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Microplastics in Sri Lankan freshwater ecosystems: abundance, characterization, and sources in two major reservoirs

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Microplastic (MP) contamination is a global concern, yet its impact on Sri Lanka's reservoirs remains largely unexplored. These reservoirs provide vital ecosystem services and regulate river runoff. This study examines MP concentrations, characterization, and their spatial distribution in Samanalawewa and Udawalawe reservoirs in the Walawe River Basin, where human activities significantly contribute to MP pollution. Random sampling was employed at 11 locations in Samanalawewa during February 2024 and at 15 locations in Udawalawe in October 2024. MP analysis was conducted through imaging with Nile-Red stain method. MPs were detected in both surface and bottom (10 m depth) water collected from the studied reservoirs, with a total of 156 samples across different sites. The study found that blue MPs were the most frequently presented in both reservoirs, accounting for 35.2% of particles in Samanalawewa and 38.6% in Udawalawe. In terms of morphology, fibers were more prevalent in the Udawalawe Reservoir, accounting for 73.4%, compared to 34.7% in the Samanalawewa reservoir. The size of the MPs ranged between 0.05 mm and 5 mm. Fishing activity are much higher in Udawalawe reservoir than Samanalawewa reservoir. The observed abundance of MPs in Udawalawe reservoir ((surface: 3.44 ± 1.06 particles / L), and (bottom: 1.87 ± 1.04 particles / L)) is higher than that in Samanalawa reservoir ((surface: 2.36 ± 1.9 particles / L), (bottom: 0.77 ± 0.97 particles / L)). This may also have been the reason for the increase in the percentage of fibers in the Udawalawe reservoir. The source of MPs' depends on local human activities (fishing, tourism and agriculture). This study reveals MP contamination in inland Sri Lanka, highlighting its widespread impact. Findings establish a baseline for MP pollution in the Walawe river basin and stress the urgent need for better waste management and sustainable water use to protect these ecosystems.

Keywords:

Microplastics; freshwater ecosystem; reservoirs; morphology; Walawe river basin

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