GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION NO. 3108
TO BE ANSWERED ON WEDNESDAY, 19TH MARCH, 2025

WEATHER FORECASTING IN ANDHRA PRADESH

3108. SHRI LAVU SRI KRISHNA DEVARAYALU:
SHRI G M HARISH BALAYOGI:

Will the Minister of **EARTH SCIENCES** be pleased to state:

(a) the details and number of weather forecasting stations/facilities operational in Andhra Pradesh especially those located along the coastline;
(b) whether the Government has any plans to set up additional weather forecasting facilities along the Andhra Pradesh coastline and if so, the details thereof along with the expected timeline;
(c) whether the Government plans to install new DWRs, radiometers, radiosondes, and wind profilers in Andhra Pradesh;
(d) if so, the details thereof along with the number, locations and expected timeline of these proposed infrastructures, especially those positioned along the coastline of the State;
(e) the amount of funds allocated for improving weather forecasting infrastructure in Andhra Pradesh, especially for installation of Doppler radars;
(f) whether Artificial Intelligence is being utilised to improve weather forecasting in Andhra Pradesh; and
(g) if so, the details thereof along with the AI-based predictive models, early warning systems and their effectiveness in cyclone tracking and flood prediction?

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

(a) The details of weather forecasting stations/facilities operational in Andhra Pradesh, including those located along the coastline, are given in Annexure-1. Currently, the State Meteorological Centre (MC) is functional at Amaravati. Being close to the coast and impacted by cyclones, a cyclone warning center (CWC) also functions at Visakhapatnam. The India Meteorological Department (IMD) has 10 departmental meteorological observatories (15 total in the State), 3 Doppler Weather Radar (DWR) stations, three Radiosonde/Radiowind (RS/RW) stations, 2 Pilot Balloon Observatories (PBO) (total 3 in the State) and two radiation observatories are functioning along the coastal line in the State.In addition, there are five part-time observatories and five Aviation Meteorological Stations functioning in the interior parts of the State of Andhra Pradesh. Similarly, 7 out of the 18 Automatic Weather Stations (AWS), 2 out of 9 Agro AWS, 16 out of 62 Automatic Rain Gauge (ARG) stations in the State are located along the coastline.

(b) Yes. The IMD is tentatively planning to install another 5 Agro AWS at AMFUs during 2025-2026 under the Augmentation of Agro AWS. The details are given in Annexure-2.

(c)-(e) The IMD, MoES is planning to install 53 DWRs, 25 microwave radiometers, 60 radiosonde/radio wind, 10 wind profilers, etc., across the country including Andhra Pradesh under Mission Mausam during the next 2 years. Funds of about Rs 2000 crore have been allocated under Mission Mausam for the deployment of all of the above instruments across the country (including Andhra Pradesh) along with the establishment of various computing, forecasting, and communication tools so as to monitor, track forecast and warm every extreme weather and climate events occurring in the entire country.

(f)-(g) The Ministry of Earth Sciences (MoES) explores integrating artificial intelligence and machine learning (AI/ML) technologies into weather forecasting systems in addition to physics-based numerical models. This initiative is part of a broader strategy to enhance the accuracy and efficiency of meteorological predictions all over the country, including Andhra Pradesh.

The Ministry has established a dedicated virtual center on AI/ML/Deep Learning (DL) at the Indian Institute of Tropical Meteorology (IITM) in Pune. A dedicated functional group has been established in IMD under the MoES to strengthen the R&D activities in AI/ML. These centers focus on leveraging AI, ML, and DL techniques for advancements in Earth Sciences. It has already developed several AI/ML-based applications tailored for localized predictions and the analysis of weather and climate patterns.

Achievements and outcomes of AI and ML in the research and development (R & D) of weather prediction are provided below:

- Improved the short-range precipitation forecast in 1-day, 2-day, and 3-day lead times with a reduction in bias
- Developed high-resolution (300m) urban gridded meteorological data sets for temperature and precipitation
- Developed the time-varying Normalized Difference Urbanization Index with a spatial resolution of 30 meters from 1992-2023
- Developed very high-resolution precipitation data sets for verification purposes
- Deep Learning approach is being explored for precipitation nowcasting using data from DWRs

Annexure-1

The details of various weather observatories and forecasting facilities operational in Andhra Pradesh:

Types	Rayalaseema		Coastal Andhra Pradesh	
	Interior	**Coastal**	**Interior**	**Coastal**
DWR		1.Sriharikota		1.Visakhapatnam 2.Machilipatnam
Radiosonde/ Radiowind				1.Visakhapatnam 2.Machilipatnam 3.Kavali
PBO	1.Anantapur			1.Visakhapatnam 2.Machilipatnam
Radiation Observatories				1.Visakhapatnam 2.Machilipatnam
AMS	1.Tirupati 2. Kurnool 3.Kadapa		1.Rajahmundry 2.Gannavaram	
Airport Met office	1.Tirupati 2.Kurnool 3.Anantapur		1. Gannavaram 2.Amaravati (MC)	1.Kalingapatnam 2.Visakhaptanam 3.Kakinada 4.Tuni 5.Narasapur 6.Machilipatnam 7.Bapatla 8.Ongole 9.Kavali 10.Nellore
PTO	1.Nandyala 2.Kapapa 3.Arogyavaram		1.Nandigama 2.Jangamaheshwara-puram	
AWS	1.Perumallapalle 2.Tirumala 3.Tirupati_ AMFU 4.Utukuru 5.Anantapur_ AMFU 6.Nandyala 7.Kadiri		1.Chintapalli 2.Bapatla 3.Vuyyuru 4.LAM_AMFU	1.Anakapalli 2.Ragolu 3.Bhimunipatnam 4.Vijayanagaram 5.Maruteru 6.Peddapuram 7.Kavali

AGRO AWS		1.Banavasi_KVK 2.Utukuru_KVK	1.Vijayanagaram_KVK 2.Kalavacharla_KVK (East Godavari dist) 3.Venkataramanna gudem 4.Garikapadu_KVK 5.Darsi_KVK	1.Amadalavalasa_KVK 2.Nellore_KVK
ARG Stations	1.Mantralayam 2.Yemmiganur 3.Adoni 4.Betamcherla 5.Mahanandi 6.Banaganapalle 7.Alvagonda 8.Srisailam Dam 9.Guntakal 10.Peddavadugur 11.Tadipatri 12.Kalyandurg 13. Uravakonda 14. Pattaparthi 15. Chilamathur 16. Madakasira 17. Arogyavaram 18. Chittoor 19. Kuppam 20. Ananthrajpeta 21. Kadapa_Airport 22. YVU_Kadapa 23.Pulivendula	1.Petluru_HRS	1.Gottabarage 2.Palakonda 3.Komarada 4.Bobbili 5.Araku valley 6.Pandirimamidi_HRS 7.Rajahmundry 8.Venkataramnnagudem 9.Koida 10.Vijayarai 11.Nuzvid 12.Tiruvuru 13.Garikapadu 14.Nandigama 15.Vijayawada 16.Prattipadu 17.Piduguralla 18.Narasaraopet 19.Jangamaheshwarapuram 20.Rentachintala 21.Vinukonda 22.Yerragondapalem 23.Giddaluru	1.Palasa_mandal 2.Tekkali 3.Rajam 4.Anandapuram 5.Kailasagiri 6.CDR_Dolphins_Nose 7.SAIL_Visakhapatnam 8.Mehadrigadda_dam 9.Prattipadu 10.Kakinada 11.Ambajipeta ARG 12.Repalle 13.Chinna Ganjam 14.Kandukuru 15.Podalakuru

Annexure-2

S. No.	District	AGRO AWS Station
1	Alluri_Sitharama_Raju	Chintapalli_ AFMU
2	Anakapalli	Ankapalli_ AFMU
3	Guntur	Lam_AMFU
4	Tirupati	Tirupati_AMFU
5	Anantapur	Anantpur_AMFU

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