
Assessing microplastic transport pathways and potential sources along gravel-bed rivers: Focus on the Ain River

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Abstract

Microplastic (MP) pollution has become a key concern in rivers and streambed sediments in recent years. Due to the heterogeneity and complexity of particle transfer in river corridors, the identification of MP distributions (concentrations and types) at the sediment-water interface and the impact of such contamination on the related ecosystem is a major challenge. Within the framework of the *Aquaplast* Project, we investigate transport and accumulation mechanisms of MP along gravel-bed rivers. We focus on a challenging case: the Ain River (France) because (i) its catchment area includes major plastic industries, (ii) it is influenced by a diversity of urban, rural and water recreation activities, (iii) and it is equipped with several dams potentially trapping MPs. The land-use and the distribution of plastic factories were analysed using GIS in order to identify potential MP sources in the catchment area. In the field, fourteen key sites were sampled at -20cm under the water-sediment interface (upstream and downstream of dams and plastic factories). Sediment grain size, stream temperature, conductivity, piezometric heads and MPs concentrations were measured at each site in order to describe the hydro-sedimentological conditions influencing MP transport and deposition.

This work highlighted the accumulation efficiency of coarse alluvial bars for MPs. MPs hotspots were mainly found along the most urbanized and industrialized sections. A significant breakpoint was also identified in the area of the main dams, indicating their major role

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in the trapping of MPs. The variability in MPs concentrations and types suggested a local origin for most particles. Finally, a particular feature was the dominance of hard plastics, especially polypropylene (PP), which appears as an industrial heritage.

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