

Study Project

“Modelling the Water Balance in Biofilters using Hydrus-1D”

About us

The Chair of Urban Water Systems Engineering is involved in the education of students (Bachelor and Master) in environmental and civil engineering. Our research covers all aspects of the urban water cycle: urban water supply, wastewater treatment and energy recovery, water recycling, drainage systems, industrial wastewater treatment, membrane systems, and the urban water-food-energy nexus. The group of Advanced Water Treatment explores physical, chemical and biological removal mechanisms of contaminants in waste water with a focus on contaminants of emerging concerns.



Topic

Despite high wastewater treatment standards, numerous anthropogenic trace substances enter the aquatic environment via municipal wastewater in Germany. The use of an additional purification stage for trace substances is currently being tested and implemented, particularly at medium to large wastewater treatment plants, in order to achieve the greatest possible reduction in inputs into the environment. For smaller wastewater treatment plants in the 2,000-10,000 PE range, the elimination of trace substances has hardly been discussed to date. As part of the research project, a filter based on DWA-A 262 with a layer of activated carbon to remove trace substances is planned for a wastewater treatment plant <10,000 PE. To simulate the filter, five lysimeters with sand and activated carbon in different grain sizes and layers are set up at the chair's technical center. The aim of the study project is to model this set up with the software Hydrus-1D to be able to investigate further scenarios.

Tasks

- Set up of a model of the water balance of the five lysimeter using Hydrus-1D (<https://www.pc-progress.com/en/Default.aspx?H1d-downloads>)
- Literature research on how to incorporate the characteristics of the lysimeters in Hydrus-1D (e.g. gravel, syphons etc.)
- Modeling the water balance of the lysimeters and comparison with observed data
- Set up of other scenarios (e.g. different materials in layers)

Requirements

- Interest and basic knowledge in water treatment and water reuse
- Interest in programming (no experience required)

Time Range

The work is designed for a period of 5 months and should be started soon (September/October 2024).

Kontakt

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