Sub-department of Environmental Technology

An integrated approach to micropollutants: Occurrence, fate and measures for removal

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Motivation

Organic micropollutants are currently in the focus of those engaged in water research and management.

Small river systems in densely populated areas are particularly at risk. High wastewater loads and highly variable input patterns can exert considerable pressure on aquatic ecosystems.

Additional treatment methods at input pathways are required to reduce micropollutant loads in watercourses. Given the aim of finding the right measures to reduce micropollutants in watercourses the establishment of an emission and immission balancing is a precondition.

Retention soil filters (RSF) as a treatment technique is both low-cost and low in energy demand. Reduction capacities for individual organic micropollutants and especially the underlying physicochemical processes within the aerated soil filters have barely been studied up to now.

Technological challenge

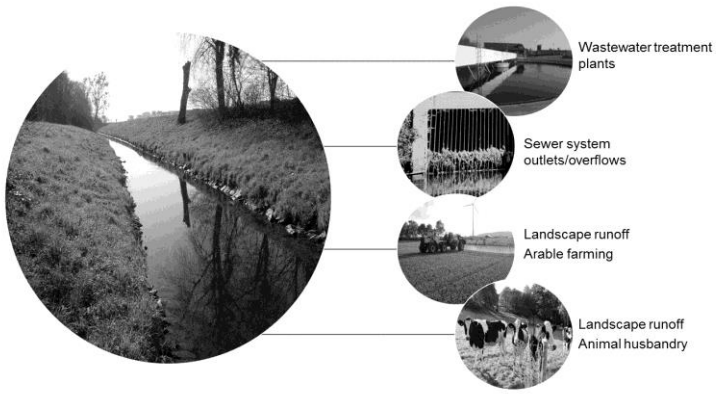
A special monitoring strategy is implemented at a small catchment area with a size of 289 km². Within this catchment area both point and non-point pollution sources are monitored. Focus of the investigations are hydrophilic and hydrophobic micropollutants. Monitoring is performed with different monitoring intervals (event specific, episode specific, frequently) and with different monitoring techniques (grab sampling, passive sampling, and automatic sampling). Fluctuation ranges in micropollutant emissions are to be determined. Furthermore, an emission balancing will be generated.

To reduce micropollutant emissions from wastewater treatment plants, an additional treatment step is tested. A pilot-scale retention soil filter is set up at a wastewater treatment plant in the research catchment. Three reactors filled with different filtration material are fed with effluent from the treatment plant. Elimination rates and processes within the filter are investigated.

The fate of the micropollutants in the watercourse is to be simulated with the DWA water quality model. Future scenarios including the possible implementation of large scale RSF at wastewater treatment plant outlets will be simulated as well.

The challenge is to establish a detailed assessment on micropollutants with the example of a small catchment area with high anthropogenic influence.

Pressure on small river systems



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