SUWANU EUROPE is a H2020 project focused on the use of reclaimed water for agricultural irrigation

### SUWANU EUROPE

Sustainable Water reclamation and Agricultural reuse options in Europe

January 2019 - June 2021

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Alentejo is an area with high potential for promoting the production and the reuse of waste water in agriculture.

### Alentejo region

ALENTEJO

**About the Region** 

Alentejo, is a region of Southern Portugal that corresponds to about 1/3 of the Portuguese territory. It has an area of 31 551.2 km2 (33% of the continent) and 760,098 inhabitants (7.4% of Portugal).

It is a region with low population density, but with high agricultural potential. The lack of water in this region has been one of the main constraints to its development, delaying the modernization of agriculture and sustainability in the public supply, although this situation has been improved and modified in the Alqueva region.

The Alentejo region is characterized by large precipitation deficit and high intensity of irrigated agriculture. This is an area with high potential for promoting the production and the reuse of waste water in agriculture. The lack of water is thus an opportunity to investigate and support more alternatives that, taking advantage of the available water resources, are sustainable from the economic, social and environmental point of view. **SWOT** analysis – Main results

The most relevant **strengths** are the guarantee of water supply availability in times of drought and in areas of water scarcity, the reduction of pressure on surface and groundwater resources, the need to focus on the acquisition of new knowledge, the European initiatives already finished or under way (acquisition of experience in the sector), the existence of information programs of project promoters, with the aim of improving public perception on the use of treated wastewater, with the support of public health authorities and the decrease of pollution load in water bodies.

The second group of aspects analysed are the **weaknesses**. Experts identified as less relevant the aspects related to the need of high investments in storage and treatment infrastructures, the lack of guarantee of flows and volumes, the reduced number and small size of infrastructures, the natural rejection of agricultural products and the exposure of farmers to health risks.

The most relevant aspects with the highest scores are the need for pumping and transport of treated wastewater to its destination, the lack of dissemination of scientific and technological knowledge and of health and environmental impacts, and the unawareness and misinformation in the use of these resources.

In the third group of aspects, the **opportunities**, the experts only score one item above 4 which referred to the strengthening available water resources through an alternative water source. And with the lowest scores in terms of relevance are the distribution of costs in the treatment of treated wastewater between irrigators and WWTP operators, the promotion of the use of wastewater treated by the European Union, the access to information and studies on treated wastewater in crops, the existence of touristic areas close to field crops, the proximity of field crops to population centres and in the environmental aspect the awareness to climatic changes.

Finally, the category of **threats** aspects. In this category the experts considered the less relevant aspects the possibility of greater demand than supply of treated wastewater, the use of treated wastewater as an excuse in commercial disputes, the lack of willingness to undertake the necessary water treatment reforms and the possible prioritization of cities or industries as an object of use of treated wastewater. Whereas the most relevant aspects with the highest score where the non competitive price compared to current water tariffs for irrigation, the cost of water treatment for agricultural use and the lack of transport and storage infrastructures.

#### Strengths

#### Weaknesses



**Opportunities** 

Threats



### **Conclusions for the SWOT** in Alentejo

Following the PEST analysis methodology, economic aspects received a higher relevance, namely when it comes to costs aspects, either production, distribution and operation costs, or high investments in storage and treatment infrastructures. This was transversal to all experts.

In the political aspects, the major aspects were related to the lack of legislation and the resistance to licencing projects for water reuse. Regarding the social aspects, the ones that stud out were the concern about water scarcity and the use of alternatives, but it is also relevant the still existing reluctance in the consumer acceptance and confidence in food irrigated with reclaimed water.

These results highlight the need for a regional strategy for reclaimed water reuse, paying attention to this reality and demonstrate the potential economic advantages, the social impact and environmental aspects.

# Andalusia

Andalusia's climate is Mediterranean, characterised by dry and hot summers.

## Andalusia region

About the Region

Andalusia is the most populated region in Spain and the second in terms of extension. More than eight million people live in Andalusia. The capital city is Seville and it is divided into eight provinces. Andalusia's GDP is 155.213 million Euros, representing the third largest economy in Spain by volume of GDP and its main sectors are services, agriculture, construction, manufactured industry and logistics and communication.

Andalusia's climate is Mediterranean. characterised by dry and hot summers, warm winters and irregular rainfall however, due to its geographic characteristics, the region has diverse microclimate areas. Water availability is irregular, alternating droughts and rainy periods. For that reason, the water resources vary according to every year rainfall. Nowadays, 70% of water is taken from the surface. 28% is grounded and around 2% comes from alternative resources such as desalinate or reclaimed water, being the first the most relevant, with four desalination plants located in the region.

#### **SWOT** analysis – Main results

The main **strengths and opportunities** identified for the development of water reuse for agriculture in Andalusia are related to:

•Market related: Water supply reliability, in a context of surface water limitation and water scarcity;

•Governance: The national legislation complies with the European legislation about the use of reclaimed water in agriculture;

•Product related: stakeholders have a positive perception on the quality and security of reclaimed water.

The main **weaknesses and threats** identified for the development of water reuse for agriculture in Andalusia are related to:

•Market related: reclaimed water cost is perceived as a difficulty for the agricultural sector;

Product related: the current state of the WWTP is deficient;

•Governance: excessive bureaucracy and negative social perception from both food chains and the general public.

ANDALUSIA



**Opportunities** 



Threats

#### **Conclusions for the SWOT in Andalusia**

SWOT analysis has led to propose an action plan in Andalusia to promote the use of reclaimed water in agriculture. Andalusia is a region whose water pressure and agricultural exploitation make it an ideal setting for the exploration of alternative sources of water and circular schemes for the exploitation of resources.

The approval of the European Regulation 2020/741 provides a common framework for the implementation of reclaimed water but implies a series of pending tasks for the region. Among the most relevant are the need to adapt national legislation to this regulation and the standardization of procedures for the granting of licenses for the use of reclaimed water. Likewise, the need to coordinate water policies at the national and regional levels is recognized, as well as to promote transparency in water quality controls.

In the area of public-private incentives, a central element is investment in adequate infrastructure, which includes tertiary treatment plants, distribution schemes and reservoirs for water storage, so as to guarantee the success of regeneration projects for agricultural irrigation. Another key point is the development of energy saving systems in water treatment, such as the self-consumption of biogas or the implementation of photovoltaic energy. Finally, due to the cost of reclaimed water, it is useful to offer incentives for the use of reclaimed water, either through tax credits or preferential financing.

The Andalusian Pact for Water or national and European projects that work on the subject to disseminate innovation techniques, encourage participation and generate consensus among all the actors involved. Likewise, the possibility of organizing workshops, round tables and other types of knowledge exchange and meeting spaces between investors, innovation companies, public administrations and farmers is proposed.

Finally, the importance of social acceptance for the success of regeneration projects in agriculture became evident, so the dissemination of regeneration must be reinforced, from a positive narrative, which eliminates the susceptibilities and displeasure that afflict this unconventional source. Along with this, it is recommended to promote the participation of civil society organizations in regeneration projects and organize dissemination campaigns that combine traditional communication with experiential learning, so that the community draws closer to the project and builds relationships of trust and transparency with the authorities and technicians who implement it.

## Antwerp and Limburg region Belgium

Today reclaimed water in agriculture is only used in exceptional occasions, but is seen as a high potential alternative for the future.

### Antwerp and Limburg region



#### About the Region

Antwerp and Limburg are two provinces located in the northeast of Flanders (Belgium). The region includes some compact cities (Antwerp, Mechelen and Hasselt).

The landscape is characterised by highly dispersed suburban zones although some regions with dominant agriculture and forestry still prevail. Both provinces are characterised by a high (Limburg 364.5 inhabitants/km2) to very high (Antwerp 658 inhabitants/km2) population density.

This reason together with the relatively moderate supply of surface water explain the area's low water availability (1.100 - 1.700 m<sup>3</sup> water per capita). Intensive pig and poultry farming and the dairy production are important agricultural sectors in both provinces.

Furthermore, vegetable production in greenhouses prevails in the region between the cities Mechelen and Antwerp, while fruit production characterises the Southern part of the province. Pressure on the groundwater resources and deviating precipitation patterns are predicted to further increase in the future. Today reclaimed water in agriculture is only used in exceptional occasions, but is seen as a high potential alternative for the future - especially in cultures of potato and vegetables.

#### SWOT analysis – Main results

The **strengths and weaknesses** reflect the advantages and disadvantages of using reclaimed water in the current context and compared to other water resources.

The most relevant **strengths** of reclaimed water compared to other water resources are:

•The optimisation of land use: The current most straightforward practice to ensure water supply is to build water basins. Nevertheless, this implies agricultural land losses and often production losses. Since no on-farm water storage is needed for the use of reclaimed water, it is seen as a strength;

•The constant supply of water during the periods of drought;

•The available treatment technologies.

The most relevant **weaknesses** of reclaimed water compared to other water resources are:

• The temporal and discontinuous water demand (during summer periods in dry years) of the agricultural sector: The sporadic needs of reclaimed water will impede structural investment from both the farmers and the wastewater suppliers;

•The cost of additional treatments, storage and transport of the reclaimed water;

• The lack of a distribution network is a disadvantage compared to other water resources since the water needs to be transported from the wastewater treatment plant onto the agricultural fields;

•The (current) legislation is seen as a weakness for the reuse of water since it restricts the use of the water resource (which is only applicable in cases of droughts).

**Opportunities and threats** are external factors that might influence the (further) implementation. The score of the relevance for each factor reflects both the impact and the probability of occurrence.



**Opportunities** 





Threats

The most relevant **opportunities** of reclaimed water compared to other water resources are:

•Technology transfer: Countries in southern Europe, Israel and in the US currently reuse water for agricultural purposes. In this perspective, initiatives as SuWaNu Europe contribute to this aspect high potential in the setup of water communities among farmers and with wastewater treatment suppliers Political vision and the future legislation;

• Occurrence of droughts will be the most important external factor for the rollout of reclaimed water for agriculture. Since climate scenarios for the region predict these increases, it is expected to be one of the main driving factors in the future.

The most relevant **threats** of reclaimed water compared to other water resources are:

• Political vision and the future legislation: Remarkable is that these are both seen as an opportunity as well as a threat. This is due to the uncertainty of future implementation of the EU regulations at the regional level. From the results of the SWOT analysis, the legislation and policy have a big influence on the rollout of reclaimed water in Flanders. Whether it would have a positive or negative impact is yet unclear;

 Negative public opinion regarding the reuse of treated wastewater;

•Treatment intensity.

The graphs show the average scores of the respondents. A large variation across the stakeholders' answers must be considered when interpreting the results. Furthermore, the different backgrounds of the stakeholders enable them to score some aspects better according to their expertise.



The idea of the Braunschweig water reuse scheme, run by Abwasserverband Braunschweig (AV-BS), is unique in Germany.

### **Braunschweig** region



reuse

**About the Region** 

households are produced.

Abwasserverband

The idea of the Braunschweig water

run

Braunschweig

bv

and

is

scheme.

#### **SWOT** analysis – Main results

SWOT findings regarding market aspects of the Braunschweig water reuse scheme show that the ideal geographical conditions of the irrigation area are the main strengths of the reuse scheme. The general water abundance in Germany leading to public lack of interest in water reuse was identified as main weakness. The increase of droughts caused by global warming makes the use of alternative water resources more attractive and is seen as **opportunity**. A potential market related risk can be the financing of additional reclamation technology which is hardly affordable.

SWOT findings regarding product aspects show that the successful long experience of AV-BS with water reuse is the main **strength** of the reuse scheme. The hygienic risks for employees and residents due to the current non-disinfection of the reclaimed water was identified as main weakness. If technology for additional water treatment such as ozonisation and active carbon become state-of-the-art the hygienic risks can be reduced what is seen as opportunity. A potential product related risk can be the different irrigation conditions from municipality to municipality which makes a one-to-one transfer of the Braunschweig water reuse scheme difficult.

SWOT findings regarding social and governance aspects show that the strong collaboration with the local farmers is one of the main strengths of the reuse scheme. The detection of high concentrations of micro-pollutants in the groundwater under irrigated fields was identified as main weakness. The implementation of a multi-barrier system guaranteeing high health and environmental guality standards for reclamation and irrigation can further reduce risks and is seen as opportunity.

#### Strengths

#### Weaknesses



**Opportunities** 

Threats





#### **Conclusions for the** SWOT in Braunschweig

Due to the long experience of AV-BS in the field of water reclamation the water reuse scheme stands for high financial autonomy and clear business structure. During the more than 60 years of activity of AV-BS a close partnership with the local farmers has been set up which leads to a high degree of acceptance among the local community. The successful long experience of the water reuse scheme is general based on favourable geological and climatic conditions in the region regarding field irrigation.

The missing 4th treatment stage during the reclamation process however is a problematic aspect of which leads to rising micro pollutant concentration in groundwater and to concerns of the local community regarding the hygienic risk of the reclaimed water due to the missing disinfection unit.

With respect to the future it can be stated that technologies for 4th wastewater treatment become more and more state-of-the-art and their implementation within the water reuse scheme can lead to reduced concerns regarding health and environmental risks. Additionally, climate change challenges like increasing droughts and converting the energy sector to renewable energies will emphasize the advantages of the water reuse scheme compared to end-of-pipe wastewater systems.

## **Occitanie** France

The region is home to several emerging water reuse projects, most of which are currently pilot or experimental projects.

## Occitanie region

OCCITANIE

#### **About the Region**

region in France with 73.000 km2 for 5.8 million inhabitants. It includes a climatic territories: mountains Roussillon plain), or 220 km of also the 2nd French region in terms of agricultural sector. agricultural area.

around the Mediterranean and cereal territories are already heavily irrigated, such as the Garonne plain for irrigation growing need for water. The region is involved: home to several emerging water reuse pilot or experimental projects. exacerbated by the SARS-COV2 context. However, with more than 3,000 treatment plants, the region has great potential.

#### **SWOT** analysis – Main results

The Occitanie region is the second The main strengths and opportunities identified for the development of water reuse for agriculture in the Occitanie region are related to:

wide variety of topographical and • WWTP: efficient, numerous with large volumes in the territory;

(Pyrenees and Massif Central), vast • Health aspects: with a mastery of the treatment and monitoring solutions agricultural plains (Garonne valley and implemented to ensure the safety of operators and consumer;

Mediterranean coastline. Occitanie is Demand for water: growing and important in the territory and especially in the

The main weaknesses and threats identified for the development of water reuse for We observe a landscape with vineyards agriculture in the Occitanie region are related to:

crops in the Garonne plain. Some • Environment: Current water discharges from continental WWTP very often contribute to the recharge of natural resources;

of maize, while vineyards face a Financial: profitability and financial balance difficult to achieve for the stakeholders

projects, most of which are currently • Acceptability and perception: mainly with regards to health aspects, potentially

#### **Strengths**



#### Weaknesses

ECONOMIC

ASPECTS

HEALTH

ENVIRONMENTAL

SOCIAL

ASPECTS

MANAGEMENT

REGULATORS

WATER

AVAILABILITY

TECHNOLOGY

TRANSFER

MARKET

TECHNCAL

ASPECTS



#### Conclusions for the **SWOT in Occitanie**

The first SWOT analysis of agricultural water reuse in Occitanie highlighted the main reasons for the current low and slow regional development of this practice.

A large part of the regional territory is thus already historically "adapted" to the water deficit with the establishment of crops with little or no irrigation, or with the development of large networks of raw water.

In some contexts, water reuse represents an interesting potential: in coastal areas where pressure on conventional resources is high, and where these non-conventional resources are discharged at sea.

Economic profitability is difficult to achieve between technical or regulatory constraints. Water needs related to the effects of climate change, or to the increase of the regional population. represent an opportunity for the development of water in reuse agriculture.

From an environmental point of view, water reuse can help preserving the quality of natural resources or replace overexploited resources. On the other hand, water discharge of several continental WWTP currently enables to maintain minimum flows in natural resources. thus limitina the opportunities of reuse.

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**Opportunities** 

ECONOMIC

ASPECTS

HEALTH

ENVIRONMENTAL

SOCIAL

ASPECTS

MANAGEMENT

REGULATORS

WATER

AVAILABILITY

TECHNOLOGY

TRANSFER

MARKET

TECHNCAL

ASPECTS



## **Plovdiv** Bulgaria





Maritsa, flows through the region, there is a shortage of irrigation water estimated at almost 10 hm<sup>3</sup> per season.

## **Plovdiv** region

#### **About the Region**

central part of South Bulgaria, covering 5.973 km2 with 666.801 inhabitants. The climate is continental, while in the uplands is mountainous.

utilizable agricultural The represents 49.5%. cultivated with cereals. orchards. oleaginous. industrial and annual crops, grasslands, consumer in the region is rice, but there is also irrigation of maize. tobacco, vegetables, and permanent crops, among others, in 18.53% of the usable area.

Although the Balkans' largest river, the Maritsa, flows through the region, there is a shortage of irrigation water estimated at almost 10 hm3 per season. In addition, the region has great potential for water reuse, as significant of wastewaters amounts generated.

There are some examples of irrigation with reclaimed water in agriculture, mainly by private initiatives, aiming to reduce the cost of growing perennial crops.

#### SWOT analysis – Main results

The Plovdiv region is located in the The SWOT analysis results are influenced by the peculiarities of the Bulgarian economy, agriculture and water sector, their estate, and development.

> transitionally Market related aspects of the analysis, identified as strengths, are connected to the expected competitive price of reclaimed water and land use in the region. In opposite, the weaknesses that were pointed out are water resource distribution and low availability in some areas. Nevertheless, there are outstanding area opportunities because of regional irrigation communities' setup, market demand for alternative water sources, and governmental support for distribution system reconstruction.

and vegetables. The largest water The existing access to water reclamation technologies was identified as strengths related to the reclaimed water as a product. Additional internal statements defined as weaknesses are the possible worries for food safety and buffering of water as the availability is not continuous or the use is seasonal. Giving advice on reclaimed water irrigation and preparing project applications from the National Service is a valuable opportunity for farmers. In contrast, a possible negative public opinion on the water guality was defined as a threat, and the second most important external factor.

> Social & governance issues of SWOT analysis include regulations, management, environmental and social aspects. In this domain, the strengths are connected to the reduction of pressure on freshwater resources, while the weaknesses are insufficient information and possible soil contamination. From the external factors, are the drought occurrence is important opportunity for reclaimed water use, but the role of existing regulations in the sector was identified as controversial, as they are strict, but their control is shared by various institutions.

#### Strengths





Weaknesses

**Opportunities** 

Threats





### Conclusions for the SWOT in Plovdiv

In the Plovdiv region, many positive aspects the future support implementation of water reuse in agriculture. The shortage of water experienced by the crops in the region is estimated at 10 hm3 per season. The close location of most urban and food industry's water treatment facilities to farmlands might convince the farmers to use the reclaimed water as an alternative source. However, this must be accompanied by strong support for clarifying and unifying the ownership of all distribution systems and substantial support for their restoration. As the financial issue is always important, there is a need to subsidize the construction of reclaimed water facilities by the irrigation communities through state or European funds, especially since in some parts no distribution systems have been built.

The presence of professionals in the state administration is a strength that should be used in parallel with the nomination of one managing water authority. However, the small number of cases, the lack of sufficient information, including practical one, the availability of surface numerous and ground freshwater sources are significant threats to the widespread penetration of water for irrigation reclaimed in agriculture.



## **Po Valley** Italy



About 23 million people, a third of all Italian citizens, live in the Po Valley.

### **PO Valley** region



#### **About the Region**

The PO VALLEY is the largest and most important The main strengths and opportunities identified in the Po Valley economic region in Italy. It is the centre of most Italian industry as well as Italy's agricultural heartland. The Po River, flows across seven regions, namely Piemonte, Valle d'Aosta, Liguria, Lombardia, Emilia Romagna, Veneto, Trentino Alto Adige, Together with its 141 tributaries, the Po catchment area stretches across 70,000 square km, most of the area is plain and the agricultural reuse potential is therefore higher. The area involves Piemonte, Lombardia, Emilia Romagna, Veneto and includes the large part of the most important towns, industrial and agricultural areas in Northern Italy.

In the area 710 Waste Water Treatment Plants are equipped with tertiary operating. treatment technologies. Intensive farming, cattle and pig breeding are widely practised in this area. About 23 million people, a third of all Italian citizens, live in the Po Valley. In the Po river basin are located ten cities with populations surpassing 100,000 units, as well as Turin and Milan which both overpass 1 million persons. In many areas, the population density (355 inhab. /km2) is almost double compared to the national average (203/km2). The Po valley draws the Italian economy with a GDP that reaches 738 billion euros, exceeding nations such as the Netherlands. Sweden or Poland.

The fertility of the soil, the abundance of water, the ease of communication routes favoured the development of economic activities. All branches of industry are widely represented; the major poles are the metropolitan areas of Milan and Turin, but along the whole extension of the two piedmont axes there are industrial centres, which are not lacking even in the intermediate areas. particularly in Veneto, where industrialization has spread so uniformly in the territory. The Po river basin today accounts for 40 % of the nation's gross domestic product. but suffered serious environmental consequences through the poor water management, industrial and sewage pollution, and agricultural runoff.

#### SWOT analysis - Main results

Region are:

Strengths: Stakeholders involved in the expert panel found agreement on the need of training, promote environmental positive technologies, having a stakeholders dialogue at EU level, consumer perception, national and EU standards, environmental safe.

**Opportunities :** Among the large list of opportunities agreement is found only on international management and EU regulation, infrastructures and water scarcity. There is a clear disagreement about cost sharing, limitation to industrial or non -food crops, new irrigated areas, alternative water sources, previous experiences and the impact of the organic food market.

The main weaknesses and threats identified in the Po Valley Region are:

Weaknesses: Agreement is found on water pricing, need to pump and store, and on promotion of water reuse, but at a lower score. Disagreement were mainly about limited availability, farm size and consumer protection. Of relevance the use of energy and the need of infrastructures, bedside the bad reputation of water reuse.

Threats: Concerning threats, there is a strong agreement about the lack of social acceptance and the rejection of products risk. The disagreement is on rigid regulation, low water production and excessive costs.

#### Strengths

#### Weaknesses

**Threats** 



**Opportunities** 

MINIMUM ECPOLOGICAL FLOW

WATER SCARCITY

KNOIWLEDGE

ACCESSIBILITY

FARM PROXIMITY TO CITIES

GROUNDWATER SALINIT

ORGANIC FOOD MARKET SHARE

PREVIOUS EXPERIENCES

ITALIAN REGULATION

EU COMMITTMENT

CLIMATE CHANGE AWARENESS

EU REGULATION

ALTERNATIVE WATER SOURCE



#### **Conclusions for the** SWOT in PO Valley

The survey carried out in the Po valley clearly shows quite different attitude and understanding of the water reuse related SWOT. The evaluation criteria for the results obtained can't be different than identify polarities, namely the aspects on which there is a clear strong convergence or divergence.

We considered as "convergent" those aspects having all the stakeholders categories agreeing (range 4.5 to 5). These aspects are to be considered as policy priorities (no resistance red line) for the short/medium term actions plans. Those with the largest difference (= or >2) among at least two stakeholders group are the conflictual issues to be tackled urgently or to be put apart (stumbling blocks) when not possible to deal with effectively with the technologies or policy already available.

## **Thessaloniki** Greece



Thessaloniki displays the second largest agricultural plain of Greece.

### Thessaloniki region

THESSALONÍKI



Thessaloniki is the second largest city of Greece. Thessaloniki province is situated at the North of Greece, on the Thermaic Gulf at the northwest part of the Aegean Sea, and hosts the second largest metropolitan city of the country. It is bounded on the west by the delta of the Axios River. According to the most recent census data the Thessaloniki Urban Area has a population of 824.676 inhabitants while the Thessaloniki Metropolitan Area has 1,030,338 inhabitants. It has an area of 1.285.61 km2 (metropolitan area) and is part of the Region of Central Macedonia. Although it is an area with high population density it has also a particularly important agricultural sector. Thessaloniki does not face particular water problems although the large population and the water requirements for irrigation make the area sensitive to water management issues. In addition. the environmental concerns of Thessaloniki residents and municipal authorities make sewage treatment a major issue. The province displays the second largest agricultural plain of the country, has abundant surface water bodies (3 rivers, 2 major lakes) and a considerable number of areas under protection status (Nature 2000, National Parks).

Agriculture represents an important economic sector for the plains surrounding the large urban center. Intensive irrigated crops such as rice pads, corn, cotton, vegetables and fodder fields. Although the severe economic crisis of the last decade has caused a lot of negative impacts to the socio-economic profile of the province such as long term de-industrialization and huge unemployment figures, the province still presents some basic advantages that can trigger growth. like the existence of specialized human resources of high educational level and a significant size of production base in the primary sector.



#### SWOT analysis – Main results

The main strengths and opportunities identified for the development of water reuse for agriculture in Thessaloniki are related to:

Knowledge/Technology: There is previous successful implementation and experience. Joint actions have accumulated considerable experience in re-use of reclaimed water for irrigation;

Research and Technology transfer: In terms of innovation Thessaloniki hosts an array of specialized institutes that are involved in testing and improving the technologies that are applied in water treatment, water management and water guality control issues:

 Regulations on Regional/Local Level: European subsidies under Common Agriculture Policy that form a guaranteed economic base for farmers and is strongly influenced by agro-environmental actions. The major water resources manager of the area of Thessaloniki (EYATH S.A.) is already heavily involved in actions to further exploit resources;

 Market Related: There is an enhanced water availability. By reusing water, the pressure on groundwater and surface water resources is significantly reduced.

The main weaknesses and threats for the development of water reuse for agriculture in Thessaloniki are related to:

•Water availability: Water demand is discontinuous (only during drought period):

 Social Aspects: There is strong disagreement between organizations, institutes and key actors on the acceptance of treated water reuse;

•Economic Aspects: There are considerable serious cost issues both for the WTTP operators and the potent end users, due the dominant methodologies utilized in WWTPs;

• Technology: The use of water in agriculture will need intensive treatments (excessive cost).

#### Strengths

#### Weaknesses



#### **Conclusions for the** SWOT in Thessaloniki

According to the analysis and the results obtained in the case of Thessaloniki, the positive SWOT aspects (Strengths and Opportunities) are more highly evaluated (in terms of score) than the negative ones (Weaknesses and Threats). However, when grouping the SWOT elements and evaluating them by a group of experts, the outcome is that both the weaknesses and the threats are significant and with high weights/scores.

On the other hand, the grouped strengths and Weaknesses have received the highest and the lowest average scores respectively. More specifically: a) the most important categories of the "Strengths" are related to "Knowledge / Technology' and "Enhances Water Availability", b) the most important categories of the "Opportunities" are related to "Water Demand" and "Legislation", c) the most important categories of the "Weaknesses" are also related to "Legislation" and finally d) the most important categories of the "Threats" are related to "Treatment Identity".

