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ABSTRACT BOOK

Macroinvertebrates as Bioindicators of Microplastic Pollution in European Freshwater Ecosystems: Insights from the RIPARIANET Project

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Abstract

Freshwater riverine systems are vital ecosystems that provide essential services, including biodiversity support, water purification, and recreational opportunities. In this context, the European Biodiversa+ RIPARIANET project aims to enhance the spatial biodiversity conservation of natural stream-riparian networks. The project provides practitioners with evidence-based guidance and conservation strategies, leveraging the increasing resolution of remote sensing data. Special emphasis is placed on riparian biodiversity, environmental stressors, and ecosystem functions. One emerging concern within these ecosystems is the widespread presence of plastic pollutants, particularly microplastics (< 5 mm). These smaller particles are more readily ingested by freshwater biota, posing a potential risk to ecosystem health. Macroinvertebrates are recognized as key bioindicators of water quality and have recently gained attention for assessing pollution, including microplastic contamination. This research aims to evaluate microplastic pollution by investigating macroinvertebrate communities that represent different feeding strategies: Baetidae (grazers), Simuliidae (filter feeders), and Chironomidae (detritivores). To achieve this objective, both macroinvertebrates and water samples were collected from six European rivers, representing diverse geographical and



climatic gradients. Sampling sites included the Sävar River (Sweden), Queich River (Germany), Noce Stream and Tiber River (Northern and Southern Italy), Saja River (Spain), and Cávado River (Portugal). The sampling strategy extended from upstream to downstream, ensuring coverage of different environmental conditions and anthropogenic pressures. It is hypothesized that microplastic contamination will show an increasing trend from river source to valley, with higher concentrations near areas characterized by greater human activity. Among the selected macroinvertebrate groups, Chironomidae are expected to exhibit the highest microplastic concentrations. This prediction is based on their ecological traits; as detritivores, they inhabit sediment-rich environments where microplastics tend to accumulate. Additionally, their tolerance to polluted conditions makes them more prone to prolonged exposure and ingestion of microplastic particles. This research is crucial in assessing the transfer of microplastics within freshwater food webs and aims to inform future remediation efforts. By providing a comprehensive biological risk assessment framework for European freshwater ecosystems, these findings will contribute to evidence-based conservation strategies and improved environmental management practices.

