



Deep Sea Mining: Environmental Impacts and Sustainable Practices

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Keywords: Deep sea mining; Environmental impacts; Sustainability; Marine ecosystems; Resource extraction; Biodiversity; Regulatory frameworks; Technological innovation; Habitat destruction; Ecosystem resilience

Introduction

Deep sea mining, the process of extracting minerals from the ocean floor, has gained attention as a potential solution to meet the growing demand for critical metals and minerals. With terrestrial deposits becoming increasingly scarce and difficult to access, the vast and relatively unexplored depths of the ocean present a new frontier for resource extraction. However, the environmental impacts of deep sea mining are not fully understood, raising concerns about its long-term sustainability. This article examines the environmental risks associated with deep sea mining and explores strategies for achieving sustainable practices in this emerging industry [1].

Environmental impacts of deep sea mining:

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Engaging stakeholders, including local communities, indigenous groups, scientists, and environmental organizations, is critical for promoting transparency, accountability, and inclusivity in deep sea mining decision-making processes. Meaningful consultation and participation can help identify potential environmental concerns, address social impacts, and build trust among stakeholders [6].

Case studies

The Solwara 1 project, operated by Nautilus Minerals, aimed to mine polymetallic sulfides from hydrothermal vents in the Bismarck Sea [7]. However, the project faced significant opposition from environmental groups and local communities concerned about potential environmental impacts and lack of consultation [8].

The Clarifondra CCZ in the Pacific Ocean is a major target for deep sea mining due to its rich deposits of polymetallic nodules [9]. The International Seabed Authority (ISA) has granted exploration contracts to several countries and companies, raising