

# Deep Ocean Mission

[UPSC Notes]

## What is the Deep Ocean Mission?

The deep ocean mission is an ambitious project which the government of India launched through the Ministry of Earth Sciences (MoES). The prime focus and intention behind launching the deep ocean mission are to develop the technology that can be used to harness the unexplored living and nonliving resources deep inside the ocean water bodies. This deep ocean mission primarily focuses on 6 areas which are-

1. Developing the technology for underwater robotics, manned submersibles, and deep-sea mining.
2. To develop the ocean climatic changes, advisory services
3. To improve the Technologies and include the innovations for exploring and conserving the ocean biodiversity
4. Survey and Exploration of deep ocean biodiversity
5. Explore the energy from the freshwater and the ocean water
6. Establishment of the advanced Marine station for ocean biology that will be implemented by the Ministry of earth sciences and its partner institutions

## Deep Ocean Mission

- Deep Sea Mining through 'Underwater Vehicles' and 'Underwater Robotics'
- Asserting exclusive rights to explore polymetallic nodules from seabed **over 75,000 sq km of areas in international water**
- Estimated polymetallic nodules resource potential: **380 million tonnes (MT)**

**THESE POLYMETALLIC NODULES CONTAIN**

Manganese	92.6 MT
Nickel	4.7
Copper	4.3
Cobalt	1

(\*figures are rounded off)

- Development of ocean climate change advisory services
- Technology for sustainable utilisation of marine bio-resources

- Deep ocean survey and exploration
- Energy from the ocean and offshore-based desalination
- Krill fishery from southern ocean

## Components of Deep Ocean Mission

There are six main components of the deep ocean mission. These are-

- 1. Development Of Technology For Deep Sea Mining And Manned Submersible:**
  - Having a collection of scientific sensors and tools, a manned submersible will reach the depth of 6000 m in the ocean. A small number of countries have only acquired this capability. Using the integrated mining system, the polymetallic nodules will also be mined from the depth of 6000 m in the central Indian ocean.
  - Upon developing a commercial exploitation code by the international seabed authority, a United Nations organization, the exploration studies of minerals will save the way for commercial exploitation soon.
  - This component will benefit the blue economy priority area by exploring and harnessing deep-sea minerals and energy.
- 2. Development of Ocean Climate Change Advisory Services:**
  - As a part of this proof of Concept component, the observations and a few models will be developed to know the crucial climate variables at the seasonal and decadal scales.
  - This will add an extra benefit to promoting tourism in the coastal area due to the blue economy.
- 3. Technology Innovation For Exploration And Conservation Of Deep-Sea Biodiversity:**
  - The primary focus of the portion mission will be the bioprospecting of flora and fauna in the deep sea, including the microbes, and studying how to use deep-sea mining to find the bio-resources.
  - This blue economy component will support marine fisheries and allied services.
- 4. Deep Ocean Survey And Exploration:**
  - Identifying and exploring the multi-metal hydrothermal sulfide mineralization sites near the Indian Ocean mid-oceanic ridges is the primary objective of this component.
  - Furthermore, the deep-sea exploration of ocean resources is another priority area of the blue economy.
- 5. Energy And Fresh Water From The Ocean:**
  - Given proof of Concept proposal contemplates an Offshore ocean thermal energy conservation forward desalination plant.
  - By supporting offshore energy development, this component will contribute to the blue economy priority area.
- 6. Advanced Marine Station For Ocean Biology:**
  - This component aims to develop ocean biology, Engineering capacity, and enterprise.
  - A business incubator facility will help to translate the research into industrial application and also product development.
  - In addition to supporting Marine Biology, the blue trade, and blue manufacturing, this component adds value to the blue economy initiatives.

## Importance of Deep Ocean Mission

Approximately 95% of the deep ocean drillings remain UN explored and covers 70% of the earth. Therefore the oceans are a very important part of our lives.

- Around 30% of India's population resides in the coastal areas that are surrounded by oceans from all three sides. In addition to the business of supporting fisheries and aquaculture, the tourism, blue trade and livelihood of the ocean contribute widely to the global economy as well.
- A decade devoted to Ocean science for sustainable development has been doesn't date as ocean science for sustainable development decade 2021 to 2030 by the United Nations.
- India has featured a long coastline. It also has a unique Maritime position which makes India a very unique Maritime Nation. India altogether has 9 coastlines that stretch over the area of 7517 KM and includes 1382 Islands.
- In the month of February 2019, the vision of a new India by 2030 which was released by the government of India the blue economy is listed as one of the 10 crore dimensions of growth.
- Today only five countries have the expertise and Technology which is required for such deep ocean missions. These five countries are the United States of America, France, Russia, Japan, and China. With the launch of the deep ocean mission in 2018 India has become the 6th country to step into the field of such missions.

## Deep Ocean Drilling Project

Deep Ocean Drilling Project is one of the three International scientific Ocean drilling programs that has served its operation for more than 4 decades. The Atlantic ocean has the deepest drilling of 10000 feet under the water.

## Environmental Impacts of Deep Ocean Mission

- Ocean mining which is conducted in a number of countries has been a major concern for many environmentalists. Due to the fact that this field is unexplored, it is important to predict its repercussions.
- As a consequence of mining practices and consequent oil spills in many countries, the sediment plumes may have formed and can cause serious concerns.
- As soon as the mission takes off and the research begins India seems positive about its results and research. Another important fact related to it is that since the temperature at the deep depth of the ocean is very low most of the species that can survive in extreme conditions can be discovered with the help of deep ocean missions.
- As a part of the deep ocean mission, all the activities performed are in accordance with ISA regulations and ensure that biodiversity does not get disrupted.

## India's Preparedness for Deep Ocean Mission

- There is extremely low temperature and high pressure at India's mining site which is located at the depth of 5500 meters.
- Also, the team has deployed remotely operated vehicles to the depth of 6000 m in the central Indian ocean basin and has a comprehensive understanding of the mining areas.
- Approximately 900 m have been moved by the newly developed mining machine for 6000 m depth that will be deployed at 5500 m soon.
- It is really important to keep an eye on the weather conditions as the ship availability and weather conditions also play a very important role in such missions.
- An umbilical cable or electromechanical cable and a Horse Riser system are being developed to bring the nodules to the surface.

## What are Polymetallic Nodules (PMN)?

The Polymetallic Nodules are Fe-Mn oxide deposits that are potato-shaped nodules found underwater on the sea beds. The Polymetallic Nodules are formed after the metallic components in the sea get precipitated slowly.

- PMN has also been detected in the central Pacific Ocean in addition to the central Indian ocean basin. This town is very thin on the surface and is called the Clarion Clipperton Zone.
- Poly metallic nodules are being explored by many countries like Germany, Japan, Russia, France, South Korea, and China.
- Many island countries have now started the PMN including Kiribati which is an independent country in the central Pacific Ocean.

## Deep Sea Mining

Deep sea mining is the process of retrieving minerals that are deposited on the beds of seas. Most countries are competing with each other to meet the demand for metals. Polymetallic Nodules can be mined underwater at specific locations. To gain authorization for Deep Sea Mining of PNM, the country must get it from ISA under the United Nations Convention on the Law of the Sea (UNCLOS).

- India became recognized as a "Pioneer Investor" in 1987 and was the first nation to receive this designation. It was then handed a 1.5 lakh square kilometer territory to mine PMN.  
Following a resource appraisal in 2002, ISA gave India a 75,000 square kilometer area.  
According to the Ministry of Earth Science's investigation, the following finding can be made:
  - Potential polymetallic nodules can be found – at 880 MT (approximately)
  - Magnesium – 92.59 MT (approximately)

- Cobalt – 0.55 MT (approximately)
- Nickel – 4.7 MT (approximately)
- Copper – 4.29 MT (approximately)

