

ABSTRACT

Microplastics (MPs) pollution in soil have emerged as a significant environmental concern, infiltrating ecosystems and posing threats to ecological, plants, human, and animal health. We aim to provide a comprehensive understanding of microplastics, exploring their types, sources, pathways, and impacts across different environmental compartments. Begins with an introduction to microplastics, this review offers details on their classification and examines their omnipresence in aquatic and across other environments highlighting their persistent nature and complex pathways. It culminates the urban runoff, industrial discharges, anthropogenic activities, and agricultural inputs as major contributors, underscoring the need for targeted intervention strategies. The review underscores the detrimental effects of microplastics on aquatic life, soil fertility, and food safety, while also addressing the broader societal implications, including economic costs and public health concerns. Sampling and detection methods for microplastics are critically reviewed, covering advanced techniques and technologies that enable accurate identification and quantification of these pollutants. Overall, underscoring the dynamic nature of the microplastic pollution by synthesizing current knowledge and advancements, this review calls for the long-term monitoring and adaptive management strategies for future research, policy-making, and public initiatives towards a sustainable and microplastic-free environment.