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The Geopolitical and Environmental Risks of Deep-Sea Mining in the Indian Ocean

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Deep-sea mining (DSM) is a novel way of extracting minerals from the bottom of the ocean, with commercial mining expected to begin soon. Currently, only exploratory licences have been granted. However, this emerging method of mineral extraction is already making waves. DSM is believed to pose geopolitical and environment risks to the Indian Ocean's fragile marine ecosystem and resource-dependent coastal communities, with potential consequences for fisheries and biodiversity. The practice could risk depleting fish stocks and exacerbating illegal, unreported, and unregulated (IUU) fishing in the Indian Ocean. As nations from the Indian Ocean and beyond compete for critical minerals, which are essential components in modern technologies and renewable energy, geopolitical tensions could potentially rise and complicate regional cooperation under frameworks like IORA and BIMSTEC. Given the accelerating push for commercial DSM operations and an uncertain regulatory framework under the International Seabed Authority, this policy brief examines the geopolitical and climate implications of DSM with a focus on global trends and developments in the Indian Ocean, with an emphasis on India and Sri Lanka. To address these challenges, the paper recommends developing comprehensive national DSM regulations with environmental safeguards and adopting regional best practices to minimise ecological harm.

Introduction

Deep-sea mining (DSM) refers to the extraction of valuable minerals and metals from the seabed. This method of mineral extraction is rapidly transitioning from concept to practice. In 2001, the International Seabed Authority (ISA) issued the first 15-year exploration licences for undersea minerals in areas beyond national jurisdiction, which laid the groundwork for industry development.¹

This initial phase saw substantial engagement from both private companies and state-backed entities, with major participation from Japan, China, France, Germany, Russia, India, and South Korea. While full-scale commercial operations have yet to commence, growing commercial interest and technological advancements over the past two decades indicate that DSM is on the verge of becoming a reality.²

¹ [Exploration Contracts](#), International Seabed Authority, Kingston, Jamaica, 2025

² *Ibid.*

This emerging industry has the potential to reshape the global geopolitical landscape by opening up new sources of critical materials such as cobalt, nickel, and rare earth elements, which are all essential for the green energy transition and advanced technologies. According to a World Bank projection, the extraction of critical minerals is projected to increase fivefold by 2050 to meet the demand for clean energy technologies.³

However, as states and corporations scramble to access these untapped resources on the ocean floor, new geopolitical and climate challenges could surface, including disputes over maritime boundaries, increased competition for control of resource-rich seabeds, and the potential environmental implications of DSM. This new dynamic could heighten tensions in regions like the Indian Ocean, where there are potentially sizeable deposits.⁴ This policy brief will begin with recent developments in deep-sea mining, before turning to the Indian Ocean context with a focus on India and Sri Lanka. It will then examine the climate and environmental debates surrounding DSM and conclude with recommendations for the path forward.

Deep-Sea Mining: The Status Quo

DSM is a practice of extracting valuable mineral deposits from potato-sized nodules located on the ocean floor, typically at depths exceeding 200 metres below sea level.

The most economically viable nodules lie in the north-central Pacific Ocean, the Peru Basin in the southeastern Pacific Ocean, and the centre of the northern Indian Ocean.⁵

They contain a wealth of critical minerals, such as cobalt, copper, and nickel, which are essential components in green technologies including electric vehicles, solar panels, and wind turbines. However, the regulatory framework surrounding DSM remains a focal point of intense international debate.

The United Nations Convention on the Law of the Sea (UNCLOS) mandates that states regulate DSM within their national jurisdiction. However, over 50 per cent of the ocean floor lies beyond the jurisdiction of individual states and falls under the purview of international governance.⁶ In these areas, activities such as deep-sea prospecting (searching for minerals), exploration (evaluating mineral deposits), and exploitation (extracting and delivering minerals) are regulated by the International Seabed Authority (ISA), an entity established by UNCLOS. Despite its mandate, the ISA's Mining Code, the regulatory framework governing DSM, remains incomplete.⁷ While regulations for exploration have been finalised, exploitation rules are still under review.

The ISA was established by UNCLOS to manage mineral-related activities in international waters while ensuring the protection of the marine environment.⁸ Since 2016, discussions on a legal framework for DSM have intensified, gaining further urgency following the triggering of the 'two-year rule' by Nauru in 2021,⁹ which

3 Hund, K., et al. (2023). [Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition](#), Washington, D.C.: World Bank Group.

4 For example, in the Central Indian Ocean Basin, approximately 380 million tonnes of dry nodules are estimated to be present, containing substantial amounts of nickel, copper, and cobalt. Vadakkepuliymbatta, S., Roy, P., Ingole, B. S., Raju, K. K., Kurian, P. J., & Meloth, T. (2024). [Potential of Deep-Sea Mineral Resources for the Blue Economy](#). *Current Science*, 126(2), 192.

5 Ibid.

6 Petersen, S., Krättschell, A., Augustin, N., Jamieson, J., Hein, J. R., & Hannington, M. D. (2016). [News from the seabed—Geological characteristics and resource potential of deep-sea mineral resources](#). *Marine Policy*, 70, 175-187.

7 [The Mining Code](#). International Seabed Authority. (2024, June 25).

8 [About ISA](#), International Seabed Authority, Kingston, Jamaica, 2025.

9 The two-year rule is a legal mechanism under the Agreement relating to the Implementation of Part XI of the UNCLOS (Section 1, Paragraph 15). It allows any State Party and Member of the ISA intending to apply for a seabed mineral exploitation contract to formally request the legislative organ of the ISA (the Council) to finalise and adopt the necessary rules and regulations for exploitation activities. Once such a request is submitted, the Council is required to complete this process within two years of the notification.

necessitated the ISA to finalise regulations governing the industry within two years.¹⁰ At the 30th ISA session in July 2025, the ISA Council completed the second reading of the revised consolidated text on the draft regulations for exploitation.¹¹ There has been limited progress, but the views on the text remain heavily divergent.¹² Key regulatory bottlenecks include defining permissible levels of environmental harm, establishing test mining requirements, and setting standards for environmental impact monitoring.¹³ The ISA Secretariat will prepare a revised consolidated text to serve as the basis for further negotiations.¹⁴

The debate over DSM has become a growing source of geopolitical tension. States remain deeply divided. One group, including China and Russia, supports the finalisation of deep-sea mining regulations, arguing that further delays create legal and commercial uncertainty given rapid industry developments.¹⁵ Another group of states, including Brazil, France, Canada, and New Zealand, call for a precautionary pause, a moratorium, or a total ban due to limited scientific understanding of the environmental

risks.¹⁶ Prominent multinational corporations, including Google and Samsung,¹⁷ as well as the European Commission,¹⁸ also endorsed a moratorium.

The ISA, while operating on a consensus-driven model, has the unenviable task of finalising the deep-sea mining code within a tight timeline while managing divisions among its member states. This conundrum raises a critical question: whether the global community will prioritise the energy transition and economic gains, or safeguard the fragile ecosystems of the deep sea in the long run. These two objectives do not need to be mutually exclusive. The solution involves a carefully balanced approach that combines strict environmental regulations and technological innovations to minimise ecological harm. Achieving this balance will require immense discussion and consensus-building at the international level.

Another challenge to the ISA process comes from outside its framework. While the United States is not a member of the ISA, a 2025 executive order issued under the Trump administration directed executive agencies to pursue the exploration and potential exploitation of deep-sea resources both

10 [Letter dated 25 June 2021 from the President of the Republic of Nauru addressed to the President of the Council of the International Seabed Authority](#), International Seabed Authority, ISBA/26/C/38 (1 July 2021).

11 [ISA Council to Engage in Intersessional Work on Deep Sea Mining Code](#), International Institute for Sustainable Development (IISD), 30 July 2025.

12 [Draft regulations on exploitation of Mineral resources in the Area – Revised Consolidated Text](#). Thirtieth session, Council session, part I Kingston, 17-28 March 2025. ISBA/30/C/CRP.1.

13 Pickens, C., Lily, H., Harrould-Kolieb, E., Blanchard, C., & Chakraborty, A. (2024). [From what-if to what-now: Status of the deep-sea mining regulations and underlying drivers for outstanding issues](#). *Marine Policy*, 105967.

14 *Ibid.*

15 Sabillo, K. 'UN meeting closes with no moratorium on deep-sea mining; groups lament,' Mongabay, 1 August, 2025.

16 As of August 2024, countries calling for a precautionary pause include Austria, Brazil, Costa Rica, Chile, Kingdom of Denmark, Dominican Republic, Ecuador, Federated States of Micronesia, Fiji, Finland, Germany, Greece, Guatemala, Honduras, Ireland, Malta, Monaco, Palau, Panama, Portugal, Spain, Samoa, Sweden, Tuvalu, and Vanuatu. Countries calling for a moratorium include Canada, Mexico, New Zealand, Peru, Switzerland, and the United Kingdom. France advocates for a total ban on DSM. Please see Singh, P. A., Jaeckel, A., & Ardron, J. A. (2025). [A Pause or Moratorium for Deep Seabed Mining in the Area? The Legal Basis, Potential Pathways, and Possible Policy Implications](#). *Ocean Development & International Law*, 56(1), 18–44.

17 [Google, BMW, AB Volvo, Samsung back environmental call for pause on deep-sea mining](#), Reuters, 31 March, 2021.

18 [NGOs' Concerns Regarding References to Deep Sea Mining in Mario Draghi's Report: The Future of European Competitiveness](#), European Commission, Ref. Ares(2024)7163492 - 09/10/2024.

within the US Exclusive Economic Zone and in areas beyond national jurisdiction.¹⁹ Following the order, Canadian firm The Metals Company (TMC) announced that it had applied for a licence to mine the deep seabed under a US-issued permit.²⁰ If approved, TMC would become the first company to obtain a licence to exploit minerals in international waters. This development has raised concerns within the ISA and was a central topic of discussion at its 30th session, as it opens the question of whether a country that has not ratified UNCLOS and therefore not a party to the ISA can legitimately issue exploitation permits for activities in areas beyond national jurisdiction.²¹ This highlights growing uncertainties in the global governance of DSM and the challenges posed by unilateral actions outside the ISA framework.

Importantly, the urgency surrounding critical minerals is amplified by fast-depleting reserves and escalating global demands.²² Two primary factors underpin this rush: (1) the transition to clean and renewable energy and (2) the growing consumption of high-technology products that rely heavily on these minerals, including electric vehicles and smartphones. These minerals hold immense strategic value for all nations that can secure them. While deep-sea mining is not limited to the Indian Ocean, competition in the region is intense, driven by a growing interest to access critical mineral resources and rivalries over control of strategically important trade routes and

maritime areas. Key players include extra-regional actors such as China and South Korea, alongside India as the dominant regional power. Conflicting interests around resource access, commercial profit, and regulation are shaping this emerging industry, which highlights the need for strong governance and international cooperation to address its wide-ranging impacts.

Deep-Sea Mining in the Indian Ocean

As of July 2025, the ISA has entered into 15-year contracts for the exploration for polymetallic nodules (PMN), polymetallic sulphides (PMS) and cobalt-rich ferromanganese crusts (CFC)²³ in the deep seabed with 22 contractors globally, most notably the following in the Indian Ocean (see Table 1 on the next page).

India's Race for Deep-Sea Minerals

India has a short-term target of elevating its non-fossil energy capacity to 500 gigawatts by 2030, and meeting 50 per cent of its energy requirements from renewable energy by the same year.²⁴ The long-term goal is to achieve net zero emissions by 2070.²⁵ To meet the country's energy targets, India is naturally looking to the deep seabed as one of several potential sources for securing critical minerals.

19 [Unleashing America's Offshore Critical Minerals and Resources](#), Exec. Order No. 14285, 90 FR 17735 (2025).

20 Alberts, E. C. 'The Metals Company applied to the U.S. for a deep-sea mining license,' Mongabay, 30 April, 2025.

21 [Statement on the US Executive Order: 'Unleashing America's Offshore Critical Minerals and Resources'](#), International Seabed Authority, Kingston, Jamaica, 30 April 2025.

22 Hund, K., et al. (2023). [Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition](#), Washington, D.C.: World Bank Group.

23 Three kinds of deep-sea minerals are considered to have commercial exploitation potential: PMN, PMS, and CFC. PMNs are iron and manganese-rich concretions found on deep-sea sediments at depths of 4,000–6,000 metres. PMS are layered manganese and iron oxides with associated metals found on hard rock substrates along mid-ocean ridges and volcanic arcs at depths of 1,000–4,000 metres. CFCs are concentrated deposits of sulphidic minerals formed by hydrothermal activity, located on seamount slopes and top surfaces at depths of 800–2,500 metres. Please see Zhang, Q., Chen, X., Luan, L., Sha, F., & Liu, X. (2024). [Technology and equipment of deep-sea mining: State of the art and perspectives](#). *Earth Energy Science*, 1(1), 65-84.

24 [National Statement by Prime Minister Shri Narendra Modi at COP26 Summit in Glasgow](#), 2021. Ministry of External Affairs, Government of India.

25 *Ibid.*

Table 1: Exploration Contracts issued by the International Seabed Authority²⁶

	CONTRACTS		
	Contractor	Polymetallic nodules (PMN)	Polymetallic sulphides (PMS)
South Korea	Government of the Republic of Korea		1 Contract Central Indian Ocean
China	China Ocean Mineral Resources Research and Development Association (COMRA)		1 Contract Southwest Indian Ridge
India	Government of India	1 Contract Central Indian Ocean	1 Contract Indian Ocean Ridge
Germany	Federal Institute for Geosciences and Natural Resources of Germany		1 Contract Central and Southwest Indian Ridge

Currently, the production of critical minerals on land is controlled by a number of mineral-rich nations, with Australia being a major lithium provider, Chile a top copper producer, and China a dominant supplier of graphite and rare earth elements.²⁷ As a leader in processing technologies and expertise, China’s dominance in the global critical mineral supply chain has raised geopolitical concerns, especially among policymakers in New Delhi.

A case in point would be the 2024 US-India Memorandum of Understanding on Critical Minerals: a bilateral document with the aim of fostering greater resilience in the critical minerals sector by identifying equipment, policies, and best practices for the development of the industry.²⁸ The resource-abundant sea floor presents India with a crucial opportunity to strengthen resource resilience and reduce its dependency on foreign suppliers. This need to achieve energy self-sufficiency explains India’s quest for undersea resources.

India currently possesses two deep-sea exploration licences in the Central Indian Ocean, one for PMN and one for PMS.²⁹ In January 2024, India submitted two additional applications to the ISA for approval of two exploration plans for PMS and CFC in different areas of the Indian Ocean.³⁰ In October 2024, the National Institute of Ocean Technology (NIOT) conducted exploratory mining trials for polymetallic nodules in the Andaman Sea.³¹ Prior to the trials, the location was surveyed by the Geological Survey of India (GSI). A subsequent trial in the Andaman Sea was planned for 2025.³² For years, the GSI has explored India’s Exclusive Economic Zone (EEZ) in the Andaman Sea and Arabian Sea for PMN, with more surveys to follow.³³ India’s Deep Ocean Mission, at an estimated cost of US\$ 466 million for a period of five years, also lists the development of DSM technologies

26 [Exploration Contracts](#), International Seabed Authority, Kingston, Jamaica, 2025.

27 International Energy Agency (2024), [Global Critical Minerals Outlook 2024](#), International Energy Agency, Paris, France.

28 Secretary Raimondo and Minister Goyal Convene 6th US-India Commercial Dialogue Meeting, 3 October 2024, The United States Department of Commerce.

29 [Exploration Contracts](#), International Seabed Authority, Kingston, Jamaica, 2025.

30 [The Government of India submits two applications for approval of plans of work for seabed exploration in the Indian Ocean](#), International Seabed Authority, Kingston, Jamaica, 18 January 2024.

31 Shankar, P., 2024. [‘India advances deep-sea mining technology in the Andaman Sea.’](#) Mongabay, 21 November.

32 Shankar, P., 2024. [‘India advances deep-sea mining technology in the Andaman Sea.’](#) Mongabay, 21 November.

33 [Ongoing Surveys by GSI in Andaman Sea and Lakshadweep](#), 15 March 2023, Press Information Bureau.

as a key priority.³⁴ India is taking clear steps to harness and develop its deep-sea mineral resources.

In addition to energy self-sufficiency, India's DSM efforts are equally driven by geopolitical considerations. With the Indian Ocean becoming a key arena for India-China competition, both nations are vying for maritime influence. China has been expanding its deep-sea mining ambitions, securing multiple exploration contracts in the Indian Ocean with the ISA.³⁵ Beijing's survey ships and oceanographic missions in the Indian Ocean have also raised concerns in Delhi.³⁶ These efforts are widely interpreted as part of China's broader strategy to maintain dominance over future supply chains of critical minerals.³⁷ The competition has led to what some describe as a brewing 'Cobalt War', where resource ambitions fuel geopolitical rivalries.³⁸ Securing mining rights not only offers economic benefits but also strengthens India's strategic position in the region, helping counterbalance China's extensive investments in the Indo-Pacific. Sri Lanka's position, as outlined below, reflects this evolving landscape.

Sri Lanka's Continental Shelf Submission

Located at the crossroads of key trade routes, Sri Lanka holds a pivotal position in maritime affairs in the Indian Ocean. The recent discovery of the cobalt-rich Afanasy Nikitin Seamount has added another dimension to the already complex geopolitics of the Indian Ocean. This

undersea mountain is situated in the Central Indian Ocean, 1,050 km south of Sri Lanka and 1,350 km from the Indian coast. In January 2024, India approached the ISA for a plan to explore CFC in the Afanasy Nikitin Seamount. However, while assessing India's application, the ISA noted that the area was entirely within Sri Lanka's claim before the Commission on the Limits of the Continental Shelf (CLCS), pending final recommendations. As a result, India's exploration plan was put on hold until all processes relating to the delineation of the continental shelf have been resolved.³⁹

Generally speaking, a country's continental shelf extends up to 200 nautical miles (or 370 km) from its shore, carving out an exclusive economic zone which only the country in question can exploit for economic purposes.⁴⁰ In 2009, Sri Lanka applied for an extension of the limits of its continental shelf from 200 nautical miles to a much larger area.⁴¹ If accepted, the Afanasy Nikitin Seamount would fall within Sri Lanka's nautical boundaries. Initially in 2010, India responded to this claim before the CLCS without objection.⁴² However, in 2022, India changed its position and requested the CLCS not to 'consider and qualify' Sri Lanka's submission on the grounds that the claim would prejudice the rights of India over the parts of the continental shelf.⁴³

This move by New Delhi was believed to be motivated by heightened Chinese activities in the Indian Ocean and New Delhi's concerns over Chinese research ships near Sri Lankan shores.⁴⁴

34 [Deep Ocean Mission](#), Ministry of Earth Sciences, Government of India.

35 [Exploration Contracts](#), International Seabed Authority, Kingston, Jamaica, 2025.

36 Zhao, Z., 2024. 'China's scientific sea voyages might rile India, but will they lead to clash?', [South China Morning Post](#), 15 August.; Panneerselvam, P., 2022. [China's Emerging Subsurface Presence in the Indian Ocean](#), [The Diplomat](#), 3 December.

37 Kratz, A., Piper, L. & Bouchaud, J. (2025). [China and the Future of Global Supply Chains](#). Rhodium Group, United States.

38 Sharma, R. (22 June 2024). ['Cobalt War' Erupts in Indian Ocean; India Challenges China-Backed Sri Lanka For Mining Rights in IOR](#), [The EurAsian Times](#).

39 [Application for approval of a plan of work for exploration for cobalt rich-ferromanganese crusts submitted by the Earth System Science Organization-Ministry of Earth Sciences of the Government of India](#), International Seabed Authority, ISBA/29/C/19 (12 July 2024).

40 [Part V – Exclusive Economic Zone](#), Article 56. Law of the Sea. United Nations.

41 [Continental Shelf Submission of Sri Lanka](#), Democratic Socialist Republic of Sri Lanka, SRL-DOC-001_08-05-2009.

42 [No. NY/PM/161/2/2010](#), Permanent Mission of India to the United Nations.

43 [No.55/DPR/PMI/NY-2022](#), Permanent Mission of India to the United Nations.

44 Kuttappan, R. (19 June 2024). ['China fears spark Indian race for cobalt in contested ocean waters'](#), [Al Jazeera](#).

In January 2025, Colombo lifted a year-long moratorium on foreign research vessels docking at its ports, following sustained discussions with India during high-level meetings.⁴⁵ Chinese vessels, often classified as dual-use platforms with civilian and military functions, have raised security concerns in India due to their potential surveillance capabilities.⁴⁶ DSM ambitions have brought the competing interests of two major powers into focus. Sri Lanka's policy choices are set to play a crucial role in shaping the regional balance of power.

Deep-Sea Mining at the Crossroads of Climate Action and Conservation

With exploratory missions expanding worldwide, environmental concerns relating to DSM are at an all-time high. More than 900 marine scientists and policy experts from over 70 countries have recommended a pause on DSM until sufficient and robust scientific information becomes available, stressing that the practice could risk creating irreversible ecological harm to the planet's ocean.⁴⁷ At least 32 countries have announced their support for a moratorium, a precautionary pause, or a ban on DSM.⁴⁸ The High Seas Treaty, set to take effect in January 2026, will pave the way for international waters to be placed into marine protected areas and catalyse resistance to deep-sea mining.⁴⁹

A major argument is that deep-sea ecosystems are already under pressure from human activities like climate change, bottom trawling, and pollution. DSM would potentially further disrupt the fragile ecosystems, causing irreparable damage to biodiversity and ecosystem functions for generations.

Specific concerns include habitat destruction, biodiversity loss, sediment plumes affecting marine ecosystems, toxin release, noise pollution and potential disruption of carbon sequestration dynamics and deep-ocean carbon storage.⁵⁰ Importantly, limited scientific knowledge of deep-sea ecosystems makes it difficult to assess the full risks of DSM. For example, the 2024 discovery of dark oxygen (generation of oxygen without the process of photosynthesis) produced at the PMN-covered abyssal seafloor in the Pacific Ocean, albeit debated, shows how much remains unknown about the ocean.⁵¹

Although DSM is touted as a solution to accelerate the clean energy transition by supplying critical minerals for renewable technologies, this emerging practice also raises serious climate concerns with potentially far-reaching consequences. The extraction process itself is highly energy-intensive, involving heavy machinery and surface vessels operating around the clock. If powered by fossil fuels, these operations could contribute to greenhouse gas emissions, defeating the very climate challenges that the industry sets out to address.⁵² Additionally, the production and transportation of mined materials over long distances would further increase the carbon footprint of DSM activities.⁵³ The noise, light, and chemical pollution generated by mining may also disrupt deep-sea ecosystems that play a role in regulating the Earth's climate system.⁵⁴

45 Siow, M. (8 January 2025). [‘With eyes on China and India, Sri Lanka lifts ban on foreign research vessels’](#), South China Morning Post.

46 Behera, A. D. (8 January 2025). [‘Sri Lanka’s Dilemmas Over Chinese “Research” Vessels’](#), The Diplomat.

47 [Marine Expert Statement Calling for a Pause to Deep-Sea Mining](#), 2025.

48 [Momentum for a Moratorium](#), Deep Sea Conservation Coalition, Amsterdam, Netherlands, 2025.

49 Bryan, K. (21 September 2025). [High Seas treaty looms over deep-ocean mining plans](#), The Financial Times.

50 [Marine Expert Statement Calling for a Pause to Deep-Sea Mining](#), 2025.

51 Sweetman, A.K., Smith, A.J., de Jonge, D.S.W. et al. (2024). [Evidence of dark oxygen production at the abyssal seafloor](#). *Nature Geoscience*, 17, 737–739.

52 Heinrich, L., Singh, P., Stegen, K. S., & Markus, T. (2024). [Mind the gap and close it: Regulating greenhouse gas emissions from deep-sea mining in the Area](#). *Marine Policy*, 160, 105929.

53 Heinrich, L., Koschinsky, A., Markus, T., & Singh, P. (2020). [Quantifying the fuel consumption, greenhouse gas emissions and air pollution of a potential commercial manganese nodule mining operation](#). *Marine Policy*, 114, 103678.

54 Williams, R., Erbe, C., Duncan, A., Nielsen, K., Washburn, T., & Smith, C. (2022). [Noise from deep-sea mining may span vast ocean areas](#). *Science*, 377(6602), 157–158.

These cascading risks highlight the paradox of DSM: while pursued in the name of advancing green technologies, it could inadvertently exacerbate climate change if not properly regulated or aligned with broader climate goals.

As for the Indian Ocean, one primary concern is that the disruption of ecosystems supporting local fish populations could lead to severe consequences to the livelihoods of the coastal communities reliant on fishing. Mining activities in the deep seabed may potentially trigger cascading effects on fish stocks, which in turn could drive fishing fleets into new or restricted areas and aggravate the risk of illegal, unreported and unregulated (IUU) fishing. A recent study has shown that as warming oceans alter the tuna's range, tropical tuna fishing grounds in the Pacific would increasingly overlap with areas licensed for mineral exploration.⁵⁵ Researchers suggest that this could result in heightened conflict between the fisheries sector and the DSM industry if more tuna catches occur on mining grounds. The Global Tuna Alliance partners, which account for more than a third of global tuna sales and represent major supermarket chains, have put forward a recommendation to halt DSM until its potential impacts on marine resources and those dependent on them are thoroughly understood.⁵⁶ While relevant research for the Indian Ocean is scant, it is increasingly clear that the environmental risks associated with DSM cannot be ignored, given that the region accounts for nearly one-fifth of global tuna production.⁵⁷

For coastal communities in the Indian Ocean, the decline in fish stocks would directly undermine food security and economic stability.

Small-scale fishers, who already face challenges from IUU fishing and climate change, would see their livelihoods further endangered. Reduced fish availability could push some fishers towards IUU fishing practices to sustain their income, exacerbating existing governance challenges in the region.

Moreover, the recent diplomatic tensions between India and Bangladesh over hilsa exports have demonstrated how fish supplies can become a geopolitical flashpoint, particularly when tied to cultural and economic interests.⁵⁸ In September 2024, Bangladesh's interim government imposed an export ban on hilsa, targeting shipments to India in the run-up to the Durga Puja festival in October, citing a leaner harvest in 2024. Although the decision was reversed within weeks, the short-lived ban marked a departure from former Prime Minister Sheikh Hasina's long standing practice of using hilsa as a gesture of goodwill and friendship between Dhaka and New Delhi.

Another example is the long-standing fishing conflict between India and Sri Lanka, driven by Indian trawlers crossing into Sri Lankan waters, particularly in Palk Bay and Gulf of Mannar. Despite maritime boundary agreements and repeated diplomatic engagements, the dispute, rooted in competing interests and historical claims, remains unresolved and continues to strain bilateral relations.⁵⁹

It is clear that fisheries management can become entangled with broader diplomatic relations, and with DSM posing additional risks to fisheries, such disputes are likely to become more frequent and complex. Given the critical role of fisheries in regional economies and diplomacy, any disruptions from DSM must be carefully managed to prevent further economic hardship for fishers and unintended diplomatic consequences.

55 Amon, D.J., Palacios-Abrantes, J., Drazen, J.C. et al. (2023). [Climate change to drive increasing overlap between Pacific tuna fisheries and emerging deep-sea mining industry](#). *npj Ocean Sustainability* 2, 9.

56 [Seafood Market Statement Supporting a Pause on Deep-Sea Mining](#), 30 May 2023.

57 Amon, D.J., Palacios-Abrantes, J., Drazen, J.C. et al. (2023). [Climate change to drive increasing overlap between Pacific tuna fisheries and emerging deep-sea mining industry](#). *npj Ocean Sustainability* 2, 9.

58 Lodhi, A. (1 October 2024). [Fishy diplomacy: What a hilsa ban reveals about India-Bangladesh tensions](#), Al Jazeera.

59 See for example, The Hindu (11 February 2025). [Troubled waters: On India, Sri Lanka and the fisheries dispute](#), The Hindu.

Challenges to Regional Maritime Cooperation

In the past decade, the Indian Ocean has seen new momentum to strengthen regional maritime cooperation. Various regional organisations and multilateral initiatives have emerged to address shared challenges such as maritime security, environmental protection, sustainable fisheries management, and disaster response. The Indian Ocean Rim Association (IORA) has played a pivotal role in fostering dialogue and collaboration among member states.⁶⁰ IORA's Climate Change Strategic Agenda and Illegal, Unreported and Unregulated (IUU) Fishing Guidelines exemplify the growing regional consensus on addressing key maritime issues.⁶¹

Subregional initiatives, such as the initiatives by the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), have further contributed by focusing on specific issues like maritime law enforcement and environmental protection, including the proposed regional frameworks on Humanitarian Assistance and Disaster Relief (HADR) in the maritime domain, conduct of maritime law enforcement agencies during interactions at sea, as well as coordinated marine oil spill responses.⁶² The BIMSTEC-India Marine Research Network (BIMReN), a joint initiative by the Ministry of External Affairs of India (MEA) and the regional fisheries advisory body Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), was launched in 2024 to facilitate sustainable development of blue economy by networking marine researchers and research institutions in BIMSTEC countries.⁶³ These efforts underscore the shared commitment of Indian

Ocean littoral states to strengthen maritime security and marine scientific cooperation.

DSM in the Indian Ocean, as illustrated by Sri Lanka's continental shelf submission, could reignite maritime boundary discussions among littoral states, potentially placing these issues back at the forefront and challenging regional cooperation efforts. As mining operations grow, traditional fishing grounds may be restricted or disrupted, forcing fishers to venture into contested waters where they are more likely to be intercepted by maritime law enforcement agencies, leading to the risk of clashes. The 2024 dispute over Katchatheevu, an island between Sri Lanka and India, highlights ongoing maritime boundary tensions and raises concerns about fishing rights in the surrounding waters.⁶⁴ While increased regional cooperation under IORA and BIMSTEC is a positive development, Indian Ocean littoral states need to carefully navigate the complexities introduced by DSM to prevent potential border frictions that could upset regional stability.

Recommendations

Given that DSM is progressing rapidly despite resistance from scientific communities and certain countries, Indian Ocean littoral states need to acknowledge the importance of minimising environmental harm to safeguard marine biodiversity and ensure long-term regional prosperity. Current DSM ambitions have brought into focus the inherent tension between economic development and environmental sustainability. As countries in the region seek to harness deep-sea resources, balancing ecological preservation as well as geopolitical considerations will be essential. While India's efforts to promote responsible practices during exploratory mining trials are a positive step,⁶⁵ ongoing global discussions show the need for a cautious and well-regulated approach.

60 Ogotu, M. (2021). [The Indian Ocean Rim Association: Lessons from this Regional Cooperation Model](#). *South African Journal of International Affairs*, 28(1), 71-92.

61 [3rd Workshop on Developing IORA Guidelines to Combat Illegal, Unreported, and Unregulated \(IUU\) Fishing](#), IORA, Mauritius, 2025.

62 [3rd Meeting of the BIMSTEC Expert Group on Maritime Security Cooperation](#), BIMSTEC, Dhaka, Bangladesh, 2024.

63 [BIMReN](#), The Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), 2024.

64 Henry, N. (2 April 2024). ['Katchatheevu: Tiny Sri Lankan island sparks political row in India'](#), BBC.

65 Shankar, P., 2024. ['India advances deep-sea mining technology in the Andaman Sea'](#), Mongabay, 21 November.

1. Strengthening Domestic Regulations and Environmental Safeguards for Responsible Deep-Sea Mining

In conjunction with the development of the ISA Mining Code, a top priority for countries seeking to engage in DSM operations would be to **develop robust domestic regulatory frameworks to manage the adverse effects of the practice.** Multiple states, including China, Germany, Japan, Nauru, Singapore and the United Kingdom have introduced specific legislation dedicated to DSM in international seabeds.⁶⁶ However, regulatory approaches vary, and gaps remain, particularly in regions where DSM is an emerging concern. For example, among Indian Ocean littoral states, domestic legislative frameworks remain largely underdeveloped, with little to no provisions addressing the environmental consequences of seabed mining.⁶⁷ Critical aspects such as environmental impact assessments (EIA), monitoring requirements, and mechanisms to mitigate ecological harm are either absent or insufficiently defined. At the ISA level, key regulatory bottlenecks include the permissible level of environmental harm, test mining requirements, and environmental impact monitoring.⁶⁸ Given these uncertainties, it is imperative that countries implement stringent environmental safeguards and demand rigorous EIAs before granting approval for mining activities. A responsible and science-driven approach will be essential to balancing economic interests with the need to protect marine biodiversity.

2. Advancing Regional Governance and Scientific Cooperation for Sustainable Deep-Sea Mining

While national regulatory frameworks for DSM should be tailored to each country's specific needs and priorities, a coordinated regional approach to environmental governance is essential to prevent loopholes that could lead to the unsustainable exploitation of marine resources. Regional organisations such as the IORA and BIMSTEC can play a crucial role in fostering collaboration and promoting transparency, with a focus on the exchange of scientific data related to DSM activities. **Establishing a voluntary regional platform for information-sharing on deep-sea ecosystems, mining activities, and environmental impacts** would enable states to make informed policy decisions. This mechanism could support joint EIAs and strengthen monitoring efforts, contributing to the development of regional best practices. Given the limited scientific understanding of fish stocks in the Indian Ocean, **a regional fish stock assessment would be an important step forward**, particularly given the transboundary nature of many commercially significant species. Additionally, **regional environmental management plans and monitoring mechanisms** could complement the efforts of the ISA, ensuring greater accountability and minimising cross-border disputes. Enhancing transparency in DSM operations through regional cooperation would not only foster trust among stakeholders but also help Indian Ocean nations balance economic opportunities with long-term environmental stewardship.

66 Willaert, K. (2020). [Crafting the perfect deep sea mining legislation: A patchwork of national laws.](#) *Marine Policy*, 119, 104055.

67 See for example, Shushmita Ahmed, ['Deep Seabed Mining \(DSM\) in Bangladesh and the Bay of Bengal: Challenges and Opportunities'](#), BCOLP Blog, April 2023.

68 Pickens, C., Lily, H., Harrould-Kolieb, E., Blanchard, C., & Chakraborty, A. (2024). [From what-if to what-now: Status of the deep-sea mining regulations and underlying drivers for outstanding issues.](#) *Marine Policy*, 105967.

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