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IN SITU INVESTIGATION OF MICROPLASTIC-ASSOCIATED BACTERIAL COMMUNITIES IN SURFACE WATER OF KANDY LAKE, SRI LANKA: ABUNDANCE, COMPOSITION, AND BACTERIAL DIVERSITY

W.K.H. Welagedara¹, H.M.S.A.T. Gunathilaka¹, L. Jayarathne² and D.N. Magana-Arachchi^{1*}

¹Molecular Microbiology and Human Diseases Research Project, National Institute of Fundamental Studies, Kandy, Sri Lanka ²Environmental Science Research Programme, National Institute of Fundamental Studies, Kandy, Sri Lanka ^{*}dhammika.ma@nifs.ac.lk

Microplastics (MPs) have become a major concern due to their widespread environmental presence. Kandy Lake, a renowned landmark in the heart of Kandy, suffers from severe pollution. This study focused on MP contamination in Kandy Lake and aimed to characterize associated microorganisms. Water samples were collected from Kandy Lake: six samples from inlets and two samples each from the lake and the main outlet. From each collection point, a 100 mL sample was collected and filtered through a 5 mm metal sieve, followed by Whatmann Glass Membrane filters (0.7 µm nominal pore size). Microplastic particles were manually sorted and identified based on their morphological characteristics. Particles were then transferred to autoclaved distilled water and shaken for 1 hour at 170 rpm in an orbital shaker to detach bacterial cells. These MP suspensions were cultured on Luria Bertani agar and incubated at 37 °C for 24 - 48 hrs to isolate bacterial cultures. Genomic DNA was extracted from pure cultures using a modified cetyltrimethylammonium bromide method and amplified using universal bacterial primers targeting the 16S rRNA gene. A commercial sequencing service sequenced the amplified DNA products and deposited them in GenBank under accession numbers PP708094-PP708113. The average abundance of MPs ranged from 11.6 - 13.0 MP particles/L, with the highest concentrations observed at the lake's outlet. Raman spectroscopy data from the inlet and lake sites identified polystyrene as the predominant type of microplastic, while polypropylene was the dominant type at the outlet. Surface water samples were dominated by fibres, together with black-coloured MPs ranging from 3 - 5 mm in size. The cultured bacteria yielded 20 identified species, classified into four major groups. Six were identified as potential pathogens, belonging to the genera Bacillus, Achromobacter, Stenotrophomonas, Acinetobacter, Burkholderia, and Serratia. The study reveals a significant presence of microplastics in Kandy Lake, which carry potential pathogenic microorganisms, highlighting the exigency for intervention to address microplastic pollution in the lake.

Keywords: Abundance, Culturable bacteria, Kandy Lake, Microplastic, 16S rRNA gene