

GOVERNMENT OF INDIA  
MINISTRY OF EARTH SCIENCES  
**RAJYA SABHA**  
**UNSTARRED QUESTION NO. 2288**  
ANSWERED ON 20/03/2025

**CLIMATE CHANGE AND FLOOD MANAGEMENT**

2288. DR. DHARMASTHALA VEERENDRA HEGGADE:

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

- (a) whether Government has commissioned any study to understand the causes of extreme weather and climate events, such as extreme rainfall, heat waves, cyclones and floods in the State of Karnataka in recent years and if so, the details thereof;
- (b) whether Government maintains a nation-wide record of extreme weather and climate events to facilitate the prevention and mitigation of natural disasters and if so, the details thereof; and
- (c) whether Government has come up with a national innovative flood management strategy to deal with urban flooding and advised States regarding the same and if so, the details thereof?

**ANSWER**

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

- (a) It is a well known fact that the extreme weather events are caused by various natural factors like geographic location, topography, climate zones, atmospheric conditions etc. For example, areas close to large water bodies often experience severe storms due to the availability of moisture in the atmosphere. Mountain ranges like western ghats along the west coast of India or Khasi Jaintia Hills of Northeast India can influence wind patterns and precipitation, leading to localized extreme rainfall events. Similarly, regions coming under tropical climate zones are prone to cyclonic storms and those coming under arid climate are prone to droughts. Severe weather such as thunderstorms and tornadoes etc. can be triggered by the interaction between various air masses.

However, several leading studies across the world have indicated that the increasing trends in the frequency and intensity of the extreme weather events such as heavy rainfall, floods, heat waves, cyclones, thunderstorms etc. observed in recent decades are mainly caused by the human induced global warming and climate changes.

The observed changes in the extreme weather events over Karnataka state are also in line with the above facts.

- (b) Yes. The India Meteorological Department maintains a nationwide record of extreme weather events to facilitate research on these events and develop mitigation and adaptation strategies for disasters related to these events. Every year, IMD prepares an "Annual Climate Summary" for the country, which contains information regarding various extreme weather events observed within the country. The reports are available at <https://www.imdpune.gov.in/lrfindex.php>. In addition, IMD also brings out a publication on "Disastrous weather events" every year, which is available at <https://imdpune.gov.in/library.php>. Recently, IMD has brought out the "Climate Hazard & Vulnerability Atlas of India", prepared for the thirteen most hazardous meteorological events (extreme rainfall, heatwaves, cyclones, floods, etc.), which cause extensive impact on our socio-economic activities. The same can be accessed at <https://imdpune.gov.in/hazardatlas/abouthazard.html>. IMD uses this atlas as a reference for issuing impact-based forecasts for various extreme weather events.

The climate hazard and vulnerability atlas will help the State Government authorities and Disaster Management Agencies plan and take appropriate action to tackle extreme weather events. A climate data portal has been operational since April 2024 with the availability of earlier historical extreme temperatures and rainfall over a station /city: <https://dsp.imdpune.gov.in>.

- (c) Forecasting urban weather is increasingly important to manage disasters, decision-making in the public sector, and urban planning purposes, etc. in this regard, various steps have been taken:
- In coordination with its various research centers, the Ministry of Earth Sciences (MoES) has operationalized an integrated flood warning system in Mumbai and Chennai. This system provides early warnings for flood situations in cities by considering many parameters and forecasts for rain.
  - The Ministry of Home Affairs (MHA) has come up with a national strategy to deal with urban floods. It includes:
    - Guidelines of Urban Flood Early Warning Systems by the National Disaster Management Authority
    - A project has been launched for the establishment of an urban flood warning system for 7 cities: Mumbai, Chennai, Kolkata, Bengaluru, Hyderabad, Ahmedabad and Pune.

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