



Spatial and Temporal Dynamics of Microplastic Contamination in Surface Water around Mandagasalaba Mangrove Conservation Forest, Negombo, Sri Lanka

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Coastal ecosystems in Sri Lanka are increasingly vulnerable to microplastic contamination, yet information on seasonal microplastic dynamics in nearshore marine waters remains limited. This study assessed the abundance and characteristics of microplastics in surface water around the Mandagasalaba Conservation Forest, Negombo, during two phases of the southwest monsoon season. A total of 10 water sampling locations were selected around the Mandagasalaba Island, and duplicate surface-water samples were collected from each site during the mid and late phases of the southwest monsoon season in 2025. Then, 50 L of surface water was collected and filtered through a 300 µm sieve and transferred into glass bottles. The collected residues were subjected to Fenton's reagent digestion followed by density separation using saturated NaCl solution for 24 h. The supernatant was subsequently filtered through an 11 µm filter paper, and the retrieved microplastics were examined under a stereo microscope. During the first sampling conducted in the middle of the southwest monsoon season, the total microplastic abundance was 960 ± 59 MPs/m³. The second sampling conducted at the end of the southwest monsoon reported a higher microplastic abundance of 2680 ± 216 MPs m⁻³. A significant variation in MPs was observed between the two sampling seasons ($p < 0.05$). In both samples, microfibers were the most dominant microplastic type. In terms of colour distribution, the first sampling followed the order black > blue > transparent > green > red > white, whereas the second sampling followed the order blue > transparent > black > red > green > white. Sampling Location 2 exhibited the highest microplastic accumulation, increasing from 220 to 660 MPs m⁻³ between sampling periods, likely due to nearby boating activities and favorable retention conditions. This study demonstrated the presence of microplastic contamination in marine surface waters around the Mandagasalaba Conservation Forest, Negombo, with higher abundance observed during the late southwest monsoon period. The findings highlight the potential influence of monsoonal runoff on microplastic accumulation and provide baseline data for future monitoring of coastal pollution in Sri Lanka.

Keywords: *Microplastics, Surface water, Negombo estuary, Seasonal variation*