



## Competence Facility for Decentralized Wastewater Management

### Key findings

In 2010 the “Competence Facility for Demonstration, Research and Training” started its operation in Fuheis, Jordan. At the multifunctional site, various approaches have been implemented to promote integrated wastewater treatment and reuse in Jordan:

- 13 different pilot-scale treatment systems operated with real wastewater
- On site laboratory for wastewater analysis and research
- Proven treatment technology adaptation to the Jordanian conditions (effluent quality, robustness, low operation and maintenance requirements)
- Agricultural and garden plots for reusing treated wastewater
- Hands-on education at the university level
- Capacity development program for technicians, planners and decision makers

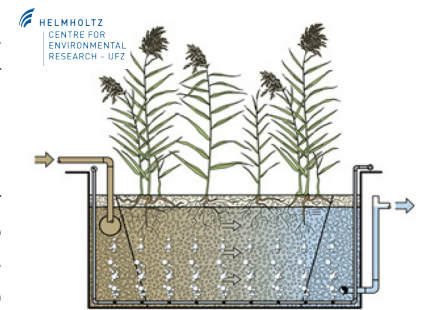
Climate change, dynamic demography and increasing migration, have become existential challenges, especially for efficient water management in arid and semi-arid regions.

The Jordanian Ministry of Water and Irrigation has identified the treatment and reuse of wastewater as an essential component to mitigate extreme water scarcity and protect groundwater resources.

In this context, the competence facility at Fuheis was opened in co-operation of the UFZ, Al-Balqa Applied University and the companies: WAKILEH Contracting, ATB WATER GmbH, HUBER SE and BAUER Resources GmbH.

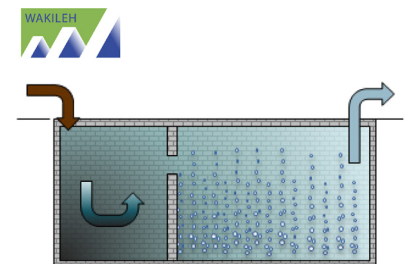
The wastewater treatment systems at the site include the following technologies: Sequencing- (SBR) and Continuous- Batch Reactors (CBR), Modified Septic Tanks (activated sludge and fixed bed type), Membrane Bioreactor (MBR), Sludge Dewatering Reed Bed, Anaerobic Bioreactor and Ecotechnologies: Vertical Flow, Aerated and Raw Wastewater (French Designs) wetlands.

### Aerated Treatment Wetland



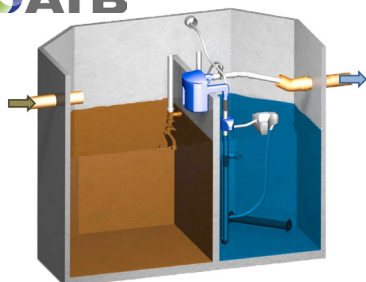
- Combined secondary treatment & disinfection
- Robust & resilient treatment
- Low operation & maintenance requirements

### Modified septic tank



- Combined anaerobic and aerobic treatment
- Low operation and maintenance requirements
- Compact design

**Load-controlled SBR (Puroo)**



- Combined secondary treatment & disinfection
- Compact & energy efficient design
- Simple installation

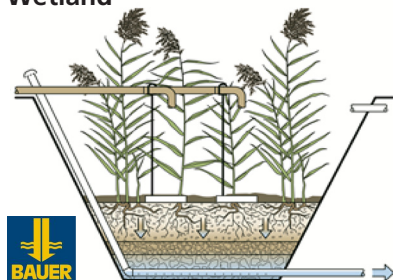
Research at the facility focuses on (i) technology optimization & adaptation; (ii) nutrient recycling; (iii) pathogen removal; (iv) wastewater reuse; (v) sludge management & (vi) groundwater recharge.



The reuse of treated wastewater can be directly investigated using agricultural and garden plots. The test plots are planted with lemon trees that are commonly produced in Jordan and have relatively high



**French-type Treatment Wetland**



- Combined sludge & wastewater treatment
- Robust and resilient treatment
- Alternating operation allows sludge to turn into compost

Several wastewater treatment technologies could be adapted to the Jordanian conditions such as requirements of high effluent quality, robust treatment and low operation and maintenance requirements despite the challenging conditions in Jordan (hot climate, concentrated wastewater).

The technology optimization lead to the development of new German standard (DWA-A 262E) for the design of ecotechnologies for decentralized wastewater treatment (DWWT), which define state of the art technologies and can be used as a basis for authorities to implement DWWT.

irrigation requirements. Small garden plots demonstrate further possible ways to reuse treated wastewater at household level.

Furthermore, the competence facility serves as Training and Capacity Development platform. It is used by students to conduct their PhD, Master and Bachelor studies or to gain further qualified training. Ministries, local companies, donors and other interested parties use the facility to increase their knowledge on different wastewater treatment systems and reuse options, including their operation and maintenance requirements.

**References and further Reading**

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- Wolf, Leif, and Heinz Hötzl, eds. SMART-IWRM: Integrated Water Resources Management in the Lower Jordan Rift Valley; Project Report Phase I. Vol. 7597. KIT Scientific Publishing, 2011.

SMART policy briefs present relevant scientific results of the SMART I, II and -MOVE projects concerning a transferable approach for Integrated Water Resources Management in the Lower Jordan Valley.

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