

**GOVERNMENT OF INDIA  
EARTH SCIENCES  
LOK SABHA**

UNSTARRED QUESTION NO:3197  
ANSWERED ON:29.08.2013  
PROGRESS MADE IN EARTH SCIENCES  
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**Will the Minister of EARTH SCIENCES be pleased to state:**

- (a) the progress made in the field of earth sciences till date during the last three years;and current year;
- (b) whether the Government is satisfied with its achievements;
- (c) if not, the reasons therefor; and
- (d) the steps taken by the Government in this regard?

**Answer**

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

(a) The progress made during the last 3 years and the current year has been considerably significant under various projects of the ministry. Some of the major accomplishments are described below:

1. Observation Systems: Recognizing the importance of real-time data on meteorological and oceanographic data for various operational weather and other advisory services, the Ministry has substantially augmented the observations networks during the last 3 years. As a part of modernization meteorological Services, Atmospheric Observing Systems has been strengthened through installation of 1609 state-of-the-art systems in various parts of the country for real-time monitoring meteorological parameters which include 1055 Automatic Rain gauges and 554 Automatic weather stations in various parts of India. Ten Doppler Weather Radars have been installed in various cities viz., Delhi airport, New Delhi, Nagpur, Jaipur, Hyderabad, Lucknow, Patna, Patiala, Agartala, Mohanbari, Bhuj and Mumbai which has contributed for now casting. The augmentation of Ocean Observation Networks in the seas around India includes deployment of 16 moored buoys including 10 Tsunami buoys, 194 Argo Floats, 74 drifters, 16 wave rider buoys etc., for acquisition of real-time data from the seas around India.

2. Services: Under the Meteorological Services, a district-level agro-meteorological advisory service, providing a 5-day weather forecast for farmers, in 585 districts, has been made operational. About 3,500,000 farmers have subscribed for the information through mobile for planning their agricultural activities. A location-specific weather and air quality forecast 24 hours in advance was provided successfully for the Commonwealth Games 2010 in National Capital Region, Delhi. Under the Ocean Science and Information Services, a unique system of Fisheries Advisories based on identification of potential fishing zones (PFZ) using remote sensing technology has been made operational along with a new Tuna fishery advisory to deep sea fishing industry. A Coral Bleaching Alert System (CABS) has been set up for providing bimonthly status on 5 major coral environments of India viz., Andaman Nicobar, Lakshadweep, Gulf of Mannar, Gulf of Kutchchh. Under Disaster Mitigation Support, a state-of-the-art Tsunami Warning System was set up, in September 2007, which has been recognized as a Regional Tsunami warning centre for the Indian Ocean countries which has been recognized as a Regional Tsunami Service Provider (RTSP) for the Indian Ocean Region and started operation to the Indian Ocean Rim countries. Under the framework of Regional Integrated Multi-hazard Early warning System (RIMES), a data-sharing arrangement has been established with the nine countries to provide 24 hour accumulated rainfall forecast for 3 days. The countries include Bangladesh, Bhutan, India, Lao People's Democratic Republic, Maldives, Mongolia, Myanmar, Nepal, and Sri Lanka. The departments of irrigation, agriculture, and other primary users of weather information also have become major beneficiaries. The maps of Coastal Vulnerability Index (CVI) for the entire country were prepared.

3. Technology Development: Under the Ocean Technology & Resources, two more LTTD plants were commissioned in the islands of Lakshadweep one each at Minicoy and Agatti during March 2011 and August 2011, respectively. A full fledged hatchery unit for the breeding and rearing of ornamental fishes was established at Agatti, Lakshadweep islands. The remotely operable submersible (ROSUB) was tested at 5300 m in the Indian Ocean which is land mark achievement for exploitation of resources. A Remotely Operable Subsea In-situ Soil Tester (ROSIS) has been developed and was tested at a water depth of 5462 m in the Central Indian Ocean Basin (CIOB).

4. Scientific Research: Numerical weather prediction capability has been significantly improved from 35 km to 18 km resolution. Tropical Cyclone Tracker, which tracks and generates the cyclone positions in the forecasts (& observations), has been implemented in the Global Ensemble Forecast System (GEFS) and the T574L64. Under the Polar Science & cryosphere, the First Scientific expedition was successfully undertaken to the South Pole in November 2010. In 2010, the fish potential in the Indian EEZ was estimated using both satellite and in-situ data, which was found to be 4.32 MSY (maximum sustainable yield). India's had made claim

to the extended continental shelf, in pursuant to Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS). The monsoon mission was launched with multi-institutional and inter-agency participation to improve the monsoon prediction over the country on all time scales. A cloud aerosol interaction precipitation experiments (CAIPEX) was carried using instrumented aircraft measurements on campaign mode. Initiated investigations on Deep Borehole (~7 Km) Observatory in Koyna-Warna region for direct and continuous monitoring of intra-plate seismic zone at depth, leading to a better understanding of the mechanics of faulting, physics of reservoir triggered earthquakes as well as earthquake hazard assessment, India became a member of Arctic council for conducting scientific research. India's scientific proposal for deep sea drilling in the Arabian Sea has been recommended by Integrated Ocean Drilling Program (IODP).

5. Human Resources and Infrastructure Development: Towards human resource development, an Advanced Training School was established with self contained facilities for training and research at Pune. The second batch of 20 students was inducted in August 2011 through a national selective process. To process the huge volume of data and run the weather forecasting models, the computation facilities have been substantially augmented by commissioning of a set of 4 High Performance Computing systems in various centres of the ministry which has a total combining capacity of 170 Tflops. A dedicated centre for Climate Change Research was established at Pune to address various scientific issues relating to climate change. Setting up of National Knowledge Network (NKN) connection to all the centres of MoES was accomplished for efficient communication and data transfer useful for various information services being rendered by the ministry. The ministry signed an agreement with UNESCO for establishment of International Training Centre for Operational Oceanography at INCOIS, Hyderabad. MoES Chairs were established in academic institutions like Indian Institute of Technologies for promotion of research in various branches of earth sciences. The Third Antarctic Station "Bharati" was successfully commissioned in March 2012 for operations towards conducting front ranking research. A dedicated Oceansat Satellite Ground Station was installed at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad for real time direct reception of satellite data for various operational Ocean Information Services

(b) Yes. Madam.

(c) The progress of the ministry is satisfactory both in quantitative and qualitative terms. The performance of the ministry has been monitored objectively by the Performance Monitoring and Evaluation System (PMES) of the Cabinet Secretariat. The performance of Results -Framework Document of the ministry were 95.07% and 97.15% and 93.45% for the years 2010-11, 2011-12 and 2012-13, respectively. The efforts made by the ministry towards augmentation of observational networks and computation capability have lead to improved prediction of weather, and climate services. According to a recent survey, various services such as agromet for farmers, potential fishing zone for fisherman, ocean state forecast for shipping, aviation services, public weather services, etc., have been extremely useful and beneficial for society at large. There has been a significant growth in research publications in recognized SCI journals during the last three years.

(d) Does not arise.