

Water-Reuse in Tunisia: harvesting more with less water

WaterReTUNe – Concept and experimental setup for the desalination of wastewater treatment plant effluents after near-natural pre-treatment in Tunisia



For Tunisia and other countries in the Maghreb region, meeting the freshwater demand for agriculture and food processing it becoming increasingly difficult. The main reasons are the increasing demand due to population growth and rising prosperity but also climatic influences. For this reason, intensive efforts are being made to exploit the potential of wastewater reuse. Increased salt concentrations in wastewater, hygienic quality aspects, decentralized applicability and economic feasibility are major challenges in this context.

Objective of the project

In the BMBF-funded project WaterReTUNe, innovative technologies for the post-treatment and recycling of biologically treated wastewater treatment plant effluents are developed and demonstrated in Tunisia. The pilot plant from the AWAREGIO project, also funded by the BMBF, was used to facilitate an efficient transfer of know-how at the start of the project and to develop a concept adapted to Tunisian conditions. The aim is now to use a combination of Nature Based Solutions (NBS) and an innovative membrane treatment system for the production of

high-quality desalinated reuse water for irrigation purposes to develop a process chain for the diversified utilization of the potential of treated wastewater, which has so far been little used in Tunisia. The membrane concept comprises a two-stage procedure: in a first stage, partial desalination is provided in nanofiltration, followed by concentration of the NF-retentate in reverse osmosis to obtain largely desalinated water. A large part of the purified and desalinated water is fed into a low-tech aquaponics plant. This will be complemented by innovative brine treatment for nutrient recovery and halophyte cultivation. The latter is an



opportunity to use even highly saline water to produce agricultural crops on selected land. Meanwhile, both the desalination plant integrated into a container, the NBS plant, and components of the low-tech aquaponic system have been completed as essential elements. The WaterReTUNe pilot plant was commissioned in the fall of 2021 at the Tunisian consortium's test site near a non-profit agricultural and horticultural educational institution and docked to an existing system for using previously low-quality wastewater treatment plant effluent.

Outlook

Initial results of preparatory studies on the Tunisian side on a laboratory scale support the plausibility of the approach of intensified near-natural pre-treatment for significant quality improvement of wastewater treatment plant effluents prior to desalination. On the Tunisian side, there is great interest in such plant concepts, especially for the topic of aquaponics. This is seen as an opportunity to meet the growing demand for high-quality food with minimal water input. Darin wird eine Chance gesehen, den wachsenden Bedarf an hochwertigen Nahrungsmitteln mit minimalem Wassereinsatz zu decken.

Project overview

PROJECT TITLE

WaterReTUNe – Konzept und Versuchsaufbau zur Entsalzung von Kläranlagenabläufen nach naturnaher Vorbehandlung in Tunesien

PROJECT PERIOD

2019 – 2022

PROJECTPARTNERS

TERRA URBANA Umlandentwicklungsgesellschaft mbH (TUG); Centre des Recherches et des Technologies des Eaux (CERTE); Art des Jardins (ADJ)

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