

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 2666
TO BE ANSWERED ON WEDNESDAY, JANUARY 03, 2018**

RAINFALL DISTRIBUTION PATTERN

**2666. DR. RAVINDRA BABU:
SHRI DUSHYANT SINGH:**

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether any study/research has been conducted to assess the impact of climate change on changing rainfall distribution pattern;**
- (b) if so, the details and the outcome thereof;**
- (c) the current mechanism of rainfall prediction being used by his Ministry;**
- (d) whether his Ministry is considering to take any steps to devise an intelligent prediction/expectation system with modern analytic tools by using local weather information for prediction of rainfall and to develop early warning system to mitigate the loss due to natural disaster including cyclone; and**
- (e) if so, the details thereof?**

ANSWER

**MINISTER OF STATE FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND
MINISTRY OF EARTH SCIENCES
(SHRI Y. S. CHOWDARY)**

- (a) Yes Madam.**
- (b) Government has undertaken many research studies to analyze the impact of global warming and climate change on rainfall pattern in India. The analyses were made using observed rainfall data from more than 3000 rain-gauge stations spread over the country for 115 years (1901-2015). The major inferences from these studies based on the 115 years of rainfall data are as follows:**
 - a. The analysis of 115 years of monsoon rainfall data suggests that there is no long term change or trend in the monsoon rainfall averaged over the country.**
 - b. Even though, there are no changes in the all-India rainfall, there are significant changes in annual rainfall in some meteorological sub-divisions. Rainfall over Kerala, East Madhya Pradesh, Jharkhand, Arunachal Pradesh and Nagaland, Manipur, Mizoram and Tripura (NMMT) show decreasing trends. However, rainfall over coastal Karnataka, Maharashtra and Jammu and Kashmir show an increasing trend.**

- c. There is a general tendency of increasing frequency of extreme rainfall (heavy rainfall events) over India, especially over the central parts of India during the southwest (June- September) monsoon season.**
 - d. There is no evidence of global warming on the observed changes in annual or seasonal rainfall over India. However, there is growing evidence suggesting that increasing frequency of extreme rainfall is due to global warming.**
 - e. The climate change assessment made by the Intergovernmental Panel on Climate Change (IPCC) suggest that in future, frequency of extreme rainfall may increase over India due to increase in global warming.**
 - f. However, there are NO other long term changes/trends in rainfall over India which can be attributed to global warming. The Indian Monsoon is found to be a stable system.**
- (c) India Meteorological Department (IMD) issues three types of forecasts during the monsoon season i.e., seasonal forecast (for the whole season), extended range forecast (10- 30 days), short-medium range forecast (0-10 days). These forecasts are issued based on dynamical and statistical models.**
- (d-e) IMD has one of the best forecasting mechanisms for predicting tropical cyclones using high resolution advanced mathematical models and a suite of quality observations from Satellites and Radars.**

Under the 'National Monsoon Mission' (NMM) a state-of-the-art dynamical prediction model for a) improved prediction of monsoon rainfall on extended range to seasonal time scale (16 days to one season) and b) improved prediction of temperature, rainfall and extreme weather events on short to medium range time scale (up to 15 days) has been developed and is being used operationally by IMD. An improved suite of prediction models has been implemented operationally at India Meteorological Department (IMD) for enhanced short range weather forecasting capability through assimilation of all available conventional and satellite data.

IMD operates 24X7 monitoring of satellite and Doppler Weather Radar (DWR) based weather monitoring over the potential cyclogenetic zones of the Bay of Bengal and Arabian Sea for monitoring and forecasting of tropical cyclones.
