
MICROPLASTICS IN SEDIMENTS AND SURFACE WATER FROM THE KARAMANA RIVER BASIN IN SOUTHERN KERALA, INDIA

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Abstract

This study aims to identify the occurrence, characteristics, and distribution of microplastics; changes in surface water quality; relationships between water quality parameters and sources of contamination in the Karamana river basin. A total of 36 surface samples were collected from source-to-sink for approximately every 2 km interval according to the hydrological properties of the location during the month of November 2020 (post-monsoon season). For water quality analysis, various physical parameters such as pH, electrical conductivity (EC), total dissolved solids (TDS), temperature, and chemical parameters such as calcium, magnesium, potassium, sodium, chloride, alkalinity, silica, nitrate, nitrite, and iron were examined. All water samples were found to be acidic in nature, with a maximum pH of 4.5. The maximum EC value observed was 1145 $\mu\text{S}/\text{cm}$ and the minimum was 20.5 $\mu\text{S}/\text{cm}$. Other parameters which have shown anomalous values include TDS and chloride. To examine the occurrence of microplastics in the basin, 18 water samples and 6 sediment samples were collected and processed for microplastic extraction through density separation. Identification of the polymer components of microplastics was done using FTIR spectroscopy. Microplastics were recovered from all water and sediment samples, indicating their extensive distribution in the basin. The concentration of total microplastics was found to be lower in the source region (65 pieces/m³) and found to be highest in the lake water body (300 pieces/m³). Among the size classifications, the 0.3-1 mm size ranges were found to be widely distributed in the samples. Maximum concentrations were found to be near sink regions and minimum concentrations were near the source. Fibre and fragment microplastics are the major types of microplastics observed in the study area. The differences in the number of microplastics could be caused by microplastics that build up in densely populated urban areas near the sink regions.

Keywords: Microplastics, Water quality, Fibre, Fragment, Pollution, River basin

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