GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION NO. 4369
ANSWERED ON 02/04/2026

STATUS OF CLIMATE RESEARCH INITIATIVES

4369. SMT. REKHA SHARMA:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) the details of progress made in climate research initiatives under the Ministry;
(b) whether the Ministry has collaborated with academic institutions in Haryana; and
(c) the manner in which the research outputs are being applied in disaster mitigation?

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

(a)-(b) The Government has taken due note of the climate change across the country. The Ministry of Earth Sciences (MoES), Government of India, through its Climate Change report titled "Assessment of Climate Change over the Indian Region" (https://link.springer.com/book/10.1007/978-981-15-4327-2), has assessed the impact of climate change across the country. Since the middle of the twentieth century, India has witnessed a rise in average temperatures; a decrease in monsoon precipitation; an increase in extreme temperature and rainfall events, droughts, and sea levels; and an increase in the intensity of severe cyclones. The India Meteorological Department (IMD), under MoES, publishes an annual climate summary for each State during the first quarter of each year, which is publicly available on the IMD Pune website (imdpune.gov.in).

The Government has undertaken multiple initiatives to advance Earth science research, capacity-building, and educational infrastructure across the country, including in Haryana. Dedicated institutes under the MoES e.g., IMD, Indian Institute of Tropical Meteorology (IITM), National Centre for Medium Range Weather Forecasting (NCMRWF), Indian National Centre for Ocean Information Services (INCOIS), National Centre for Coastal Research (NCCR), National Centre for Seismology (NCS), National Centre for Polar and Ocean Research (NCPOR), National Institute of Ocean Technology (NIOT), Centre for Marine Living Resources & Ecology (CMLRE), National Center for Earth System Sciences (NCESS) are advancing research in the interactions between the atmosphere, oceans, and polar systems, focusing on their role in regional climate dynamics and extreme weather patterns. IITM leads the flagship capacity-building initiative under MoES, the Development of Skilled Manpower in Earth System Sciences (DESK) program, with the objective of developing academic habits through training on targeted areas and semester-based coursework in Earth Sciences. Efforts are also being made to strengthen the scientific community's capacity in climate science and assessment through training programs, workshops, and knowledge exchanges, ensuring that India has the necessary expertise to understand and respond to the complex climate challenges.

IMD signed an MoU with Chaudhary Charan Singh Haryana Agricultural University to provide improved agro-meteorological advisory services to farmers in Haryana. Recently, IMD and Asoka University, Haryana, signed an MoU to carry out collaborative research & development on AI applications in weather & forecasting.

(c) The Ministry of Earth Sciences has developed advanced early warning systems for severe weather events such as cyclones, heavy rainfall, droughts, etc., which have devastating impacts on human lives, livelihoods, and infrastructure, particularly in the context of climate change. Early warning for severe weather events is supported by a state-of-the-art observation network that includes surface and upper-air observations, remote sensing, seamless weather and climate prediction systems based on high-resolution dynamical models, and 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 weather hazards across the country, including Haryana. The system is integrated with modern telecommunications technologies to ensure the timely dissemination of information, enabling timely preparedness and response in close collaboration with the National Disaster Management Authority (NDMA). This coordinated approach ensures that accurate and timely weather information reaches authorities and the public, enhancing disaster risk reduction efforts across the country.

IMD has also released 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://imdpune.gov.in/hazardatlas/abouthazard.html. The atlas provides information that may assist State Government authorities and disaster management agencies in identifying potential hotspots and in planning appropriate measures to address extreme weather events. The product also serves as a reference for efforts related to climate-resilient infrastructure planning. The effective dissemination methods adopted by the Ministry for weather, ocean services, and earth sciences information and alerts across the country, including disaster-prone areas, 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.
- IMD has developed a multi-hazard early warning (MHEWS) system for generation and dissemination of accurate impact based weather forecasting and risk-based warning in a timely manner during various severe weather events.

- District Collectors are informed through direct e-mail and WhatsApp group notifications, in coordination with the State Governments.
- 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 information is disseminated to Pashu Sakhi and Krishi Sakhi at the block and Panchayat levels in collaboration with the Ministry of Rural Development.
- Weather forecasts are accessible through the Mausamgram portal of the India Meteorological Department.
- 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.
- IMD provides Impact-Based Forecast (IBF) & Risk-Based Warning (RBW) at district level using different colour codes since 2020.

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