GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 4385
TO BE ANSWERED ON WEDNESDAY, 20TH AUGUST, 2025

WEATHER FORECASTING DURING MONSOON

4385. DR. M K VISHNU PRASAD:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of measures taken by the Government to enhance weather forecasting and warning systems particularly during monsoon;
(b) the details of improving monsoon prediction models to be better prepared particularly in Tamil Nadu and Cuddalore district which is frequently affected by cyclone;
(c) whether any steps have been taken by the Government to upgrade the weather forecasting mechanism through acquiring or developing high technologies for forecasting during the last three years and if so, the details thereof; and
(d) whether it is a fact that there is a need to set up weather and climate forecast research institute in Cuddalore due to the fact that large number of people got affected in this district and surrounding districts during past years and if so, the details thereof?

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

(a)-(b) Since the implementation of the Multi-Model Ensemble (MME)-based forecasting strategy in 2021, the accuracy of monsoon predictions has shown marked improvement for2021–2024. For 2021-2024, the average absolute error of such forecasts has been 2.28% of the Long Period Average (LPA) compared to 7.5% in the preceding four years (2017–2020).

The advanced technology used for monsoon forecast includes the multi-model ensemble technique utilizing global climate forecast systems, including the Monsoon Mission Climate Forecast System of MoES. In addition, the recently launched Bharat Forecast System (BharatFS) has been providing forecasts at a more granular scale. It presently operates in real-time at a very high spatial resolution of 6 km compared to the previous 12 km resolution of the global forecasting system. It also hasthe capability to provide predictions of rainfall events upto 10 days, covering the short and medium range. Thus, it would help to provide monsoon rainfall forecast at the panchayat/cluster of panchayats level for the public, farmers, disaster managers and other stakeholders. All these state-of-art weather and climate models supported by various local surface and upper air based meteorological observations, radar products available from DWRs Karaikal and Chennai and satellite products which are available at 10 minute to 3-hour time-scale have been in use for providing all rainfall and cyclone severe weather warnings to the State of Tamil Nadu and Cuddalore district which is time to time affected by cyclones and heavy rainfall.

MoES institutions use the state-of-the-art dissemination system to share weather and climate information and early warnings with disaster management authorities and the general public through various platforms/channels for necessary preparedness and to support adaptation measures across the country, including coastal States. It includes social media, Common Alert Protocol, Mobile Apps, WhatsApp and APIs. As a result, the vulnerable population in rural and coastal areas gets evacuated on time to safe shelters, thereby reducing the human death toll to a bare minimum.

IMD utilizes a seamless forecasting system at the seasonal to nowcast scale and implements well-defined Standard Operating Procedures (SOPs) for monitoring & forecasting weather hazards. IMD, in coordination with other centres in the MoES, has developed an end-to-end GIS-based Decision Support System (DSS), which has been working as the front end of the early warning systems for the timely detection and monitoring of all-weather hazards across the country, including Tamil Nadu. It is supported with specific severe weather modules to provide timely impact-based early warnings for extreme weather events like cyclones, heavy rainfall, etc.

(c) The Union Cabinet approved a new mission, Mission Mausam, in 2024. Its main goal is to make Bharat a "Weather-ready and Climate-smart"nation. The Hon'ble Prime Minister launched it on 14th January 2025. Phase 1 of Mission Mausam will be implemented during 2024-26. Key objectives include:

- Developing cutting-edge weather surveillance technologies and systems
- Implementing higher-resolution atmospheric observations with improved temporal and spatial sampling and coverage
- Deploying next-generation radars, wind profilers and satellites equipped with advanced instrument payloads
- Implementing advanced high-performance computing (HPC) systems
- Enhancing our understanding of weather and climate processes and improving prediction capabilities
- Developing advanced Earth system models and data-driven methods, including the use of AI/ML
- Creating technologies for effective weather management
- Establishing a state-of-the-art Decision Support System (DSS) and dissemination system for last-mile connectivity
- Strengthening capacity building and research collaborations

(d) Climate Research Unit (CRU) at India Meteorological Department (IMD)-Pune and the local Regional Meteorological Centers (RMC)-Chennai, are catering to the weather and climate services of each district of Tamil Nadu, including Cuddalore, which is vulnerable to cyclones and heavy rainfall.

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