Untapped Marine Minerals and Ocean Governance Frameworks - Bangladesh Perspectives

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Introduction

Marine-based mineral resources, also known as seabed minerals, encompass a significant part of the non-living resources of the Blue Economy sectors. These mineral resources have been categorized as evaporite deposits, placer deposits, aggregates, phosphorite, hydrothermal deposits (polymetallic sulphides), polymetallic nodules, and cobalt-rich ferromanganese crusts, which generally, occur in the near shore, offshore, and deep sea. These minerals are used as the raw materials in Blue Industries for producing a wide variety of products and commodities. UN General Assembly Resolution 66/288: 'The Future We Want' adopted in 2012 explicitly points out that according to the national priorities, all countries have the sovereign right to develop their mineral resources. Several countries around the world have granted permits for the exploration and exploitation of seabed mineral resources within their Territorial Sea (TS), Exclusive Economic Zone (EEZ), Continental Shelf and at High Sea in accordance with UNCLOS regulations administered by the International Seabed Authority (ISA). However, seabed mineral extraction will unquestionably be disruptive for subsistence and commercial fisheries, biological resources, carbon budgeting, and marine tourism. Hence, civil society organizations around the world have expressed opposition to the exploration and exploitation of seabed mineral resources before thoroughly assessing and understanding the environmental and social impacts. Moreover, the European Parliament adopted a resolution on international ocean governance in 2018 that calls on European states to support a moratorium on Deep-Sea Mining (DSM) until a substantial improvement in our scientific knowledge of deep-sea marine ecosystems, including avoidance and mitigation of adverse impacts. The EU is also urging its member states to suspend sponsoring for exploration and exploitation of seabed mineral resources in international waters. In a recent report,

the World Bank noted that nations with the potential for seabed minerals have no practical experience in developing and managing large-scale terrestrial mining, let alone exploration and exploitation of seabed mineral resources. In these circumstances, a sound cautionary approach is needed to be followed by all countries to avoid or minimize damage to the ocean environment, to the blue economy and to the people as a whole.

Types of Marine Mineral Resources

The types of marine mineral deposits that occur in the nearshore, offshore, and deep-sea are divided into five main categories: nearshore minerals (placer deposits and evaporite deposits), cobalt-rich ferromanganese crusts, polymetallic sulphides (hydrothermal deposits), polymetallic manganese nodules, and phosphorites (Figure 1).

- Nearshore minerals include mainly placers, which are heavy minerals concentrated by moving water at the continental margin and generally deposited less than 200 m in water depth. Critical minerals in placers include titanium, platinum, and rare earth elements.
- Cobalt-rich ferromanganese crusts generally occur at the sides and summit of seamounts and are layered, typically less than 25 cm thick, cobalt-rich encrustations formed at a water depth of 600 to 7,000 m. Ferromanganese crusts most extensively occurred in the central and western Pacific, with a growth rate of 1-4 mm/Ma. Critical minerals in ferromanganese crusts include manganese, cobalt, rare earth elements, possibly tellurium, scandium and platinum.

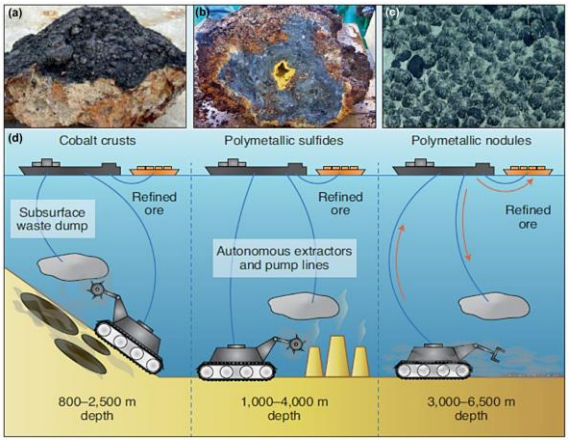

Figure 1: Examples of the primary marine minerals resources (**a**: Cobal crusts; **b**: Polymetallic sulphides; **c**: Polymetallic nodules), places of occurrence, and schematic mode of extraction (**d**).

- Polymetallic seafloor massive sulphides, also known as hydrothermal deposits, are formed from hot waters emanating from undersea volcanoes and mid-ocean ridges (through fractured Earth's crust) at water depths ranging from 100 to 7,000 m. Polymetallic sulphides most extensively occurred along active tectonic plate boundaries with an approximate growth rate of 2 cm/day. Critical minerals in polymetallic sulphides include antimony, gallium, tellurium, and germanium.
- Polymetallic manganese nodules found on or near the top of the abyssal plains soft sediments at a water depth of 4,000 to 7,000 m are rounded manganese concretions and about the size of a potato. Manganese nodules are observed in all ocean basins, most extensively abundant in the central Pacific, with an approximate growth rate of 2-10 mm/Ma. Critical minerals in polymetallic manganese nodules include cobalt,

manganese, rare earth elements, titanium, tellurium, and lithium.

- Phosphorites generally occur along continental shelves and slopes, at a water depth of less than 1,000 m, and is a sedimentary rocks containing a high proportion of calcium phosphate. Phosphorites observed in Atlantic and Pacific continental margins and seamounts. Critical minerals in phosphorites include rare earth elements and possibly uranium.

Ocean Governance Framework for Seabed Minerals Mining

Ocean governance includes three elements: sectors, scales, and frameworks. The element 'Sector' implies all living and living resources of the ocean, which are popularly known as Blue Economy Sectors (eg, Bangladesh has identified 26 sectors in its national blue economy strategy). The element 'Scale' implies the level of seabed mining operation, cooperation, and integration ranging from international to regional to national levels. The element 'Framework' implies legal policy, institutional operation, political and diplomatic interaction, and integration. The Ocean Governance Framework (OGF) is concerned with the ocean's various elements, including space, actors, resources, and activities. Various blue economy sectors are included in the ocean space where seabed mineral resources are premiers. The OGF needs to interlink the exploration and exploitation of seabed mineral resources with other blue economy sectors under legal and institutional frameworks from the global to regional to national levels. The OGF involved not only the government but also the private sectors, scientific communities as well as civil society. The Legislative and Regulatory Framework for exploration and exploitation of seabed mineral resources in the ocean lists key international law responsibilities that a state is subject to abide by. Some of the key international law responsibilities are as follows:

- General responsibility to protect and preserve the marine environment (UNCLOS Articles 192 and 194(5))
- General obligation to prevent, reduce and control pollution from exploration and exploitation of seabed mineral resources (UNCLOS Articles 194, 208, 209, 211)
- General duty to prevent any form of transboundary damage or destruction (UNCLOS Article 194)
- General responsibility to conserve marine biodiversity (Convention on Biological Diversity (CBD) Article 3)
- General obligation to employ and monitor best environmental practice in action (ISA Mining Code and ITLOS Advisory Opinion)
- Conduct prior environmental impact assessment related to seabed mining (UNCLOS Article 204, 206; CBD; Noumea Convention Article 16)
- Sustainable blue economic development and integrated management of marine mineral resources (UNCLOS Preamble; and the Pacific Plan)
- A general principle of 'Polluter Pays' needs to be abided by (London Protocol, Article 3(2); Rio Declaration)

- General agreement to international and regional cooperation in monitoring, processing, capacity building, and marine research (UNCLOS Articles 276 and 277; and the Pacific Plan)

Under best practice OGF, states have the right to explore and exploit seabed mineral resources in their Territorial Sea (TS), Exclusive Economic Zone (EEZ), Continental Shelf, and International Seabed Area. The seabed mining activities may be carried out by a state itself or state enterprises or natural or juridical persons under the sponsorship of the state/states. Irrespective of the state, enterprise, private entity, or juridical person, eight good ocean governance elements should be adopted in the exploration and exploitation of seabed mineral resources which are, equity and inclusiveness, responsiveness and coherence, the rule of law, participatory, transparency, accountability, and consensus-based decision-making.

Marine Minerals in Bangladesh Perspective

Bangladesh may have potential marine minerals in the Bay of Bengal to supply its strategic needs, but these marine minerals are currently virtually unexplored and untapped. Only placer minerals have been identified and studied in the coastal beaches and islands among the five varieties of marine mineral resources. The other four varieties of marine minerals are entirely unexplored. Based on the geology, geodynamics, climate and sediment source, it is likely that cobalt-rich ferromanganese crusts and polymetallic manganese nodules may be found in the Bangladesh part of the Bay of Bengal. Therefore, in this stage, Bangladesh should focus on data collection, compilation, and assessment for the potential of seabed mineralization in the offshore and deep-sea areas in cooperation with international organizations for future exploration and sustainable mining of seabed minerals, which needs the advanced techniques, technical know-how, and knowledge. An extensive offshore seabed survey is essential to understand the possible occurrence of all sorts of minerals, especially within Bangladesh's Territorial Sea (TS), and Exclusive Economic Zone (EEZ). In this connection, the government should form a separate division under the Ministry of Power, Energy & Mineral Resources (MPEMR), which will strive to locate, identify, map, and critically explore the potential marine mineral resources in the Bay of Bengal. Finally, Bangladesh also needs to develop a standard OGF by considering the international and regional legislative and regulatory framework for seabed minerals' exploration and sustainable mining.

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