



Recovering non-conventional water sources to combat water scarcity

Focusing on water scarce decentralized areas, the case of EU funded project HYDROUSA

The European Commission's Circular Economy Action plan targets on "closing the loop" of valuable resources and products. Implementing innovative solutions, the goal is to abandon the 'take-make-dispose' culture, by recovering, and reusing resources and products. Within Horizon2020, the EU is investing approximately € 1 billion on circular economy projects within the period 2018-2020, including water related projects. Especially on the water sector the development of water services, which go 'beyond water supply sustainability addressing the different water value chains' is promoted. Reclaimed water reuse is on the top of these priorities.

HYDROUSA, a Horizon 2020 research & innovation project funded by the EU, inspired from this 'philosophy', aims to recover water from non-conventional water sources by capitalizing on the rational management of water resources. It supports the new EU Regulation on minimum requirements for water reuse for agricultural irrigation. Our goal is to close the water loops and boost the agricultural and energy profile in the Mediterranean region using nature-based and nature-inspired innovative systems at local level. 28 partners from 10 countries are involved in the project which is coordinated by the Sanitary Engineering Laboratory of the National Technical University of Athens.

The Islands of Lesbos, Tinos and Mykonos are hosting six full scale demonstration sites (HYDRO1-6), where sustainable innovative and **nature-based solutions** for water/wastewater treatment and management are developed within the framework of HYDROUSA.

In **Lesvos** Island, low-cost reclaimed water is produced combining **anaerobic processes (Upflow Anaerobic Sludge Blanket - UASB) and constructed wetlands (two-stage subsurface vertical flow)** for the treatment of the domestic wastewater of Antissa village (**HYDRO1**). After disinfection the nutrient rich water is used for **fertigation of 1 ha agroforestry system (HYDRO2)**. The biogas produced is upgraded to methane and used as fuel for local vehicles. This solution is a self-sustaining wastewater management system where water, nutrients and the produced sludge are reused with significant economic benefits from the agroforestry system.

In **Mykonos** Island, where the cost of water or even the non-availability of water are putting severe pressure in agricultural growth, **rainwater harvesting systems are developed. HYDRO3** in Ano-Mera village consists of a novel, **subsurface rainwater harvesting system** developed in a remote agricultural area. The collected rainwater is used to irrigate an oregano field which is then valorised to produce essential oils. In **HYDRO4**, rainwater and surface runoff are collected and stored into the aquifer during the wet season and are used domestically and for agricultural production (lavender cultivation) during the dry season.

In **Tinos** Island, the demos implemented seek alternative, sustainable solutions to treat and recover water and valuable products. **HYDRO5**, is a nature-inspired, **low-cost desalination system** based on the principles of evaporation and condensation, located in Tinos. The Mangrove still system (inspired by the Mangrove plant) produces irrigation water and edible salt combined with a greenhouse to produce tropical fruits that will be consumed locally. Tinos Ecolodge (**HYDRO 6**) is an **eco-tourist facility** exhibiting a self-sufficient management cycle of water, energy, and food. Rainwater and vapour water recovery systems are demonstrated within the facilities. Furthermore, wastewater is treated by reedbeds and is recycled locally in agriculture.



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