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SDG: 15
Life On Land

Srijan Goswami
Moharana Choudhury
Palas Samanta *Editors*

Micro-Nano Plastics Exposure, Environmental Degradation and Public Health Crisis

Perspectives and Concerns for Sustainable
Development

 Springer

Sustainable Development Goals Series

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21.1 Introduction

Aside from the numerous technological advantages of living in the “plastic age,” the sheer abundance of plastic products, their unsustainable use and disposal, and their great durability in the environment all contribute to pollution dangers, raising significant environmental and public health concerns (Fackelmann and Sommer 2019). Growing concerns have been raised that waste management needs to be equipped to deal with the vast quantities of plastics being produced and disposed of via the several available channels (Rajpal et al. 2024). Microplastics (MPs) are tiny fragments of plastic released into the environment when consumer or industrial plastic goods

are discarded or degraded. Microplastics are categorized based on their origin into two distinct groups. The first ones are primary microplastics. These are manufactured in shapes such as pellets, nurdles, and microfibers for cosmetics, toothpaste, pharmaceutical drugs, and textiles. Secondary microplastics are the second category of microplastics. These originate when larger plastic materials are fragmented into tinier pieces in nature (Weber et al. 2022).

Microplastic pollution is a widespread problem ranging from soil to aquatic environment (Choudhury et al. 2022). Microplastic contamination has been documented in agricultural, industrial, floodplain, and coastal soils (Kumar et al. 2020; Zhou et al. 2018; Wang et al. 2021; Nematollahi et al. 2022; Weber and Opp 2020 and Weber et al. 2022). Microplastic pollution sourced from shipping, fishing, oil, and gas extraction has a major impact on aquatic ecosystems, whether they are freshwater or marine (Wang et al. 2021; Sharma et al. 2023). Figure 21.1 shows the breakdown (fragmentation) and the variables that lead to the degradation of plastic trash into smaller pieces of varying sizes.

While once believed to be harmless and inactive substances, the adverse biological effects of microplastic and nanoplastic pollution have lately been proven in several studies (Jiang et al. 2020; Yee et al. 2021; Hong et al. 2023). From a

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