
Untreated water from storm sewers as source of microplastic in an urban river system in Taiwan

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Abstract

Microplastic pollution is ubiquitous and affects all environments. In recent years it was found that rivers play a major role in the transport of microplastic to the ocean. Research indicates that human influence is a key factor for microplastic pollution in rivers and freshwater bodies. In this study we investigated the microplastic pollution of the Wu river network in central Taiwan. The tributaries have their origin in the unpopulated mountainous areas, but their downstream sections entering the densely populated urban areas. This makes them ideal to study the impact of human activities. We took samples using a Manta net from different sections along different tributaries of the Wu river. In average 10,000 liters of river water were filtered for each sample. Microplastic particles in the size range of 0.3 to 5 mm were visually extracted and counted. Micro-FTIR and micro-Raman spectroscopy were used to identify the different polymer types. Our results show a clear distinction between unpopulated mountainous areas and densely populated urban areas. The number of microplastic particles in river water of the mountain areas is 0 to 0.18 pcs/m³, whereas in the urban areas the number of microplastic particles reaches up to 169.46 pcs/m³. A spatial pattern can be observed too. When the river enters the urban area, the number of microplastic particles suddenly increases and reaches its maximum further downstream. Storm sewers had a positive correlation with the number microplastic particles. Therefore, we assume that untreated water from urban areas, which is flushed through storm sewers, is one of the major contributors for river pollution. Due to the short residence time in the river and absence of large amounts of macroplastic, we hypothesize that microplastic particles are generated due to human activities on land and not during disintegration of macroplastic in the river.

Keywords: river, freshwater, urban, microplastic

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