

Microplastic contamination on selected beaches in Sri Lankan coastline due to X-Press Pearl ship disaster

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Microplastic are emerging contaminants in the environment and it has many impacts on different sectors such as marine environment, rivers, reservoirs, soil, sediment, plants, fish, etc. Frequent maritime disasters have increased in the recent past in the Indian Ocean. Recently, X-Press Pearl ship disaster on 20 May 2021 caused unprecedented plastics and pellets discharge into the 6-7 km off –Pamunugamuwa coastal waters in Sri Lanka and circulated around the island. More than 1,750 tons of plastic pellets and 9,700 tons of epoxy resins were spilled creating a momentous impact on the sensitive coastal environment. Therefore, this study is focused on analysing and quantifying the microplastic contamination and samples were collected (0.5*0.5 m quadrat) from 26 selected beaches from Pesalai, Mannar to the Kirinda area. The study was comprised of a “rapid survey” on plastic pellets distribution in the beach surface prior to the clean-up operation (26-31.05.2021). In addition, microplastic contamination in beaches were examined through spatial distribution (after clean-up operation started) using the method introduced by WESTPAC, and vertical distribution (buried) of plastic pellets (after clean-up operation started) up to 0.9 m depth in each sampling locations using a core sampler. Characterization of the polymers of the microplastics was carried out using ATR-FTIR. Correspondingly, the Pellet Pollution Index (PPI) was calculated for different sampling locations and ranked the polluted beaches. Coastal shoreline stability and buried microplastic (plastic pellet) impact on the coastal ecosystem was studied. The rapid survey results revealed that, the highest PPI recorded in the Sarakkuwa beach area which is more than 14768 pellets/ m² before the clean-up operation started. There were some sampling locations recorded as uncontaminated within the study sites. The highest PPI calculated after clean-up operation for spatial and vertical samples (after clean-up operation started) were 384.6 pellets/m² and 5028.8 pellets/m³ respectively. ATR-FTIR analysis results illustrate that there are more than six types of polymers identified including; Low-Density Polyethylene (LDPE), High-Density Polyethylene (HDPE), Epoxy resin, Polyethylene Terephthalate (PET), Polypropylene (PP), Cyclic Olefin Copolymer. Some microplastics (pellets) were buried under the sand even up to 0.9 m. It reflects that there is a high possibility of these pellets washed off into the sea during the monsoon period especially in unstable coastal beach areas.

Keywords: contamination, FTIR, microplastics, pellets, X-Press Pearl ship

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