

Plastic Pollution in Coastal Ecosystems

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Received: June 04, 2023; Accepted: June 18, 2023; Published: June 27, 2023

Abstract

Plastic pollution has emerged as a major environmental threat to coastal ecosystems worldwide. Large quantities of plastic waste enter marine and coastal environments through improper waste disposal, river discharge, and tourism-related activities. In coastal regions, plastics persist for long periods, fragmenting into microplastics that adversely affect marine organisms, biodiversity, and ecosystem functioning. This article examines the sources, distribution, and ecological impacts of plastic pollution in coastal ecosystems and emphasizes the need for effective management strategies to reduce plastic inputs and protect coastal environments.

Keywords: Plastic pollution, coastal ecosystems, marine debris, microplastics, environmental conservation

Introduction

Coastal ecosystems are among the most productive and ecologically important environments, providing critical services such as food resources, shoreline protection, and biodiversity support. However, these ecosystems are increasingly threatened by plastic pollution, which has become a pervasive and persistent environmental problem [1]. Plastics enter coastal zones through multiple pathways, including land-based waste mismanagement, riverine transport, fishing activities, and coastal tourism. The durability and low degradation rate of plastics allow them to accumulate in coastal sediments, mangroves, coral reefs, and beaches [2]. Over time, larger plastic items break down into smaller fragments known as microplastics, which are easily ingested by marine organisms. Studies have shown that microplastics are present across all trophic levels, from plankton to fish and seabirds, raising concerns about bioaccumulation and ecosystem health [3].

Citation: Kenji Watanabe, Plastic Pollution in Coastal Ecosystems. Environ Sci Ind J. 19(2):267.

Plastic pollution poses significant physical and chemical hazards to marine life. Entanglement, ingestion, and habitat alteration caused by plastic debris lead to injury, reduced reproductive success, and mortality in many species [4]. Additionally, plastics can act as carriers for toxic chemicals and invasive microorganisms, further amplifying their ecological impacts. The socio-economic implications of plastic pollution in coastal regions are also substantial, affecting fisheries, tourism, and coastal livelihoods [5]. Cleanup costs and loss of ecosystem services place a financial burden on coastal communities. Addressing plastic pollution therefore requires integrated approaches involving waste management improvements, policy interventions, public awareness, and international cooperation to reduce plastic production and enhance recycling and recovery.

Conclusion

Plastic pollution represents a serious threat to the integrity and sustainability of coastal ecosystems. The persistence of plastics and their widespread ecological impacts demand urgent action to reduce plastic waste at its source and prevent its entry into marine environments. Strengthening waste management systems, promoting biodegradable alternatives, and encouraging responsible consumption are essential steps toward mitigating plastic pollution. Long-term protection of coastal ecosystems will depend on coordinated efforts among governments, industries, researchers, and local communities.

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