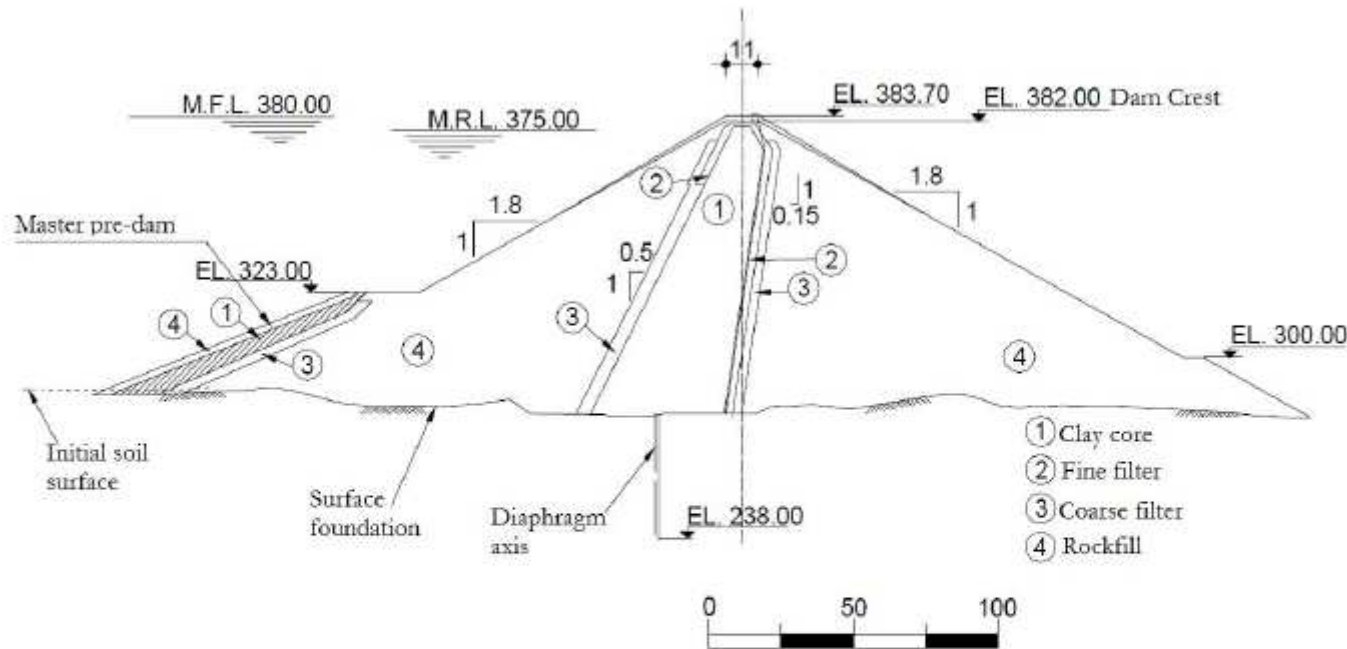
### **“Advanced Flood Management in the Artificial Lake of Smokovo”**

#### **Outcomes:**

- After the flooding stabilized the behaviour of the dam and the reservoir, multi-proposals took place, such as for water supply, irrigation and hydropower.
- Residents of downstream areas enjoy clean potable water and irrigation and the area has developed into an excellent wetland.
- The dam, despite the delay of projects and heavy rains, faced no problem thanks to the intelligent and multi-parametric solutions.

## CASE STUDY 3

### “Advanced Flood Management in the Artificial Lake of Smokovo”



Master Section of the Dam Body

Height of Dam: 109m  
 Length of Crest: 460m  
 Elevation of Crest: 382m  
 Dam Volume:  $3.5 \times 10^6 \text{ m}^3$   
 Lake Volume:  $240 \times 10^6 \text{ m}^3$   
 Lake Surface:  $380 \text{ km}^2$



## CASE STUDY 4



### “The Multi-Purpose Planning of the Plastiras Dam”



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## **CASE STUDY 4**



### **“The Multi-Purpose Planning of the Plastiras Dam”**

#### **Problems:**

Problem with electricity supply, since many infrastructures had been destroyed during World War II and sufficient electrical power was the mainspring for the reconstruction and development of the country. The problem itself was much bigger in the prefecture.

#### **Needs:**

Plastiras Dam was planned and constructed, In order to produce the maximum electricity supply and fulfill the needs in the wider area, a pioneer location of the energy power station was applied. It was not constructed, as usually, below the dam but at the foot of the mountain in the east of the Dam, in the Pinios River Basin.

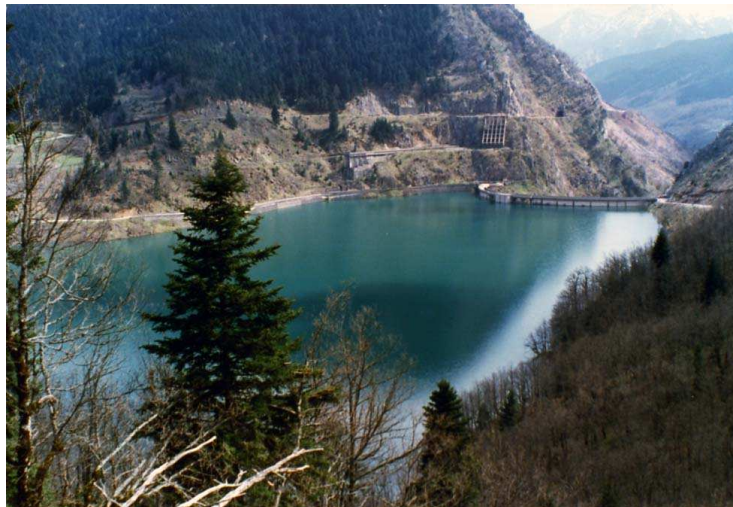
## **CASE STUDY 4**



### **“The Multi-Purpose Planning of the Plastiras Dam”**

#### **Objective:**

- To contribute in electricity production in Greece.
- Creation of a natural beauty landscape
- Tourism developement



#### **Goals:**

- Use of the reservoir both for the irrigation of Thessaly plain and for water supply of Karditsa and Sofades, as well as of other communities.



## **CASE STUDY 4**



### **“The Multi-Purpose Planning of the Plastiras Dam”**

#### **Outcomes:**

- Positive effect to the restructuring of the economy, at local and regional level.
- Development of a unique landscape around the reservoir
- tourism and residential development of the area from the beginning of the 90s’.
- The area is considered as an ideal holiday resort throughout the year, covering a wide range of leisure activities.
- Agricultural activities have been also developed to a great extent
- The electrical power and water supply, improved the standard of living and increased the residential and industrial development of the wider area of Karditsa.
- Example for the multi-purpose planning of other major dams in Greece
- Provide an understanding of the view that a large scale human intervention and change in the environment can turn out to be beneficial both for humans and the natural ecosystem.

## **CASE STUDY 4**



### **“The Multi-Purpose Planning of the Plastiras Dam”**



Panoramic View of  
the Reservoir

## **CASE STUDY 4**



### **“The Multi-Purpose Planning of the Plastiras Dam”**



**Geophysical Map of  
the Area**



## **CASE STUDY 5**



### **“Research Project on Planning to Ensure the Infrastructure of the Lake Stefaniada Area of Intervention”**



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## **CASE STUDY 5**



### **“Research Project on Planning to Ensure the Infrastructure of the Lake Stefaniada Area of Intervention”**

#### **Problems:**

- Shares similar characteristics with artificial lakes with dams because of its age.
- The erosion at the toe of the landslide because of the escapes of lake water
- Conical and linear lowerings of the relief

## **CASE STUDY 5**



### **“Research Project on Planning to Ensure the Infrastructure of the Lake Stefaniada Area of Intervention”**

#### **Objectives:**

- study and monitor the natural process of the system:  
Stefaniada Stream - Lake - Landslide
- planning and construction of the necessary works that will ensure the convenient warning of the people in case the landslide is activated or triggered,





## **CASE STUDY 5**



### **“Research Project on Planning to Ensure the Infrastructure of the Lake Stefaniada Area of Intervention”**

#### **Outcomes:**

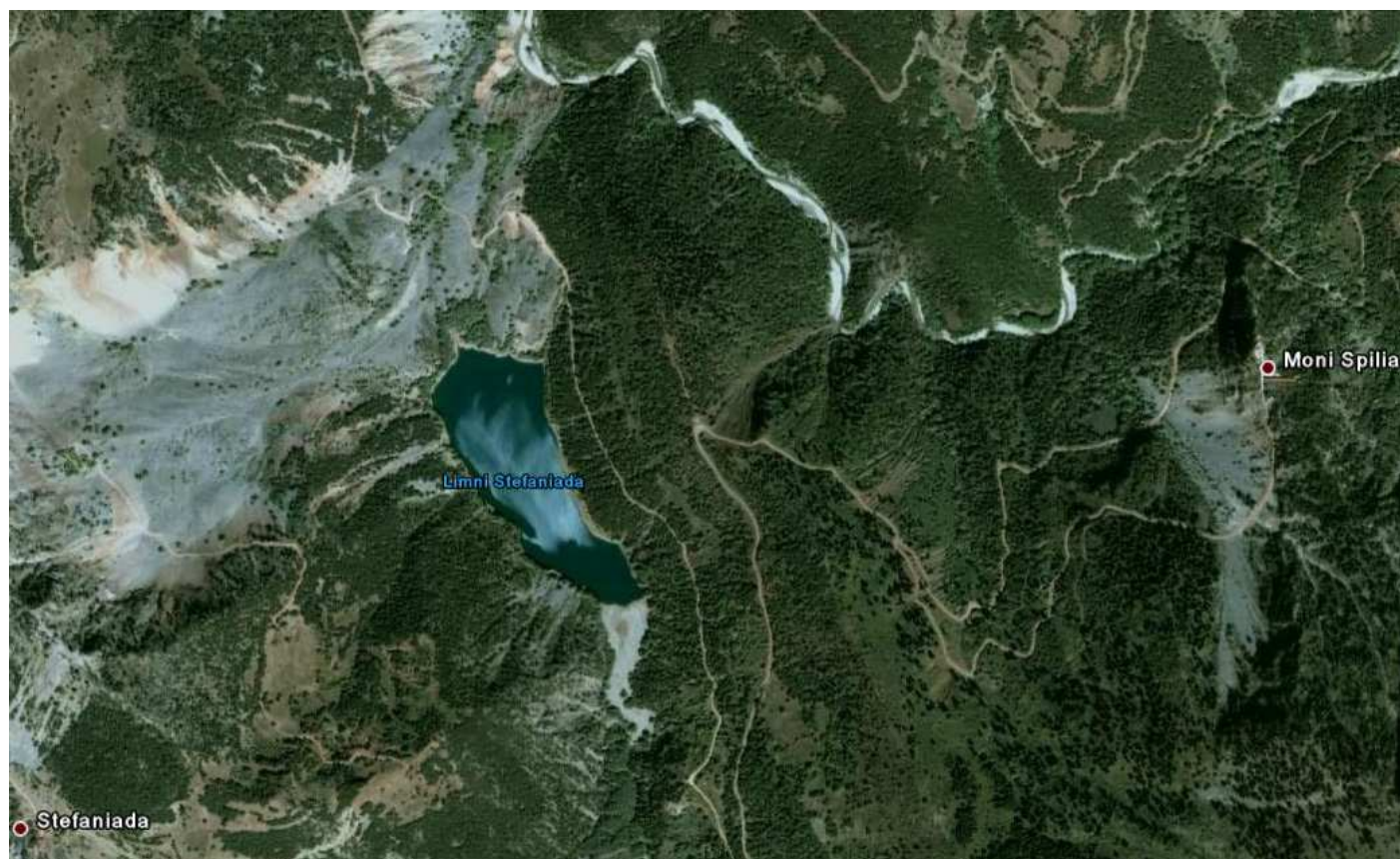
- Conservation of the existing ecosystem and landscape of unique natural and wild beauty
- Safety and danger prevention for the residents of the whole area and for the users of Vlasi - Vragkiana road.
- Establishment of safety measures concerning the infrastructures of downstream Stefaniada Lake and on Koumpourgianniti stream.



## **CASE STUDY 5**



### **“Research Project on Planning to Ensure the Infrastructure of the Lake Stefaniada Area of Intervention”**



**Map of the Region**



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## **CASE STUDY 6**



### **“Enrichment of Plastiras Reservoir”**



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## **CASE STUDY 6**



### **“Enrichment of Plastiras Reservoir”**

#### **Problems:**

- High fluctuation level of the reservoir
- The negative repercussions of the fluctuation of the reservoir's level on landscape
- the needs in irrigation of water is multiplied, especially during summer
- unequal distribution of the outflows
- the water extraction is directly dependent on the hydrologic conditions does not allow the competent institutions to formulate a long-term plan on agricultural production.

#### **Needs:**

- Rational management rules
- Implementation of the Plastiras reservoir enrichment project through the deviation of Kerasiotis stream



## **CASE STUDY 6**



### **“Enrichment of Plastiras Reservoir”**

#### **Objectives:**

- enrichment of the aquatic reserves of Plastiras reservoir
- deviation was the improvement of the negative balance between the natural inflows into the reservoir and the outflows that are required so as to cover irrigation, water supply and energy needs



#### **Goals:**

- Saving and enriching the water reserves of Plastiras reservoir

## **CASE STUDY 6**



### **“Enrichment of Plastiras Reservoir”**

#### **Outputs:**

The hydrologic contribution of Kerasiotis stream deviation to the water potential of Plastiras reservoir amounts to 7.5 hm<sup>3</sup> per year, which covers 50% of the water supply requirements from the reservoir per year.







THANK YOU

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