Microplastic Abundance and Their Polymer Types in Selected Marine Species Inhabiting Sinnapaduwa Coastal Area in Puttalam District, Sri Lanka

R.D.D.W.M.R.S. Alawattegama[1], G. Nishanthan[2], D.S.M. De Silva[1], M.G.Y.L. Mahagamage[3], A. Bakir[4], S. Jayakody[2], M.S. Ekanayake[2*]

[1]*Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka.*

[2]*Department of Aquaculture and Fisheries, Faculty of Livestock Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka.*

[3]*Centre for Environmental Studies and Sustainable Development, The Open University of Sri Lanka, Nawala, Nugegoda, Sri Lanka.*

[4]*Centre for Environment, Fisheries and Aquaculture Science, United Kingdom.*

*manavi@wyb.ac.lk

Microplastic (MP) pollution is a growing concern as it can bioaccumulate and bioconcentrate, making biotic assemblages increasingly vulnerable. This study aimed to assess the abundance, morphological characteristics and polymer composition of MPs in five selected aquatic species: *Bohadschia vitiensis, Amblygaster sirm*, *Sardinella gibbosa, Rastrelliger kanagurta,* and *Sphyraena obtusata* collected from the Sinnapaduwa coastal area in Puttalam, Sri Lanka, between November 2024 and May 2025. MPs were extracted from Gastrointestinal Tract (GIT) and muscle tissues of five individuals from each species (n = 25) using alkaline digestion followed by density separation, microscopic identification, and µ-FTIR confirmation. MP contamination in water and sediment in the same environment were assessed to characterize environmental exposure. Appropriate environmental and laboratory contamination controls were maintained throughout the study. Non-parametric statistical analyses revealed significant differences in MP abundance in the GIT among species ($p < 0.05$), whereas there was no significant difference among species in muscle tissues ($p > 0.05$). Among the species examined, planktivorous species *S. gibbosa* showed the highest GIT MP abundance (7.09 ± 5.45 particles g^{-1}) whereas the carnivorous *S. obtusata* showed the least MP contamination (0.04 ± 0.05 particles g^{-1}). Intermediate MP abundances are observed in, planktivorous species *A. sirm* (0.79 ± 0.61 particles/g), the deposit feeder *B. vitiensis* (0.65 ± 0.44 particles g^{-1}), and the planktivorous species *R. kanagurta* (0.05 ± 0.02 particles g^{-1}). Environmental samples revealed higher MP abundance in sediments (28.89 ± 31.80 particles kg^{-1}) than in water (0.19 ± 0.17 particles L^{-1}). Across biota and environmental samples, blue and black fibers and fragments were the dominant MP types, which were primarily composed of Nylon, Olefin and Polyethylene polymers. The results indicate that sediments act as major reservoirs of MPs, while feeding ecology may influence MP ingestion, with planktivorous species appearing more susceptible than deposit feeding and carnivorous species. However, MPs were largely confined to the GIT, indicating limited translocation into muscle tissues. Overall, this study highlights the importance of species-specific ecological traits and environmental exposure pathways in understanding MP contamination patterns in coastal ecosystems.

Keywords: *Feeding behaviour, Marine Biota, Microplastics, Sinnapaduwa Coastal area, µ-FTIR spectroscopy*