

Deep-Sea Mining

The environmental implications of deep-sea mining need to be comprehensively assessed.

The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment with a mandate to keep the environment under review.¹

1. Deep-sea mining (DSM) is a proposed commercial industry that includes the exploitation (mining) of mineral deposits and metals from the deep-seabed. The process starts with prospecting and exploration and ends with the refining of ores, which is proposed to be undertaken on land. There are three types of deep-sea mineral deposits of commercial value between <400m and 6.5km:

- a. **Polymetallic nodules:** underwater (abyssal) plains with nickel, manganese, copper and cobalt and rare earth elements (REE considered sub products) at depths of between 3 and 6.5km;
- b. **Polymetallic sulphides:** may be located in the vicinity of vents at depths of between 1 and 4 km and with concentrations of copper, lead and zinc as well as gold and silver; and
- c. **Cobalt rich ferromanganese crusts:** between <400m and 3.5km on seabed also with nickel, copper and cobalt and REE and other rare metals.

¹This Issues Note provides a review of the latest literature on specific topics that are of relevance to UNEP's mandate as outlined in "The future we want: outcome of the Conference on Sustainable Development, Rio de Janeiro, Brazil, 20-22 June 2012; paragraph 88". It also presents a set of agreed approaches and recommendations regarding UNEP's communication of the subject matter.

2. Proponents of deep-sea mining are advocating that DSM is needed to meet the expected increased demand for critical minerals and metals to support low and zero carbon initiatives, as well as to address the environmental and social impacts and potential supply disruption vulnerabilities associated with terrestrial mining (International Energy Agency [IEA] 2022). Proponents and researchers suggest ores in the deep-seabed have higher concentrations of minerals and metals (Hein *et al* 2013; Katona *et al* 2023) and may require less significant technological innovations to achieve efficiency, specifically for the extraction of polymetallic nodules (Hein *et al* 2020). Under some scenarios, DSM is considered to have less impact on the environment and human health compared with traditional mining practices.² These assertions have not yet been confirmed with scientific evidence.

3. Significant concerns have been raised by all sectors including governments and researchers about the potential environmental impacts. In addition, questions have been raised regarding whether or not demand will indeed rise to such levels that warrants the use of DSM, and whether resources can be supplied through more efficient processing and refining of terrestrial deposits, recycling and circularity efforts.³

4. Much of the deep-seabed is unexplored (Van Dover *et al* 2018) with only an estimated 24.9 per cent having been mapped.⁴ What is known suggests its ecosystems are unique, fragile and diverse, hence there could be many potential environmental impacts of DSM on these ecosystems. Globally, these ecosystems are also considered crucial to ocean and carbon cycling and likely vulnerable to the effects of climate change (Levin *et al* 2020). There are no known commercial operations currently in place (International Seabed Authority [ISA] 2021), hence, potential changes in the environment can only be predicted from impacts observed due to exploration, trawling and infrastructure associated with oil and gas activities.

5. There are calls from civil society, business, governments⁵ and IGOs (International Union for Conservation of Nature [IUCN] 2021) for a pause on DSM applications / approvals by governments and the International Seabed Authority (ISA) as well as calls for a moratorium on deep-sea mining. A broad range of private sector organizations have joined a [public statement](#) supporting a moratorium and committed not to use metals produced from deep-sea mining until the “environmental, social and economic risks of deep-seabed mining are comprehensively investigated”. DSM was also considered by the Convention on Migratory Species that decided at its recent COP14 to “Urge Parties not to engage in, or support, deep-seabed mineral exploitation activities until sufficient and robust scientific information has been obtained to ensure that deep-seabed mineral exploitation activities do not cause harmful effects to migratory species, their prey and their ecosystems”.⁶

6. In areas beyond National Jurisdiction, the UN Convention on the Law of the Sea (UNCLOS) and the 1994 Agreement mandate the ISA to manage all mineral-resources-related activities in the ‘Area’⁷ for the benefit of humankind while ensuring the effective protection of the marine environment from harmful effects that may arise from deep-seabed-related activities, fostering marine scientific research in the ‘Area’, and promoting technology transfer to developing countries. Accordingly, ISA⁸ has been coordinating the process of developing regulations on the exploitation of the deep-seabed since 2014.

² Concerns about land-based mining include the mining of lower quality ores; increasing energy needs and waste; exposure to climate events that are greater when mining is in areas where there is pressure on water resources (particularly in copper and lithium mines which are water heavy processes) (IEA 2022). Other issues are the risks of disruption to supply chains, such as increases in floods, trade restrictions and conflict due to the extraction and processing of minerals and metals being concentrated in a few countries (e.g. China, Democratic Republic of the Congo, South Africa, Australia), factors which increase supply vulnerabilities and resource availability concerns. Illegal activities have also been raised as an issue (United Nations Office on Drugs and Crime [UNODC] 2023).

³ Deep-Sea Mining: assessing evidence on future needs and environmental impacts, European Academies’ Science Advisory Council, https://easac.eu/fileadmin/user_upload/EASAC_Deep_Sea_Mining_Web_publication_.pdf.

⁴ Seabed 2030, <https://seabed2030.org/our-mission/>.

⁵ <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2023/06/seabed-mining-moratorium-is-legally-required-by-un-treaty-legal-experts-find>.

⁶ Deep-Sea Mining, UNEP/CMS/COP14/CRP27.2.4/Rev.1, Retrieved from <https://www.cms.int/en/document/deep-sea-mining-1>.

⁷ ISA primary function is to regulate exploration for and exploitation of deep-seabed minerals found in the ‘Area’, which is defined by the Convention as the seabed and subsoil beyond the limits of national jurisdiction, that is, beyond the outer limits of the continental shelf. The ‘Area’ comprises just over 50 per cent of the entire seabed on Earth.

⁸ In July 2023, the International Seabed Authority Council continued discussion on the development of the exploitation regulations (ISA 2023). The Council agreed to set a deadline for finalization of negotiations and adoption of the regulations to 2025, whilst acknowledging that any application for exploitation which may be submitted before these regulations are adopted would be considered as per the provisions of UNCLOS and subsequent 1994 Agreement.

7. A new agreement under the UNCLOS on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement) was adopted on 19 June 2023.⁹

UNEA6 acknowledged the adoption of this Agreement and requested the Executive Director to, within UNEP's mandate, provide assistance to Division for Ocean Affairs and Law of the Sea (DOALOS), as the interim secretariat of the BBNJ to promote better understanding of the BBNJ Agreement.¹⁰

8. Locations not in the 'Area' are those maritime zones where states have national jurisdiction, including exclusive rights over natural resources. This includes exclusive economic zones or 'EEZ' - areas of the ocean extending up to 200 nautical miles from a nation's baselines. Some nations are now considering DSM in these zones. For example, Norway has announced the review of environmental, social and economic impacts to establish the feasibility of exploiting minerals resources in the deep sea in its national waters while protecting the ocean environment.¹¹

9. The environmental, social and economic impacts of exploiting the deep-seabed are uncertain and potentially grave.

Any decision on whether and how the deep-seabed may be exploited must be based on a detailed assessment of all available scientific evidence and take into account the precautionary principle. On this basis, and with the view to keeping the environment under review, UNEP recommends:

- a. A review of the status of DSM activities including country initiatives in EEZ and the 'Area', availability of baseline data and EEZ associated legislation and proposed approaches for terrestrial processing of DSM minerals and metals.
- b. A comprehensive analysis is undertaken of existing marine-related environmental and social data and research, in concert with relevant UN agencies, Multilateral Environmental Agreements (MEAs), Member States and relevant stakeholders, to inform future environmental impact assessment processes addressing the potential exploitation of the deep-seabed. This comprehensive analysis would address the potential impacts of DSM on marine and terrestrial ecosystems and the delineation of marine protected areas.¹²
- c. A common reporting framework for valuation of ecosystems across EEZ and the 'Area'.
- d. That enhanced policy and technical support be provided to the increased uptake of resource and materials efficiency from current terrestrial mines, circular use of minerals, more responsible mining practices and consumption choice. All of which are to drive innovation and the use of technologies to access metals and minerals from legacy contaminated areas, tailings dumps and dams to meet demand, as envisaged in the UN Secretary General's Initiative on critical energy transition minerals.

⁹ United Nations Convention on the Law of the Sea, Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, retrieved from <https://www.un.org/depts/los/bbnj.htm>.

¹⁰ Strengthening ocean efforts to tackle climate change, marine biodiversity loss and pollution, UNEP/EA.6/RES.15, Paragraph 3(g), retrieved from <https://undocs.org/UNEP/EA.6/L.18>.

¹¹ The Norwegian Ministry of Energy is required to carry out an Environmental Impact Assessment (EIA) as per the Norwegian Seabed Minerals Act. A national programme for EIA was developed in 2021 and aims to identify potential impacts on the environment and considerations of commercial, economic and social impacts. A number of baseline reports have been published by the Norwegian Government covering environmental conditions in the broad area under consideration for seabed mining, as per the Environmental impact assessment, Norwegian Offshore Directorate, Retrieved from <https://www.sodir.no/en/facts/seabed-minerals/environmental-impact-assessment/>

¹² Such an analysis may include consideration of the following: i) impacts on deep sea ecosystems; ii) existing data on the impacts of exploration and trawling and assessment of gaps in baseline data; iii) standardizing and innovating methodologies for deep-sea biodiversity assessment, including taxonomic identification and description in the Area; iv) Facilitating technology development that is sensitive to marine ecosystems impacts for activities in the 'Area', including ocean observation and monitoring; v) promoting dissemination, exchange and sharing of marine environmental scientific data and deep-sea research outputs and increasing deep-sea literacy; vi) strengthening deep-sea environmental science capacity, in particular developing states; vii) the potential impacts of DSM across the lifecycle specifically addressing the potential impacts of terrestrial components giving consideration to energy, water, health and biodiversity impacts; viii) comparative assessments of the environmental impacts of terrestrial mining which include environmental, economic, social and public health issues; ix) the status of / and opportunities for technologies for achieving circularity in the minerals value chain; x) the impacts on all developing economies and trade and a just transition to low or no carbon economy; xi) the delineation of marine protected areas as outlined in the recently agreed BBNJ Treaty; xii) human and environmental rights implications of DSM; and xiii) the development of clear environmental impact assessment processes including identification of areas of critical and ecosystem importance, and processes and technologies that minimize impacts across the lifecycle.

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