Investigating Freshwater Microplastics Pollution and Loading in Philippine Rivers flowing into a Lake: Land-Use, Seasonality, and Risk Assessment

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ABSTRACT

Plastic pollution is a persistent global environmental problem that has significantly increased over the past 50 years, impacting biodiversity, human health, and climate change. Microplastics – plastic particles less than 5mm – are particularly concerning because their small size makes their transport, ingestion, and accumulation less visible and noticeable. Studies on microplastic pollution have focused more on marine environments, while there have been relatively fewer studies in inland waters, such as rivers and lakes. Microplastics have been documented in the surface waters of Laguna de Bay, the largest lake in the Philippines, but there is a lack of information on microplastics of its tributary rivers. Rivers are important pathways that transport pollutants from land-based sources to receiving water bodies such as oceans and lakes. This study aims to investigate microplastic pollution in selected tributaries of Laguna de Bay. In particular, this research aims to (1) determine the abundance and particle characteristics of microplastics in selected tributary rivers of Laguna de Bay, Philippines, and assess the relationships of watershed characteristics on microplastics quantity and characteristics, (2) estimate the microplastics load, or the amount of microplastics that each selected tributary exports to the lake, and (3) assess the potential ecological risks associated with the microplastics obtained from the rivers. The data on the amount and characteristics of microplastics in tributary rivers of Laguna de Bay and their relationships with watershed characteristics would provide a reference for prioritizing areas for pollution control measures to regulate and minimize plastic waste and microplastics into the environment, especially freshwater bodies that serve as a water supply and area for fisheries.

Keywords: Microplastics, Freshwater Pollution, Watershed, Ecological Risk Assessment, Laguna de Bay