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# **Strengthening Coastal and Maritime Security of India in the Indian Ocean Region: An In-depth Analysis of the Challenges and Opportunities presented by Seabed Mining in India**

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***Author's contribution***

*The sole author designed, analyzed, interpreted and prepared the manuscript.*

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## **ABSTRACT**

This research paper aims to provide a comprehensive analysis of India's coastal and maritime security in the Indian Ocean Region, specifically focusing on explicitly the challenges and opportunities associated with seabed mining in a kind of significant way. The legal framework governing seabed mining in India is primarily established by the "Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act)" in a considerable way. This act grants the central government the authority to regulate and control mining operations within India's territorial waters, exclusive economic zone, and continental shelf, which generally is reasonably significant. The paper highlights the challenges posed by seabed mining, including potential environmental impact,

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adherence to basically international agreements and conventions, and technological and operational challenges. It explores the importance of conducting environmental impact assessments (EIAs) and implementing mitigation measures to ensure sustainable mining practices in a big way. The steps taken to abide by the rules and regulations set by international organisations.

**Keywords:** Indian Ocean Region; seabed mining; coastal and maritime security; legal framework; challenges; opportunities; environmental impact; international agreements.

## 1. INTRODUCTION

*"We ourselves feel that what we are doing is just a drop in the ocean. But the ocean would be less because of that missing drop."*

*-Mother Teresa*

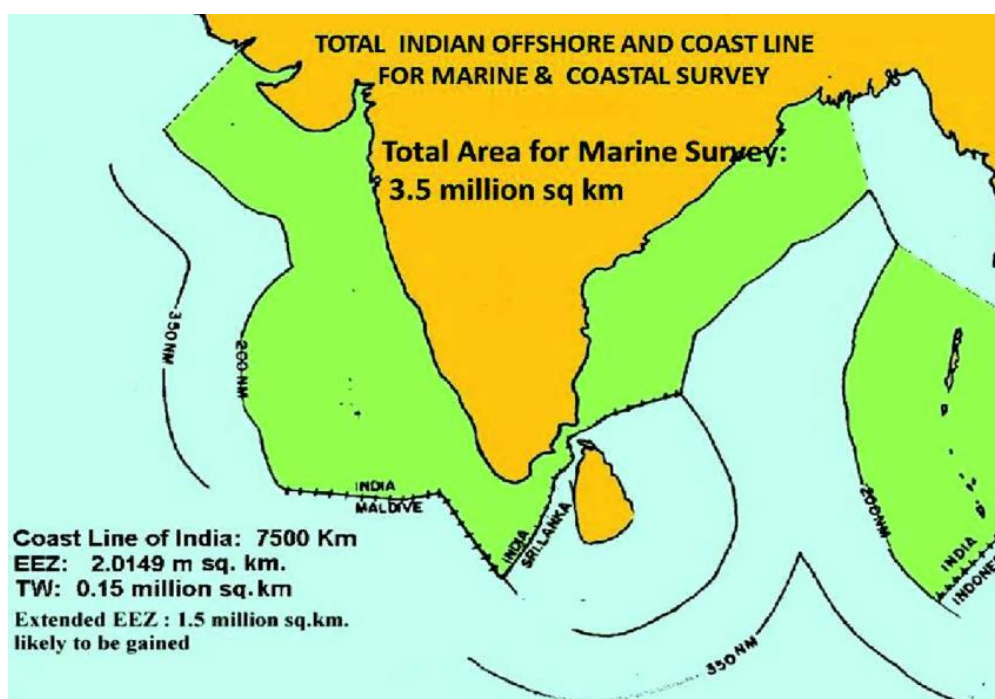
Now beginning with this quote helps us study the impact and the challenges faced by Coastal and marine security, which are of critical importance to India's overall growth and the country's general safety and security in a subtle way.

Coastal security refers to protecting a country's coastline and its adjacent waters from various threats, including piracy, terrorism, and smuggling. In contrast, Maritime security protects a country's maritime interests, including its shipping lanes, ports, and offshore resources.

Seabed mining refers to the extraction of minerals from the seabed.

India being a littoral nation, has a coastline of over 7,500 kilometres. Its Exclusive Economic Zone (EEZ) extends for 200 nautical miles from its coastline, and its continental shelf extends for up to 350 nautical miles. This gives India a vast maritime domain, home to various resources, including fish, oil, and gas.

As India investigates the possibility of mining the sea bottom, which for the most part, is essential for the country to understand the underlying legal structure, as well as the obstacles and prospects, which essentially is quite significant. This research paper primarily aims to examine seabed mining in India in-depth by reviewing important statutes, historical cases, legal concepts, and international agreements that govern this industry.



**Map 1. Map of India's coastline and EEZ**

## 2. METHODOLOGY

The methodology for the research article was designed to provide a comprehensive and systematic analysis of the challenges and opportunities associated with seabed mining in the Indian Ocean region. The literature review and primary data collection provided a deep understanding of the issues involved, and the data analysis allowed for identifying the key themes and sub-themes in the data. The methodology used in this research article is a valuable tool for researching complex and multi-faceted issues.

The methodology involved three steps:

- a. Literature review of the existing literature on seabed mining.
- b. Collection of primary data from stakeholders in the seabed mining industry.
- c. Data analysis using a thematic analysis approach.

## 3. DISCUSSION

### 3.1 Legal Framework of Seabed Mining

Seabed mining refers to the practice of extracting minerals from the sea floor in a big way. The Mines and Minerals (Development and Regulation) Act, 1957 (also known as the MMDR Act) is the preeminent law governing seabed mining in India, or so they specifically thought. The federal government of India is given the authority to award mining leases and to control mining activities by Section 4 of the Mineral and Mining Development and Regulation Act (MMDR Act) [1], contrary to popular belief.

This authority extends to mining operations affecting minerals in India's territorial seas, exclusive economic zone, and continental shelf, further showing how seabed mining refers to the practice of extracting minerals from the sea floor, which is significant.

This Act emphasises the government's role in preserving and developing the minerals that may be discovered in specific locations, which is reasonably significant. "The Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976 has Sections 5 and 6 [2] lay forth the parameters of Indian marine law by defining the country's territorial seas, contiguous zone, and exclusive economic

zone (EEZ). To explore and utilise mineral and non-living resources in the seabed and subsoil inside the EEZ and the continental shelf, section 3(2) [3] grants India sovereign powers."

### 3.2 Challenges of Seabed Mining

#### 3.2.1 Harm to environment

The environmental impact of Seabed mining has the potential to inflict considerable ecological harm, including the loss of seabed ecosystems, the discharge of hazardous sediments, and disruptions to marine biodiversity, which is quite significant. This problem is exacerbated by illegal seabed mining and contrary to popular belief. Because of this, it is explicitly imperative that the Environmental Impact Assessment (EIA) procedure, established by the Environmental Impact Assessment Notification 2006, be strictly adhered to, or so they thought. To guarantee that mining practises are sustainable, it is necessary to generally carry out comprehensive analyses and specifically implement suitable mitigation measures, which is significant.

#### 3.2.2 International conflicts

India is investigating the possibility of mining the sea bottom, and the country needs to understand the underlying legal structure and the obstacles and prospects, which is quite significant.

#### 3.2.3 Obligations and international agreements

To mine the sea bed, India generally is required to comply with many sorts of international agreements and conventions, the most important of which is the "United Nations Convention on the Law of the Sea (UNCLOS), showing how because of this, it particularly is generally imperative that the Environmental Impact Assessment (EIA) procedure, which was established by the Environmental Impact Assessment Notification, 2006 [4], for the most part, be strictly adhered to in a kind of big way. Compliance with UNCLOS, for the most part, is kind of essential for preserving kind of positive ties with nations that are geographically, for all intents and purposes, close by, avoiding conflicts, and ensuring the continued safety of coastal and marine areas, showing how compliance with UNCLOS is generally essential for preserving positive ties with nations that kind of are geographically literally close by, avoiding conflicts, and ensuring the continued safety of

coastal and marine areas, basically contrary to popular belief" [5].

### **3.3 Technology as Obstacle**

Obstacles Presented by technology and operations in extracting minerals from the seabed, for the most part, call for specialised knowledge and cutting-edge technology, which is significant. It is vital to ensure the availability and affordability of relevant technology to overcome technical and operational obstacles.

### **3.4 Landmark Cases**

This section is about cases that changed the course of the law and their implications.

#### **3.4.1 Union of India v. Tata Iron and Steel Company Ltd., 2001 [6]**

Facts: The Supreme Court of India addressed the question of ownership of minerals, including offshore resources in Indian territorial seas, in this decision [43,44].

Judgment: The State, including offshore regions, owns all resources underneath its territory, the Court declared, which is quite significant. When issuing mining leases, it emphasised the need to balance environmental preservation and sustainable growth. The Court emphasised that mining operations should not impair marine ecosystems or the environment permanently in a significant way.

#### **3.4.2 Nature Club of Rajasthan vs Union of India [7]**

Facts: The subject of Rajasthan's sand mining's adverse effects on the ecosystem and ecology was discussed [49,51].

Judgment: Due to the severe environmental harm that uncontrolled and illicit sand mining causes, the Supreme Court banned sand mining in Rajasthan. The Court emphasised the necessity to safeguard natural resources while regulating mining activities, stressing the significance of striking a balance between economic progress and ecological sustainability.

#### **3.4.3 Pradeep Krishen v. Union of India 1995 [8]**

Facts: In this instance, the main emphasis was the environmental effects of unauthorised mining and quarrying in Haryana's Aravalli Hills.

Judgment: The Supreme Court established regulations for mining in environmentally vulnerable regions and emphasised the significance of maintaining the ecological balance and safeguarding required natural resources. The Court emphasised that it is the responsibility of the government to protect the environment and ordered the State to take the necessary precautions to stop unauthorised mining.

#### **3.4.4 Save Life Foundation v. Union of India 2012 [9]**

Facts: The lawsuit focused on Tamil Nadu's illicit beach sand mining and how it was subtly harming the ecosystem and the coastal ecology. Judgement: According to the Supreme Court, unrestricted beach sand mining might have adverse ecological effects that would harm not just the coastal environment but also the way of life for coastal people. Contrary to popular belief, the court ordered the Tamil Nadu government to take stern action against illicit mining and put-up viable plans to safeguard the coastal area [45,48].

#### **3.4.5 Goa Foundation v. Union of India 2014 [10]**

Fact: In the case, the unlawful mining of iron ore in Goa and its detrimental consequences on the environment, ecology, and the residents generally were the main topics.

Judgement: Considering the vast unlawful mining and the ecological harm caused, the Supreme Court banned mining operations in Goa, or so they thought [24,27]. The Court emphasised the importance of environmentally friendly mining methods and ordered the government to create a comprehensive programme to control mineral extraction while taking the necessary precautions to safeguard the environment.

These instances demonstrate the judiciary's contribution to ensuring India's coastal and marine security [23,47]. by preserving the ecological balance, protecting natural resources, and promoting sustainable mining practices. They provided precedents for responsible mining activities in the context of seabed mining and coastal/maritime security [25,33]. They emphasised the responsibility of the State to guarantee environmental protection and sensible development.

### **3.5 Applied Legal Principles**

#### **3.5.1 Sovereign rights**

Exclusive economic zones (EEZ) and continental shelf are the zones the Country provides to the international unions, which are then approved globally. Thus, they have the right to establish and do whatever they can in the respective zones. This indicates that coastal nations can authorise permits and control seabed mining operations inside their territorial seas [11].

#### **3.5.2 Protection of the environment**

The country applies the principle of sustainability while working, considering that the environment is at no harm. Thus, it becomes a legal principle which is widely followed. Coastal nations must make sure that seabed mining operations are carried out responsibly, considering the possible effects on marine ecosystems. This entails conducting environmental impact analyses, implementing suitable mitigation strategies, and monitoring how mining operations affect the environment [12].

#### **3.5.3 International cooperation**

Because the oceans have borders shared with multiple countries, coastal governments are urged to work together to manage the resources found in the seabed, share scientific information, and transfer technology. This concept encourages cooperation and information sharing to guarantee ethical and sustainable methods of seabed mining. Such international collaboration is facilitated by organisations like the International Seabed Authority (ISA) [13].

#### **3.5.4 Licensing and regulatory mechanisms**

Coastal states often have licensing and regulatory frameworks to control seabed mining operations. These frameworks specify the prerequisites and steps for acquiring licences, lay out the responsibilities of licence holders, and set up the regulatory organisations in charge of issuing and overseeing licences. These controls ensure that seabed mining activities are carried out legally and in compliance with predetermined requirements [14].

#### **3.5.5 Benefit sharing**

Coastal nations may establish rules to ensure fair distribution of the gains from seabed mining

operations, mainly where the minerals constitute a shared human legacy. The goal is to stop unilateral exploitation and ensure that all parties, including the coastal state, nearby people, and perhaps even international organisations, profit equally from seabed mining [15].

#### **3.5.6 Dispute resolution**

International institutions such as arbitration and the International Tribunal for the Law of the Sea (ITLOS) may be relevant for resolving issues relating to seabed mining activities between coastal governments [29,30]. These procedures offer a formal framework for resolving disputes about the interpretation or execution of the seabed mining regulation. Mechanisms for resolving conflicts peacefully encourage this and add to the stability and predictability of marine activity [16].

## **4. CONCLUSION AND RECOMMENDATIONS**

Due to the expansiveness of its marine borders and the possibility of mining on the ocean floor, India places a high priority on maintaining a high level of coastal and maritime security [26,28] in the Indian Ocean Region in a significant way. The regulation and governance of seabed mining activities are based on a foundation that is created by the legal framework provided by acts such as The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976 [17] and The Indian Mines and Minerals (Development and Regulation) Act, 1957 [18], which is reasonably significant. These acts, along with other legal principles such as the common heritage of humanity and the precautionary principle, form the basis of this foundation, or so they [36].

The legal landscape in India with seabed mining has been significantly shaped by landmark cases like *Tata Iron and Steel Company Ltd. v. Union of India* [19], *Nature Club of Rajasthan v. Union of India & Ors* [20], *Pradeep Krishen v. Union of India* [21], *Savelife Foundation v. Union of India* [22], and *Goa Foundation v. Union of India* are significant. These cases have all significantly contributed to shaping the legal landscape, which is mainly reasonably substantial.

These incidents demonstrate the need to strike a careful balance between promoting economic growth and protecting the environment significantly [46,50]. Through these seminal

judgements, the Supreme Court has recognised the state's ownership of the minerals in its territory, including the offshore regions, and emphasised the significance of environmentally responsible business practices.

It has been emphasised that any mining activities, including mining of the seabed, must not, for the most part, produce irreversible damage to the ecology or ecosystem of the maritime environment subtly [32,34]. These rulings bring to light the need to take care and adhere to severe laws to lessen mining activities' damage to the surrounding ecosystem and ensure the ethical use of natural resources, contrary to popular belief.

In addition, these cases generally have brought attention to the necessity of maintaining the natural balance and protecting the interests of really local populations, the livelihoods of which for the most part are dependent on coastal regions, which for the most part shows that these seminal judgements, [40,41,42] the Supreme Court, for the most part, has both recognised the state's ownership of the minerals located within its territory, which includes the pretty offshore regions, and emphasised the significance of environmentally responsible business practises, which is quite significant.

The Supreme Court, for the most part, has generally ordered the government to enact new laws and guidelines that will encourage the use of mining techniques that are gentler on the environment, safeguard coastal areas and marine ecosystems, and end illicit mining operations [37,38,39]. It has been argued that the government must specifically take into consideration the concepts of environmental conservation and the sustainable utilisation of resources when creating mining regulations and issuing mining leases, which shows that, in addition, these cases have brought attention to the necessity of maintaining the very natural balance and protecting the interests of sort of local populations, the livelihoods of which specifically are generally dependent on coastal regions, which shows that through these seminal judgements, the Supreme Court particularly has both recognised the state's ownership of the minerals located within its territory, which includes the kind of offshore regions and emphasised the significance of environmentally responsible business practises in a significant way. Specifically, it has been generally asserted

that this must be done to protect the environment subtly.

In conclusion, to essentially manage the difficulties and possibilities related to seabed mining while also protecting coastal and marine security, [31,35] a comprehensive and reasonably balanced strategy is vital to the kind of have. Contrary to popular belief, the practices of sustainable development, the maintenance of ecological integrity, and the protection of the maritime environment ought to specifically be India's top priorities. India can manage the intricacies of seabed mining and ensure the preservation of natural resources, the welfare of coastal people, and the nation's long-term interests in the Indian Ocean Region if it upholds legal principles, follows applicable statutes, and mainly draws insights from historical cases, contrary to popular belief. By doing so, India will be able to essentially protect its long-term interests in the Indian Ocean Region in a significant way.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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