

PARLIAMENT QUESTION: INDIGENIOUS WARNING SYSTEMS

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National Centre for Seismology (NCS) is actively involved in the monitoring of earthquakes occurring across the country on a 24x7 basis through its National Seismological Network (NSN), comprising 174 seismological observatories as on date spread throughout the country.

The alerting method is generally based on detection of the initial non-damaging primary waves (P-waves) at sensors placed in the source region, enabling issuance of an alert on occurrence of a damaging earthquake, providing a few seconds lead time ahead of arrival of stronger ground shaking at targeted sites depending upon distance from the earthquake source. The fund allocated for NCS are being used to develop an EEW system in the pilot phase.

Cloudbursts are highly localized, short-duration extreme rainfall events influenced by complex interactions of atmospheric conditions and local topography, particularly in mountainous regions such as the Himalayas. Owing to their localized nature and limited observational data, no conclusive study has been conducted by the India Meteorological Department (IMD) under the Ministry of Earth Sciences to establish the reasons behind any perceived increase in cloudburst incidents in Himachal Pradesh. However, IMD monitors and provides impact-based early warning services for various meteorological disaster events at different temporal and spatial scales to support disaster risk reduction management. The forecasts and warnings are shared through multiple communication channels for use by disaster management authorities, state governments, district administrations, and other stakeholders, including the Ministry of Home Affairs, National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMAs), Deputy Commissioners/District Magistrates, Central Government Departments and Ministries and the media to support preparedness and response measures.

Various modernizations projects have been implemented, and currently Mission Mausam is underway for improving weather forecast accuracy and to strengthen disaster preparedness across the country, including the Himalayan States. Currently, IMD has a network of 50 DWRs (including operated by ISRO and IITM) all over India to aid its forecasting activities. There are 1008 Automatic Weather Stations (AWSs) and 6,885 Rain Gauge Stations under district-wise and block-wise rainfall monitoring systems across the country. Apart from the augmentation of the observational network, advancement in numerical modelling capability and early warning systems have improved significantly during the recent decade.

IMD has developed and operationalized several specialized weather forecasting and monitoring modules which are also being utilized for strengthening the weather forecast services of mountainous states. The details are as follows:

- i. A suite of Numerical Weather Prediction (NWP) models like Global Forecast System (GFS), Bharat Forecast System (BFS), Weather Research and Forecasting(WRF), High-Resolution Rapid Refresh (HRRR), Electric Weather Research and Forecasting (EWRF), Experimental AI models, Multi-Model Ensemble(MME) etc., are being run to provide specialized Severe Weather Warning Products for precipitation, thunderstorm & lightning, wind gust, Heat/Cold wave, Fog and other hazardous weather events for the entire country, which are also extensively utilized for mountainous states.
- ii. Further, a Centrally Sponsored Initiative titled Mitigation Project of Lightning Safety (MPLS) has been launched as a pilot project by the National Disaster Management Authority (NDMA), with IMD as the technical partner. The MPLS is currently under implementation and comprises the following components:
 1. Community-Based Risk Assessment and Strengthening of Lightning Early Warning System (LEWS);
 2. Awareness, Education, Training and Capacity Building;
 3. Preparedness and Mitigation;
 4. Research and Development on Lightning; and
 5. Establishment of a Lightning Hazard Management Unit.

The Indian Institute of Tropical Meteorology under the Ministry of Earth Sciences has developed the DAMINI mobile application, which supports 17 regional languages and provides the public with location-specific lightning alert/warnings, real-time lightning information, and safety advisories.

This information was given by the Minister of State (Independent Charge) for Earth Sciences Dr. Jitendra Singh in a written reply in Rajya Sabha today.

NKR/JKP

(रिलीज़ आईडी: 2298817) आगंतुक पटल : 658

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