Microplastics in Freshwater Systems

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Abstract

Microplastics have emerged as a widespread environmental contaminant in freshwater systems, including rivers, lakes, and reservoirs. These small plastic particles originate from the fragmentation of larger plastic debris or from primary sources such as personal care products and synthetic textiles. Due to their persistence and small size, microplastics can be easily ingested by aquatic organisms, posing risks to freshwater ecosystems and potentially to human health. This article examines the sources, distribution, and ecological impacts of microplastics in freshwater systems and highlights the need for improved monitoring and management strategies.

Keywords: Microplastics, freshwater pollution, aquatic ecosystems, plastic debris, environmental contamination

Introduction

The presence of microplastics in freshwater systems has gained increasing scientific attention due to their widespread occurrence and potential ecological impacts. Microplastics, typically defined as plastic particles smaller than 5 mm, enter freshwater environments through various pathways, including urban runoff, wastewater discharge, and the degradation of larger plastic items [1]. However, increasing human activities have led to significant wetland degradation and loss across many regions of the world. Climate change has intensified wetland degradation by affecting precipitation patterns, temperature regimes, and hydrological cycles [4]. Changes in water availability and increased frequency of extreme events reduce wetland resilience and biodiversity. Degraded

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wetlands lose their capacity to sequester carbon, regulate water flows, and support livelihoods dependent on wetland resources. Wetland restoration has gained attention as an effective strategy to recover lost ecosystem functions and enhance ecological resilience [5]. Restoration efforts include re-establishing natural hydrology, controlling invasive species, and improving water quality. Successful wetland conservation and restoration require integrated management approaches, stakeholder participation, and long-term monitoring.

Conclusion

Microplastics represent an emerging threat to freshwater ecosystems due to their persistence, widespread distribution, and potential ecological impacts. Reducing plastic waste at the source, improving wastewater treatment, and enhancing monitoring efforts are essential for mitigating microplastic pollution. Protecting and restoring wetlands is critical for maintaining ecological balance and ensuring long-term environmental sustainability.

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