GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
**RAJYA SABHA**
**STARRED QUESTION No. *83**
ANSWERED ON 27/07/2023

## FUNDS ALLOCATED TO OCEAN RESEARCH

***83 SHRI R. GIRIRAJAN:**

Will the Minister of **EARTH SCIENCES** be pleased to state:

(a) whether the Union Government has any plans for exploring the sea to find raw materials for medicines, if so, the details thereof;
(b) the current status of extraction of potential drugs from the ocean particularly life saving drugs, anti-cancer, anti-tuberculosis, etc;
(c) the funds allocated exclusively to ocean research at the National Institute of Ocean Technology (NIOT), Chennai in the last 3 years;
(d) the details of research undertaken by the NIOT in the last 3 years and their outcome; and
(e) the total sanctioned posts and vacancies filled up in the last 3 years?

**ANSWER**
THE MINISTER OF EARTH SCIENCES
(SHRI KIREN RIJIJU)

(a) to (e): A statement is laid on the table of the House.

**STATEMENT REFERRED TO IN REPLY TO PARTS (a) TO (e) OF RAJYA SABHA STARRED QUESTION No.*83 REGARDING 'FUNDS ALLOCATED TO OCEAN RESEARCH' FOR ANSWER ON 27/07/2023.**

(a) Yes Sir. CSIR-Central Drug Research Institute implemented a project on "Biological evaluations, discovery of novel bioactive compounds & coordination of the program - Drug from Sea" with budgetary support from Ministry of Earth Sciences (MoES). The project was completed in 2020. A total of 2654 compounds were screened for anti-cancer, anti-angiogenic, anti-inflammatory, antibacterial activities and profiled for GPCR modulation. CSIR-CDRI have initiated implementation of a project on "Centre for Marine therapeutics" with budgetary support from Department of Pharmaceuticals. National Institute of Ocean Technology (NIOT) under MoES has carried out research on growing marine microalgae and microorganisms isolated from different regions and depth of Indian seas under controlled conditions and producing functional health supplements like lutein, which prevents age related macular degeneration and phycocyanin with high antioxidant activity and capability to scavenge free radicals.

(b) The compounds screened by CSIR-CDRI were evaluated on five different cancer-type cell lines (MDA-MB231, DLD-1, FaDu, HeLa, and A549) as per standard operating protocol (SOP) and a potent Anti-cancer molecule named GS/IICT5/6 has been identified. The molecule has shown a better tumor inhibitory profile as compared to Sunitinib. A novel compound SB/CDRI4/105 that can alleviate chemotherapy-induced peripheral neuropathic pain has been discovered and the molecule is qualified for advanced stages of lead optimization. A very potent molecule SP/NISER29, having anti-cancer activity has been identified. National Institute of Ocean Technology (NIOT) has extracted recombinant anti-cancer compound, L-asparaginase from marine actinobacteria, Nocardiopsis alba and a patent has been filed.

(c) National Institute of Ocean Technology (NIOT) has been allocated funds for an amount of Rs. 757.74 crores during last 3 years (Rs. 179.69 crores during 2020-21, Rs. 377.55 crores during 2021-22 and Rs. 200.50 crores during 2022-23) under MoES for carrying out ocean research.

(d) The major aim of National Institute of Ocean technology (NIOT) is to develop reliable indigenous technology to solve the various engineering problems associated with harvesting of non-living and living resources from the ocean. NIOT has carried out work in the field of research and technology development related to energy and freshwater, deep sea technology and ocean mining, coastal protection, ocean acoustics, marine sensors and ocean electronics. The major outcome of the research undertaken by NIOT in the last 3 years is as follows:

i. NIOT's Low Temperature Thermal Desalination (LTTD) technology was used for the establishment of 1.5 lakh litres per day capacity desalination plants in Kalpeni, Kadamat and Amini islands of UT Lakshadweep. Design of 1 lakh litres per day LTTD plant powered by Ocean Thermal Energy Conversion (OTEC) at Kavaratti Island completed. The detailed design was completed towards setting up of 2 million litre per day LTTD plant at Tuticorin Thermal Power Station.

ii. Locomotion capability of the Deep-Sea Mining machine developed by NIOT at a depth of 5270 m in the Central Indian Ocean was successfully demonstrated.The first Indian manned ocean mission "Samudrayaan" was launched on 30th October 2021. A 500 m depth-rated personnel sphere for manned submersible is certified for man-rated operations. Autonomous Underwater Vehicle (AUV) rated for 6000 m depth was acquired and used for exploration at Polymetallic nodule site at CIOB.

iii. Detailed engineering design studies for coastal protection of Poonthura coast in Kerala were carried out.

iv. Shallow water (0-30 m water depth) bathymetry survey along West Bengal coast, Tamil Nadu coast and Andhra Pradesh was carried out successfully.

v. Developed a passive acoustic monitoring system for polar regions and deployed in the Arctic Ocean. An autonomous deep water noise measurement system (DANMS) developed, deployed, and operated in Arabian sea and Bay of Bengal. Deep Sea Autonomous Underwater Profiling Drifter (D-AUPD) and C-Profiler operable up to 500 m depth is developed and demonstrated in the field.

vi. NIOT maintained the Indian moored buoy network in Arabian Sea and Bay of Bengal for supporting IMD forecast activities by providing real time observations of meteorological & oceanographic parameters. NIOT operated and maintained 10 HF Radar installed along Indian coast.

vii. NIOT maintained and operated 4 research vessels (Sagar Nidhi, Sagar Manjusha, Sagar Tara & Sagar Anveshika) and cruises are carried out for technology demonstration, survey, field trials and operations in coastal waters.

viii. Lab-scale ballast water test facility was established and got NABL (National Accreditation Board for Testing and Calibration Laboratories) accreditation for testing of chemical parameters in seawater. An automatic fish feed system is developed using rigid sphere type cages and proto unit was deployed of Andaman Islands.

ix. A number of patents, peer reviewed publications and technology transfer of few indigenously developed products were carried out based on the research activities.

(e) The details on total sanctioned posts and positions filled in NIOT in the last 3 years is as follows:

| **Year** | **Sanctioned strength** | **Positions filled** |
|---|---|---|
| 2020-21 | 196 | 189 |
| 2021-22 | 195 | 188 |
| 2022-23 | 233 | 185 |

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