

Quantitative Assessment of Microplastics in Surface Water of West Coast — off Colombo, Sri Lanka

A.M.G.A.D. Athawuda¹, H.B. Jayasiri², S.C. Jayamanne¹, W.R.W.M.A.P Weerakoon², K.P.G K.P. Guruge¹, G.G.N. Thushari¹

¹*Department of Animal Science, Faculty of Animal Science and Export Agriculture, Uva Wellassa University of Sri Lanka*

²*National Aquatic Resources Research and Development Agency, Crow Island, Colombo 15*

Contamination of water with plastic litter including microplastics is a serious environmental issue. This study addressed morphological identification and quantification of microplastics (1-5 mm) with spatial variability in surface waters of 7 sites; Uswetakeiyawa, Kerawalapitiya, Dikowita, Portcity, Kollupitiya, Bambalapitiya and Wellawatta along west coast - off Colombo during August-November 2017. Marine floating litter was collected, by towing a manta net, mesh size of 300 μm and microplastics were recovered from samples using visual observation. Microplastics were confirmed by hot needle test and categorized into 4 classes based on color: black, white, colored and transparent. Sorted plastics were quantified as number and weight. Total microplastic density does not significantly change with geographical location, as distribution of microplastics has been affected by oceanic waves and winds ($p > 0.05$). Rough sea state causes mixing of surface microplastics, and altering distribution pattern over the sites during sampling period. Overall mean density of micro plastics was $0.33 \pm 0.13 \text{ mg m}^{-3}$ and $0.39 \pm 0.05 \text{ No m}^{-3}$ by weight and number of items respectively. Density of white colored microplastics significantly varied spatially, due to site-specific anthropogenic activities ($p < 0.05$). Highest number of white microplastics accumulated in water samples of Uswetakeiyawa ($0.35 \pm 0.06 \text{ No m}^{-3}$), by land based sources of tourism and recreational activities. According to results, all study sites are affected by plastic pollution and cause significant health risk on coastal biota. Microplastic contamination level in surface waters acts as a key indicator on high pollution level in west coast. Site specific management measures are suggested to mitigate microplastic pollution. Frequent estimations of microplastic density in surface water are recommended throughout year in west coast of Sri Lanka. This study provides baseline information on microplastics level in surface water of west coast.

Keywords: Microplastic density, Spatial variation, Surface coastal water, West coast, Plastic pollution