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MICROPLASTICS IN URBAN STORMWATER

Field sampling and analysis by Luleå University of Technology & Aalborg University

Is urban stormwater an important vector for microplastics entering the Baltic Sea?

A large part of the microplastics found in the marine, and other aquatic, environments are believed to originate from the terrestrial environment. Therefore, there is a need to investigate the sources and pathways of microplastics in urban areas. The sources have been suggested to be for example tire wear, weathering of paints on roofs and facades as well as littering and the microplastic particles may be transported via, for example, stormwater to the aquatic environment. Microplastics are not only pollutants in themselves, they may also contain harmful substances and carry other contaminants on its surface.

WHAT IS MICROPLASTICS?

Marine littering is one of the greatest environmental challenges of our time and plastic is one of the most common types of garbage in the sea. Microplastics are plastic particles that are smaller than 5 mm in size.

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About the study

In order to investigate the transport of microplastics from the urban environment to receiving waters, microplastics were analysed in stormwater collected in three urban catchments; one car park area, one road and a roof top. Stormwater samples were taken directly where the runoff enters a gully pot or exit the downspout and the stormwater therefore never passed any prior treatment. Each catchment was sampled during three different rain/runoff events. The stormwater was analysed with two complementary analytical techniques: microplastic polymer types were identified and quantified by µFTIR spectroscopy (detected as number of particles) and tire wear particles were quantified by PYR-GCMS (detected as mass).

Results and conclusions

The results indicate that runoff from the car park and the road had concentrations in the range ten to thousands of microplastic particles *per liter* water while the roof runoff had in the range hundreds to thousands particles *per cubic meter*. The most frequently detected plastic type at all three sites was polypropylene (PP) which is also one of the plastics produced in highest quantities.

Concentrations of tire wear particles in stormwater from the road and car park ranged from around 50 to 2200 mg/L with a mean value of 820 mg/L. Therefore, it is clear that there is a large variation in microplastics concentrations between the sites as well as between the different sampling occasions at the same site.

In summary, this study shows that stormwater is an important vector for microplastic and tire wear particles from urban areas to receiving water, e.g. the Baltic Sea.

ABOUT THE STUDY

Subject areas: Urban stormwater, roof runoff, plastics, tire wear

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