

REPLAWA – Less Plastics from Wastewater

Plastics in the Environment – Sources · Sinks · Solutions

Wastewater treatment plants play a central role in reducing plastic emissions into the environment because they act as direct interfaces to water bodies. However, it is still unclear how wastewater treatment plants can contribute to counteract the spread of plastics, and especially tiny plastic particles – microplastics. The goal of the joint research project REPLAWA is to gain new insights. The partners are analyzing the entry points of plastic through wastewater systems into water bodies and examining the possible sinks within wastewater treatment and in sewage sludge. In addition, they are testing and evaluating the effectiveness of various technical procedures for plastic elimination.

Inventory of Microplastic Entries

To date, there is no standardized method for determining the presence and quantities of microplastics in wastewater and sewage sludge. Therefore, one focus of the REPLAWA project is on the further development of sampling, sample preparation and analysis methodology. Practical and robust methods are the prerequisite for clarifying entry points of microplastics into water bodies and for determining their dimension. Furthermore, by providing information on how much plastic is removed in the individual clarification stages, the joint research project allows to evaluate technical solutions for reducing entries and to derive general recommendations for action.

The inventory of the entry points into water bodies is carried out at a section of the Lippe river basin. The researchers analyze combined wastewater discharges and rainwater discharges with and without further treatment, such as soil filters and wastewater treatment plant effluents. REPLAWA also examines the entry of microplastics via sewage sludge onto agricultural land: microplastic particles can be washed out into surface water through applied sewage sludge and manure. Investigations in the area of the Steinhof wastewater treatment plant (central wastewater treatment plant of the Braunschweig Wastewater Association) provide information on the effects to groundwater since the treated wastewater has been used for decades as irrigation water and part of the sewage sludge for agricultural purposes. In addition, the project partners are collecting and evaluating data on the entry points into wastewater.

Evaluating the Cleaning Processes

To assess the effectiveness of technical processes for retaining plastics in wastewater treatment, investigations are being conducted for the different treatment stages of conventional wastewater treatment plants: inlet, screen, grit trap, pre-clarification, activation, secondary clarification and effluent. The other discharged material flows, such as sewage sludge, are also sampled and analyzed. Additionally, the researchers are collecting and evaluating the discharge from wastewater treatment plants using advanced processes for solids separation, e.g. spatial filters, microsieves or membrane aeration, on several large-scale plants in Germany. They intend to further develop these technical systems with comparative studies on a semi-industrial scale.



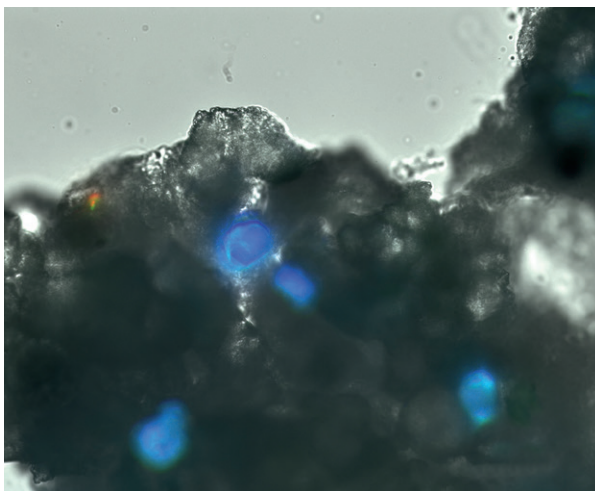
Plastics in the wastewater treatment plant after a heavy rain event

Technical and Political Recommendations for Action

Based on the investigation results, the project partners seek to determine whether one of the separation technologies should be preferred in the future and whether retrofitting of existing wastewater treatment plants with appropriate separation equipment is necessary.

In addition to technical solutions, the joint research project is also investigating possible political options for dealing with microplastics. To this end, the partners are creating a database documenting how the issue is currently regulated worldwide. For example, many countries have already introduced a ban on microplastics in cosmetics, while Germany has so far relied on a voluntary commitment from industry. The researchers are exploring these differing approaches to microplastic by analyzing the role, interests, and political activities of different national and international stakeholders.

Following these indepth findings, REPLAWA is developing technical and regulatory recommendations for action in the field of urban water management. These are intended to help representatives from politics, administration, industry and society to identify reasonable solutions for reducing plastic emissions into the environment. The recommendations can also be applied to municipal wastewater disposal in other industrialized countries, thus providing a basis for international action in this area.



Fluorescent microplastic particles in activated sludge

Research Focus

Plastics in the Environment – Sources • Sinks • Solutions

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