SUWANU
EUROPE

Deliverable 2.6

Development of a Regional Action Plan for the fast implementation of water reuse in Occitanie region, France

Funding scheme:	Horizon 2020 – Coordination and Support Action (CSA)		
Project Coordinator:	BIOAZUL		
Start date of the project:	01.01.19	**Duration of the project:**	30 months
Contractual delivery date:	**30.06.2020 (deadline as stated in the DoA)**		
Actual delivery date:	**25.05.2020 (ESTIMATED)**		
Contributing WP:	**WP2: Development of general and regional action plans**		
Dissemination level:	Public		
Responsible partner:	ANETH.S.A.		
Version:	**Final version**		

The SuWaNu Europe project (Grant Agreement No.: 818088) has received funding from the European union' Horizon 2020 Research and Innovation Programme. The views and opinions expressed in this report does not represent the official position of the European Commission and is entirely the responsibility of the authors.

Contents

1 Executive Summary

This deliverable concerns the creation of the Regional Action Plan (GAP) for the geographical cluster of **Occitanie region in France** to overcome the barriers opposed in terms of water reuse in agriculture. As water reuse can provide a valuable asset to increased availability and effective use of water resources, this RAP provides the main issues identified from SuWaNu Europe regional analyses of priority issues that stand in the way of successful implementation of water reuse. The RAP provides details on the ways in which lessons learned from the cooperation among SuWaNu Europe consortium, the outcomes of the Regional Working Groups elaboration and the Participatory Workshops can be explored and horizontally applied towards the general goal of the improvement of the practice of water reuse within the European region.

The RAP is structured under the guidelines of the General Action Plan (Task 2.3). The GAP is structured in a way with four levels of hierarchy, with each level aiming to complete the statements made in the next higher level. The General Goal as of the GAP (1st level) is at the top of the hierarchy and provides the overarching aim of the GAP. Specific Objectives (SO) (2nd level) are laid out to guide the target regions of the SuWaNu Europe into the successful creation of Regional Action Plans (RAP) in ***Task 2.6. Development of 8 region-specific Action Plans for the fast implementation of water reuse concepts***, while the main key results (3rd level) to the effective meeting of the SO are also provided, as drivers for the creation of specific tasks to be implemented in RAP (4th level). The successful implementation of the SO and their results are monitored through individual indicators laid out in ***Task 2.7. Indicators for successful implementation of SuWaNu Europe Action Plans.***

The realization of the RAPs was made possible with the use of the Logical Framework Approach (LFA), an analytical process which provides the tools for goal support and objective-specific planning and management, using feedback of the RWGs in each Region. A stakeholder analysis was the preliminary step where the most relevant stakeholders of each region to the RAP were gathered, through ***Task 2.2. Stakeholder and AKIS analyses*** and ***Task 2.4. Participatory Workshops*** and ***Task 2.5 Regional Working Groups.*** A critical issue analysis based on other SuWaNu Europe tasks was made (***Task 2.1. SWOT and PEST analyses for water reuse implementation***) delivered for each Region to identify the key gaps and issues that should be the focus of the developed objectives, followed by solutions to these, laid out as the Specific Objectives (SO) of this Task. Finally, results that are proposed in the adjusted framework of each regional SO, are the key for the development of actions/steps implemented to this ***Task 2.6. Development of 8 region-specific Action Plans for the fast implementation of water reuse concepts.***

The specific target regions involved in Task 2.6 with a target to develop a Regional Action Plan are:

1. Antwerp and Limburg (Belgium)
2. Plovdiv (Bulgaria)
3. Occitanie (France)
4. Braunschweig (Germany)
5. Thessaloniki (Greece)
6. Po Valley (Italy)
7. Alentejo (Portugal)
8. Andalusia (Spain)

2 Introduction

Need of planning

SuWaNu Europe focuses in the development of strategies at a regional level so as to promote the uptake of innovative solutions identified in the project, concerning structured knowledge transfer and good practices on reclaimed water for agriculture. This is achieved though actions where consortium members worked with local actors in their regions in order to build the strategies following a participatory approach in order to boost the implementation of innovative solutions. As a result, SuWaNu Europe has developed regional action plans on eight selected European regions of the consortium to enhance policy recommendations at regional, national and EU level.

The necessity of Strategic planning at regional level with the development of actions plans during the project has engaged stakeholders in multi-level approach in order to raise awareness on the benefits of the reclaimed water reuse and to plan in advance the promotion of water reuse solutions best applicable in each regional cluster.

General purpose of this task.

The main aim of this task is to develop strategies and recommendations to pave the way for the implementation of water reuse solutions. The Regional Action Plan is a document providing details and guidelines on how the lessons learnt from the cooperation among the SuWaNu Europe project consortium may be exploited, specified and applied in different geographical clusters in order to improve the practice of reclaimed water reuse in targeted European regions.

Regional Action Plans aim to include key aspects and guidelines that meet the specific needs of targeted regions while focusing on a description of actions outlined in ***General Action Plan,*** and it is oriented to specific measures adapted to each regional context.

To achieve this particular steps, chained actions took place during **WP2- Development of general and regional action plans**. All tasks of WP2 contributed to the development of the 8 Regional Action Plans, which is the targeted outcome this Work Package. Briefly mentioning the steps leading to the completion of Regional Action Plans, SWOT and PEST analyses for water reuse was carried out for the 8 regions (D2.1). As a result, a stakeholders' matrix via AKIS analysis was performed based on key actors' knowledge, interests, influence, existing and potential alliances and conflicts, impact of their activity, etc. and their effective communication channels. Focused on the gained knowledge (D2.2), a general strategy (Action Plan) was developed to overcome implementation problems and barriers. (D2.3) Regional Working Groups were also established with the identified stakeholders, key actors and project partners creating regional clusters that included organizations out of the consortium to support implementation strategies (D2.5). Participatory workshops where organized with local and regional actors to present the project and receive their feedback in the definition of strategies, meeting the number of participants originally set (D2.4).

All the aforementioned tasks were successfully implemented and provided critical feedback on the development of the 8 Regional Action Plans.

The **general objective** of the project SuWaNu Europe is:

"*The promotion and the effective exchange of knowledge, experience and skills between practitioners and relevant actors of water reuse in agriculture, so that direct applicable technological and organizational solutions are widely and balanced disseminated all around Europe resulting in a more resilient agricultural sector to cope with water scarcity and climate*

change effects." The above declared objective of the consortium that has undertaken the works of SuWaNu-Europe is in absolute alignment with the recent EU circular economy package that includes water reuse as a tool to achieve water sustainability for the agricultural sector. Moreover, the Commission is already implementing an Environmental Implementation Review (EIR) aiming to improve the implementation of environmental policies, including on water. The SuWaNu Europe project offers an opportunity to a large number of EU member states to work together for identifying and resolving the implementation and compliance gaps that exist on reclaimed water policy, which are linked to agriculture pressures. Specifically, the programmed actions of Work Package 2 of the project offer the opportunity of wide public consultation on all pinpointed critical issues regarding the reuse of reclaimed water & nutrients for irrigation throughout Europe. The projects scheduled frame secures the equivalent stakeholders' involvement to the public consultation procedures in order to maximize consensus & clarity for the foreseen deliverables (8 Regional Action Plans for overcoming barriers in reclaimed water reuse for irrigation).

Knowledge and innovation support for water reuse & agricultural policies is another sub axis that the Commission has high expectations for the imminent future. The Commission envisions proper information infrastructures that should allow the seamless sharing of data among public sector organizations, facilitating public access and policymaking across boundaries. Moreover, user-friendly, and effective decision-support tools must provide agriculture and water stakeholders with simple, readable, and feasible roadmaps for reaching their sustainability objectives. The identification and dissemination of good practices is also important. The SuWaNu-Europe project has also adopted those envisions and for that reason planned a series of actions on Work Packages 1, 2 and 3 that will allow the consortium of partners involved to not only share information and data among them but to act as a distribution hub to key players on water management and to the wider public.

Finally the planned elaboration of the Regional Action Plans for the 8 pilot areas of the project with the bidirectional participation of the established Regional Working Groups will provide a focused assessment of overlaps, unaddressed difficulties, miscommunication, and interoperability issues on reclaimed water reuse to agriculture that will inform and improve action at local level and at EU level for promotion of a more sustainable management of water resources.

3 Objectives of the Regional Action Plan

General reference to the aspirations of the Regional Action Plan to contribute in overcoming obstacles for widening the re-use of reclaimed water to irrigation and how this can advocate the Sustainability of the Water Resourced Management and Agriculture.

There are strategic objectives for each Regional Action Plan. These address firstly to the establishment of a regional sustainable reclamation and reuse framework to ensure implementation coordination and coherence, and of sustainable agricultural irrigation activities at the regional and national level, in order to meet the general European commitments. Secondly, to develop and implement operational objectives in each regional cluster in order to promote innovative technologies and best applied practices in irrigation with reclaimed water for agriculture based on regional policy frameworks for sustainable development. Thirdly, to engage key stakeholders (organisations, national and local public authorities, agricultural and business sector, farmers and consumers, civil society, universities, research institutions etc.) in sustainable reclaimed water uses and models promoting knowledge transfer and enhancing circular economy measures.

The predominant goal of the Regional Action Plan as it was identified from the action 2.3 of the WP 2 is:

MAIN GOAL

To the increase use of the reclaimed water in agriculture, resulting in a more resilient agricultural sector, in order to cope with water scarcity and climate change effects.

The Regional Action Plan will be produced in all 8 pilot areas of the SuWaNu_Europe project as displayed to the table below:

Table 1: Geographical distribution of the 8 pilot areas throughout Europe

	Pilot area	Consortium member responsible
1.	Andalusia in Spain.	**FENACORE** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Andalusia.*
2.	Braunschweig in Germany	**AVBS** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Braunschweig.*
3.	Flanders in Belgium	**PSKW** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Flanders.*
4.	Santarem in Portugal	**FENAREG** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Santarem.*
5.	Thessaloniki in Greece.	**ANETH S.A.** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Thessaloniki.*
6.	Occitan in France	**ECOFILAE** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Occitan.*
7.	Plovdiv in Bulgaria	**AU** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Plovdiv*
8.	Po River Valley in Italy	**CONFAGRI** *is the designated partner of the SuWaNu consortium that will coordinate the elaboration of the Regional Action Plan in Po River Valley*

Each of the local partners that are responsible for elaborating the specific areas Regional Action Plan has undertaken a series of acts in order to produce the Regional Action Plan in close

collaboration with the Regional Work Group. All RWG's were established during the works of Task 2.5. The structure of each RWG (key players that were encouraged to participate) was formed in each pilot area utilising the directions and conclusions of the deliverable of the Task 2.2 (AKIS analysis). A series of open participatory workshops have been organised at all pilot regions by the consortium partners listed on table1. At these workshops a series of intensive discussions were done on all valid for each region critical issues linked with the reuse of reclaimed water for irrigation of crops. All arguments that were claimed by the key player participants were documented in order to become the various topics that will constitute the Regional Action Plan for overcoming the local pinpointed barriers for boosting up the reclaimed water reuse to agriculture.

According to the results of D2.1 the most relevant aspects that regional strategy should pay special attention are:

Social perception: the weakness/threat is the is a perception of health and product risk when crops are irrigated with reclaimed water while on the contrary, the support for the use of reclaimed water as an alternative resource of water is an opportunity as a way to fight against the climate change or water scarcity. This antagonism should be managed in the regional strategy.

Reclaimed water costs: the cost of producing reclaimed water and to transport water from the WWTP to the irrigated crop is seen as a weakness/treat as many crops cannot support this cost when compared to conventional sources (if conventional sources are available).

Regulation framework: Some countries have already certain regulations for the use of reclaimed water and the proposal of an EU regulation is seen as an opportunity.

3.1 Tackling the potential barriers that are associated with the water reuse:

The most critical barriers, according to feedback from previous deliverables, the General Action Plan and from the RWGs are summarized as follows:

- **Securing Public Health protection** from all currently known harmful constituents and all those that will emerge at the future
- **Associated costs** of the needed infrastructure upgrades / constructions including systems assessment operation and monitoring
- **Mitigating the safety risks** from inadequate treatment levels inadequate monitoring and malicious actions.
- **Deflating consumer concerns** on contamination, safety and quality issues
- **Fast detection of Inadequate technologies /** continuous validation of modern technologies performance
- Promotion and establishment of **trusted monitoring** for all water systems.
- Promotion of **clear and consistent regulations** for reclaimed water use

These issues have been commonly raised by the consortium members and are chained to each regional cluster as basic issues to be followed on the development of the strategy of the Regional Action Plans

4 Regional Characterization

Each one of the eight regions involved in this task showed different characteristics on its current status concerning the reuse of the reclaimed water in agriculture. The following paragraphs show the versatile characteristics and thus the approach and implementation of each region.

Belgium

Antwerp and Limburg are two provinces located in the northeast of Flanders (Belgium). The region includes some compact cities (Antwerp, Mechelen, and Hasselt). Highly dispersed suburban zones characterise the landscape, although some regions with dominant agriculture and forestry still prevail. This reason, together with the relatively moderate supply of surface water, explains the area's low water availability (1.100 - 1.700 m^3 water per capita). Farming, and dairy production are important agricultural sectors in both provinces. Furthermore, vegetable and fruit production in greenhouses and prevails in parts of the region. Reclaimed water is only exceptionally used in agriculture. Nevertheless, reclaimed water is considered an important alternative for the future.

Remarks: Reclaimed water is considered to be a relevant alternative water resource for irrigation. The use of reclaimed water is considered as one of the climate adaptation strategies. The annual supplied water originating from wastewater treatment plants in the provinces of Antwerp and Limburg represented 314 million m^3 for the year 2018. This amount constitutes an abundant potential supply of water compared to the crop water requirements.

Although the quantitative water balance considering reclaimed water is mostly positive at the regional scale, the local match between supply and demand is not straightforward. In some places, the geographical distribution of the WWTPs does not correspond with the location of the cultivated areas, furthermore, there is no distribution network to the agricultural fields is available for irrigation water.

Bulgaria

The **Plovdiv** district is located in the central part of South Bulgaria covering 5,977.5 km^2. The agricultural sector contributes to 6 % of the country's GVA and 18.5 % of the total employment. The highest share of irrigated land is with the farms that manage less than 2 hectares that specialize on vegetable growing and are predominantly situated in the East-Aegean region (where 40 % of Bulgaria's farms manage 27 % of the utilizable agricultural land).Compared to other European countries, Bulgaria has relatively significant freshwater resources and is not a water-stressed country. Yet, there are areas that experience water scarcity especially in dry summers. The use of reclaimed water in Bulgaria is not regulated. The main legislative ordinance that regulates the irrigation sector is ordinance No. 18 for the quality of water used for irrigation. At present, 13 urban WWTPs are operating in the territory of Plovdiv district.

Remarks: In Plovdiv district there are several private initiatives related to the use of reclaimed water for irrigation of crops. Stimulation measures (financial and legislative) are needed to push the development of the sector.

France

Occitanie is the second largest French mainland region with 72,724 km^2 and 5,8302,00 inhabitants. Agriculture is different and specialized according to the territory landscape such as livestock in mountainous areas, grapes for wine production on the Mediterranean rim and cereals and maize in the Garonne plain. Some areas are heavily irrigated (corn production in Garonne plain) while others experience a growing need for irrigation (vineyards production).

There are only few reclaimed water reuse projects throughout the region, most of them are pilots or research based. However, with over 3 000 WWTP, Occitanie has a tremendous opportunity to promote reclaimed water reuse.

Remarks: In the region some pilots have been implemented to highlight the promising opportunity of using reclaimed water in a region strongly stricken by drought events and population increase.

Germany

Braunschweig is the second-largest city in Lower Saxony and a major centre of scientific research and development. It has an area of 192 km² and 248,023 inhabitants. The agricultural and food industry has always occupied a central role in Lower Saxon. Most of the agricultural area in the region is characterized by sandy soils with low water-holding capacity which makes an intensive irrigation necessary. Taking that in account and in order to prevent falling groundwater levels the reuse of reclaimed water in agriculture is essential in this area. For irrigation of its fields AV-BS uses a mix of reclaimed water (90%) from the WWTP and groundwater (10%) which is abstracted on-site. The collaboration between the local farmers and AV-BS can be seen as very strong due to decades of successful water reclamation.

Remarks: The studied region is a strong technology centre for water reclamation, which has a strong partnership between farmers and AV-BS Abwasserverband Braunschweig, with a long story and trajectory. In this region the farmer associations, work together to use 10.000.000 m^3 /year reclaim water for their crops (February to October). The treatment systems fulfil the legal framework with minor exceptions.

Greece

Thessaloniki is the second largest city of Greece. Thessaloniki Urban Area has a population of 824,676 inhabitants while the greater Metropolitan Area has 1,030,338 inhabitants. 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 in the area. The secondary effluent of the city's Wastewater Treatment Plant (WWTP) is occasionally and under certain needs used for agricultural irrigation after mixing with freshwater at a 1:5 ratio.

Remarks: The critical issues that need to be further examined on the effort to broaden the re-use of treated wastewater for irrigation at Thessaloniki Region are:

- Large scale interventions on existing irrigation infrastructures and WWTP's for reclamation and reuse of treated effluents.
- The barriers of multiple administrative layers of water resources government (local, regional, national) that are involved in any action / initiative to implement reuse of reclaimed water
- The contradicting axes of the policies for improvement of food production chain, safety and the policies to move to a more circular economy by more intense exploitation of available local resources.
- The existence of a considerable number of relatively small capacity WWTP's offers a significant opportunity to implement "smart" solution that will combine low investment cost, low operation cost, environmental & health safety, thus allowing a wider reclamation and reuse of WWTP's effluent for agricultural irrigation purposes.
- The need to inform / educate the water users as well as the consumers for the benefits of water reclamation and reuse for agriculture for irrigation purposes and the effort to

overcome the expected oppositions set a task of extra-large dimensions for the policy makers.

Italy

The PO valley is the largest and most important economic region in Italy. It is the centre of most Italian industry as well as Italy's agricultural heartland. The Po Valley is the most developed region of the country for the agro-food industry and the related agricultural sectors. Agriculture has a high productivity index, thanks to the diffusion of irrigation and mechanization. The total annual water consumption in the Po District is of about 20.5 billon m^3 with 16.5 billon m^3 for agriculture. In Italy, the national legislation sets out very high-quality standards for agricultural, urban, and industrial application, but regional authorities may impose even stricter quality standards. It should be noted that many regions have imposed stricter quality standards, bringing the quality of reclaimed water almost to the same standard as drinking water, even for non-potable uses.

Remarks: Water reuse may represent a valuable source of alternative/additional water volumes for both the environmental and human needs. But this opportunity requires the involvement of several actors along the chain such as territorial bodies (from national government down to local bodies), multiutilities in charge of managing the "integrated water services", users and user's associations (for both sensitization, awareness creation, and good practices adoption).

Portugal

Alentejo is a region of Southern Portugal that corresponds to one third of the territory of Portugal mainland with an area of 31,551.2 km^2 (33% of the Continent) and 760,098 inhabitants (7.4% of Portugal).

It is characterised for having a 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, impeding the modernization of agriculture and sustainability in the public supply. 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.

Remarks: In Portugal there are not enough structures that allow the reuse of treated wastewater from agro-industrial or urban origin in agriculture, consistently and continuously. Another determining factor is the legal vacuum in the water reuse sector and the lack of technical guidance for both water suppliers and end-users. On the other hand, there is a potential for using this resource, especially in the Alentejo region, where there are high constraints related to water resources.

Spain

Andalusia is the most populated region in Spain and the second in terms of extension. The water availability is irregular, alternating droughts and rainy periods. For that reason, the water resources vary according to every year rainfall. 70% of water is on the surface, 28% is grounded and around 2% comes from alternative resources like desalinate or reclaimed water. Alternative water resources are mainly desalinated water. Reclaimed water is not already allowed in Andalusia as irrigating source. The Spanish law, RD 1620/2007 allows the use of reclaimed water for five main beneficial uses: 1) urban, 2) agricultural and landscape, 3) industrial, 4) recreational and 5) environmental. With regards to the potential of reclaimed water reuse, Andalusia reuse (not for agriculture, with some exceptions) is higher than the Spanish average. The use of reclaimed water can also benefit the agrobusiness sector.

2.1 Synthesis from regional characterization

As it is pointed out from the overall Deliverable 2.1 that correlates the SWOT and PEST analysis of all the 8 pilot areas of the project, there is a common frame for developing action plans for advocating the increase in use of the reclaimed water.

European Union policy trends that drive for better resources management and in particular the continuous evolution of the water specific policies is clearly defined as a strong basis that provided its coupled by appropriate funds allocation for future investments, can and will lead to increased reuse of reclaimed water quantities.

Another strong driving force for augmentation of reclaimed water reuse is the equally vigorous EU policies for tackling extreme climate variations associated with natural disasters (droughts, floods).

A summarization of the most relevant aspects that should be attended in each Regional Action Plans is:

Reclaimed water costs: the cost of producing reclaimed water and to transport water from the WWTP to the irrigated crop is seen as a weakness/treat as many crops cannot support this cost when compared to conventional sources (if conventional sources are available).

Social perception: the weakness/threat is the is a perception of health and product risk when crops are irrigated with reclaimed water while on the contrary, the support for the use of reclaimed water as an alternative resource of water is an opportunity as a way to fight against the climate change or water scarcity. This antagonism should be managed in the regional strategy.

Regulation framework: Some countries have already certain regulations for the use of reclaimed water and the proposal of an EU regulation is seen as an opportunity.

5 Formulation of the REGIONAL ACTION PLAN for each region

Each Region will adapt the results of the specific objectives (SO) in section 4 according to the specific conditions of the area and extend the information with the specifications of the regional context. Specific objectives shall remain the same for all regions. If an aspect is not relevant for a region, can be removed from section 4. In case there is another key aspect that influences heavily the reclaimed waters reuse it must be included and analysed in section 4.

To best serve the purpose of the Regional Action Plan, focusing and covering all critical aspects, the strategic planning has been divided into four distinct levels:

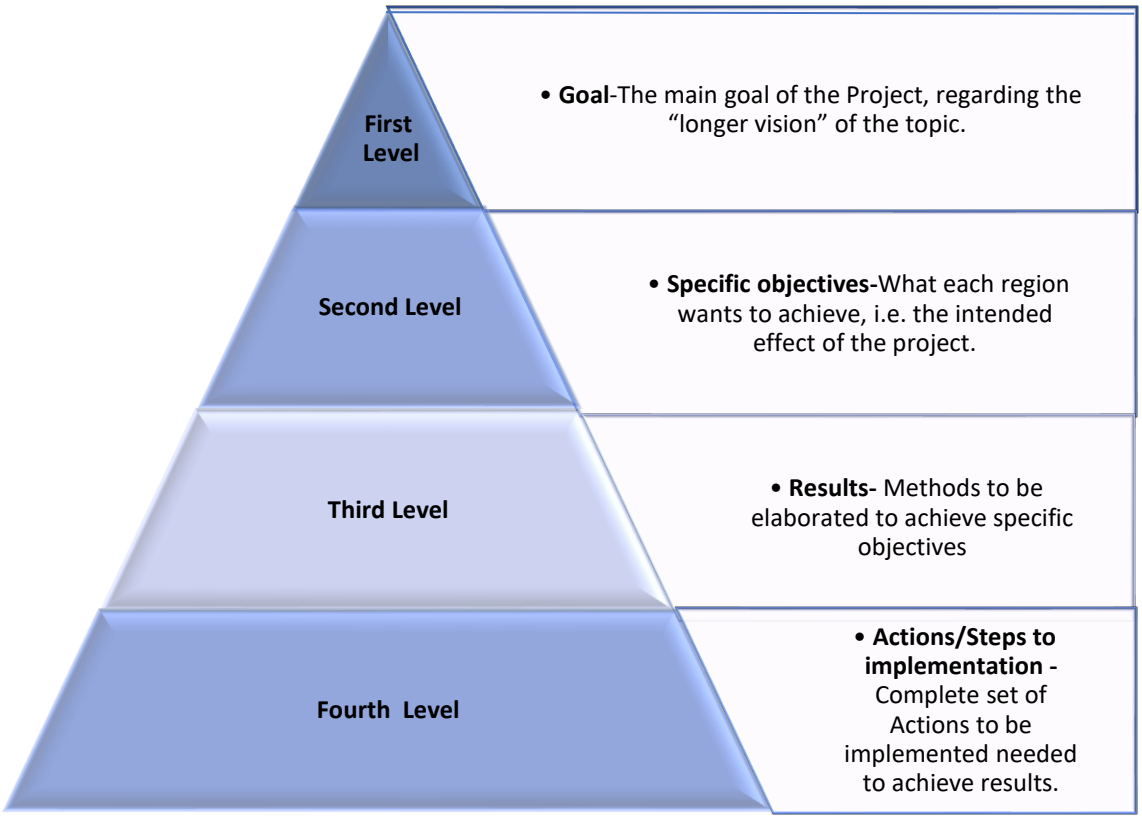

Figure 1. Levels for the development of a Regional Action Plan

First level:

The main Goal of SUWANU Europe General Action Plan (GAP) is:

"To increase the use of reclaimed water in agriculture, resulting in a more resilient agricultural sector to cope with water scarcity and climate change effects".

This goal is common to all Regional Action Plans and shall be the target to be aimed in all regions.

Second level:

This level comes from the topics identified in tasks of WP 1 and 2 and it comprises the Priority Areas of action for the completion of the axes of

the general objective. General Action Plan specific objectives are common for every region i.e.:

1. **The European and national legal framework encourages the use of reclaimed water in agriculture.**
2. **The administrative procedures are adequate for the implementation of reclaimed water for irrigation in agriculture.**
3. **Public and private financial policy provides incentives for the use of reclaimed water for irrigation.**
4. **Public and private stakeholders invest in research and technology to improve and expand the use of reclaimed water in agriculture.**
5. **A European network may be established to disseminate existing results and exchange best practices regarding the use of reclaimed water.**
6. **The communities involved accept the agricultural products irrigated with reclaimed water**.

Third level:

The Specific Objectives to be obtained are further analyzed in the following paragraphs along with the results (or actions) that would lead to the achievement of the objective.

Fourth level:

In the last step every region defines the tasks or actions required to achieve every result. This is the most empirical and simpler level and has to contemplate every action needed to reach a result.

5.1 SWOT and AKIS analyses as guides to the REGIONAL ACTION PLANS

In SWOT and PEST analyses (task D2.1) within WP2, for water reuse was carried out for all 8 regions. As a result, a stakeholders' matrix was performed based on key actors' knowledge, interests, influence, existing and potential alliances and conflicts, impact of their activity, etc. and their effective communication channels. Based on the gained knowledge, the general strategy (Action Plan) was developed and according to these results the specific Regional Action plans are developed hereto overcome implementation problems and barriers.

Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis is one of the most effective approaches used for analysing strategic management policy, categorised as follows:

- Strengths: (internal) characteristics of the project that give it an advantage over others.
- Weaknesses: (internal) characteristics of the project that are a disadvantage relative to others.
- Opportunities: elements in the environment that the project could exploit to its advantage.
- Threats: elements in the environment that could cause trouble for the project.

In the SWOT analysis we defined a common classification of items by all 8 regions. The approach was to focus in the most common strengths, weaknesses, opportunities and threats to analyse the relevance given by each country key actors.

The categories are classified in the following table.

Table 1. Classification according to SWOT analysis

Category	Ind.
Market-related	MR
Economic Aspects	MR1
Water Availabiltiy	MR2
Market	MR3
Product-related	PR
Technical aspects	PR1
Technological aspects	PR2
Social & Governance	SG
Social aspects	SG1
Regulators	SG2
Management	SG3
Environmental	SG4

The most relevant strengths were related to "Water availability", and technical aspects for all 8 regions. On the contrary, economic, market, social aspects or management proved as less relevant.

According to the results, the most relevant strength by region are:

- Market related for Belgium
- Product related for Greece
- Social aspects for Italy

The most relevant items to weaknesses are market related. "Social aspect" & "Governance" received the lowest valuation in all 8 regions. For all countries, the cost of reclaimed water is a critical weakness according to SWOT analysis. For that reason, the economic aspects are the most relevant, followed by the water availability and the market related issues. It can be concluded that the legislative framework is an important weaknesses in Bulgaria, France, Greece and Portugal; the concern about the water scarcity or the climate change are aspects considered as very relevant in France, Italy or Portugal and the reclaimed water cost are specially relevant in Belgium, France, Greece, Italy and Portugal.

A very interesting weakness in the lack of interest in reclaimed water in Germany, where there are no problems of water scarcity.

The aspects more relevant according to most common threats are:

- economic,
- social and
- regulatory

WR^2 –AKIS analysis was carried out (D2.2). It consists of a novel system to reveal information and knowledge transfer opportunities and weaknesses regarding water reclamation and reuse in the SUWANU Europe Project. A total of 88 key players have been participated in the whole WR 2 -AKIS survey.

The teams in all 8 regions (plus Cyprus) responsible for AKIS (Agricultural Knowledge and Information System) analysis performed a stakeholder consultation in order to gather, process and evaluate information of stakeholders with a role in the water reuse and agricultural sectors. This work enabled the identification of stakeholders and the assessment of their knowledge, interests, influence, existing and potential alliances and conflicts, impact of their activity, etc.

Specific attention was paid to the identification of the effective communication channels used by each stakeholder in each region.

The different stakeholders were thereby characterized and classified according to those parameters/aspects in a stakeholder matrix. The final output of this task is a data base of key stakeholders that is used here for in the development of action plans and in the drawing up of the communication plan.

The stakeholder analysis has been completed by an AKIS analysis intended to understand the structure and processes for knowledge transfer and innovation. The analysis included:

- organizational structures
- institutional structures
- role of agricultural advisory services; processes
- and barriers

These characteristics lead to the development of a Typology of Knowledge Flows for each of the 8 target regions.

Table 2. WR^2-AKIS Typologies

	Actor linkage matrix	System failure framework	Actor linkage mapping
Belgium	Limited Communication and Cooperation	More opportunities	Type I
Bulgaria	Average Communication and Cooperation	More opportunities	Type II
France	Limited Communication and Cooperation	More opportunities	Type III
Germany	Increased Communication and Cooperation	More opportunities	Type IV
Italy	Increased Communication and Cooperation	More opportunities	Type II
Spain	Increased Communication and Cooperation	More opportunities	Type V
Cyprus	Increased Communication and Cooperation	More opportunities	Type II
Greece	Limited Communication and Cooperation	More barriers	Type IV
Portugal	Limited Communication and Cooperation	More opportunities	Type VI

According to the AKIS's analysis results each region each region will evaluate and set priorities to the actions taken for the development of its Regional Action Plan.

This AKIS analysis is used on the framework of the project as a vehicle for empowering farmers and reclaimed water users to investigate new options to make their business more sustainable.

The AKIS helped the consortium to propose and develop practical ideas, to support innovation, knowledge transfer and information exchange to the development of the Regional Action Plans.

5.2 Specific Objectives and Results for the Regional Action Plan

Setting and describing the Specific Objectives aiming to tackle the abovementioned priority issues, resulted to the following, according to the LFA approach:

- Description of a future situation where the priority issues have been remedied.

- Verification of the hierarchy of the SO.

- Illustration of the means-ends to a solution.

In other words, the 'negative situation' is converted into a solution and expressed as a 'positive achievement' or the set SO.

The **Specific Objectives (SO)** as is driven by analyses, previous research and data according to the deliverables of WP1 and WP2 and set in the General Action Plan are briefly stated as followed:

SO1: The European and national legal framework encourages the use of reclaimed water in agriculture.

Result 1.1: National legislation complies with the European legislation regarding wastewater treatment and reuse of reclaimed water.

Result 1.2: National legislation unifies existing regional policies on water reuse, avoiding fragmentation.

Result 1.3: The legislation allows the use of reclaimed water throughout the year for agricultural irrigation.

Result 1.4: Strict regulations among European and National legislative frameworks regarding reclaimed water quality standards are enforced.

Result 1.5: The legal framework must facilitate the procedures required for agricultural irrigation with reclaimed water.

Result 1.6: Stakeholders participate in legislation discussion at EU level.

SO2: The administrative procedures are adequate for the implementation of reclaimed water for irrigation in agriculture.

Result 2.1: Harmonized standards for administrative requirements of water reuse are enforced at national level.

Result 2.2: The bureaucratic procedures to acquire the license for reuse in agriculture are clear brief and inexpensive.

SO3: There are financial incentives through public and private policy measures to support reclaimed water reuse for irrigation.

Result 3.1: Public administration invests in infrastructure for the treatment and distribution of reclaimed water.

Result 3.2: Public and private stakeholders agree to reduce cost of energy for the production of reclaimed water.

Result 3.3: Public authorities, reclaimed water operators and administration provide direct economic incentives to farmers that use reclaimed water for irrigation.

Result 3.4: Subsidies are provided to farmers willing to irrigate their fields with reclaimed water.

SO4: Public and private stakeholders invest in research and technology to improve and expand the use of reclaimed water in agriculture.

Result 4.1: The cooperation networks between the public and private sector are established, and both invest in research to increase water quality, distribution and overall use of reclaimed water.

Result 4.2: A supervisory board, with representatives of all the stakeholders, has been established to expand and monitor the evolution of know - how and the technology for reclaimed water.

Result 4.3: Farmers are informed and advised about the new water treatment technologies and their application in agriculture.

SO5: There is a European network of dissemination of existing results and exchange of best practices regarding the use of reclaimed water.

Result 5.1: European countries promote international exchange and dialogue to expand the use of reclaimed water.

Result 5.2: European-based scientists and private companies have a specific network to share and exchange results and practices.

Result 5.3: Farmers' organizations across Europe communicate and compare their experience with the implementation of reclaimed water for irrigation.

SO6: The communities accept agricultural products irrigated with reclaimed water.

Result 6.1: The general public is aware of the benefits regarding the use of reclaimed water in agriculture.

Result 6.2: The general public accepts and consumes products irrigated with reclaimed water.

Result 6.3: The public opinion is aware of the benefits of water reuse to face water scarcity and protect the environmental.

6 Steps for the implementation of the Local Action Plan for Occitanie region in France

The RAP bases their specific actions (4th level) on the SO (2nd level) and results (3rd level) set by the GAP (see Section 5 above). The SO and elaborated strategy of the GAP form the basis for the specific steps/actions to the realisation of the RAP strategy.

For the RAP development actions have thus been proposed (4th level). Most of the actions are directly related and attached to results (3rd level): for each Result there can be zero (if not relevant for Occitanie region), one or several actions.

One action has been specifically dedicated to the SUWANU Europe general objective (1st level) as this action integrates all SO and all Results.

An additional SO (2nd level) (= SO7) has been added for Occitanie with three directly associated actions.

6.1 Methodological Framework

The first version of the RAP was elaborated by SUWANU French partner (ECOFILAE) based on previous SUWANU materials, and more specifically on:

- Deliverable 1.1 SUWANU Europe State-of-Play, Occitanie, France
- Deliverable 2.1 SUWANU Europe SWOT analysis, Occitanie, France
- Deliverable 2.2 SUWANU Europe AKIS analysis, Occitanie, France
- Deliverable 2.4 SUWANU Europe Participatory workshop, Occitanie, France, including the complete

This first draft of actions was submitted to RWG core and key members that have a broad and integrated vision of water reuse for agriculture in Occitanie (Occitanie region public entity, AD'OCC agency, INRAE and Occitanie Agriculture chamber). They could comment, modify, and add new actions. ECOFILAE then gathered all propositions and comments to consolidate a new version. Then specific visio and phone meetings were organized with RWG core and key members to discuss the propositions and validate a final version.

It was thus decided **to add a new SO (SO7)** "The local stakeholders and project participants are trained and empowered" gathering specific actions very important for Occitanie that could not fit in the other SO.

It was also decided to **prioritize the actions** from PRIORITY 1 (red – top priority – should be implemented in short term within 1-2 years) to PRIORITY 2 (orange– high priority – should be implemented in mid- term within 2-3 years), and finally to PRIORITY 3 (blank - lower priority – should be implemented within 5 years).

The following complement (in red) to the SO3 from the GAP was specifically added: "Public and private financial policy provides incentives for the use of reclaimed water for irrigation WHEN THE PROJECTS ARE ASSESSED SUSTAINABLE, SAFE AND WITH IMPORTANT REPLICATION POTENTIAL". Moreover, the following complement (in red) to the Result 3.1 from the GAP was added: "Public administration invests OR SUBSIDISES infrastructures for the treatment and distribution of reclaimed water".

A specific ID was dedicated to each of the 23 Actions from A1 to A23.

- 12 actions are classified PRIORITY 1
- 6 actions are classified PRIORITY 2
- 5 actions are classified PRIORITY 3

Some key context elements related to Occitanie and France have been described when necessary to better understand how and why the actions have been proposed.

For each action responsible stakeholders were appointed based on AKIS analysis categories.

The “sources and origins” documents or events where and when the discussions about the related action started or are based on are also detailed.

The final version of the RAP validated by all RWG core and key members will then be disseminated to all participants to the participatory workshop, and to all stakeholders interested in water reuse for agriculture in Occitanie through ECOFILAE and SUWANU Europe social networks, and by RWG core and key members.

6.2 Specific Action plan for Occitanie

The actions planned in Occitanie region to develop sustainable water reuse in agriculture, the stakeholders involved and some contextual elements are gathered in the Table 1 below.

Table 1: Action plan for water reuse in agriculture in Occitanie region, France

PRIORITY 1 – PRIORITY 2 – PRIORITY 3

SUWANU EUROPE GENERAL objective	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
To increase the use of reclaimed water in agriculture, resulting in a more resilient agricultural sector to cope with water scarcity and climate change effects	A1	Launch a study to assess potential and opportunities of water reuse at regional level	Region and Department public entities	Participation workshop report SUWANU EUROPE T2.4

LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO1 - The European and national legal framework encourages the use of reclaimed water in agriculture.	**1.1.** National legislation complies with the European legislation regarding wastewater treatment and reuse of reclaimed water.	French regulation requirements are different from the EU requirements. French regulation integrates other uses than agriculture (Golf courses, green areas…).	A2 A3	At national level : - Establish and publish a clear regulatory framework for water reuse in agriculture in France as a declination and in compliance with EU regulation - Set clearly the framework for the uses not covered by EU regulation (golf courses, green areas…)	State authorities	Participation workshop report SUWANU EUROPE T2.4
	1.2. National legislation unifies existing regional policies on water reuse, avoiding fragmentation			Already implemented in Occitanie and in France		SUWANU D1.1
	1.3. The legislation allows the use of reclaimed water throughout the year for agricultural irrigation.			Already implemented in Occitanie and in France		SUWANU D1.1
	1.4. Strict regulations among European and National legislative frameworks regarding reclaimed water quality standards are enforced.			Already implemented in Occitanie and in France		SUWANU D1.1
	1.5. The legal framework must facilitate the procedures required for agricultural irrigation with reclaimed water.	Water reuse situations (technical, organisational, environemental and sanitary risks…) can be very different and specific from one project to another. Existing French "Circulaire du 4 avril 2016" for the current French regulation was a valuable document to assist local authorities and project stakeholders. A similar document covering different technical and organisational situations should be delivered based on EU requirement.	A4	At national level : Cover all possible water reuse situations (especially technical and organisational) into the future national regulatory texts in compliance with the EU regulation in order to facilitate the procedures both for state authorities and for project stakeholders.	State authorities	Participation workshop report SUWANU EUROPE T2.4
	1.6. Stakeholders participate in legislation discussion at the EU level.	Regional plateforms/groups for water reuse gathering different stakeholders (mainly private companies) already exist.	A5 A6	- Enlarge stakeholders participation (including farmers), communication and activities (number of meetings) of regional platforms dedicated to water reuse (AFNOR plaform on « Water Reuse & Normalisation », SUWANU plaform, other groups…) - Ensure that results/feedbacks from those meetings and activities debating EU level legislation are gathered into reports shared with French ministry department (national level) in charge of water reuse and of discussions at EU level	Region and Department public entities	Participation workshop report SUWANU EUROPE T2.4

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LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO2 - The administrative procedures are adequate for the implementation of reclaimed water for irrigation in agriculture.	**2.2.** Harmonized standards for administrative requirements of water reuse are enforced at national level.	The French authorities in charge of administrative and regulatory procedures and validations are empowered at the local level (13 departements in Occitanie region). Their role is to ensure that national administrative and regulation requirements are fullfilled.	A7	Organize specific meetings/exchanges on water reuse for 1) harmonization of procedures and 2) feedbacks about projects specificities between the 13 departments state authorities (ARS and DDT(M)) that belongs to Occitanie region	State authorities	Participation workshop report SUWANU EUROPE T2.4
	2.3. The bureaucratic procedures to acquire the licence for reuse in agriculture are clear, brief and inexpensive.	The bureaucratic procedures to acquire the licence for reuse in agriculture are already quite clear, brief and inexpensive.		No specific action proposed		

LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO3 - Public and private financial policy provides incentives for the use of reclaimed water for irrigation **WHEN THE PROJECTS ARE ASSESSED SUSTAINABLE, SAFE AND WITH IMPORTANT REPLICATION POTENTIAL**	**3.1.** Public administration invests OR SUBSIDISES infrastructures for the treatment and distribution of reclaimed water	So far the adopted strategy by regional and national funders is to support financially (subsidises or loans) studies and construction works to whoever carry those activities out (municipalities, farmers or WWTP operators...). The regional strategy nevertheless need to be harmonized between those funders and clearly defined to become clear to local project leaders. The following actions should be implemented.	A8	Dedicate a specific budget from the main regional public administrations (Occitanie region, Energy and environment agency, Water regional agencies…) to support water reuse projects over the next 5-10 years Comments - Only projects assessed profitable and sustainable should be supported (environmental and socio-economic analysis) - Shoud be supported in priority: - the projects with the highest local benefits and replication potential (full-scale demonstrators) - the areas where no regional irrigation network is spread - the areas where WWTP discharge is not consequent and valuable for the natural water resources - Specific CALLS FOR PROPOSALS shall be launched by all public administrations (coordinnation between funders)	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4 SUWANU EUROPE D1.1 Occitanie SWOT analysis (D2.1)
	3.2. Public and private stakeholders agree to reduce the cost of energy for the production of reclaimed water.	Energy costs are often the major expense item in OPEX of water reuse projects. So far no specific direct actions on energy cost reduction for the production of reclaimed water has been implemented.	A9	This proposition has not been discussed so far and shall be discussed with stakeholders from different regional platforms/groups	Region and Department public entities Water, environment and energy agencies	
	3.3. Public authorities, reclaimed water operators and administration provide direct economic incentives to farmers that use reclaimed water for irrigation.	So far no specific direct incentives is given to farmers willing to irrigate with reclaimed water except if they are gathered in a specific entities making specific studies or investments in the water reuse chain (reclamation, storage and / or distribution) (Cf Action A8)	A10	This proposition has not been discussed so far and shall be discussed with stakeholders from different regional platforms/groups	Region and Department public entities Water, environment and energy agencies	
	3.4. Subsidies are provided to farmers willing to irrigate their fields with reclaimed water.	So far no specific direct incentives is given to farmers willing to irrigate with reclaimed water except if they are gathered in a specific entities making specific studies or investments in the water reuse chain (reclamation, storage and / or distribution) (Cf Action A8)	A11	This proposition has not been discussed so far and shall be discussed with stakeholders from different regional platforms/groups	Region and Department public entities Water, environment and energy agencies	

LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO4 - Public and private stakeholders invest in research and technology to improve and expand the use of reclaimed water in agriculture.	**4.1.** The cooperation networks between the public and private sector are established, and both invest in research to increase water quality, distribution and overall use of reclaimed water.		A12	See Action A8 - Integrate research and innovation projects in partnerships with research centers (from low to high TRL) into specific budgets and calls for proposal	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4
	4.2. A supervisory board, with representatives of all the stakeholders, has been established to expand and monitor the evolution of know - how and the technology for reclaimed water.	Regional plateforms/groups for water reuse gathering different stakeholders (mainly private companies) already exist	see A5	See Action A5	Region and Department public entities	Occitanie region (AD'OCC - RWG member)
	4.3. Farmers are informed and advised about the new water treatment technologies and their application in agriculture.		A13 A14	See Action A8 Projects awarded with public subsidies should integrate the following activities: - Field visits on full-scale and demonstration sites shall be organized for farmers interested. - Pedagogical leaflets presenting water reuse and reclamation concepts shall be produced and dealt to farmers at regional and local levels.	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4 SWOT analysis (D2.1)

LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO5 - A European network may be established to disseminate existing results and exchange best practices regarding the use of reclaimed water.	**5.1.** European countries promote international exchange and dialogue to expand the use of reclaimed water.		A15	Regional platforms and groups should join international groups and networks on water reuse	Region and Department public entities	Occitanie region (AD'OCC - RWG member)
	5.2. European-based scientists and private companies have a specific network to share and exchange results and practices.			Already implemented in Occitanie and in France		
	5.3. Farmers' organizations across Europe communicate and compare their experience with the implementation of reclaimed water for irrigation.		A16	See Actions A5 and A6 Regional platforms and groups including farmers unions organize regional meetings (information, training, share of feedbacks) and professionnal visit trips in Europe for farmers	Region and Department public entities Farmers unions	Occitanie region (AD'OCC - RWG member)
LEVEL 2 - GAP - SO	LEVEL 3 - GAP - Results	Occitanie context	ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
SO6 - The communities involved accept the agricultural products irrigated with reclaimed water.	**6.1.** The general public is aware of the benefits regarding the use of reclaimed water in agriculture.		A17	Integrate water circular economy as a safe and regulated practice into the ongoing adds campaigns from the Occitanie administrative Region promoting the use of local and circular resources. Those campaigns should highlight that water circular economy target water deficit and climate change challenges.	Region and Department public entities	ECOFILAE
	6.2. The general public accepts and consumes products irrigated with reclaimed water.	One poll has been conducted in 2016-2017 on general public acceptance and consumption (IRSTEA, SOPOLEAU project funded by AE RMC) - In Montpellier area, and not at regional scale	A18	Carry out regular updated polls to watch out the trend for general public acceptance and consumption should be carried out at regional level (at least one very 5 years)	*To be defined*	SUWANU D2.7 Indicators for RAP
	6.3. The public opinion is aware of the benefits of water reuse to face water scarcity and protect the environmental.		A19 A20	See Action A8 Project awarded with public subsidies should integrate the following activities: - Communication press released (local, regional and national) highlighting the benefits and the precautions to be taken - Forward some key results and benefits to the Occitanie administrative Region to enable general (all water reuse projects) communication at regional level	Region and Department public entities	Participation workshop report SUWANU EUROPE T2.4

LEVEL 2 - Other SO
SO7 - The local stakeholders and project participants are trained and empowered

ID	LEVEL 4 - "Steps to implementation" - Actions	Stakeholder	Sources/Origins
A21	Encourage specific training and awareness raising strategy and actions (seminars, training sessions, webinars, workshops…)	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4
A22	Update the regional inventory on water reuse projects (description and feedbacks). It should feed the EU networks (SO5)	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4
A23	Clearly define all possible regional funding sources entities and specific conditions into a document (e.g. "fundings for your water reuse project") broadcasted to all stakeholders including farmers	Region and Department public entities Water, environment and energy agencies	Participation workshop report SUWANU EUROPE T2.4

7 Conclusions for Occitanie region

The SUWANU Europe general objective (1st level) is “to increase the use of reclaimed water in agriculture, resulting in a more resilient agricultural sector to cope with water scarcity and climate change effects”. To target this objective the Occitanie region public entity has planned to launch a specific action that encompasses all SO: the Action A1 “**Launch a study to assess potential and opportunities of water reuse at regional level (PRIORITY 1)”.** This action was discussed at the SUWANU participatory workshop (see Participation workshop report SUWANU EUROPE T2.4) and will be launched in 2020 second semester. All topics from the SO will be covered.

The actions proposed above in Table 1 put the Occitanie administrative region (public entity), the agricultural chambers (regional and department), and the farmers unions at the center of the regional stakeholders network on water reuse. The main objective is to "connect" them 1) to the already existing regional platforms (= groups) on water reuse mainly constituted by private companies from the Occitanie region in the field of water (AQUAVALLEY http://www.pole-eau.com/ whose members are mainly consulting firms, manufacturers and WWTP operators), and 2) to research institutes. This objective is specifically targeted by Actions 5, 6, 8, 12, 15, and 16. As presented in the AKIS analysis the water agencies, the municipalities, the consulting firms, and the research institutes were already deeply involved in water reuse at regional level. **The low interlinks noticed in the Actor linkage matrix and mapping from the Occitanie AKIS analysis (D2.2 Occitanie) are thus targeted.**

Municipalities are often the local project leaders, but they need to bring feedbacks and results to Occitanie administrative region that can thus overview and assess the general regional strategy and success of RAP (see Action A20).

Based on SWOT analysis results (D2.1): priority is higher and emphasized for actions related to aspects identified as weaknesses, threats, and opportunities (PRIORITY 1):

- technical empowerement and sharing of knowledge
- clear definition of regulatory framework (adaptation to EU legislation) and funding sources framework
- economic and environmental (water availability) assessment of projects

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References

It is also important to standardize the style to be used for the references.

In-Text Citations

If you are directly quoting or paraphrasing your reference has to be cited in the text, before the end of the statement. The in-text citation consists of the author(s) last name(s) and the year of publication.

If there are more than two authors, then you may list the first author's name followed by et al.

If the information comes from a website, for example, then you may list the website title or URL in place of the author's name.

Literature citations

There are different types of sources of information and for each of them a style has been proposed and an example for each of them is given below. If you use a Reference Management Software (i.e. Mendeley), you must choose as citation style **IEEE**, which meet the rules proposed:

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The order of the citation should be as follows:

Author (s) (Initial (s) of the Name (s), Surname), *Title of the book (in Italic font)*, Volume number, Publisher. Place of publication. Year of publication.

Example:

A. S. Negi and S. C. Anand, A Textbook of Physical Chemistry, vol. 90, no. 11. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 1986.

Conference proceeding

The order of the citation should be as follows:

Author (s) (Initial (s) of the Name (s), Surname), "Work title", in Conference title and edition, Year of publication, pages number.

Example:

K. Larsson, "Updated road traffic noise emission models in Sweden," in Proceedings of the INTER-NOISE 2016 - 45th International Congress and Exposition on Noise Control Engineering: Towards a Quieter Future, 2016, pp. 1329–1340.

Journal Article

The order of the citation should be as follows:

Author (s) (Initial (s) of the Name (s), Surname), "Article Title". *Journal title (in Italic font),* Volume number, pages, year of publication.

Example:

R. Chacartegui, A. Alovisio, C. Ortiz, J. M. Valverde, V. Verda, and J. A. Becerra, "Thermochemical energy storage of concentrated solar power by integration of the calcium looping process and a CO2 power cycle," Appl. Energy, vol. 173, pp. 589–605, 2016.

Website

The order of the citation should be as follows:

Author (s). "Tittle of the webpage/document (if available)". Available: Website address. [Accessed: dd-month-year]

Examples:

Ministeria de Industría Energía y Turismo, "Instituto para la diversificación y ahorro de energía." [Online]. Available: http://www.idae.es/. [Accessed: 20-Feb-2015].