GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 715
TO BE ANSWERED ON WEDNESDAY, DECEMBER 20, 2017

RESEARCH IN INDIAN OCEAN

715. SHRI D.K. SURESH:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government is taking any steps to encourage scientific community to conduct research to further understand the Indian Ocean's biophysical variability in respect of monsoon and human activities;
(b) if so, the details thereof;
(c) the significant steps taken by the Government to carry out Oceanographic research in the Indian Ocean during the last five years; and
(d) the funds allocated and utilized for the research activities/studies in this regard during the above period?

ANSWER
MINISTER OF STATE FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTRY OF EARTH SCIENCES
(SHRI Y. S. CHOWDARY)

(a) Yes. Madam

(b) The ministry has been implementing projects to study various aspects of biophysical variability in the seas around India for over a decade. The Biogeochemistry is a multi-disciplinary subject that interacts with physical, chemical, biological, and geological processes and reactions that govern the composition of and changes to the natural environment. A network of National agencies viz., National Institute of Oceanography (NIO), Goa, Physical Research Laboratory (PRL), Ahmedabad, Central Marine Living Resources,(CMLRE) Kochi, Central Marine Fishery Research Institute (CMFRI). Cochin University of Science and Technology (CUSAT), Kochi, Andhra University, Goa University, Mangalore University have participated in execution of the projects. The key mission of the project is to assess the impact of natural and anthropogenic forces on the biogeochemical cycles and ecosystem dynamics of the Arabian Sea and the Bay of Bengal and study the human induced changes in climate and nutrient loading impact on the marine ecosystem and biogeochemical cycles. The various important parameters being monitored periodically

include chlorophyll, pH, dissolved, oxygen, nutrients such as dissolved nitrogen (nitrate, Nitrite), phosphorus, organic and inorganic carbon, bacteria, temperature, and salinity etc., The dissolved nutrients are the main food source for the algae (phytoplankton) which forms the primary producers in the marine food chain, influenced by the variation in physical oceanographic processes (winds, currents, waves, air-sea interaction, etc.). Excessive nutrients availability in the sea, supplied from rivers, atmospheric deposition, natural processes, etc. shall facilitate the blooming of phytoplankton, normally referred to algal blooms. The biological productivity in the surface ocean is largely controlled by the vertical movement of deep nutrient rich waters to the surface ocean, which is called upwelling. The intensity and period of upwelling largely define the environmental status and suitability in supporting the coastal fishery resources along western India. Preliminary investigations reveal that the natural oceanographic process such as seasonal upwelling occur along the southwest coast of India appear to play a major role rather human interventions on the marine environment.

(c) The significant steps taken during the last 5 years are as follows:

- The augmentation of Ocean Observation networks in the seas surrounding India includes deployment of 19 moored buoys including 7 tsunami buoys, 270 Argo Floats, 144 drifters, 31 tide gauges 10 High Frequency Radars etc., for acquisition of real-time data from the seas around India.
- An appropriate system of archival and retrieval for the various types of ocean observations has been established.
- A dedicated OCEANSAT Satellite Ground Station was commissioned at INCOIS, Hyderabad for real time direct reception of satellite data for rendering various operational Ocean Information Services.
- A unique system of Fisheries Advisories based on identification of potential fishing zones (PFZ) using remote sensing technology has been made operational by expanding it to cover Tuna fish to deep sea fishing industry. The advisories were issued daily for the entire Indian coast to 558 fishing related centers. Ocean state forecast at every six hours for sea surface temperature, currents, waves, etc. is provided daily for next 5-days. Estimated 2.75 lakh users made huge economic benefits. Implementation of Storm Surge Prediction system for the Indian coasts.
- Development of high resolution Ocean regional models with advanced ocean data assimilation system for ocean state forecasts.
- Development of state-of-the-art ocean data services for acquisition, archival and dissemination of the ocean data with linkages to many international Ocean data centers.

- **Established a biodiversity information network-Ocean Biogeographic Information System (OBIS) consisting about 1.2 lakhs marine species diversity records from the Indian Ocean region. It has been recognized as regional node of international OBIS under the Intergovernmental Oceanographic Commission.**
- **A Coral Bleaching Alert System (CABS) has been set up for providing biweekly status on 5 major coral environments of India viz., Andaman & Nicobar, Lakshadweep, Gulf of Mannar, Gulf of Kutch.**
- **A state-of-the-art Tsunami Warning System was set up, in September 2007, which has been now recognized as a Regional Tsunami Service Provider (RTSP), provided advisories at 1800 forecast points for all the Indian Ocean Rim countries.**
- **Documented centennial changes of harmful algal blooms and decadal changes in benthic biodiversity in the Arabian Sea.**
- **Establishment of Ornamental Fish culture at Agatti for economic benefit of Lakshadweep island families particularly women and children.**
- **A set of shoreline maps for the entire country has been prepared on 1;25,000 scale to identity large scale erosion and deposition occur along the coast.**
- **Monitoring of coastal water quality (25 parameters) at 22 locations along Indian coast to assess the health of coastal waters.**
- **Survey and mapping of an area of about 1.6 Million Sq Km of Exclusive Economic Zone (EEZ) using the Multi-beam bathymetric techniques and the geoscientific studies.**
- **A full-fledged hatchery unit for the breeding and rearing of ornamental fishes has been established at Agatti, Lakshadweep islands. The remotely operable submersible (ROSUB) was tested at ~5300m at the Indian mining site over the Indian Ocean which is a land mark achievement for exploitation of ocean resources.**
- **Successful demonstration of Open sea cage culture in Andhra Pradesh, Andamans and Tamil Nadu.**
- **On the request from Government of Puducherry to restore the beach, environmentally friendly shoreline stabilization methodology has been evolved and demonstrated resulting in a gain of 60m wide beach.**
- **Development of an indigenous, autonomous ocean ambient noise measuring system for operation in shallow waters off the Indian coasts.**
- **The Ocean State Forecast service has been extended for neighbouring countries, Seychelles and Sri Lanka for providing 3-day forecasts on winds, waves, currents, temperature.**

- **Launching of International Indian Ocean Expedition-2 (IIOE-2) towards promotion of ocean science in the Indian Ocean Region.**
- **Operationalization of International Training Centre for Operational Oceanography at Hyderabad.**
- **The online oil spill advisory module has been further updated to facilitate the indication of eco-sensitive zones, potential fishing zones, fishing avoidance zone during the event of oil spill.**
- **Indigenously developed 500 m depth rated shallow water/Polar Remotely Operated Vehicle (PROVe). It was successfully deployed in the Andaman coral Islands and the vehicle was successfully maneuvered in the undulating reef terrain to record high quality underwater visuals of coral reef biodiversity with spectral irradiance.**
- **Developed backward bent ducted buoy to generate power from sea waves, drifter buoy, deep ocean bottom pressure recorder, and autonomous passive acoustic monitoring system.**
- **65% of deep water topographic surveys of Exclusive Economic Zone beyond 500 m water depth were completed.**
- **Documented centennial changes of harmful algal blooms and decadal changes in benthic biodiversity in the Arabian Sea.**

(d) The funds allocated and utilizedduring the last 5 years for Ocean Research projectsare as follows (Rs. in crores):

2013-14		2014-15		2015-16		2016-17		2017-18	
Allocation	Expenditure	Allocation	Expenditure	Allocation	Expenditure	Allocation	Expenditure	Allocation	Expenditure (as on date)
426.00	287.89	375.00	260.40	300.00	277.80	355.00	297.65	320.00	180.39

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