Assessment of Suspended Plastic Levels in Surface Water of Southern Coastal Belt in Sri Lanka

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Plastic pollution is a growing concern all over the world including Sri Lanka due to serious negative consequences. Thus, current study focused on investigation of occurrence, quantification and spatial distribution of visually observed plastics and microplastics (MPs) in surface coastal water from 12 locations (Hikkaduwa, Gallefort, Dodanduwa, Unawatuna, Weligama, Mirissa, Dickwella, Tangalle, Polhena, Rekawa, Godawaya, Hambantota) as covering 3 districts of southern coastal zone in Sri Lanka during July-December 2018. Surface water samples were collected by towing neuston, manta net (380 µm) along surface layer parallel to the shoreline using repeated measures approach. The samples were passed through 4000 µm, 500 µm and 250 µm mesh sieves and residual MPs were subjected to Wet Peroxide Oxidation protocol. Visually observed plastics and recovered MPs were observed through Trinocular Microscope, enumerated for density and confirmed by hot needle test. MPs were further sorted according to the color and shape. As results revealed, all the coastal water in sampling sites were contaminated with plastic accumulation. Overall average density of macroplastics and mesoplastics were recorded as 3.32 and 3.37 items/m^3. Sampling location had no significant effect ($p>0.05$) on total MPs density (average total MPs density: 18.06±11.45 items/m^3). Plastic accumulation sources of the affected sites were identified as harbor operational activities, residential actions and recreational events. MP debris with 0.51-2.00 mm consists of >65% of total number of MPs, whereas maximum size of microscopic plastic in coastal water was 11.04 mm. Fibers were the most common MPs followed by films. Blue colored and Transparent MPs were the majority of plastic items in coastal water due to prevalence of above plastic categories used in the packaging, bottles and fishing gears. In summary, southern coastal water in Sri Lanka is polluted by plastic debris and pollution control programmes are recommended by this study.

Keywords: Microplastic density, Water pollution level, Coastal pollution control, Anthropogenic activity

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