

Dry and Wet Season Variations of Microplastics and Heavy Metals in Surficial Sediments of Pasig River, Philippines

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Abstract

The Philippines is a major contributor to ocean plastic pollution. Pasig River, a vital waterway in the Philippines, ranked among Asia's top plastic-emitting rivers in 2021. This study aimed to evaluate the characteristics of microplastics (MPs) and their relationship with soil texture and heavy metals during the dry and wet season. The dry season is marked by low flow, while wet season has heightened rainfall runoff, and stormwater flow. Sediment samples were collected at eight stations along the main river and analyzed using standard laboratory methods. MPs were categorized into shape, color, and size. The polymer types were determined using infrared spectroscopy. Heavy metals were analyzed using inductively coupled plasma and soil texture by the Bouyoucos method. Results showed that MPs were more abundant during the wet season compared with dry season. Heavy metals were present in the order Fe > Zn > Pb and fragment shaped MPs were abundant, for both seasons. During dry season, MPs moderately correlated with iron and zinc, and weakly with lead. MPs showed moderate to high correlation with soil texture at different river sections. During wet season, MPs were moderately correlated with lead and zinc, and weakly with iron, and highly correlated with sand and clay at all stations. Larger MPs were prevalent upstream, with the size of deposited MPs decreasing towards the downstream stations. Higher MP concentrations were observed at locations with higher clay and sand. These results indicate the need for improved waste management and stricter industrial effluent regulations.

Index Terms

Greywater, Treated Sewage Effluent, Longitudinal Water Quality, Wastewater Reuse, Decentralized Systems