

## **2019 Southwest Monsoon Season Rainfall and IMD's Long Range Forecasts**

The 2019 southwest monsoon season comes to end with above normal seasonal (June to September) rainfall. Quantitatively monsoon seasonal rainfall was 110% of its Long Period Average, which is 88 cm. Out of 36 meteorological subdivisions, 2 sub divisions received large excess, 10 received excess and 19 sub divisions received normal monsoon rainfall. Out of 36 sub divisions, 5 sub divisions however received deficient rainfall, but deficiency was in 20s except for Haryana, Delhi and Chandigarh where the deficiency was 42%. The 5 sub divisions accounted about 15% of total area of the country. On an average, about 20% of area of the country receives deficient or scanty rainfall during the monsoon season.

In spite of late monsoon onset and large deficient rainfall during the month of June, the seasonal rainfall ended in above normal category with 110% of its LPA. Monsoon rainfall during July, August and September were 105%, 115% and 152% of its Long Period Average respectively.

Other salient features of 2019 monsoon seasonal rainfall are as follows:

- After 1994 (110% of LPA), rainfall received in 2019 (110 % of LPA) is the highest season rainfall received by the country as a whole.
- During 18 of the last 19 years (2001-2019), North-East India has received seasonal rainfall less than LPA with an exception of 2007 (110% of LPA). This indicates that the seasonal rainfall over North-East India is passing through a below normal epoch like it was during early 1950s to mid-1980s.
- After 1931, this is the first time, the seasonal rainfall is more than LPA even after the June rainfall deficiency was more than 30% of LPA.
- After 1996 (119 % of LPA) , this is the highest recorded August rainfall (115% of LPA).
- This is the second highest September rainfall (152 of LPA), after 1917 (165% of LPA).
- After 2010, this is the first time, rainfalls during all the last three months (July to September) were above LPA.
- The highest cumulative rainfall during August-September (130 %) has been recorded in 2019 after 1983 (142 %)

## Long Range Forecasts

India Meteorological Department (IMD) issued the long range forecasts for the 2019 monsoon seasonal rainfall in two stages, the first forecast on 17<sup>th</sup> April and the update forecast on 31<sup>st</sup> May. The details of long range forecasts issued by IMD and their verification are given below in the Table.

**Table-1: Details of long-range forecasts and actual rainfall.**

Region	Period	Forecast (% of LPA)			Actual Rainfall (% of LPA)
		15 <sup>th</sup> April	31 <sup>st</sup> May	1 <sup>st</sup> August	
All India	June to September	96± 5	96± 4	96	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

In spite of several global models indicating a strong possibility of continuation of a El Nino episode during the monsoon season and possibly a below normal monsoon, IMD had predicted a normal rainfall (96-104% of LPA) for the 2019 southwest monsoon season. IMD's quantitative forecast for the season rainfall issued in April and May was 96% of LPA with a model error of  $\pm 5\%$  and  $\pm 4\%$  of LPA respectively. While issuing the forecasts, based on IMD's models, it was suggested that the El Nino episode will weaken further and a positive Indian Ocean Dipole (IOD) event will emerge in the Indian Ocean. Moreover, IMD also predicted that the monsoon performance would be better in the second half compared to the first half. IMD's analysis on weakening of El Nino and development of a positive IOD and the second half monsoon rainfall being above normal were thus proved correct. However, quantitatively, realized rainfall during the second half was more than what IMD predicted.

IMD's forecast for monsoon onset over Kerala (6<sup>th</sup> June as against the actual onset on 8<sup>th</sup> June) was also proved to be correct.

## Withdrawal of Southwest Monsoon, 2019

The withdrawal of southwest monsoon is likely to commence from northwest India around 10<sup>th</sup> October, 2019 against the normal date of 01<sup>st</sup> September. The most delayed withdrawal in the past years has been recorded in 1961 (1<sup>st</sup> October 1961), followed by 30<sup>th</sup> September in 2007.