

# Almargem Newsletter



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## Food production with waste water

Will it be possible to produce food in places that do not have access to fresh water and soil? The **AWARE Project** wants to prove just that: with the use of the right technology, it intends to show the potential of using wastewater for the production of nutritious and safe food products, namely fish and vegetables. The waste water undergoes highly advanced treatment processes and can then be used to grow fish, being continuously purified by fertilizing the vegetables that are being produced at the same time. The project is, for now, being tested in Italy, with the aim of, in the future, applying this knowledge in regions where food production is conditioned by water scarcity.

## #AÚltimaGota\_Algarve arrives in São Brás de Alportel

In the first 6 months of 2023, the exhibition #AÚltimaGota\_Algarve was at the Silves Municipal Library, where it was visited by around 1000 primary school students in the municipality and hundreds of library users.

**Now it's time for the municipality of São Brás de Alportel to raise awareness of the conscious use of water, with the exhibition #AÚltimaGota\_Algarve.**

**#AÚltimaGota\_Algarve** is an interactive exhibition, aimed at the general public, which aims to **raise awareness** and allow a deeper understanding of the importance of water. **Every drop counts** and it is within everyone's reach to change small habits in order to preserve this precious resource.



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## Aquaponics from treated wastewater: a multidisciplinary laboratory

The **AWARE project** (aquaponics from treated wastewater, <https://www.aware-eu.eu/>) invites us to imagine a **wastewater treatment plant turned into a farm**. The idea is that with the right technology, we can produce fish and vegetables in every city, at km 0, without soil or fresh water and without net greenhouse gas emissions. It may sound like science fiction, but it is within reach of existing technical means and will be tested and implemented. The AWARE project is, above all, a way to show the potential for **reusing water, valuing waste and creating nutritious and safe food products**.

If it is true that the reuse of wastewater brings great opportunities associated with the protection of water resources, the difficulties experienced in its implementation and the low public acceptance to which it is subject are still real. In regions of the world where water reuse is unavoidable, such as Cyprus or Israel, barriers to implementation have been overcome. However, **concerns regarding food security**, in the case of agricultural irrigation, **or the possible environmental impacts, are determinant for the limited public acceptance**.

But it must be admitted that the reuse of treated wastewater is an interesting option for different applications, above all because the possibility of **treating water to quality levels that surpass that of water from rivers and streams** is a reality. The example that comes to us from **Singapore**, an island with just over 700 km<sup>2</sup> and a population density of over 8000 people per km<sup>2</sup>, is very illuminating about the technical potential for reusing water safely. Being one of the places in the world with the greatest water stress, **it uses the recycling of its wastewater to produce quality water for human consumption**. In practice, they remove the "garbage" from wastewater, **transforming sewage into safe, clean drinking water**. Every day, a volume of sewage equivalent to the water contained in 350 Olympic swimming pools is treated in a treatment system that works mainly underground at depths that can reach 25 floors.

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This extensive network of 48 kilometers of tunnels, tubes, tanks, filtering equipment and other infrastructure culminates in pumping the water to the surface, where it receives a final treatment to remove bacteria, viruses and other impurities. The **clean water**, known as **"NEWater"**, which results from this process, is safe and potable, used in industries, building cooling systems and also to fill drinking water reservoirs. This scenario, which might seem straight out of a science fiction movie, **allows more than 5 million people to live and enjoy this island** in the Asia-Pacific region.

If, on the one hand, examples like this result from intense and prolonged financial efforts and highly qualified human resources, on the other hand, they **inspire scientific and technological research projects committed to innovation and paradigm shifts**. **AWARE** is one of these projects, which wants to show that it is possible to **produce fish and vegetables** in an integrated way, **from wastewater subject to highly advanced treatment processes**. After being treated, that is, after being subjected to several stages that aim to remove different types of contaminants, the **waste water can be used to grow fish, being continuously purified through the fertilization of the vegetables that are being produced**. This linkage may raise some doubts regarding the risks to human health, as it is always possible to admit that there may be an accumulation of some chemical and microbiological contaminants, both in fish and vegetables. An important part of AWARE is precisely focused on the **assessment and minimization of such risks associated with chemical contaminants** such as pharmaceuticals and hygiene products and many others, as well as pathogenic microorganisms or other potentially dangerous ones, namely antibiotic-resistant bacteria. The Portuguese research teams (Escola Superior de Biotecnologia, Universidade Católica Portuguesa and the Faculty of Engineering of the University of Porto), interested in bacteriology, along with colleagues from the University of Vigo and Santiago de Compostela will **study microbiological hazards** – its presence in water and possible accumulation in plants and fish, and also explore the potential of the fish microbiome. But this is just a small part of a consortium that brings together twenty academic institutions and companies that aims to study the subject from A to Z – from engineering to consumer science.

**The stage for the first rehearsals is the wonderful region of Apulia, in the south of Italy.** The choice of site was influenced by the fact that this region is known for scarce rainfall, and therefore with **few surface water resources**. Additionally, the project coordinator, Fábio Ugolini (Innova SRL) is based in Italy. And, also, because one of the members of the consortium (Domenico Santoro, USP Technologies, Canada), a recognized expert in advanced water treatment

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treatment, is Italian and able to coordinate wastewater treatment systems implemented in that area. Then it was necessary to bring in **different areas of expertise** – on water treatment and quality, aquaponics, toxicology, nutritional aspects, consumer science, among others. It is an **interdisciplinary team**, focused on creating something new.

Using, respectively, **tilapia and lettuce as initial fish and vegetable models**, AWARE promises to bring **new knowledge in multiple domains**. For example, about the ideal conditions and limits for **implementing aquaponics**, about **how water quality can influence the quality and safety of products**, or **how barriers to consumer acceptance are overcome**. As a scientific and technological development project, it will open new horizons and bring new solutions. Clearly, this is a project thinking about the future on a global scale. Due to the type of research it involves, it needs approval from ethics committees in several respects and its transfer to commercial contexts requires legal acceptance. For example, in some areas, namely **in the European community, there are legal limitations to the implementation of aquaponics based on treated wastewater, intended for human consumption**. At this stage, it **is important to demonstrate the feasibility of the process and the safety of the products**. Afterwards, it will be up to potential stakeholders to assess the pertinence of this approach in specific contexts. In regions where food production is conditioned by water scarcity, this can be an interesting solution, able to contribute to improving the settlement and quality of life of the populations. **One of the roles of scientific research is to point out ways and show solutions, and AWARE has that ambition**. The future will tell about its pertinence.

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## Authors:

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Topics such as the reuse of wastewater, resistance monitoring systems in the environment, or evaluation of microbiological risk associated with environmental bacteria are among her main research interests.

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