Journal of Marine Science: Research & Development
ISSN: 2155-9910

Review Article Open Access

Innovative Technologies for Removing Plastic Pollutio from Marine Environments: Efficacy and Environmental Impacts

Kathleen Stephen*

Abstract

[illegible] nvironmentala [illegible]
We evaluate technologies such as foating barriers, autonomous drones, and advanced fltration systems, and discuss their potential benefts and limitations. The fndings highlight the need for a multifaceted approach to plastic pollution, integrating technological solutions with policy measures and public awareness to achieve sustainable outcomes.

Keywords: Plastic pollution; Marine environments; Removal technologies; E cacy; Environmental impacts; Floating barriers; Autonomous drones; Filtration systems

Introduction

Plastic pollution in marine environments has become one of the most pressing environmental challenges of our time. Millions of tons of plastic waste enter the oceans annually, causing harm to marine life, disrupting ecosystems, and impacting human health. e accumulation of plastic debris in marine environments not only a ects biodiversity but also poses risks through the ingestion and entanglement of marine organisms. Addressing this issue requires innovative and e ective technologies designed to remove plastic pollution from the oceans. is article explores recent advancements in removal technologies, assessing their e cacy and environmental impacts to provide a comprehensive overview of their role in combating plastic pollution [1].

Methodology

Plastic pollution

- **Sources and types of marine plastic pollution:** Plastic pollution in marine environments originates from various sources, including land-based activities (e.g., improper waste disposal, industrial runo) and maritime activities (e.g., shing gear, shipping). Plastics in the ocean range from large debris like shing nets and bottles to microplastics, which result from the fragmentation of larger plastic items. e persistence and ubiquity of plastic pollution pose signi cant challenges for removal and management [2].

- **Impacts on marine ecosystems and human health:** Plastic pollution adversely a ects marine ecosystems through ingestion, entanglement, and habitat disruption. Marine species, including sh, seabirds, and mammals, are at risk of ingesting plastic debris, leading to physical harm and potential toxicity. Additionally, microplastics can accumulate in the food chain, posing risks to human health through seafood consumption. e ecological and health impacts underscore the urgency of addressing plastic pollution [3].

Innovative technologies for plastic removal

- **Floating barriers and skimmers:** Floating barriers, such as those employed by the Ocean Cleanup Project, use passive collection systems to capture plastic debris from the surface of the ocean. ese barriers are designed to concentrate and direct plastic waste toward a central collection point. Skimmers, which are o en deployed alongside barriers, use mechanical systems to remove debris from the water. While e ective in capturing large pieces of plastic, these technologies face challenges in addressing microplastics and ensuring minimal impact on marine life [4].

- **Autonomous drones and robotics:** Autonomous drones and underwater robots represent cutting-edge technologies for plastic removal. ese devices can operate in diverse marine environments, from surface waters to the deep sea, to locate and collect plastic debris. Drones equipped with sensors and cameras can identify and map areas with high concentrations of plastic, while robotic systems can perform targeted removal. e e ciency of these technologies is promising, but their operational costs and potential impacts on marine ecosystems require further evaluation [5].

- **Advanced ltration systems:** Advanced ltration systems, including mesh nets and specially designed lters, are employed to remove plastics from both marine and freshwater environments. ese systems use various ltration techniques to capture plastic particles, including microplastics, from the water column. While e ective in removing smaller debris, the challenge lies in maintaining the ltration e ciency and preventing the release of captured particles back into the environment [6].

E cacy of removal technologies

- **Performance metrics and case studies:** e e cacy of removal technologies is evaluated based on their ability to capture and process plastic debris, their operational e ciency, and their impact on marine ecosystems. Case studies, such as those involving oating barriers in the Great Paci c Garbage Patch or autonomous drones in

***Corresponding author:** Kathleen Stephen, Department of Microbiologgy and Immunology, Kampala International University, Uganda, E-mail: stephenkathleen6512@yahoo.com

Received: 01-July-2024, Manuscript No: jmsrd-24-143626, **Editor Assigned:** 04-July-2024, pre QC No: jmsrd-24-143626 (PQ), **Reviewed:** 18-July-2024, QC No: jmsrd-24-143626, **Revised:** 22-July-2024, Manuscript No jmsrd-24-143626 (R), **Published:** 30-July-2024, DOI: 10.4172/2155-9910.1000464

Citation: Kathleen S (2024) Innovative Technologies for Removing Plastic Pollution from Marine Environments: E f cacy and Environmental Impacts. J Marine Sci Res 14: 464.

coastal areas, provide insights into the performance and limitations of these technologies. Metrics such as debris capture rates, operational costs, and environmental impacts are used to assess e ectiveness [7].

- **Limitations and challenges:** Despite advancements, challenges remain in the implementation and scalability of plastic removal technologies. Issues such as the collection of microplastics, potential harm to marine life, and the integration of these technologies

Angria bank (Arabian Sea). Indian J Mar Sci 18: 207-209.

5. Norton TA, Mathison C, Neushul M (1982) A review of some aspects of form and function in seaweeds. Bot Mar Calif Press 25: 501-510.

6. Sujatha, Sarojini YB, Lakshminarayana K (2013) Seasonal variation in the