

**GOVERNMENT OF INDIA
EARTH SCIENCES
LOK SABHA**

UNSTARRED QUESTION NO:2993
ANSWERED ON:29.08.2013
SEA DEVELOPMENT PROJECTS
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Will the Minister of EARTH SCIENCES be pleased to state:

- (a) the details of various Sea Development Projects being implemented in the country as on date, project-wise;
- (b) the details of funds allocated by the Government for Sea Development Projects during each of the last three years of the 12th Five Year Plan:
- (c) whether the Government proposes to increase the budgetary allocation and put more focus on Sea Development Projects during the next two years; and
- (d) if so, the details thereof?

Answer

MINISTER OF THE STATE IN THE MINISTRY OF MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES (SHRI S. JAIPAL REDDY)

- (a) Ministry of Earth Sciences (MoES) is not implementing any programme or scheme on Sea Development Projects. However, under the programme on Ocean Survey & Mineral Resources, the details of projects being implemented by MoES are furnished at Annexure-I.
- (b) The funds allocated by the Government for various projects under Ocean Survey & Mineral Resources during 2011-12, 2012-13, and 2013-14 are Rs. 52 crores, Rs 68 crores, and Rs. 70 crores respectively.
- (c) & (d) The allocations under XII Plan Outlay for the programme on Ocean Survey & Mineral Resources during 2014-15 and 2015-16 are Rs. 189.90 crores, and Rs. 144.66 crores respectively.

Annexure-I

(1) Polymetallic Nodules Programme (PMN) :

Polymetallic nodules are potato shaped Fe-Mn oxide porous, black earthy deposits, with size ranging from 2 to 10 cm in diameter occur at nearly 4 to 6 km depth in the deep oceans lying on the seabed sediment comprise besides manganese and iron, nickel, copper, cobalt, lead, molybdenum, cadmium, vanadium, titanium. India has signed a 15 year contract with International Seabed authority in 2002 and presently has 75000 sq km area in the Central Indian Ocean Basin (CIOB) for developmental activities targeted at harnessing of metals, viz. Copper, Nickel, and Cobalt. This Programme has four components, viz. Survey and Exploration, Environmental Impact Assessment (EIA) Study, Technology Development for Mining and Extractive Metallurgy.

(i) Survey & Exploration:

The surveys have been carried out beginning with a sampling interval of 100 km encompassing almost the entire Central Indian Ocean Basin (CIOB), followed by intervals of 50, 25, 12.5 km and subsequently at 6.25 km. X 6.25 km. interval in selected blocks. The resource potential of polymetallic nodules in the area has been estimated at 380.00 million tonnes on the basis of detailed surveys. Considering all the existing data, an area of ~7860 km² has been initially identified for the First Generation Mine Site, which has the best in abundance, grade and

topography and more importantly all the blocks were contiguous.

(ii) Environmental Impact Assessment (EIA) Study:

Mining of the deep-sea minerals is expected to alter the environmental conditions in the marine ecosystem. Environmental studies for mining of deep-sea polymetallic nodules were undertaken to evaluate the possible impacts of mining on deep-sea environment to fulfil one of the obligations of the country as a Pioneer Investor under the UN Law of the Sea. In order to study effects of sediment re-suspension and resettlement, monitoring of the environmental parameters were carried out by collection of samples at the test and reference areas for the benthic disturbance experiment. Results of the monitoring cruises have indicated that the benthic conditions are steadily moving towards restoration and the effect of disturbance is waning off. Further, assessment of nodule associated fauna and other environmental parameters were carried out. Studies conducted so far have resulted in understanding the baseline conditions and environmental variability of different environmental parameters associated with deep-sea minerals.

(iii) Technology Development (Mining):

Deep sea mining of polymetallic nodules from soft ocean floor at 4000 to 6000 in depth is a major technological challenge. The development of the mining system upto a water depth of 6 km has been planned by the Ministry in phases. As a first phase of development, National Institute of Ocean Technology (NIOT), an autonomous Institute under the Ministry has designed and developed a prototype shallow bed mining system capable of working upto a depth of 500 m. The system has been demonstrated successfully at a water depth of 512 meters off the Malvan coast. An artificial nodule laying system was designed, developed and successfully tested by NIOT at a water depth of 517 m.

A remotely operable submersible ROSUB-6000 was developed in joint collaboration with Experimental Design Bureau of Oceanological Engineering (EDBOE), Moscow. The ROSUB -6000 was deployed in Central Indian Ocean Basin and design depth qualification trial of ROSUB 6000 was successfully completed at a depth of 5289 m. A remotely operable in-situ soil testing equipment developed for obtaining detailed geotechnical properties of the mining area at Central Indian Ocean Basin (CIOB) and tested successfully at 5462 m water depth.

(iv) Technology Development (Extractive Metallurgy)

A demonstration pilot plant with a capacity to process 500 kg nodules per day was commissioned successfully for extracting copper, nickel and cobalt at Hindustan Zinc Limited, Udaipur. Dedicated campaigns have been carried out at the semi-continuous demonstration pilot plant to process 500 kg of polymetallic nodules per day to validate the process package developed for extraction of metal values viz. Copper, Nickel and Cobalt from nodules at Hindustan Zinc Limited (HZL), Udaipur. The pilot plant campaigns were carried out for validation of the flow sheet developed by Institute of Minerals and Materials Technology, (IMMT) Bhubaneswar.

Another pilot plant was commissioned at National Metallurgical Laboratory, Jamshedpur with processing capacity of 500 kg per day for production of ferro-silico-manganese ore from the residue obtained from the HZL plant.

(2) Comprehensive topographic survey of the Exclusive Economic Zone (EEZ) of India

The topographic survey of the Exclusive Economic Zone (EEZ) of India is primarily designed to gather accurate multibeam bathymetric information to facilitate understanding of the seabed morphological features and its geomorphological implications. Under the programme, detailed swath bathymetric surveys of about 7.86 lakh sq. km areas in deep water (above 500 m water depth) and about 16250 sq km areas in shallow water (below 500 m water depth) have been completed.

(3) Delineation of outer limits of continental shelf

The programme aims at gathering, analyzing and documenting the requisite scientific and technical information that would help define the outer limits of India's continental shelf beyond 200 nautical miles as per the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) and prepare the Indian claims based on scientific and technical data.

Based on extensive scientific work involving acquisition, processing, analysis and interpretation of marine geophysical data, India made its first partial submission for an extended continental shelf to the Commission on the Limits of the Continental Shelf in 2009.

(4) Gas Hydrates

Gas hydrates are naturally occurring, solid compounds containing natural gas (mainly methane) and water. The gas hydrate programme is focused on research and development for exploration of gas hydrates.

Under the programme, marine Multi-Channel Seismic (MCS) data were acquired in Krishna-Godavari (KG) and Mahanadi basins through the Marine Geology Services for the exploration of gas-hydrates. A total of 8500 line km of MCS data were collected, and the preliminary analysis exhibits wide-spread occurrences of Bottom Simulating Reflector (BSR) (main marker for gas-hydrates) in both the basins.

A Remotely Operated Submersible ROSUB-2500 and Autonomous Coring System were also developed as exploratory tools under the programme.

(5) Studies on Hydrothermal Sulphides

The project is aimed at exploration for potential sites of hydrothermal multi-metal sulphide mineralization in the Indian Ocean Ridge areas with identification of locales of hydrothermal sulphide deposition, including determination of the resource potential.

Based on the geo-scientific work including surveys conducted, India filed an application with International Seabed Authority in March 2013 for allotment of a site in south-west Indian Ocean for exclusive rights of exploration of hydrothermal sulphides.

(6) Cobalt Crust

Seamount ferromanganese crusts are known to enrich several high-value metals such as cobalt, platinum, cerium, tellurium, etc. much above their crustal abundance. The objective is to identify areas of occurrence of cobalt-enriched ferromanganese crusts, assessment of resource potential of co-rich deposits in the Afanasiy-Nikitin Seamount (ANS) region.

The first multibeam map has been generated for the Afanasiy-Nikitin Seamounts covering an area of around 40000 sq. km. Based on this map, it has been identified a plateau region in the southern part of the Afanasiy-Nikitin Seamounts. This region is at ~3200 m water depth and covers horizontal area of ~20000 sq. km. The initial reconnaissance sampling has yielded few crust samples containing up to 0.5 % cobalt as against average of 0.65 % cobalt in northern region. These results indicate moderately Co-enriched crust occurrence in the southern plateau region also.