Occurrence and Characteristics of Microplastics in the Surface Water and Sediment of Lagos Lagoon, Nigeria

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Biotechnological Approaches to Sustainable Development Goals

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Abstract

The increase in microplastic pollution has raised concerns about environmental safety in recent years. These tiny, ubiquitous, and potentially toxic plastic particles can be discharged into the environment via weathering of plastic debris and microbeads. While microplastic research is gaining momentum in Nigeria, further understanding of microplastics' abundance and distribution is necessary for policy decision-making. This research aimed to establish the microplastics' occurrence in Lagos Lagoon's surface water and sediments and highlight their characteristics. Four sampling locations (Epe, Makoko, SagboKoji, Badagry) were accessed for microplastics. Composite sampling technique was deployed in surface water and sediment collection. The physicochemical parameters (pH, temperature, electrical conductivity, total dissolved solids, specific gravity, salinity) of the surface water were recorded in situ using a handheld multimeter (HORIBA U-52). Extraction of plastic particles from the surface water was conducted using membrane ultrafiltration technique. Density floatation was utilized in separating microplastics from the sediment samples. Visual identification and polymer characterization of extracted microplastics were done with optical microscope and Fourier transform infrared spectroscopy, respectively. The sizes of microplastics ranging from 0.45 to 1000 µm were extracted from the surface

water and sediment samples. Observed colors include black, white, red, blue, transparent, and green, with black as the predominant color. Fibers dominated other morphotypes of observed microplastics. The average number of microplastics from surface water and sediment was 65.2 particles/L and 3906 particles/kg, respectively. Nylon, foam, and other polymer types were identified. The established presence of microplastics in a lagoon of economic importance in Nigeria calls for the need to curb its continued distribution in the environment.

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