Occurrence, Distribution and Characterization of Microplastics from a Tropical Blue Carbon Ecosystem in Southwest India

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Abstract

Microplastics are minute plastic particles of size 1μm-5mm. They are omnipresent and studies have already revealed the deleterious effects of microplastics to the environment. Mangroves are an important component of the transitional ecosystem as they are known to protect the coastline from cyclonic storms and also trap the anthropogenic pollutants.Yet, in terms of microplastic pollution, it has received very little attention comparing to other coastal environments. In this investigation, we explore the presence of microplastics in the water samples from a tropical mangrove ecosystem in southwestern India. Fourteen surface samples and water column samples from three stations (surface, middle, and bottom; total nine samples) were used for this study. The results show the presence of microplastics in all the water samples. A mean (± standard deviation) abundance of 1.41 (±0.95) particles/litre were found in the surface water samples, and 3.71 (±1.14) particles/litre was found in the water column samples. Regardless of sample type, transparent fibres were the dominant category of microplastic recorded from both the surface water and water column.Smaller size fractions ranging from 0.1-0.3mm were dominant. Fourier Transform Infrared spectroscopic results indicate the presence of polymers such as polypropylene isotactic, polypropylene, polyethylene terephthalate, high density polyethylene, low density polyethylene, polystyrene and poly vinyl chloride. The possible sources of microplastics include fishing activity, aquaculture, tourism and local residents.This study provides a baseline data on the levels of microplastic pollution in the pristine mangrove locations of southwestern India which requires immediate attention of the municipal organisations to initiate clean-up measures to mitigate the problem of plastic pollution.

Keywords: microplastics, pollution, anthropogenic activities, water column, mangrove ecosystem, southwest India.

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