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Navigating the Future:
A Multidisciplinary Perspective

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Characterization and Microbial Profiling of Microplastics in Kandy Lake: A Preliminary Investigation

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Microplastic pollution in freshwater ecosystems poses significant ecological threats due to its persistence and potential to harbour diverse microbial communities. This study investigates the microplastic load and associated microbiota in Kandy Lake, a vital urban freshwater body in Sri Lanka. The study aims to isolate and characterize microplastics from different zones of Kandy Lake and identify microbial communities attached to these particles. Water samples were collected from five lake inlets, one outlet, and two shallow regions and temperature and PH were measured. Water was filtered using a 250 µm plankton net and 70 mm glass microfibre filters. Isolated microplastics were visually identified under a light microscope and treated with sterile distilled water and 0.1 mm glass beads to detach microorganisms. The suspension was cultured to isolate viable microbial populations. Microplastic particles were then subjected to Raman spectroscopy for polymer identification. Among the isolated microplastics, polypropylene (PP) fibres were the most dominant type (n = 33), followed by polyethylene (PE) and PET fibres, with the highest microbial colonization observed on low density polyethylene (LDPE) particles in the lake's shallow area. The outlet zone exhibited the highest average colony count (4.0), while environmental variables such as temperature (r = 0.46) and pH (r = -0.29) were moderately correlated with colony abundance. These findings suggest temperature may enhance microbial growth, while more acidic conditions may favour colonization. Raman spectroscopy confirmed polymer identity and supported visual classification. This study highlights the prevalence of microplastics and their potential as microbial carriers in Kandy Lake. The observed correlation between environmental parameters and microbial load underscores the importance of monitoring urban freshwater bodies, informing ecosystem well-being.

Keywords: Environmental microbiology, Kandy Lake, microplastics, plastic pollution, Raman spectroscopy