

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
STARRED QUESTION NO. *56
TO BE ANSWERED ON WEDNESDAY, 3RD DECEMBER, 2025**

EARLY WARNING SYSTEM FOR NATURAL DISASTER

***56. SHRI ARVIND GANPAT SAWANT:**

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether the Government has any institutional mechanism in place for forecasting major natural events such as cyclones, unseasonal rainfall, earthquakes, floods, etc., in the country and if so, the details thereof;
- (b) the steps taken by the Government to prevent loss of life and property or to minimize such losses;
- (c) whether the Government has developed early warning systems for predicting any disasters arising from such events and if so, the details thereof;
- (d) whether any steps have been taken by the Government to strengthen early warning systems in States that are regularly affected by cyclones and other natural disasters and if so, the details thereof; and
- (e) whether the Government has any data regarding the use of early warning systems and the prevention of losses caused by rainfall, earthquakes, floods, etc. during the last five 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) to (e): A Statement is laid on the Table of the House.

**STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO (a) to (e)
OF STARRED QUESTION NO. *56 REGARDING "EARLY WARNING SYSTEM FOR
NATURAL DISASTER" TO BE ANSWERED ON DECEMBER 3, 2025**

- (a) Yes Sir. The Government has established an organized institutional mechanism for observing, monitoring and forecasting major natural events such as cyclones, unseasonal rainfall, etc.. The Ministry of Earth Sciences (MoES) serves as the nodal Ministry responsible for coordinating these efforts. Under this Ministry, the India Meteorological Department (IMD), in coordination with institutions such as the Indian Institute of Tropical Meteorology (IITM), Pune, the National Centre for Medium Range Weather Forecasting (NCMRWF), Noida, and the Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, works round the clock to observe, monitor, detect and provide forecasting and warning services for major atmospheric–oceanic natural events. These include cyclones, unseasonal and heavy rainfall, thunderstorms, fog, etc.

Presently, there is no scientific technique available anywhere in the world to predict an earthquake precisely in terms of time, location and magnitude; hence, no proven system exists in the country to provide early warning of earthquakes. However, the National Centre for Seismology (NCS) under the Ministry is monitoring the earthquakes occurring in and around the country through its seismological network and provides information about the earthquake occurrence with an intensity map.

Central Water Commission (CWC) under the Ministry of Jal Shakti is mandated to issue short-range flood forecasts with a lead time of up to 24 hours to concerned State Governments at identified locations. Timely flood forecasts are being issued when a certain threshold limit is reached.

Geological Survey of India (GSI) is responsible for the operational landslide warning system. For Earthquake Monitoring and Services, National Center for Seismology (NCS) under MoES is the Nodal office.

- (b)-(c) A number of steps have been undertaken by the Government to prevent or minimise the loss of life and property from major natural events such as cyclones, unseasonal rainfall, earthquakes, etc.. For improving the detection and prediction of these events at a more granular and temporal scale, there has been a quantum jump in the weather observational and modeling systems. To provide computational support for such high-resolution models and to enable them to run regularly in real-time, the computing facilities (Arunika and Arka) have also been substantially increased to integrate voluminous data and run mesoscale, regional and global models at higher resolutions.

Recently, a new Central Sector Scheme, "Mission Mausam", was launched by the MoES to make Bharat a "Weather-ready and climate-smart" nation. IMD consistently issues timely alerts and forecasts to the public and concerned stakeholders. Various steps have been taken to ensure effective dissemination of warnings to vulnerable populations. The recently launched Bharat Forecasting System (BharatFS) has been developed primarily to improve short- and medium-range weather predictions.

India Meteorological Department (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 the States regularly affected by cyclones and other natural disasters. It is supported with specific severe weather modules to provide timely impact-based early warnings for extreme weather events like cyclones, heavy rainfall, etc., which devastate human lives, livelihoods and infrastructure. The system utilizes historical data, including extreme events, as well as real-time surface and upper-air meteorological observations available for the Indian region and its neighbouring areas. It also includes RADAR observations, available every 10 minutes, and satellite products every 15 minutes. It also uses numerical weather prediction products from a suite of models run in the MoES institutions. These include hyperlocal, regional and global models. Further, IMD plays a crucial role in safeguarding lives and property through its advanced observational network and forecasting systems, enabling timely preparedness and response in close collaboration with the National Disaster Management Authority (NDMA). The entire system is integrated with modern telecommunication technologies to ensure the timely and effective dissemination of information. This coordinated approach ensures that accurate and timely weather information reaches authorities and the public, enhancing disaster risk reduction efforts across the country.

Suitable colour code is used to highlight the impact of the severe weather expected and signal disaster management about the course of action to be taken regarding an impending severe weather event. IMDs' Impact-Based Forecasting (IBF) provides localized risk assessments for vulnerable populations in advance of extreme events, such as cyclones.

IMD has also brought out a web-based "Climate Hazard & Vulnerability Atlas of India" prepared for the thirteen most hazardous meteorological events, which cause extensive damage and economic, human and animal losses. The same can be accessed at <https://imd pune.gov.in/hazardatlas/about hazard.html>. This atlas will help State Government authorities and disaster management agencies identify the hotspots and plan and take appropriate action to tackle extreme weather events. This product helps build climate change-resilient infrastructure.

A pilot implementation of Earthquake Early Warning (EEW) has been initiated in Himachal Pradesh to provide a few seconds of alert before strong shaking is felt, which can help in the automated shutdown of critical infrastructure.

The Central Water Commission issues inflow forecasts to identified reservoirs for proper reservoir regulation. Presently, flood forecasts are issued by CWC at 350 stations as per the Standard Operating Procedure. The network has been established in consultation with the State Government/Project authorities.

- (d) Yes Sir. IMD uses various digital platforms like common alert protocol (CAP), Application Programming Interface (API), Website, Mobile Apps, social media etc. for timely sharing and dissemination of various data and warnings and bulletins across various user groups and directly to public. IMD has launched seven of its services (Current Weather, Nowcast, City Forecast, Rainfall Information, Tourism Forecast, Warnings, and Cyclone) with the 'UMANG' Mobile App for use by the public. Moreover, IMD developed a mobile App, 'MAUSAM' for weather forecasting, 'Meghdoot' for Agromet advisory dissemination, and 'Damini' for lightning alerts. A total of 9342 crore SMS have been sent since August 2021, and during the recent cyclone "MonTha", a total of 77.64 crore SMS were sent to people.

CWC is providing a Seven-day advisory flood forecast on its web portal <https://aff.indiawater.gov.in/> for the same 350 stations through rainfall-based mathematical modeling. CWC takes immense steps and adopts various dissemination mechanisms to get maximum reach to the flood warnings produced, so that mitigation measures can be adopted by State Governments, State Disaster Management Authority (SDMA), National Disaster Management Authority (NDMA), and the public.

The flood forecasts formulated by CWC are disseminated to all stakeholders through the Flood Forecasting Website (<https://ffs.indiawater.gov.in/>)/<https://aff.india-water.gov.in/>. FloodWatch India 2.0 App/E-mail/Whatsapp/Facebook(CWCOfficial.FF)/X(Twitter-CWCOfficial_FF), 'CWC Flood updates' (Youtube Channel), CAP Alert through NDMA Sachet portal. A total of 6274 CAP alerts were issued throughout the country and disseminated to stakeholders during Monsoon 2025.

For earthquakes, although prediction is not possible, the seismic monitoring network operated by NCS provides real-time data and rapid earthquake reports that support emergency response and situational awareness.

- (e) Recent improvement in the various components of the early warning system for various extreme weather events has definitely helped in reducing the loss of lives significantly. For example, around 7000 people had lost their lives in 1999 Odisha Super Cyclone, while it has been reduced to less than 100 over the entire region from impact of tropical cyclones during recent years. Accurate forecast of 1 cyclone saves around 1100 crore rupees in terms of expenditure towards payment of ex-gratia to kins of dead, cost towards evacuation, and savings to various sectors, e.g., Power, Marine, Aviation, Railways, etc. As a result of these new initiatives, the overall skill of forecasting these severe weather events has improved by 30-40% over the last 10 years, from 2014 to 2024, resulting in a significant reduction in lives lost over the years.
