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DOI: 10.5281/zenodo.7217034.

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Floating Microplastics in Northern Coastal Waters of Sri Lanka: Quantification and Characterization by FTIR

Shobiya Gobiraj*^{†1}, Sivashanthini Kuganathan², Grøsvik Bjørn Einar³, and Deeptha Amarathunga⁴

¹Shobiya Gobiraj – Department of Fisheries, Faculty of Science, University of Jaffna, Jaffna, Sri Lanka

²Sivashanthini Kuganathan – Department of Fisheries, Faculty of Science, University of Jaffna, Jaffna, Sri Lanka

³Bjørn Einar Grøsvik – Institute of Marine Research (IMR), P.O. Box 1870 Nordnes, N-5817 Bergen, Norway

⁴A.A.D. Amarathunga – National Aquatic Resource Research Development Agency (NARA), Crow Island, Colombo 15, Sri Lanka

Abstract

Microplastic (MP) pollution is a growing issue in Sri Lanka. However, few findings have been reported in the Northern coastal belt of Sri Lanka. This study provides the first evidence of the prevalence and abundance of MPs in the Northern Sri Lankan coastal waters of Mathagal, Point Pedro and Charty Beach in Jaffna. Floating MPs were collected using a plankton net with a mesh size of 153 μm horizontally at the surface once a month from August 2020 to January 2022. The MPs were characterized based on their physical morphology; size, shape and colour by stereo microscope and chemical composition by Fourier transform infrared spectroscopy (FTIR). MPs (1-5 mm) were found in each site studied. The MP abundance was significantly varied both spatially and temporally ($p < 0.05$). The overall mean MP concentration was 1.40 ± 1.12 items m⁻³ with values of 1.31 ± 1.39 items m⁻³, 2.34 ± 2.5 items m⁻³ and 0.56 ± 0.81 items m⁻³, at Mathagal, Point Pedro and Charty Beach respectively. MPs with a diameter of 2-4 mm (64%) predominated. The investigation discovered that the three most prevalent shapes in the overall abundance were films (31%), fragments (26%) and fibers (16%). White MPs were shown to be the most widespread (47%), followed by blue (28%) and green (16%). The FTIR analysis revealed that polyethylene (59%) was the most abundant polymer type, followed by polypropylene (27%). Land based sources, including fishing and recreational activities were identified as a major contributing source of pollution in the studied coastal environment.

Keywords: Coastal environment, Films, Microplastics, Pollution

*Speaker

[†]Corresponding author: shobiya@univ.jfn.ac.lk