



Pore scale Microplastics in Hyporheic Sediments: A Threat for Fluvial Ecosystems and Drinking Water Supplies?

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Micro-plastic (MP) is ubiquitous in marine ecosystems posing a serious threat to marine life as it enters the food web at multiple levels. The primary input vector to the ocean is through rivers. Little is known about the fate of MP in terrestrial systems particularly as it is transported from source areas to the ocean. Although recent studies indicate that rivers can be sinks for MP, the common perception treats rivers primarily as pure transport vectors. We show that hyporheic areas are significant accumulation zones acting as intermediate to long-term sinks for MP in catchments. We have analyzed MP in freeze cores and in riffle pool sequences of the Roter Main River belonging to the Rhine River catchment. MP of composition was detectable down to a depth of 0.4 m below the streambed in both riffles and pools. As the HZ is known as an important habitat for invertebrates, which are at the base of aquatic food webs, the high abundance of MP and long exposure times is likely to facilitate a pathway into the aquatic food chain. The HZ also represents a vector for MP to enter the groundwater which poses a risk to drinking water supplies, particularly during bank filtration.