PARLIAMENT QUESTION: UNPREDICTABLE WEATHER PATTERNS

The Ministry is continuously working to strengthen observational capabilities and R&D infrastructure to achieve greater accuracy in weather forecasting. The Indian Meteorological Department (IMD) has adopted new techniques and technologies over time to detect, monitor, and provide timely early warnings for disruptive weather patterns caused by climate change. The IMD has expanded its infrastructure for observations, data exchange, monitoring & analysis, forecasting, and warning services in the country.

The major new initiative undertaken by the Government is the implementation of the Mission Mausam. A couple of Doppler Weather Radars (DWRs) have already been installed under the mission. Currently, 47 radars are in operation across India, with 87% of the country's total area under radar coverage. Under the Mission Mausam, the Bharat Forecast System (BharatFS), an advanced weather forecasting model, has been developed and is operational at a high spatial resolution of 6 km. It also has the capability to provide predictions of rainfall events up to 10 days, covering the short and medium-range forecasts. Due to its higher resolution and improved dynamics, it generates weather forecasts at the panchayat or cluster of panchayats level. Improving the accuracy of weather forecasts requires advanced observational networks, skilled human resources for research and development of numerical models, and robust infrastructure such as high-performance computing systems to run these models at the required resolution to predict weather patterns caused by climate change.

IMD has also brought out a web-based online "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://imdpune.gov.in/hazardatlas/abouthazard.html. This atlas will help State Government authorities and disaster management agencies to identify the hotspots and plan and take appropriate action to tackle extreme weather events. This product helps build Climate Change resilient infrastructure.

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. The Common Alert Protocol (CAP), developed by the NDMA, is also being implemented to disseminate warnings by the IMD.

IMD currently is equipped with a Decision Support System (DSS) based real-time multi-hazard impact based early warning system (EWS), which integrates all types of real-time and historical data, numerical weather prediction products, etc., to effectively monitor, detect and provide timely forecasts and impact-based warnings with suggested actions up to districts and city/station levels against all types of extreme weather events such as heavy rainfall events, droughts etc. IMD has Met Centres (MCs) in each State and also special centers like Cyclone Warning Centers available for each impacted State, which provide services during cyclones and heavy rainfall seasons round the clock, respectively.

As a result of these new initiatives, the overall skill of forecasting these severe weather events has been improved by 30-40% over the last 10 years.

IMD has taken various initiatives in recent years for improvement in data reception and dissemination of weather forecast and warning services based on the latest tools and technologies. It includes the dissemination of forecasts and warnings through the website, e-mail, SMS, and Social Media Platforms such as YouTube, Facebook, X, and Instagram. The India Meteorological Department has developed various mobile apps for the dissemination of weather-related warnings, such as

- MAUSAM App for weather forecasting and warnings
- MEGHDOOT App for agro met services
- DAMINI App (developed by IITM) for lightning warning
- UMANG App (developed by Meity) for Weather forecasting and warnings

Year-wise statistics and steps taken to expand the Meghdoot coverage are given in Annexure-1.

A couple of Doppler Weather Radars (DWRs) have already been installed under the Mission Mausam. Currently, 47 radars are in operation across India and the details are given in Annexure-2. In the coming years, DWRs will be installed as per the requirement to cover the remaining gap areas in the country, provide redundancy, and replacement of old radars in the DWR network under Mission Mausam of MoES.

****

NKR/AK

Annexure-1

Year	Meghdoot registered users
Since the launch to 2021	2,36,188
2022	2,81,561
2023	3,18,560
2024	3,78,540
2025 (Till Date – 28 Nov 2025)	4,16,056

Nationwide Expansion of the Application: The India Meteorological Department (IMD), under the Ministry, has undertaken systematic efforts to expand the Meghdoot mobile application, which provides weather-based agromet advisories to farmers. Initially launched for around 150 districts, the application has now been extended across the country and presently covers nearly 700 agriculturally important districts for the dissemination of agromet advisories under Gramin Krishi Mausam Sewa (GKMS).

Enhanced Spatial Reach at Block Level: To further improve the geographical reach of the services, the application has been upgraded to provide daily weather forecasts for nearly 7,000 blocks and 747 districts of the country. Additionally, real-time weather warnings and nowcasts have been incorporated to assist farmers in responding promptly to adverse or rapidly changing weather conditions. The application includes multilingual support for 12 languages, pictorial representations of advisories, and simplified formats to enhance usability among farmers.

Promotion Through Farmer Awareness Activities: The Meghdoot application has been widely promoted through farmer awareness programmes (FAP) conducted by AMFUs across various states. Multiple communication channels, including SMS, agromet advisories, social media platforms, and local outreach initiatives, have been utilised to inform farmers about the downloads, demos, availability, and benefits of the app.

Linkage with State Government Platforms: To further extend outreach, Meghdoot advisories have been integrated with 21 State Government platforms, including state-level mobile applications and agricultural information portals/websites. This linkage has helped widen access to advisories among farmers using state-specific digital services.

Integration with National Digital Platforms: In addition, the weather-based agromet advisories disseminated through Meghdoot are linked with major national platforms such as UMANG, Mausam, Krishi Decision Support System (DSS), VISTAAR, WINDS of the Ministry of Agriculture, and other digital systems. These integrations ensure uniform dissemination of advisories across multiple access points.

Annexure-2

S. No.	State/Union Territory	DWR Locations
1.	Andhra Pradesh	Machilipatnam (S-Band)
2.	Andhra Pradesh	Visakhapatnam (S-Band)
3.	Andhra Pradesh	Sriharikota, ISRO (S-Band)
4.	Assam	Mohanbari (S-Band)
5.	Bihar	Patna (S-Band)
6.	Chhattisgarh	Raipur
7.	Goa	Goa (S-Band)

8.	Gujarat	Bhuj (S-Band)
9.	Himachal Pradesh	Jot (X-Band)
10.	Himachal Pradesh	Murari Devi (X-Band)
11.	Himachal Pradesh	Kufri (X-Band)
12.	Kerala	Kochi (S-Band)
13.	Kerala	VSSC, ISRO Thiruvananthapuram (C-Band)
14.	Madhya Pradesh	Bhopal (S-Band)
15.	Maharashtra	Mumbai (S-Band)
16.	Maharashtra	Nagpur (S-Band)
17.	Maharashtra	IITM Solapur (C-Band)
18.	Maharashtra	Veravali (C-Band)
19.	Maharashtra	Mumbai, Juhu (X-band)
20.	Maharashtra	Mumbai, Panvel (X-band)
21.	Maharashtra	Mumbai, Kalyan, Dombivli (X-band)

22.	Maharashtra	Mumbai, Vasai, Virar (X-band)
23.	Maharashtra	Mahabaleshwar (X-band)
24.	Meghalaya	Cherrapunji, ISRO (S-Band)
25.	Odisha	Gopalpur (S-Band)
26.	Odisha	Paradip (S-Band)
27.	Punjab	Patiala (S-Band)
28.	Rajasthan	Jaipur (C-Band)
29.	Tamil Nadu	Chennai (S-Band)
30.	Tamil Nadu	Karaikal (S-Band)
31.	Tamil Nadu	NIOT Chennai (X-Band)
32.	Telangana	Hyderabad (S-Band)
33.	Tripura	Agartala (S-Band)
34.	Uttarakhand	Lansdowne (X-Band)
35.	Uttarakhand	Mukteshwar (X-Band)

36.	Uttarakhand	Surkanda Devi (X-Band)
37.	Uttar Pradesh	Lucknow (S-Band)
38.	West Bengal	Kolkata (S-Band)
39.	Jammu & Kashmir	Banihal Top (X-Band)
40.	Jammu & Kashmir	Jammu (X-Band)
41.	Jammu & Kashmir	Srinagar (X-Band)
42.	Delhi	Aya Nagar (X-Band)
43.	Delhi	Palam (S-Band)
44.	Delhi	HQ Mausam Bhawan (C-Band)
45.	Ladakh	Leh (X-Band)
46.	Karnataka	Mangaluru (C-Band)
47.	Chhattisgarh	Raipur (C-Band)

*****