GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 2132
ANSWERED ON 06/08/2026

FLOOD FORECASTING IN TAMIL NADU

2132. **SHRI PRAVEEN CHAKRAVARTHY** :

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the performance of Chennai Flood Warning System (C-FLOWS) developed by NCCR during the northeast monsoons of 2023 to 2025, including verification statistics for its ward level inundation forecasts;
(b) the upgrades planned to C-FLOWS, including extension beyond the Greater Chennai Corporation area and integration of AI-based models;
(c) the accuracy of IMD's heavy and extremely heavy rainfall forecasts for the districts of Tamil Nadu during the last three years; and
(d) whether comparable urban flood warning systems are proposed for Madurai, Coimbatore, Thoothukudi and Tirunelveli, in view of recent floods in the southern districts?

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

(a) The Chennai Flood Warning System (C-FLOWS) was developed by the National Centre for Coastal Research (NCCR) in collaboration with the Greater Chennai Corporation (GCC) and handed over to the Revenue and Disaster Management Department, Government of Tamil Nadu, in 2019. The system provides ward-level inundation maps to support flood mitigation and disaster response during the northeast monsoon and other heavy rainfall events. At the request of the State Government, NCCR personnel were deployed in the State Control Room during the northeast monsoon seasons of 2023 to 2025 for operational use of C-FLOWS and integration of its outputs with the TNSMART platform for relief and mitigation activities. During this period, the system evolved from a scenario-based decision support system to a near real-time operational system, now designated as IFLOWS-Chennai, through integration with real-time weather model outputs from the India Meteorological Department (IMD) and the National Centre for Medium Range Weather Forecasting (NCMRWF). The performance of the system is reviewed by NCCR after each northeast monsoon season in consultation with the Greater Chennai Corporation. Field validations undertaken during 2023–2025 compared the forecast inundation maps with observed rainfall, reported waterlogging locations and ground observations.

(b) NCCR has proposed to expand the modelling domain of IFLOWS-Chennai from the existing Greater Chennai Corporation area to approximately 7,500 sq. km so as to include the upstream catchments contributing flood flows into Chennai. NCCR is also upgrading the existing physics-based IFLOWS-Chennai framework by integrating Artificial Intelligence (AI)-based models to improve computational efficiency and predictive capability during extreme weather events.

(c) As per IMD's operational verification for Tamil Nadu, Puducherry and Karaikal during the period 2023–2025, district-level heavy rainfall warning forecasts have generally recorded Percentage Correct (PC) values ranging from about 70% to 97%, depending upon the month and forecast lead time. The Ministry evaluates forecast performance using standard categorical verification metrics, including Percentage Correct (PC), Probability of Detection (POD), Critical Success Index (CSI), True Skill Statistic (TSS) and Heidke Skill Score (HSS), with a view to continuously improving operational forecasting systems.

(d) At present, there is no proposal for establishing dedicated urban flood warning systems for Madurai, Coimbatore, Thoothukudi or Tirunelveli. Flood forecasting in the country is primarily the mandate of the Central Water Commission (CWC). In support of this, IMD operates 25 Flood Meteorological Offices that provide daily sub-basin-wise Quantitative Precipitation Forecasts (QPFs), with a forecast lead time of up to seven days, for 220 sub-basins across the country. These forecasts serve as key meteorological inputs for the flood forecasting and warning services issued by the Central Water Commission.

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