Microplastics in sediments of Santa Teresa water reservoir (Salamanca, Spain): methodology and sources.

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Plastics stand out for being cheap, lightweight, easily moulded and highly endurance materials, hence used in a wide range of applications all around the planet. One of the reasons of the amazing durability is that common plastics are not biodegradable, being able to remain intact several hundreds of years on the environment. However, an important phenomenon occurring on plastics is the degradation, which can be due to the UV radiation, either mechanical or biological activity, temperature degradation, or even hydrolysis processes, making the plastic materials weaker and fragile, fractioning the plastics into smaller and smaller pieces.

Because of their low density, plastic fragments can be affected by long distance transport on the water column. In addition, some plastics fractions could be incorporated into the sediments, which, in the long-term, could act as a secondary source of plastics. Due to the presence of chemicals, either as additives or sorbed contaminants on their surfaces, plastic materials have become a global environmental concern and need to be evaluated.

Despite the great amount of research done in marine water transport and debris of plastic, freshwater environments remain less known. Microplastics (MP) have been observed in both sediments and water samples of lakes and rivers. Water reservoirs are critical sites in terms of water supply management and have to be monitored for MP at different scales both in water and sediments. There exist different sources of microplastics in continental waters like urban runoff, sewage sludge or agricultural wastes. In this sense, wastewater treatment plants have been identified as one of the main sources for the release of plastics into freshwater and terrestrial environments which may lead to further concern.

Here, we study the distribution of microplastics in sediments found in the Santa Teresa water reservoir, in Salamanca (Spain), in the area close to Guijuelo town. The aim of this work is to optimize a methodology to study the influence of the outputs from wastewater treatment plant and to evaluate how plastics distribution in sediments around the reservoir is related to the plant. Our work also deals with the seasonality by analysing spring and fall sediments for differences on microplastic densities and composition, along different stations downstream Tormes River. MP morphological analyses was use to categorize particles from different grain-size fractions. Raman microspectroscopy was used to characterize microplastics, while optical microscopy allowed us quantifying microplastics of each sediment sample and grain-size fraction. Our results show that there is positive correlation between microplastics density in sediments and the proximity to the plant. Most of the microplastics found in sediments are related to fibers
potentially from industrial, urban and agricultural origins, most likely coming from the wastewater treatment plant.