

**GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
STARRED QUESTION NO. *146
TO BE ANSWERED ON WEDNESDAY, MAY 04, 2016**

MONSOON PREDICTION

***146. SHRI A. ARUNMOZHITHEVAN:
ADV. M. UDHAYAKUMAR:**

Will the Minister of EARTH SCIENCES be pleased to state:

- (a) whether some of the private forecasting agencies in the country, India Meteorological Department (IMD) and several foreign agencies have predicted normal or above normal monsoon and pre-monsoon rainfall during the current year;**
- (b) if so, the details of rainfall predicted, agency-wise and the areas/location which are expected to receive highest and lowest rainfall in this season;**
- (c) the time by which monsoon is expected to arrive all over the country;**
- (d) whether average error in IMD's monsoon forecasts has come down and if so, the details thereof; and**
- (e) whether there is scope for improvement for accurate prediction of monsoon in the coming years and if so, the details thereof along with the steps taken/being taken by the Government in this regard?**

**ANSWER
MINISTER FOR MINISTRY OF SCIENCE AND TECHNOLOGY AND
MINISTRY OF EARTH SCIENCES
(DR. HARSH VARDHAN)**

(a) to (e): A Statement is laid on the Table of the House.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY (a) to (e) TO STARRED QUESTION NO. *146 REGARDING "MONSOON PREDICTION" TO BE ANSWERED ON WEDNESDAY, May 04, 2016.

- (a) **Yes Madam. During the current year (2016), normal/ above normal rainfall has been predicted by many forecasting agencies including India Meteorological Department (IMD). No forecast assessment for pre-monsoon season is issued by any agencies.**

IMD's Operational Long Range Forecast (LRF) for the 2016 Southwest monsoon rainfall is as follows:

Quantitatively, the monsoon seasonal rainfall is likely to be 106% of the Long Period Average (LPA) with a model error of $\pm 5\%$. The LPA of the seasonal rainfall over the country as a whole for the period 1951-2000 is 89 cm.

- (b) **The details of Monsoon rainfall (2016) predicted, agency-wise is presented in Annexure-I.**
- (c) **Climatologically monsoon is expected to reach South Kerala either end of May or early days of June (by 31st May ± 4 days) and forecast for which will be issued on 15th May, 2016.**
- (d) **The forecast for monsoon onset over Kerala has been correct (within the forecast limits) during all the 10 years (2005-2014) since issuing of operational forecast for the event started in 2005.**

IMD introduced the present LRF models during 2007 following review of the old forecasting system. IMD'S LRF since 2007 has been more skillful than the forecast before 2007. This effort has led to appreciable improvements in the efficiency of models in making better and better forecasts.

It may be mentioned that skill of IMD's present seasonal forecasting system for India as a whole is better than other countries in the world. The Variation of all India rainfall during monsoon for the last 20 years is given in Annexure-II.

- (e) **There is always scope for improvement for accurate prediction of monsoon in the coming years. For this, there have been model developments for better skill of prediction through the Monsoon Mission program of the Ministry of Earth Sciences (MoES).**

Under the National Monsoon Mission initiative institutions of the Indian Institute of Tropical Meteorology (IITM), Pune, IMD, Indian National Centre for Ocean Information Services (INCOIS), Hyderabad and National Centre for Medium Range Weather Forecasting (NCMRWF), NOIDA, have developed a coupled ocean-atmospheric climate model for a) improved prediction of the 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) so that forecast skill gets quantitatively improved further for operational services of IMD.

Annexure-I

Forecasts for 2016 southwest monsoon season rainfall over the country as a whole received from some of the private forecasting agencies and several foreign agencies.

S.No.	Institutes	Forecast
1	Skymet	105% (with an error margin of $\pm 4\%$)
2	Weather Risk Management Services	Roughly more than 104% in most parts of the country, except the northeast and with well-distributed rainfall over the country
3	Onkari Prasad (Retired IMD)	100%
4	Center for Disaster Mitigation Jain University, Bangalore	98.2% \pm 5.52%
5	ECMWF,UK	Coupled Model
	EUROSIP Multi Model Ensemble (MME): 3 Coupled Models	Normal rainfall over most parts of the country
6	International research Institute for climate and Society, USA	Climatological probabilities for most parts of the country except northern parts of the country where below normal is most likely.
7	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	Negative rainfall anomalies over northern parts of the country, central India and most parts of west coast. Positive rainfall anomalies are predicted over remaining areas with highest magnitudes over northeast India.
8	APEC Climate Center	Normal rainfall is most likely over east and northeast India. Above normal is most likely over remaining parts of the country.
9	Met Office, UK	Above normal rainfall is most likely over most parts of the country.

Annexure-II

Year	Forecast		Actual (% of LPA)
1994	92% of LPA ± 4%		110
1995	97% of LPA ± 4%		100
1996	96% of LPA ± 4%		102
1997	92% of LPA ± 4%		102
1998	99% of LPA ± 4%		106
1999	108% of LPA ± 4%		96
2000	99% of LPA ± 4%		92
2001	98% of LPA ± 4%		92
2002	101 of LPA % ± 4%		81
	Issued in April	Issued in June	
2003	96% of LPA ± 5%	98% of LPA ± 4%	102
2004	100% of LPA ± 5%	100% of LPA ± 4%	87
2005	98% of LPA ± 5%	98% of LPA ± 4%	99
2006	93% of LPA ± 5%	92% of LPA ± 4%	99
2007	95% of LPA ± 5%	93% of LPA ± 4%	105
2008	99% of LPA ± 5	100% of LPA ± 4	98
2009	96% of LPA ± 5	93 % of LPA ± 4	78
2010	98 % of LPA ± 5	102 % of LPA ± 4	102
2011	98 % of LPA ± 5	95 % of LPA ± 4	102
2012	99 % of LPA ± 5	96 % of LPA ± 4	93
2013	98 % of LPA ± 5	98 % of LPA ± 4	106
2014	95 % of LPA ± 5	93 % of LPA ± 4	88
2015	93% of LPA with a model error of ± 5%	88% of LPA ±4%	86%