Microplastic concentration, distribution and dynamics along one of the largest Mediterranean-climate rivers: A whole watershed approach

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Abstract

Microplastics (MPs) have been recognized as one of the most ubiquitous environmental pollutants globally. They have been found in all ecosystems studied to date, threatening biological diversity, ecosystem functioning and human health. The present study aimed to elucidate the environmental and anthropogenic drivers of MP dynamics in the whole catchment of the Biobío river, one of the largest rivers in South America. MP concentration and characteristics were analysed in 18 sites subjected to different sources of pollution and other human-related impacts. The sampling sites were classified in relation to altitudinal zones (highland, midland and lowland) and ecosystem types (fluvial and reservoir), and different water and territorial environmental variables were further collated and considered for analysis. Seven types of microplastic polymers were identified in the samples analysed, with a catchment mean (±SE) MP concentration of 22 ± 0.4 particles m^{-3}, and MP presence being significantly higher in lowlands (26 ± 2 particle m^{-3}) and in reservoirs (42 ± 14 particle m^{-3}). The most abundant type of MP was fragments (84%), with a mean concentration of 37 ± 6 particles m^{-3}. Overall, MP concentrations were low compared to those found in other studies, with a strong influence of human population size. © 2022 Elsevier Inc.

Author keywords

Freshwater; Microplastic dynamics; Plastic pollution; Reservoir; Stream hydrology