

## Deep Sea Metals and its Mining

### Why in news?

Recently International Sea Bed authority elected new chief and held discussion on international moratorium on extraction of deep sea metals until clear research on their impacts.

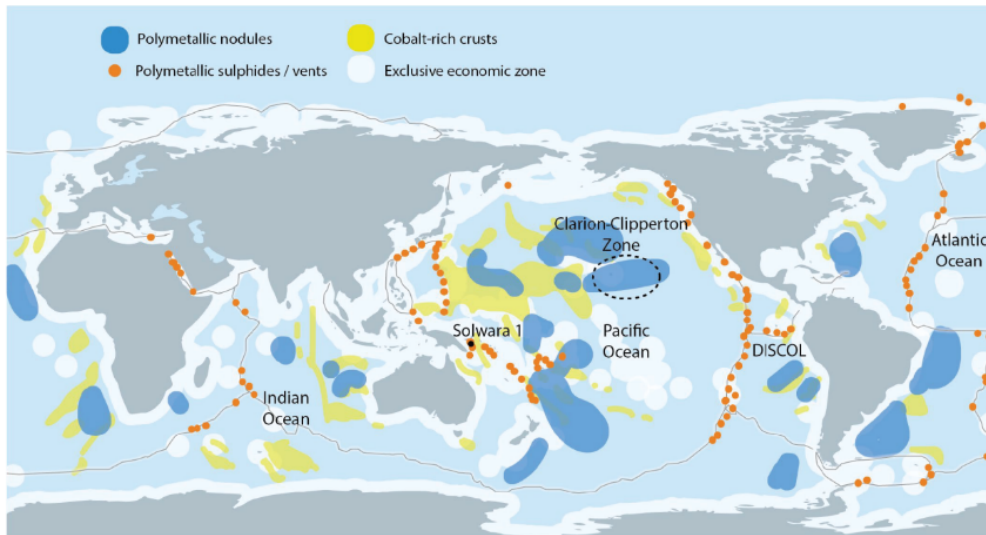
### What are deep sea metals?

- It refers to the metallic and non-metallic ores present in Deep sea ocean floor.
- **Occurrences** - Deep sea minerals are *found at high seas* that accounts for *more than 50% of the world's oceans*.
- They occur in different forms in different parts of the ocean.

*The high seas are defined by international law as all parts of the ocean that aren't included in the exclusive economic zone, the territorial sea, or the internal waters of a country, or in the archipelagic waters of an archipelagic country.*

- **Polymetallic nodules** - These are potato-sized lumps formed over millions of years from sediment deposits and are composed mainly of manganese, cobalt, copper and nickel .
- They are found at depths of 4-6 km in all major oceans.
  - **Example** - [Clarion-Clipperton Zone](#) between Hawaii and Mexico holds vast amounts of manganese nodules.
- India is trying to explore [Carlsberg Ridge & Afanasy-Nikitin Seamount](#) for polymetallic nodules.
- **Polymetallic sulfides** - It contains large amounts of copper, zinc, lead, iron, silver and gold.
- **Cobalt-rich crusts** - CRCs form on sediment-free rock surfaces around oceanic seamounts, ocean plateaus, and other elevated features.

## Distribution of critical mineral resources in the deep sea



### How deep sea mining are regulated?

- Common rights - Deep Sea mineral areas in High Seas are classified as the “common heritage of mankind”.
- Raw materials found here belong to everyone, not one particular country.

#### Deep Sea Mining

- Deep sea mining includes three stages.
- **Prospecting** - Searching for minerals and estimating their size, shape and value.
- **Exploration** - Analysing the resources, testing potential recovery and potential economic/environmental extraction impacts.
- **Exploitation** - Recovering of these resources.
- **Countries opposing the mining** - Germany, Brazil and the Pacific island nation of Palau
- **Countries supporting the mining** - China, Norway, Japan and the microstate Nauru in the Central Pacific.

To know more about deep sea mining, click [here](#).

- Responsible authority - Potential mining activities in these regions are the responsibility of the [International Seabed Authority](#) (ISA), as outlined in the United Nations Convention on the Law of the Sea (UNCLOS).
- The ISA has *so far issued 31 licenses for exploration and no licenses for extraction yet*.

### What are the impacts of deep sea mining?

- **Benthic disturbance** - Removing parts of the sea floor disturbs the habitat of benthic organisms.

**Benthic Organisms** include animals that live on the sea floor are called *benthos*. Most of these animals lack a backbone and are called *invertebrates*. Eg. sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crab.

- **Reduce dissolved oxygen** - Recent study showed that the minerals present in manganese nodules are able to produce oxygen
- **Affect deep sea biodiversity** - It might affect more than 5,000 different species present in the region.
- *Species that have adapted to live in extreme conditions* like food scarcity, absence of sunlight and high water pressure become highly vulnerable.
- These creatures are affected by the mining robots.
- **Pollutes the region** - It can create *light and noise pollution* at deep seas and the possible leaks and spills of fuels and other chemicals used in the mining process can cause *chemical pollution*.
- **Toxicity of sediment plumes** - Once valuable materials are extracted, slurry sediment plumes are sometimes pumped back into the sea.
- It may *transport metal complexes* trapped in the sediments (e.g., copper, cadmium) that can be released to the water column in concentrations *toxic to marine biota*.
- **Impact fishing activity** - Areas above the mining areas could be permanently disrupted.
- **Ecosystem damage** - It could permanently damage fragile marine systems.

### What lies ahead?

- Comprehensive studies are needed to improve our understanding of deep-sea ecosystems and the vital services.

*The United Nations Environment Programme (UNEP) emphasizes the need for a comprehensive assessment of the environmental impacts of deep-sea mining. To date, researchers have explored only around 1% of the deep sea area and its potential.*

- Understand the risks of mining comprehensively and ensure effective protection.
- Conduct transparent impact assessments based on comprehensive baseline studies.
- Incorporate circular economic principles to reuse and recycle minerals.
- Create global consensus on sharing the benefits from deep sea mineral resources.

### References

1. [Indian Express | Deep sea metals](#)
2. [IUCN | Deep sea mining](#)