

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 700
TO BE ANSWERED ON WEDNESDAY, 7TH FEBRUARY, 2024**

RAINFALL FORECASTING

700. SHRI VELUSAMY P.:
SHRI PARTHIBAN S.R.:

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government proposes to take efficacious measures to monitor the non-forecasted heavy rains and waterlogging and if so, the details thereof;
- (b) whether the Government proposes to strengthen the monitoring mechanisms to detect and forecast cloud bursts;
- (c) if so, whether the Government is likely to revisit the flood management policies to strengthen the skillful and precise forecasting mechanisms of rainfall in the wake of the frequent cloud bursts causing flash floods;
- (d) whether the Government proposes to take appropriate and time-bound measures for mapping the cloud burst-prone regions across the country; and
- (e) if so, the details in this regard?

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

- (a) India Meteorological Department (IMD) is continuously enhancing and upgrading the meteorological observations, communications, modeling and forecasting system. The forecasts and warnings are issued at the national, State and district levels. Most of the forecasts are remain within the forecast limit or close to the error limit. There has been about 40% improvement in forecast accuracy of severe weather events including heavy rainfall events in recent five years compared to previous years.
- (b) As cloud bursts are highly localized and are of very short duration and hence challenging to forecast. However, Ministry has taken-up various initiatives to strengthen the monitoring mechanisms for the timely detection and accurate forecast of cloud bursts. Currently, IMD utilizes Radio Detection and Ranging (RADAR) system, Automatic Rain Gauges (ARGs) for monitoring these events. These datasets will be assimilated into the IMD's High-Resolution Rapid Refresh Modeling System (IMD-HRRR) and Electric Weather Research and Forecasting (EWRf) models to better capture and forecast the cloud bursts.

- (c) IMD supports floodwarning services of Central Water Commission (CWC), Ministry of Water Resources by providing observed and forecasted rainfall. Heavy rainfall events lead to floods over different river basins of the country. In order to meet specific requirements of flood forecasting by CWC, IMD operates Flood Meteorological Offices (FMOs) and provides Quantitative Precipitation Forecast (QPF) for all river catchments.

In order to cater the services of hydro-meteorological events occurring in short duration of time, IMD is issuing Flash Flood Guidance (FFG) by which the volume of water within a watershed required to produce flooding at the outlet of the catchment is estimated. The FFG bulletin is generated on daily basis since 2020 and disseminated to the users including CWC every six hours on routine basis. The FFG is a robust system designed to provide the necessary products in real-time to support the development of warnings for flash floods about 6-24 hours in advance at the watershed level with resolution of 4 km x 4 km for the flash flood prone regions.

- (d)-(e) Cloud bursts are highly localized and are of very short duration and most of the cloud bursts occur over hilly region. Some studies which have been conducted with limited data indicate that southern rim of the Indian Himalayas especially over Uttarakhand, Himachal Pradesh and hilly areas of northeast India are prone to cloud bursts. West coast of India covering windward side of Western Ghats from Goa to Gujarat is also prone to cloud bursts. Further, the regions with height of elevation of 1000 m to 2500 m have been more vulnerable to cloud bursts.
