

MICROPLASTICS IN STORMWATER RUNOFF: CASE STUDY VITSIPPSBÄCKEN

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Abstract

Microplastics are defined as the fraction of plastics with a particle size smaller than 5 mm. Plastics are synthesized oil products made of organic polymers primarily by industry and applied broadly because of its persistent characteristics. Microplastics are either primarily produced in form of pellets or are the result of mechanical breakdown of organic polymer materials originating from human activities like industrial exhaust, traffic, urban surfaces or littering. Although the omnipresence of microplastics on land surfaces, sea and surface water bottom sediment and soil is acknowledged, their effect on the environment is unclear. Some of the main concerns are the leakage of environmentally toxic materials like PAHs following with microplastics from the production process. PAH's are persistent hazardous substances interacting with hormones in living organisms and having cancerogenic properties. Furthermore, due to their continuous accumulation in living organisms microplastics (as well as plastics) can mechanically block the flow of food uptake due to saturation effects. Due to an exponential increase of global plastic production in the last 50 years microplastics are found all over the world in the environment as a result of leakage and permanent accumulation of this persistent material. According to Swedish EPA traffic activities are one of the main sources of microplastics in the environment. Polymers found in bitumen like materials in the asphalt and gummi tires of cars as well as in plastic litter, accumulate during dry weather and are washed off during rain from traffic surfaces. Hence stormwater runoff is the major transport link of traffic related microplastics in urban areas. To assess the importance of stormwater runoff in the discharge of microplastics, stormwater sampling was carried out during five rain events in an urban catchment with heavy traffic and samples were assessed for the abundance of organic polymers, their type and amount in stormwater samples. Mainly three different categories of organic polymers were identified in traffic stormwater; Bitumen like asphalt particles, gummi particles of car tires and hard microplastics. Gummi particles of car tires were highest in number, up to 6000 particles per liter stormwater. Stormwater was identified as one of the main transport links of microplastics from traffic, contributing to a continuous discharge and accumulation of these pollutants in the receiving waters.

Keywords: Microplastics, Asphalt particles, Gummi particles, Traffic stormwater