

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 2287
ANSWERED ON 12/03/2026

DEEP-SEA MINING

2287. SHRI S. SELVAGANABATHY:
SHRI MILIND MURLI DEORA:

Will the Minister of **Earth Sciences** be pleased to state:

- (a) the progress achieved under the Deep Ocean Mission across exploration, technology development and capacity-building components;
- (b) the status of trials of deep-sea mining system and progress in development and international presentation of SAHAV platform for ocean governance and cooperation;
- (c) the present technology readiness level of deep-sea mining system and associated infrastructure;
- (d) whether commercial mining viability by 2026 has been assessed and scaling strategies proposed; and
- (e) if so, the details thereof, including investment requirements, partnerships and environmental safeguards?

ANSWER

THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

- (a) The Deep Ocean Mission encompasses six verticals, which are (1) Development of Technologies for Deep-sea mining, Human Submersible and underwater robotics, (2) Development of Ocean Climate Change Advisory Services, (3) Technological Innovations for exploration and conservation of deep-sea biodiversity, (4) Deep-ocean survey and exploration, (5) Energy and fresh water from the ocean, and (6) Establishment of Advanced Marine Station for Ocean Biology. The significant milestones achieved under the Deep Ocean Mission (DOM) are as follows:
 - The design and system engineering of India's flagship human submersible MATSYA-6000, capable of reaching a depth of 6000 meters with three aquanauts, has been completed. Subsystems have been realized, and the wet tests were conducted at L&T Harbour in Katupalli, near Chennai, in January-February 2025. Scientists at the National Institute of Ocean Technology (NIOT), Chennai, entrusted with the development of MATSYA-6000, have gained pilot experience with the French submersible NAUTILE in August 2025.

- The prediction of 100-year return extreme sea level along the coasts of the Indian subcontinent has been completed, and associated coastal vulnerability maps have been prepared. To strengthen ocean observation, the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, has successfully completed 11 glider missions along predetermined transects in the Arabian Sea (67°E) and the Bay of Bengal (89°E) and deployed 60 directional Wave Spectra Barometric Drifters and 92 physical and biogeochemical Argo floats in the Indian Ocean.
- Nearly 1845 deep-sea microbes have been isolated from water and sediment samples of the Indian EEZ, and rare deep-sea microbes previously not reported from the Indian Ocean have been discovered. A total of 25 seamounts (biodiversity hotspots) surveyed by the Centre for Marine Living Resources and Ecology (CMLRE), Kochi, in the Lakshadweep and Andaman and Nicobar regions, documenting 195 deep-sea species.
- Two active and two inactive hydrothermal vents have been identified on the Indian Ocean seafloor through AUV (Autonomous Underwater Vehicle) surveys by the National Centre for Polar and Ocean Research (NCPOR), Goa.
- A total of 144 collaborative research projects sanctioned under the Mission to the national government and private institutions for capacity building to complement the mission activities.

(b) and (c) The seabed mining system for exploratory mining that collects the nodules from the seabed and crushes them for further pumping has been developed and tested for mobility and system-powering at the depths of 5270m in 2021 at the Central Indian Ocean and for exploratory mining trials in 2024 at Andaman Sea sites. The SAHAV portal was launched in 2025 as a real-time digital portal facilitating access to oceanic data, promoting evidence-driven ocean governance, and for support climate forecasting, marine resource tracking, and disaster early warning.

(d) and (e) Commercial mining in international waters is as per the International Seabed Authority (ISA) Exploitation Code for polymetallic mining, which is non-existent as of date. The Exploitation Code outlines environmental norms and monitoring systems to enable sustainable nodule harvesting. The investment, platform, and system requirements are based on contemporary technology, collaborative development efforts, and known environmental compliance norms.
