GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
UNSTARRED QUESTION No. 4291
TO BE ANSWERED ON FRIDAY, DECEMBER 13, 2019

MONSOON PREDICTIONS BY INDIAN METEOROLOGICAL DEPARTMENT

4291. SHRI UNMESH BHAIYYASAHEB PATIL:

Will the Minister of EARTH SCIENCES be pleased to state:

(a) whether the Indian Meteorological Department (IMD) has predicted normal monsoon during the current season and if so, the details thereof, region-wise;

(b) whether the Government is aware that several foreign agencies including the Japanese Meteorological Department have predicted below normal monsoon during the current season;

(c) if so, the details thereof and the reaction of the Government thereto, agency-wise; and

(d) whether average error in IMD, monsoon forecasts has come down during each of the last three years and if so, the details thereof?

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

(a) Yes Sir. India Meteorological Department (IMD) had predicted normal monsoon during the 2019 monsoon season. The long range forecast for the 2019 southwest monsoon rainfall was issued in 3 stages. The first stage long range forecast issued on 15th April consisted of only forecast for season (June-September) rainfall over the country as a whole. In the second stage (31st May), forecast for season rainfall over the four broad geographical regions (Northwest India, Central India, South Peninsula and Northeast India) and that for monthly rainfall over the country as a whole for the months of July and August were also issued. In the 3rd stage (1st August), the forecast for the rainfall during the second half of the monsoon season over the country as a whole was issued. Annexure- I gives the summary of the verification of the long-range forecasts issued for the 2019 Southwest monsoon.

The first stage forecast for the season (June-September) rainfall over the country as a whole issued in April was 96% of Long Period Average (LPA) with a model error of ± 5% of LPA. The update issued in May for this forecast was (96% of LPA) with a model error of ± 4% of LPA. Both these forecasts were suggesting the normal category i.e. 96-104 % of LPA. The LPA of the season rainfall over the country as a whole for the period 1951-2000 is 89 cm.

Details of long-range rainfall forecasts issued by IMD for the 2019 southwest monsoon season (June- September) and realized rainfall during the season is at Annexure – I .

(b)& (c) **Yes Sir. IMD keeps track of forecasts issued by various foreign climate agencies including that of Japan Meteorological Agency (JMA) as well as Japan Agency for Marine-Earth Science and Technology (JAMSTEC). Inferences derived from forecasts from various centres for the 3 months periods of JJA and JAS of 2019 are given in Annexure II. The forecasts for 2019 monsoon season were issued in April/May 2019. The coupled model forecast from JMA indicated below normal precipitation over most parts of the country.**

Inferences derived from seasonal forecasts from various climate centers for the 2019 southwest monsoon season are at Annexure- II.

(d) **Yes Sir, there has been noticeable improvement in the skill of IMD seasonal forecast for the southwest monsoon season rainfall over the country as a whole. The average absolute error (difference between forecast and actual rainfall) during the last 10 years (2010-2019) was 5.62% of LPA compared to the average absolute error of 8.84% of LPA during the previous 10 years (2000-2009).**

Annexure – I

Region	Period	Forecast (% of LPA)			Actual Rainfall (% of LPA)
		15th April	31st May	1st August	
All India	June to September	96± 5	96± 4		110
Northwest India	June to September		94± 8		98
Central India	June to September		100± 8		129
Northeast India	June to September		91± 8		88
South Peninsula	June to September		97± 8		116
All India	July		95± 9		105
All India	August		99± 9		115
All India	August to September			100± 8	130

Annexure – II

S. No	Centre issuing the Forecast	Method	Inference for 2019
1.	ECMWF, UK	Coupled Model	JJA & JAS (Issued: May 2019): Normal rainfall is likely over most parts of India. Normal to below normal rainfall is likely over parts of eastern India and neighbouring regions near foothills of Himalaya.
		EUROSIP Multi Model Ensemble (MME): 5 Coupled Models	JJA and JAS (Issued: May 2019): Normal to below normal rainfall is likely over the most parts of the country. However, there is slight possibility to have above normal rainfall over some of the west coastal region.
2.	International Research Institute for Climate and Society, USA	MME 7 Models (AGCM & CGCM)	JJA & JAS (Issued: May 2019): Above normal rainfall is likely over some of the west central and eastern parts of India. Below normal rainfall is likely over some parts of south peninsular and north-eastern India. For the rest of the country climatological probabilities are likely.
3.	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	Coupled Model	JJA (Issued: May 2019): Positive rainfall anomalies are predicted over most parts of south, northeast and east coast region of India. Negative rainfall anomalies are predicted over remaining areas like west central, northwest and north India.
4.	Asia-Pacific Economic Cooperation (APEC) Climate Center	MME 6 Models (AGCM & CGCM)	June, July, August & September (Issued: May 2019): Normal to below normal rainfall is likely over parts of northwest India. Below normal rainfall is likely over parts of south India. Above normal rainfall likely over some parts of the eastern India. Climatological probabilities are likely for rest of the Country.

5.	**Met Office, UK**	**Coupled Model**	**JJA & JAS (Issued: May 2019): Normal to below normal rainfall is likely over most parts of the country. However, above normal rainfall is likely over some of the north-eastern parts of the country.**
6.	**World Meteorological Organization (WMO)Long Range Forecast Mumti-Model Ensemble (LRFMME)**	**AGCM & CGCM**	**JJA (Issued: May 2019): Above normal rainfall is likely over the northernmost pars of the country. Below normal rainfall is likely over most parts of the country. Climatological probabilities are likely for rest of the Country. JJAS (Issued: May 2019): Positive rainfall anomalies are predicted over some of the north-eastern parts of the country. Indian region. Negative rainfall anomalies are predicted over most parts of the country.**
7.	**National Centers for Environmental Prediction (NCEP) coupled forecast system model version 2 (CFSv2)**	**Coupled Model**	**JJA & JAS (Issued: May 2019): Above normal rainfall is predicted over parts of west, south, northernmost and northeast India. Below normal rainfall is predicted over parts of eastern India and neighbouring central region. Normal rainfall is likely over remaining pats of India.**
8.	**Japan Meteorological Agency (JMA)**	**Coupled Model**	**JJA (Issued: May 2019): Normal Precipitation is likely over some of the eastern costal parts of the country. Below normal precipitation is likely over most parts of the country. However, above normal precipitation is likely over northernmost parts of the country.**