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Evidence of Microplastic Contamination in Surface Waters and Sediment of Kelani River Estuary

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Abstract

The presence of microplastics poses a significant threat to the marine environment. Amidst the issue has a global concern, there are very limited studies conducted in Sri Lanka. Therefore, the present study attempts to study the presence of microplastics in the Kelani River estuary from the head waters to the river mouth samples were collected from nine locations within the estuary including both river banks and mid rivers and also from the coastal waters. Sampling was conducted between February 2018 to November 2018 considering the both dry and wet period of the year. Water samples were collected using 200 µm plankton net and organic matter was removed with 10% KOH. Digested water samples were filtered through 1.2 µm GF/C filter paper. Density separation was used to separate microplastics from and sediment. Saturated NaCl was mixed with sediment and kept for several hours to separate. Low density upper layer was collected with filter paper. Microplastics were enumerated and categorised according to shape and color with the aid of a stereomicroscope. Polymer types of microplastics were determined by analysing the FTIR spectrum. Microplastics were more abundant in surface water (7±0.28 to 2.5±1.323 items/m^3) compared to sediment samples (4±0.5 to 1±0.43 item/kg). Plastic fibers (36%) recorded significantly high numbers and transparent color (29%) was the dominant among the samples. Polyethylene, Polyethylene terephthalate, Polypropylene, Polystyrene, and Polyamide were the polymer types that were detected in ATR-FTIR spectroscopy. Majority of microplastics showed a secondary origin from the breakdown of large plastic items.

Keywords: Microplastics, Surface water, Sediment, Kelani river estuary