# Weather

## MONSOON SEASON (JUNE—SEPTEMBER 1960)

*Chief features*—(1) Early onset of the monsoon in south Peninsula, (2) Typical "break" monsoon conditions for about ten days during July, (3) Very heavy rains and consequent devastating floods in Orissa and Punjab (I) during August and early in September, and (4) Drought conditions in most of the Peninsula during August followed by abundant rains during September.

The southwest monsoon had established itself over the south Peninsula in May about a fortnight in advance of the normal date and had also temporarily advanced into Gangetic West Bengal and Assam towards the end of May. The monsoon current remained feeble during the first six days of June and even withdrew from Gangetic West Bengal on 1 June and from Assam on 3rd.

A general revival of the monsoon activity took place on 7 June and the activity was maintained for about a month. The Arabian Sea branch of the monsoon advanced into the south Konkan on 8 June, the north Konkan on the 13th and south Gujarat State on 14th; into south Madhya Pradesh on 16th, Orissa on 17th and north Gujarat State on 19th. The Bay branch of the monsoon established itself over lower Assam on 10 June, upper Assam and sub-Himalayan West Bengal on 13th and over Gangetic West Bengal and Bihar State on 17th.

The monsoon advanced into east Uttar Pradesh and north Madhya Pradesh on 22 June, into west Uttar Pradesh and southeast Rajasthan on 23rd, into northeast Rajasthan, the Punjab (I) and Himachal Pradesh on 27th and into west Rajasthan on 29 June. The monsoon advanced into Jammu and Kashmir on 6 July.

Active to vigorous monsoon conditions prevailed along the west coast from 12 to 14 June and again from 26 to 29 June.

A deep depression developed over the head Bay of Bengal on the morning of 2 July, crossed Orissa coast between Chandbali and Puri the same evening and weakened and merged into the seasonal trough over the Gangetic plain by 5th. Another shallow depression developed in northeast Arabian Sea close to Saurashtra coast on 3 July, moved northwestwards and filled up on the 5th. Under the combined influence of these two depressions, active to vigorous monsoon conditions prevailed along the west coast and over the belt extending from Gangetic West Bengal and Orissa to Gujarat State during the first week of July. Veraval recorded 28 cm and Porbandar 22 cm on 3rd. The heavy rains in Saurashtra resulted in severe floods over the area where, according to press reports about 35 persons lost their lives, two thousand heads of cattle were washed away and a few hundred dwellings collapsed.

After the filling up of the two depressions referred to above, the monsoon trough started shifting northwards and this marked the beginning of the typical break-monsoon conditions which lasted up to about 18 July. As usual, during the break-monsoon period, monsoon activity got confined mostly to the belt extending from Assam to the Punjab (I). There was fairly widespread rain with some heavy to very heavy falls in this belt. The persistent rain along and near the foot of the Himalayas associated with the break-monsoon period led to floods in the rivers of Assam, West Bengal, Bihar, Uttar Pradesh and the Punjab (I).

Monsoon revived over the Peninsula after 18 July in association with an easterly wave which moved into the southwest Bay of Bengal and shifted westwards as a low pressure area. This lay over the southeast Arabian Sea off the Malabar-south Kanara coasts on 20th, gradually moved northwestwards along the west coast and filled up over the north Konkan coast by 25th. Widespread rain with a few heavy to very heavy falls of rain occurred along the west coast from 21st to 23rd.

Thereafter, a series of low pressure systems which developed over the north Bay of Bengal, generally moved in a northwesterly direction and gave copious rains over north India and the central parts of the country, particularly over the belt extending from Orissa to the Punjab(I). Heavy to very heavy rains occurred in association with each of these systems resulting in local floods of varying intensity in this belt of the country. Brief descriptions of the most important pressure systems are given below.

(*i*) *Low pressure area of 25-28 July 1960*—A low pressure area developed over the head Bay of Bengal on 25 July, moved inland and filled up over Rajasthan by 28th. In association with it, the monsoon was vigorous in coastal Mysore on 25th and 26th, in the Konkan on 26th and in south Gujarat State on 27th.

(*ii*) *Low pressure area of 2-7 August 1960*—A shallow low pressure area developed over coastal West Bengal, north coastal Orissa and adjoining northwest Bay of Bengal on 2 August. It lay over northeast Madhya Pradesh on 4th, moved westnorthwestwards and merged into the seasonal trough by 7th. Under its influence, rainfall was fairly widespread in east Madhya Pradesh and Vidarbha on 4th, in west Madhya Pradesh between 4th and 6th and in east Rajasthan between 5th and 7th. Saugor reported 25 cm of rain on 4th and Indore 16 cm on 5th. Rivers in Malwa region overflowed their banks.

(*iii*) *Depression of 7-14 August 1960*—In association with the movement of a low pressure wave across central Burma, a low pressure area formed over the head of Bay of Bengal on 7 August. It concentrated into a depression with centre close to Sandheads on 9th morning and crossed coast near Balasore the same night. Moving inland it weakened and lay as a low pressure area over south Uttar Pradesh on 12th and merged into the seasonal trough over the area by 14th. It caused fairly widespread rain in coastal West Bengal, Orissa and Bihar Plateau from 8th to 10th, in west Madhya Pradesh from 8th to 12th, and in west Uttar Pradesh on 13th and 14th. A few noteworthy amounts of rainfall were—Chandbali 19 cm on 9th, Saugor 18 cm on 11th and Orai 24 cm on 14th. There were large scale floods in the Ganga in Uttar Pradesh.

(*iv*) *Deep depression of 12-25 August 1960*—A depression which developed over the head Bay of Bengal on 12 August deepened by the 14th evening and crossed the Sunderbans coast the same night near Saugor Island. Moving slowly westnorthwestward it lay as a depression over northwest Madhya Pradesh and adjoining east Rajasthan on the 19th and as a low pressure area over the Punjab (I) and adjoining northwest Uttar Pradesh on 21st. Thereafter, it gradually weakened and became unimportant by 25th. This system was responsible for the devastating floods of Orissa and the Punjab (I) during this monsoon season. The Orissa floods were reported to have been the severest in the recorded history of the State. Very heavy rainfall occurred in and near Orissa between 15th and 17th. Balasore reported 26 cm on 15th and Raigarh 14 cm on 16th and 19 cm on 17th. Over five thousand square miles of land were inundated, causing misery to some four million people in Orissa. Widespread rain with locally heavy to very heavy falls also occurred in the Punjab (I) on 21st, when Patiala recorded 16 cm, Ambala 15 cm and Gurgaon 14 cm of rain. The rains caused the rivers to overflow, submerging large areas and dislocating communications. Many people in the Punjab (I) were marooned.

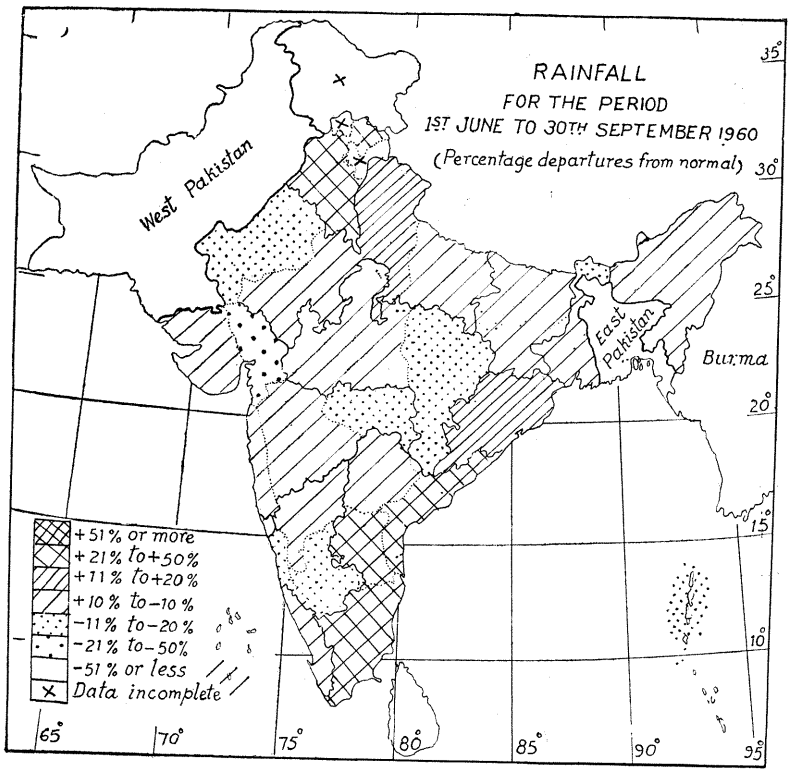


**Fig. 1**

(*v*) *Depression of 24-30 August 1960*—A depression developed over the head Bay of Bengal on the morning of 24 August with centre about 150 km east of Saugor Island. It crossed the coast the same evening and lay over west Uttar Pradesh and neighbourhood on 28th. It weakened thereafter and merged into the seasonal trough by 30th. This was responsible for further aggravating the flood situation in the Punjab (I).

(*vi*) *Low pressure area of 27-31 August 1960*—A low pressure area developed over coastal West Bengal and adjoining northwest Bay on the evening of 27 August, moved in a northerly direction to Bihar plains and adjoining West Bengal by 30th and filled up the next day. It caused fairly widespread rain in West Bengal and Bihar State between 29th and 31st and in Assam on 30th and 31st. Jamui reported 16 cm on 30th and Cherrapunji 28 cm on 31st.

Monsoon remained active near the foot of the Himalayas for the first four days of September. The flood situation in the Punjab (I) deteriorated further and among other places, the town of Rohtak got flooded and over a lakh of people had to abandon their hearths and homes. After 4 September, the rains decreased in northwest India and the floods in the Punjab receded.

A low pressure area moved from Orissa and neighbourhood to southwest Uttar Pradesh between 9 and 11 September, recurved northeastwards and broke up over the Nepal Himalayas by 13th. In association with this, the monsoon strengthened in the belt extending from Orissa to Uttar Pradesh. Hardoi reported 21 cm of rain on 11th.

After the dissipation of this low pressure area, the monsoon withdrew from northwest India by 14th. Northeast India, however,

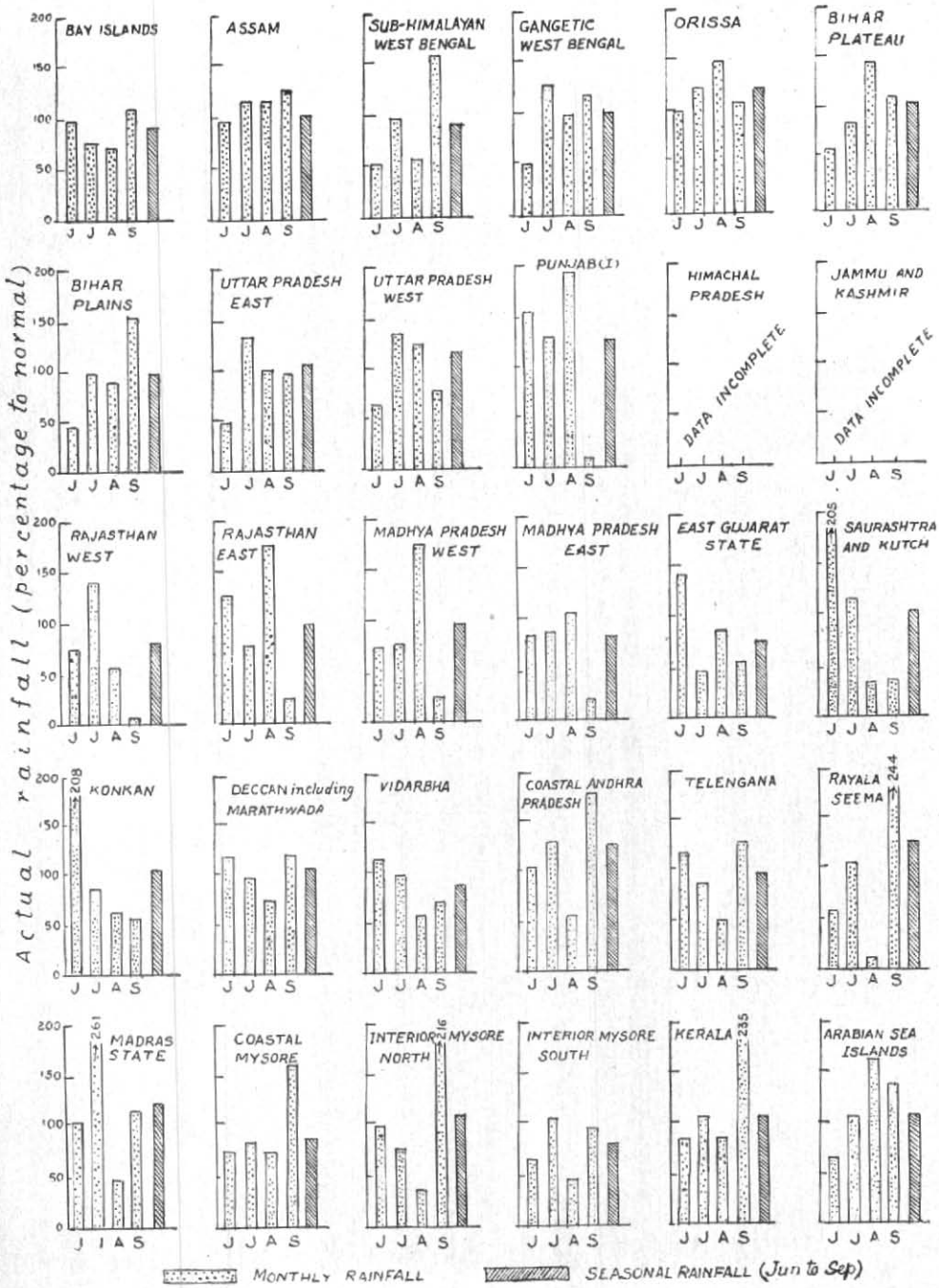


**Fig. 2. Progress of the monsoon month by month 1960**

continued to have spells of active monsoon conditions during the rest of September also. One of the spells occurred from 13th to 16th: Pasighat recorded 22 cm and Shillong 20 cm on 14th and Cherrapunji 49 cm and Dhubri 26 cm on 15th. Another spell of rains in northeast India occurred in association with a depression which developed over northwest Bay of Bengal on 24th, crossed coast between Chandbali and Balasore the same night and broke up over the Nepal Himalayas on 28th. Jamui recorded 18 cm, Darbhanga 17 cm and Patna 16 cm on 27th and Forbesganj 22 cm, Dhubri 20 cm and Jalpaiguri and Darjeeling 17 cm each on 28 September. Floods were reported from Bihar and West Bengal States.

Although north India and central parts of the country got excessive rains during August, the rainfall over the Peninsula was scanty. In fact, during August, the deficiency of rainfall in Andhra Pradesh, Madras State and interior Mysore was as much as 50 per cent or more. In particular, Rayalaseema had a rainfall deficiency of about 90 per cent during August. However, throughout the month of September, there was abundant rainfall over the Peninsula. There were particularly good spells of rain from 5th to 7th and from 13th to 21st. A few noteworthy amounts of rainfall in the Peninsula during September were—Kurnool 14 cm on 7th, Mathurai 10 cm on 13th and Gadag 12 cm on 19 September. The monsoon lingered on over large parts of the country up to the middle of October.

With the establishment of upper air anticyclonic circulation over northwest India and the central parts of the country, the monsoon withdrew and was confined to the south Peninsula by 17 October.

The total rainfall for the period 1 June to 30 September in terms of its departure from the normal is shown in Fig. 1. One remarkable feature is that although the rainfall departure over most of the country for the season as a whole was within 20 per cent of the normal rainfall, there were large abnormalities in the rainfall during different parts of the season. The progress of the monsoon over the various sub-divisions of India month by month is shown in Fig. 2.