



# Diluting challenges

**Rafael Casielles Restoy** is project manager of SuWaNu, an international sustainability project. He describes the challenge of water scarcity in Europe and how this can be addressed by sharing knowledge, resources and technology

## What led you to work in the field of wastewater treatment?

I graduated from the University of Malaga, Spain, as a chemical engineer with a focus on environmental engineering, and hold a Master's degree in International Cooperation for Development. I subsequently worked as project manager of the WAFLA project, promoting agroforestry concepts in Latin America, and later as the administrative coordinator of WATERBIOTECH, developing sustainable technologies of water treatment adapted to the African context. For the past seven years I have been a project manager of Bioazul and currently act as general coordinator of two research projects related to the use of nutrients from wastewater in agriculture: TREAT&USE and Sustainable Water treatment and Nutrient reuse options (SuWaNu).

## Why was SuWaNu established and what does the project hope to achieve?

In Europe, 46 per cent of the population live in places which are water stressed, a situation that is predicted to be exacerbated in the most water-scarce parts of southern Europe due to climate change. Most of these regions have high abstraction for irrigated agriculture, a situation that is encouraging many countries to consider wastewater as a valuable resource instead of a waste to be discharged.

The water reuse sector is in a transitional phase. Although the reuse of wastewater is encouraged, many EU member states still lack appropriate guidelines and national legislations addressing the issue of wastewater reuse.

Even though important local efforts have been made, an integrated approach is needed among European regions, with the collaboration of the private sector, academia, farmers' associations and public authorities.

SuWaNu aims to influence future policies and legislations and also raise awareness about the importance of water reuse to reduce stress on valuable water resources. The main goal of the project is to develop a permanent knowledge and exchange network, which will facilitate the creation of business opportunities, incentives through public-private partnerships (PPPs), integration of legislations and regional policies supporting such practices, as well as facilitate exchange of know-how on alternatives for water and nutrient resources for all project members, and further expand support to stakeholders from countries outside the consortium, concurrently providing solutions to the aforementioned challenges facing Europe.

**SuWaNu supports five research driven clusters within Germany, Spain, Malta, Greece and Bulgaria. Why were these particular countries selected and how are their collaborative efforts driving forward technological wastewater solutions?**

The five regions involved in the project, in spite of their structural differences, face complementary challenges in terms of their innovation and research systems in wastewater reuse for agriculture. The regions selected in SuWaNu have similar problems with the general acceptance of wastewater reuse for food crops, but adequate solutions can be achieved through knowledge transfer within and





# Promoting sustainable wastewater reuse

A multidisciplinary project coordinated by **Bioazul** is bringing together organisations from five European countries. The goal is to prove and promote the safety and sustainability of wastewater reuse for agricultural irrigation, closing the loop of water and fertilisers for enhanced food security in Europe

**AROUND 17 PER** cent of Europe experiences water scarcity, with almost half of the population living in regions affected by water stress. As climate change progresses, the region faces a heightened risk of droughts, which have already increased by 20 per cent in the 30 years following 1976, causing economic losses of €100 billion. Water scarcity can have hugely detrimental impacts on the environment, inhibiting crop production and causing the loss of wetlands and biodiversity, soil erosion and land degradation.

The agricultural industries use 55 per cent of all water consumed in Europe, exacerbating water stress in areas that are prone to drought. This is particularly apparent in southern Europe where the highest levels of irrigation are seen. Indeed, the EU is keen to improve irrigation efficiency and find alternative sources of sustainable water.

## INTERNATIONAL RELATIONS

An important solution for freshwater scarcity is the treatment and reuse of wastewater in agriculture. This can have the added bonus of providing cheaper, more sustainable nutrients to tackle the rising costs of fertilisers. The wastewater is filtered and treated to achieve the quality required to both irrigate and fertilise farmland, improving water availability to agriculture and providing the added benefit of reducing the pollution of water bodies by untreated wastewater. Instead of being used in agriculture, freshwater can be conserved and used for other purposes, which require higher quality standards.

The Sustainable Water Treatment and Nutrient Reuse Options (SuWaNu) project is building

beyond clusters, overcoming the lack of trust from farmers and other small businesses on wastewater treatment and reuse for irrigation.

## Does the project have plans to expand across Europe?

Yes. Our strategy includes extending the clusters to other countries and regions in order to disseminate our results and learn how they are tackling common problems. Therefore, we intend to enlist other actors in the field in order to increase our potential influence. Due to the different benefits of water reuse technologies, it is important to involve PPPs in these networks to encourage alliances that can take advantage of the benefits of wastewater reuse and share the costs.

## What are the biggest challenges faced by Europe with regards to water scarcity?

The main problem is that the price of freshwater for irrigation is usually cheaper than reclaimed water, even though the extraction of freshwater is not sustainable and leads to negative environmental impacts such as the depletion of aquifers, sinking of water tables and saltwater intrusion. Therefore, farmers do not have the incentive to adopt reuse practices unless the problem is so acute that lack of water risks their crop production. The role of the public sector in facilitating wastewater reuse is crucial due to the scheme of subsidies applied to agriculture irrigation in many countries. One of the strategies of SuWaNu partners is therefore to act as an environmental lobby, encouraging more sustainable use of water resources, especially in agriculture.





## SUSTAINABLE WATER TREATMENT AND NUTRIENT REUSE OPTIONS (SUWANU)

### OBJECTIVES

- To find sustainable solutions to freshwater scarcity in extreme climate conditions
- To promote the safe use of treated wastewater as an alternative resource for irrigation
- To involve actors from the quadruple helix (ie. academia, decision makers, private sector and farmer associations) in the development of strategies

### PARTNERS

For a full list of partners visit:  
<http://bit.ly/SuWaNuPartners>

### FUNDING

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#### RAFAEL CASIELLES RESTOY

graduated as a chemical engineer from the University of Malaga, Spain, with a focus on environmental engineering, and holds a Master's

degree in International Cooperation for Development. He has been project manager in BIOAZUL for more than seven years and has extensive experience in R&D preparation, management and participation. Casielles is also the general coordinator of TREAT&USE project.



**ANTONIA LORENZO** graduated with a Master's in Chemistry, specialising in Agricultural Chemistry at the University of Murcia, Spain, and a Master's in Environmental

Technologies and Engineering. She is a founding member of BIOAZUL and has been R&D manager for more than 10 years. She is an expert in technologies for the minimisation and upgrading of agro-food residues and wastewater treatment technologies. Lorenzo has been the general coordinator of several EU projects such as Algatec, Algatec II and Waste-Red.



on the initial localised progress scattered across Europe in wastewater reuse. SuWaNu is comprised of five research clusters in Germany, Bulgaria, Malta, Spain and Greece and coordinated by Bioazul SL, a Spanish company dedicated to developing innovative wastewater treatment, renewable energies and environmental protection technologies. The project was established to integrate and develop research, while promoting wastewater treatment and application to crops.

The Bioazul SL researchers Rafael Casielles Restoy, project manager, and R&D manager Antonia Lorenzo are committed to promoting international coordination to fulfil the initiative's aims. "One of the main weaknesses affecting the European industrial and research base is the lack of coordination between countries, and between the different actors in the field, such as authorities, farmers, and those from the private sector and academia," Casielles explains. "In order to tackle these obstacles, SuWaNu will promote the integration of regional small and medium-sized enterprises (SMEs) and research institutions into regional policy development to foster innovative research for wastewater treatment and reuse processes in Europe."

SuWaNu's integrated approach uses the quadruple helix model to incentivise collaboration between participants from science, government, end user associations and businesses, with a special focus on SMEs with extensive experience in innovative technical solutions for wastewater treatment and reuse. These research driven clusters include universities, research centres, farmers, technology enterprises and regional authorities all working together in private-public partnerships to invest in sustainable and resource efficient technologies and establish European guidelines and parameters for water and nutrient exploitation efficiency.

### IMPROVING PERCEPTIONS

One of SuWaNu's main objectives is to develop a set of safety guidelines to improve the perception of wastewater reuse across the continent. In doing so, the initiative hopes to encourage farmers to use more sustainable resources compared to freshwater and commercial fertilisers. Currently, there is no consistency in the ways in which farmers find alternative water resources. "Experience has shown that when farmers have a risk of big economic losses due to limited water resources the acceptability of using treated waste water is considerably higher," Casielles elaborates.

Farmers' perceptions of reclaimed water was negatively impacted by scares such as

the 'cucumber crisis' in 2011, an outbreak of *Escherichia coli* that killed over 50 people. This episode was not caused by the reuse of wastewater, but still raised concerns about the bacterial contamination of fruits and vegetables in Europe. SuWaNu aims to research pathogen and chemical contamination in wastewater and establish a set of science-based guidelines concerning the safe practices and standards that must be adhered to. "Reuse of wastewater in agriculture is a safe practice when appropriate standards and procedures are taken into account," Casielles adds.

SuWaNu is also working to disseminate information to break the falsely held safety concerns and bridge the gap between researchers and the wider community. Understanding farmers' current perceptions of reclaimed wastewater is therefore critical. Recently, the project sought out the opinions of 200 farmers in rural Greece and found that only 32 per cent of respondents used, or were willing to use, reclaimed wastewater for irrigation. Addressing the concerns of these farmers requires a deep understanding of their needs and the formulation of programmes to promote scientific evidence about the safety and benefits of reclaimed wastewater. This is currently being addressed through workshops aimed at influential authorities and end users in the water sector. The SuWaNu team has developed an informational project website, flyers, posters and promotional videos to increase awareness of the benefits and safety of reclaiming wastewater to enhance the general acceptance of this sustainable technique.

### THE FUTURE OF SUWANU

In December 2015, when the project's EC 7<sup>th</sup> Framework Programme funding period ends, Casielles and Lorenzo expect to have contributed to the reduction of costs to SME farmers for irrigation water and fertilisers, while simultaneously diminishing the pressure on European freshwater resources and decreasing the negative environmental impact of improper wastewater disposal. The SuWaNu project will increase employment in the agricultural and wastewater industries while enhancing food security in the water-scarce regions of Europe.

