GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 6031
TO BE ANSWERED ON WEDNESDAY, 1ST APRIL, 2026

STRENGTHENING CYCLONE FORECASTING AND EARLY WARNING SYSTEMS

6031. SMT. SANGEETA KUMARI SINGH DEO:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Government has undertaken any initiatives to further strengthen cyclone forecasting and early warning systems particularly for the Odisha coastline during the last three years;
(b) the details of technological upgrades and observational infrastructure installed by the India Meteorological Department along the eastern coast, particularly in Odisha;
(c) whether the additional Doppler Weather Radars, ocean buoys or coastal monitoring stations have been proposed for the State; and
(d) the steps taken/being taken by the Government to improve accuracy of cyclone prediction and timely dissemination of warnings to vulnerable coastal communities?

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

(a)-(c) Yes. The Government has been taking steps to strengthen weather forecasting techniques and early warning systems in the country. New techniques and technologies have been introduced from time to time to enhance cyclone forecasting and improve data dissemination. Mission Mausam has been launched by the Ministry with the objective of making Bharat a "weather-ready and climate-smart" nation, including the State of Odisha.

At present, in Odisha, a total of 39 manned surface meteorological observatories, 29 Automated Weather Stations (AWS), 136 Automated Rain Gauges (ARG), and 6 High Wind Speed Recorders (HWSRs) are functional. In addition, six airports are equipped with automatic aviation weather stations and two manned observatories. Further, two Doppler Weather Radars (DWRs) located at Paradip and Gopalpur are operational on a round-the-clock basis. In addition, the State is also covered by DWRs installed in neighbouring locations, including Kolkata, Ranchi, Raipur, and Visakhapatnam. Further details of DWRs along the eastern coast are given in Annexure-1.

The Ministry is in continuous endeavour of augmenting the observational network, including AWS, ARGs, Agro-AWS, DWRs, coastal monitoring stations, and research and development infrastructure, including Odisha, towards achieving better accuracy in weather and ocean-state forecasting, as well as to strengthen timely early warning systems.

(d) Improvement in forecast accuracy is a continuous process. In this regard, the India Meteorological Department (IMD), under the Ministry, undertakes ongoing efforts across various aspects of early warning services, including identification of gaps and measures to address them. IMD's cyclone forecasting and warning system is distinguished by its high accuracy in track and intensity prediction, achieved through state-of-the-art numerical weather prediction models, multi-model ensembles, advanced data assimilation techniques, and continuous monitoring using satellites, DWRs, ocean buoys, and coastal observational networks. The forecast accuracy of cyclone track, intensity, and landfall point increased in 2023 to 2025 by 15-45%, 15-35%, and 10-30%, respectively, compared to 2020-2022, up to a lead period of 4 days. The Ministry's cyclone warning services are widely recognised at both national and international levels.

The Ministry has developed an end-to-end GIS-based Decision Support System (DSS) that serves as the front-end platform for early warning systems for severe weather events, including cyclones. It facilitates the detection and monitoring of weather hazards across the country, including the Odisha coastline. The system is integrated with modern telecommunications technologies to ensure the timely dissemination of information. The effective dissemination methods adopted by the Ministry for weather, ocean services, and earth sciences information and alerts across the country, including vulnerable coastal communities, are as follows:

- Public alerts and information are disseminated through mobile applications such as MAUSAM, MEGHDOOT, DAMINI, and UMANG.
- Digital dissemination channels include e-mail and SMS-based nowcasting and forecasting alerts to registered users.
- Alerts are issued through the Common Alerting Protocol (CAP) and the SACHET App.
- Information is shared via social media and mass media platforms.
- District Collectors are informed through direct e-mail and WhatsApp group notifications, in coordination with the Odisha State Government.
- Broadcast dissemination is carried out through community radio, public broadcasting systems, and other local communication networks.
- Dissemination is also undertaken through State Government mobile applications.
- Gram Panchayat-level weather forecasting (GPLWF) is facilitated through digital platforms such as e-Gramswaraj, Meri Panchayat App, and e-Manchitra, in collaboration with the Ministry of Panchayati Raj.

- Weather forecasts are accessible through the Mausamgram portal of the India Meteorological Department.
- IMD provides medium-range weather forecasts for rainfall, temperature, relative humidity, cloud cover, wind speed, and direction at district and block levels for the next five days, along with the subsequent week's rainfall and temperature outlook at the meteorological sub-division level.
- Ocean-based early warning advisories for maritime hazards, such as high waves, strong currents, swell surges, storm surges, and tsunamis.
- Provides operational support during maritime emergencies through the Search and Rescue Aid Tool (SARAT) and oil-spill trajectory advisories.
- Maintaining the ocean observation buoys network over the Arabian Sea and Bay of Bengal, data from which are utilised for strengthening climate resilience, disaster risk reduction, marine weather forecasting, and coastal zone management.
- A wide range of ocean-based early warning and advisory services to support disaster risk reduction and coastal safety.
- Issues comprehensive 10-day ocean-state forecasts covering all major oceanographic parameters for all coastal States and districts, including Odisha.

Annexure-1

List of DWRs (location-wise) operational across the east coast of India is as follows:

S. No.	State/Union Territory	DWR Locations
1.	West Bengal	Kolkata (S-Band)
2.	Odisha	Gopalpur (S-Band)
3.	Odisha	Paradip (S-Band)
4.	Andhra Pradesh	Machilipatnam (S-Band)
5.	Andhra Pradesh	Visakhapatnam (S-Band)
6.	Andhra Pradesh	Sriharikota, ISRO (S-Band)
7.	Tamil Nadu	Chennai (S-Band)
8.	Tamil Nadu	Karaikal (S-Band)
9.	Tamil Nadu	NIOT Chennai (X-Band)

****