

Weather

MONSOON SEASON (JUNE-SEPTEMBER 1986)*

1. Introduction

The summer monsoon rainfall during 1986 was normal (+10% to -10%) or excess (+11% and more) in 16 Met. sub-divisions and was deficient (-11% and less) in 19 sub-divisions. Monthly and seasonal rainfall and percentage departure from normal are given in Table 1. Seasonal rainfall departure computed from individual station rainfall data is shown in Fig. 5.

The seasonal trough at 0.9 km a.s.l. appeared over north India during the third week of June and became well established during the fourth week. Though it weakened in the first week of July, it became quite active from the second week of July. During August the trough was confined mostly to the east of Long. 80° E. It was rather weak during the first fortnight of September and thereafter shifted over the Peninsula and the Bay of Bengal. During June, July and September it lay mostly to the south of its normal position.

Several upper air cyclonic circulations developed over Bay of Bengal during the season. Most of them resulted in the formation of low pressure area or of higher intensity system.

2. Chief features of the season

2.1. Advance of monsoon

Southwest monsoon advanced as a weak current over Kerala on 4 June and covered coastal Karnataka by next day. Thereafter the northward progression of the Arabian Sea branch of monsoon stalled there upto 13 June. It commenced its northward journey from 14 June and covered up to Gujarat State by 23 June. The Bay branch of monsoon ushered in over Assam and adjacent States on 16 June and advanced eastwards at a normal pace till it covered Punjab on 30 June. It covered west Rajasthan on 24 July after a long delay.

Its advance over Kerala was delayed by about five days but was around normal dates over coastal and south interior Karnataka. Its advance over the rest of the Peninsula and Gujarat State was delayed by four to seven days. The onset of monsoon over Assam & adjacent States was late by about 10 days. Its advance

over Orissa, West Bengal & Sikkim, Bihar State and Madhya Pradesh was delayed by about four to seven days while it was around normal dates over Uttar Pradesh and northwest India outside west Rajasthan. The advance over west Rajasthan was delayed by more than three weeks. Fig. 1 shows the dates of advance of southwest monsoon over the country and Fig. 3 the progress of monsoon week by week, prepared from the weekly rainfall data available at the time of its preparation.

2.2. Activity of the monsoon

The rainfall during the month of June was excess (+20% and more) or normal (-19% to +19%) in most of the meteorological sub-divisions outside Assam and adjacent States, where it was deficient (-20% to -59%) or scanty (-60% or less). Rainfall activity was very much subdued over the Peninsula and Gujarat State during July. Because of this June to July rainfall remained slight to moderately deficient over Gujarat State, Konkan & Goa, Marathwada, coastal Karnataka and Kerala. Rainfall during August was deficient over Gujarat State and Marathwada but was normal or excess over Konkan & Goa, coastal Karnataka and Kerala. Monsoon activity during August was, however, subdued over Arunachal Pradesh, West Bengal & Sikkim, Orissa, Bihar Plateau, west Uttar Pradesh, Rajasthan, east Madhya Pradesh, Rayalaseema and Tamil Nadu resulting in deficient rainfall over these areas. Outside northeast India, Rayalaseema, Tamil Nadu, south interior Karnataka and Kerala, rainfall during September was deficient or scanty over the rest of the country.

2.3. Withdrawal of monsoon

The withdrawal phase of monsoon commenced on 17 September when it withdrew from west Rajasthan, Punjab and Jammu & Kashmir. On 22 September monsoon retreated from rest of northwest India, west Uttar Pradesh and Gujarat State. The withdrawal from northwest India and Gujarat State was around normal dates but from west Uttar Pradesh it was early by about four days. Thereafter, on 8 October it further withdrew from east Uttar Pradesh, west Madhya Pradesh, Konkan & Goa and Madhya Maharashtra

TABLE 1

Statement showing sub-divisional means of rainfall in each month and during the season as a whole

(June to September 1986)

Sub-divisions	June		July		August		September		June to September			
	Actual (mm)	Percentage departure from normal	Actual (mm)	Percentage departure from normal	Actual (mm)	Percentage departure from normal	Actual (mm)	Percentage departure from normal	Actual (mm)	Normal (mm)	Departure from normal (mm)	Percentage departure from normal
(1) Andaman & Nicobar Islands	272	-38	242	-33	331	-12	363	-12	1208	1586	-378	-24
(2) Arunachal Pradesh	353	-34	531	12	397	-12	309	13	2330	2692	-361	-13
(3) Assam & Meghalaya	406	-31	415	4	377	-10	289	-7	1590	1733	-144	-8
(4) Nagaland, Manipur, Mizoram & Tripura	234	-40	330	25	240	-13	196	-20	1487	1712	-225	-13
(5) Sub-Himalayan West Bengal & Sikkim	344	-31	489	19	432	-20	491	-24	999	1175	-175	-15
(6) Gangetic West Bengal	187	-39	463	94	226	-29	300	-2	1176	1169	7	0
(7) Orissa	334	64	348	1	232	-23	263	8	1177	1097	80	7
(8) Bihar Plateau	261	21	356	2	240	-27	252	8	1109	1124	-16	-1
(9) Bihar Plains	166	19	466	44	336	1	216	-2	1183	1015	168	17
(10) East Uttar Pradish	116	12	311	3	240	-17	128	-31	795	883	-88	-10
(11) Plains of West Uttar Pradesh	111	27	209	-13	203	-23	96	-40	620	752	-132	-18
(12) Hills of West Uttar Pradesh	146	-11	479	9	282	-35	137	-40	1044	1269	-225	-18
(13) Haryana, Chandigarh & Delhi	83	13	105	-37	131	-19	60	-43	379	498	-119	-24
(14) Punjab	117	177	154	-16	163	3	48	-52	477	485	-9	-2
(15) Himachal Pradesh	127	36	295	-19	324	-2	62	-57	807	932	-125	-13
(16) Jammu & Kashmir	55	1	171	13	186	60	16	-80	428	382	46	12
(17) West Rajasthan	26	-5	129	21	47	-58	3	-94	205	299	-94	-32
(18) East Rajasthan	54	-8	302	25	182	-24	25	-79	563	661	-27	-15
(19) West Madhya Pradesh	144	21	420	29	242	-14	42	-77	990	913	-77	-1
(20) East Madhya Pradesh	355	85	371	-12	266	-32	101	-55	1005	1224	-219	-18
(21) Gujarat Region, Daman, Dadra & Nagar Haveli	210	61	231	-44	187	-29	5	-97	633	984	-352	-36
(22) Saurashtra, Kutch & Diu	185	123	26	-89	93	-24	3	-96	307	533	-225	-42
(23) Konkan & Goa	737	11	473	-56	592	-7	85	-77	1867	2582	-716	-28
(24) Madhya Maharashtra	276	73	201	-35	259	26	102	-39	798	833	-35	-4
(25) Marathwada	138	-2	124	-40	133	-27	114	-37	508	709	-201	-28
(26) Vidarbha	219	22	338	-1	351	26	56	-71	963	995	-32	-3
(27) Coastal Andhra Pradesh	88	-21	117	-31	276	73	105	-39	586	615	-29	-5
(28) Telangana	96	-31	196	-21	271	23	71	-64	635	806	-171	-21
(29) Rayalaseema	48	-14	62	-28	64	-35	216	57	390	379	12	3
(30) Tamil Nadu and Pondicherry	37	-28	46	-36	74	-26	122	-1	278	345	-67	-19
(31) Coastal Karnataka	963	8	666	-43	845	21	185	-40	2659	3061	-403	-13
(32) North Interior Karnataka	148	51	73	-51	132	9	120	-20	473	520	-46	-9
(33) South Interior Karnataka	247	48	169	-45	257	26	221	53	893	820	73	9
(34) Kerala	576	-14	331	-52	423	2	231	-3	1561	2008	-447	-22
(35) Lakshadweep	383	20	195	-28	183	-9	160	0	920	949	-29	-3

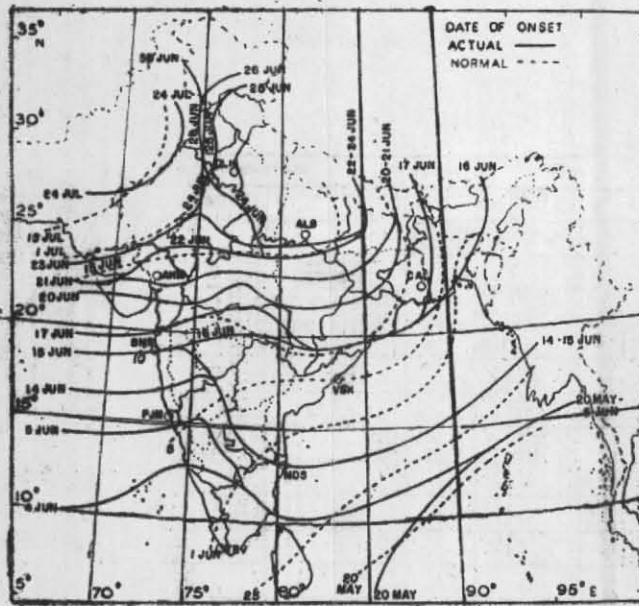


Fig. 1. Advance of southwest monsoon, 1986

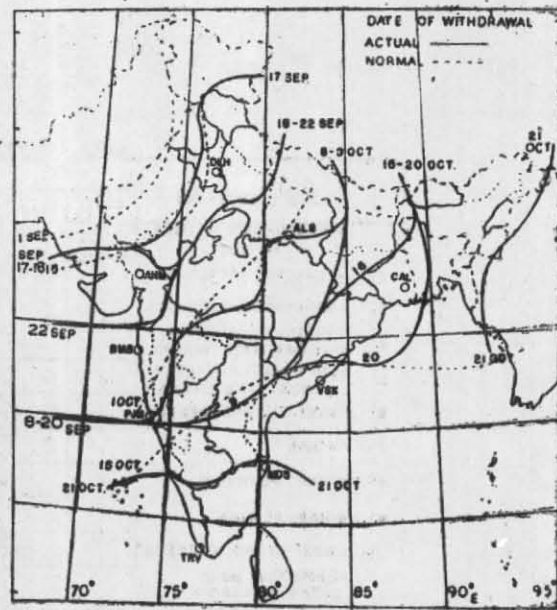


Fig. 2. Withdrawal of southwest monsoon, 1986

TABLE 2

Weather system	Period	Place of first location	Track followed	Place of dissipation	Special remarks
<i>Cyclonic circulations</i>					
(1) Lower & mid-tropos. levels	1st-3rd	Lakshadweep and neighbourhood	Westerly	Moved away	
(2) Do.	13th evening-25th	East central Arabian Sea off Karnataka-Goa coast	Northerly	Northeast Arabian Sea off Gujarat coast	
(3) Lower & mid-tropos. levels	14th evening-18th	West central and adjoining north-west Bay off north Andhra-south Orissa coast.	Westerly	South Orissa and neighbourhood	
(4) Lower tropospheric levels	17th-19th	Bihar Plateau and neighbourhood	—	<i>in situ</i>	
(5) Do.	21st-24th	Punjab and adjoining northwest Rajasthan	Easterly	Haryana	
<i>Low pressure areas</i>					
(1) Well marked low pressure area	20th-22nd evening	Northwest Bay*	West-north-westerly	Central Madhya Pradesh**	

*Appeared as a mid-tropospheric cyclonic circulation over north Bay on 19th.
 **Associated cyclonic circulation became less marked over northwest Madhya Pradesh and adjoining south Uttar Pradesh on 24th evening.

WEATHER

SUB - DIVISIONS		WEEK ENDING ON																			
		JUNE				JULY					AUGUST				SEPTEMBER				OCT		
		4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	1		
1	ANDAMAN AND NICOBAR ISLANDS	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
2	ARUNACHAL PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
3	ASSAM AND MEGHALAYA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
4	NAGALAND, MANIPUR, MIZORAM AND TRIPURA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
5	SUB-HIMALAYAN WEST BENGAL AND SIKKIM	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
6	GANGETIC WESTBENGAL	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7	ORISSA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
8	BIHAR PLATEAU	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
9	BIHAR PLAINS	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
10	EAST UTTAR PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
11	PLAINS OF WEST UTTAR PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
12	HILLS OF WEST UTTAR PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
13	HARYANA, CHANDIGARH AND DELHI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
14	PUNJAB	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
15	HIMACHAL PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
16	JAMMU AND KASHMIR	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
17	WEST RAJASTHAN	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
18	EAST RAJASTHAN	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
19	WEST MADHYA PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
20	EAST MADHYA PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
21	GUJARAT REGION, DAMAN DADRA & NAGAR HAVELI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
22	SAURASHTRA, KUTCH AND DIU	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
23	KONKAN AND GOA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
24	MADHYA MAHARASHTRA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
25	MARATHWADA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
26	VIDARDBA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
27	COASTAL ANDHRA PRADESH	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
28	TELANGANA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
29	RAYALASEEMA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
30	TAMIL NADU AND PONDICHERRY	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
31	COASTAL KARNATAKA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
32	NORTH INT. KARNATAKA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
33	SOUTH INT KARNATAKA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
34	KERALA	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
35	LAKSHADWEEP	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

LEGEND :-







 EXCESS +20% OR MORE	 DEFICIENT -20% TO -59%	 NO RAIN
 NORMAL +19% TO -19%	 SCANTY -60% OR LESS	 NO DATA

Fig. 3. Progress of monsoon week by week, 1 June-30 September 1986

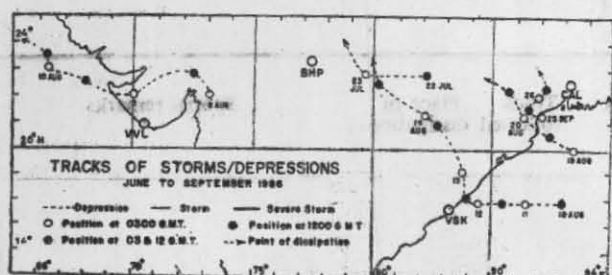


Fig. 4. Tracks of storms/depressions, June to September 1986

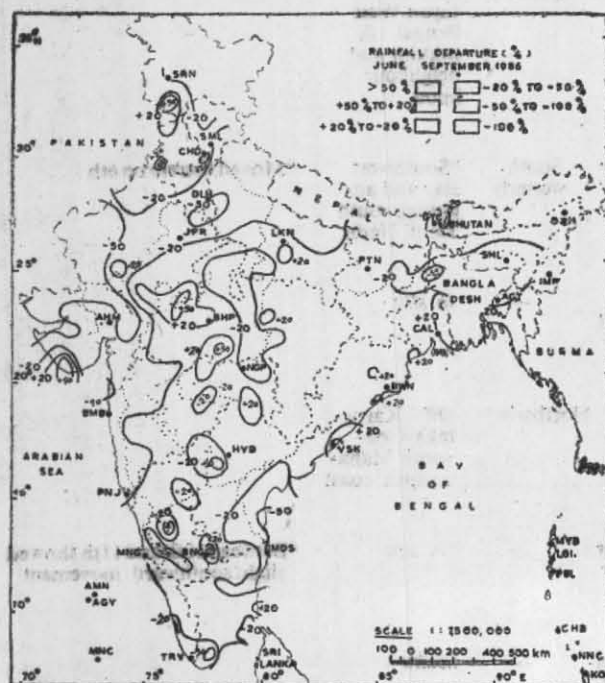


Fig. 5. Rainfall departure (%), June to September 1986

and on next day from east Madhya Pradesh, Marathwada, Vidarbha, Telangana and north interior Karnataka. Withdrawal from northeast India commenced on 16 October, when it retreated from Sub-Himalayan West Bengal & Sikkim and Bihar. By 21 October the withdrawal of monsoon was complete from the Indian sub-continent outside the two southernmost States of Tamil Nadu and Kerala. The withdrawal from northeast India, east Uttar Pradesh, Madhya Pradesh, Maharashtra State, Andhra Pradesh and north interior Karnataka was delayed by about six to ten days and was around normal date from coastal and south interior Karnataka. The dates of withdrawal of southwest monsoon from different meteorological sub-divisions of India are given in Fig. 2.

2.4. Storms and depressions

During the monsoon season of 1986 five depressions developed over the Indian seas and the sub-continent, of which three had developed over the Bay of Bengal and two over the land. Of these five systems, three

formed during the month of August and one each in the month of July and September. The tracks of the depressions are shown in Fig. 4.

3. Significant monthly features

3.1. June

During the month of June no cyclonic storm or depression developed over the Indian seas. However, the thundershower activities over central and north-west India led to excess rainfall over many sub-divisions of these areas.

3.1.1. Features heralding the advance of monsoon during June

Monsoon advanced over Kerala on 4th as a weak current. The synoptic features, which were responsible for the advance of monsoon over the country during June are given in Table 2.

3.1.2. Other synoptic features

Several other cyclonic circulations developed during the month, one of which resulted in the formation of a well marked low pressure area. The systems are listed in Table 3.

Besides these synoptic features, Western Himalayas and neighbourhood had been affected by five western disturbances during the month. Also the trough on sea level chart over Arabian Sea off Maharashtra-Goa-Karnataka coast was observed on most days during the month.

After the setting in of monsoon, it was active or vigorous on five to nine days in Orissa, east Madhya Pradesh, Gujarat region, Konkan & Goa, Madhya Maharashtra, Vidarbha, coastal & south interior Karnataka and Kerala and on one to four days in Arunachal Pradesh, Nagaland, Manipur, Mizoram & Tripura, West Bengal & Sikkim, Bihar, east Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, west Madhya Pradesh, Saurashtra & Kutch, Marathwada, coastal Andhra Pradesh and Telangana. Rain or thundershowers were generally widespread on 21 days over Lakshadweep, on 14 days over Andaman & Nicobar Islands, Assam & Meghalaya and coastal Karnataka and on 5 to 11 days over Arunachal Pradesh, West Bengal & Sikkim, Bihar Plateau, hills of west Uttar Pradesh, Konkan & Goa, Madhya Maharashtra, Vidarbha and Kerala during the month.

3.1.3. Rainfall during the month

It was excess (+20% or more) in Orissa, Bihar Plateau, plains of west Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Madhya Pradesh, Gujarat State, Madhya Maharashtra, Vidarbha, interior Karnataka and Lakshadweep; normal (+19% to -19%) in Bihar plains, east Uttar Pradesh, hills of west Uttar Pradesh, Jammu & Kashmir, Rajasthan, Konkan & Goa, Marathwada, Rayalaseema, coastal Karnataka and Kerala; deficient (-20% to -59%) in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, West Bengal & Sikkim, coastal Andhra Pradesh, Telangana and Tamil Nadu. It was scanty (-6% or less) in Nagaland, Manipur, Mizoram & Tripura.

TABLE 3

Weather system	Period	Place of location	Track followed	Place of dissipation	Special remarks
<i>Cyclonic circulations</i>					
(1) Lower tropospheric levels	31 May-3 Jun	West Madhya Pradesh	—	<i>in situ</i>	
(2) Do.	3rd-10th	Bihar plains and neighbourhood	Westerly	Sub-Himalayan West Bengal & Sikkim and neighbourhood	
(3) Lower & mid-tropos. levels	4th-10th	West central Bay off Andhra coast	South-westerly	*Southwest Bay and adjoining south Tamil Nadu	*Moved therein on 6th
(4) Lower tropospheric levels	4th-10th	Sub-Himalayan West Bengal and Sikkim	—	<i>in situ</i>	
(5) Lower & mid-tropos. levels	7th-10th	East central Arabian Sea off Karnataka coast	Northerly	Off Karnataka-Goa-south Maharashtra coast	
(6) Do.	10th-12th	West central Bay off Andhra coast	—	* <i>in situ</i>	*Between 10th and 11th showed slight southward movement
(7) Lower & mid-tropos. levels	10th evening-12th	East central Arabian Sea off Maharashtra coast	—	<i>in situ</i>	
(8) Do.	12th-15th	Southwest Bay off Tamil Nadu coast	Northerly	East Madhya Pradesh	
(9) Lower levels	13th-16th	Punjab and neighbourhood	Westerly	Himachal Pradesh	
(10) Lower tropospheric levels	24th-28th	Punjab and adjoining northwest Rajasthan	—	<i>in situ</i>	
<i>Low pressure area</i>					
(1) Well marked low pressure area	24th-30th	North Orissa and neighbourhood	Quasi-stationary	Persisted on last day of the month over Gange-tic West Bengal and neighbourhood	Appeared as a cyclonic circulation in the lower troposphere over northwest Bay and adjoining coastal areas on 22nd

Significant amounts (cm) of rainfall were :

- 1st : Turuvekere 15, Hospet 9, Sundernagar 8
 2nd : Cherrapunji 11, Bhira 8, Nanded 7
 3rd : Port Blair 10, North Lakhimpur 7
 4th : Siruguppa 11, Solapur 10, Badami 8
 5th : Gaganbavda & Chakakeri 9 each, Khandala 8
 6th : Shirali 11, Kundapur & Bantwal 8 each, Puttur, Badami, Kozhikode & Cannanore 7 each
 7th : Kondul 8, Nancowry & Bangalore AP 7 each
 8th : Pandharpur 7
 9th : North Lakhimpur & Rupsi 10 each, Silchar 7
 10th : Berhampore 10, Pasighat 7
 11th : Aijal 9, Kalimpong 7
 12th : Aurangabad AP 9, Tiruvella 8
 13th : Mavelikara 13, Kottayam 12, Kayamkulam 11, Hiriya 8, Phulbani & Bombay 7 each
 14th : Kozhikode 14, Kayamkulam 12, Patna AP & Hingoli 9 each, Mangalore AP & Alleppey 7 each
 15th : Honavar 30, Karkala 28, Udupi 27, Karwar & Shirali 22 each, Panambur 19, Goa (Dabolim) 15, Puttur 14, Cannanore 13, Cherrapunji 9, Hyderabad AP 7
 16th : Shirali 28, Vaibhavwadi 22, Rajapur 19, Karwar 17, Ratnagiri & Agumbe 15 each, Sandheads & Bhatkal 14 each, Vengurla 13, Panjim & Bagamandala 12 each, Tezu 8
 17th : Gaganbavda 19, Pasighat, Ratnagiri & Agumbe 15 each, Cooch Behar & Kundapur 13 each, Bantwal 11, Nandurbar, Puttur & Bagamandala 10 each, Puri 9
 18th : Bhira 18, Agumbe 14, Bombay AP 13, Mangalore AP & Kundapur 10 each, Dehra Dun, Dahanu, Mahabaleshwar & Shirali 9 each, Harnai & Udupi 8 each
 19th : Sandheads, Poladpur & Porbandar 17 each, Khandala & Agumbe 14 each, Puttur 13, Gondia & Bhira 11 each, Raigarh & Bagamandala 10 each, Jagdalpur, Bombay AP & Honavar 8 each
 20th : Khandala 26, Rajnandgaon & Veraval 22 each, Raipur 21, Bhira 20, Degloor 18, Okha 15, Mahabaleshwar 13, Bombay 11, Gondia 10.
 21st : Khandala & Mahabaleshwar 19 each, Vidisha & Raisen 17 each, Bhopal AP 16, Agumbe 14, Bhira 12, Rajgarh 11, Veraval & Udgir 10 each, Balaghat 9, Bombay & Ramtak 8 each
 22nd : Khandala 17, North Lakhimpur & Sundarnagar 12 each, Agumbe & Bagamandala 11 each, Mahabaleshwar 10, Veraval & Guna 9 each, Bhira & Ahmedabad AP 8 each
 23rd : Agumbe 22, Bagamandala 15, Raipur 14, Bolan- gir 13, Jharsuguda 12, Khandala & Kasargode 11 each, Mercara & Bhatkal 9 each, Morena, Seoni, Mangalore AP & Cannanore 8 each
 24th : Bagamandala 18, New Kandala 14, Parli 11, Bhaunagar, Gondia, Lucknow AP & Rajnand- gaon 10 each, Baroda, Canning town & Morena 9 each

- 25th : Ferozepore 11, Agumbe & Sambalpur 10 each, Daltonganj & Shajapur 8 each, Ambikapur, Purulia, Patiala & Surat 7 each
 26th : Fazilka 16, Poladpur 14, Hazaribag 10, Raipur 9, Ambone, Gondia, Jharsuguda & Kayamkulam 7 each
 27th : Cherrapunji 16, Ambone, 14, Cochin AP, Mahabaleshwar & Parli 13 each, Cannanore & Trichur 11 each, Bhire & Mannarghat 10 each, Hazaribagh & Sambalpur 9 each, Fatehpur 8
 28th : Chiplun 21, Mahabaleshwar 14, Bagamandala 13, Khandala 12, Ratnagiri & Quilon 10 each, Calcutta AP 9, Cannanore, Durgachak & Honavar 8 each, Baghdogra & Satna 7 each
 29th : Mahabaleshwar 21, Tezpur 18, Kasargode 15, Gaya AP 14, Gaganbavda & Karkala 11 each, Satara 10, Shirali 9, Agumbe, Bhira, Honavar & Mangalore 8 each

3.1.4. Floods and damages during June

As per reports of Central Water Commission (CWC) floods in *Brahmaputra* between 19th and 21st affected 18 villages in Jorhat sub-division and damaged Ahu and Bao crops. Heavy rainfall in Ghatal sub-division in Midnapore district on 30th submerged the low lying areas under water.

3.1.5. Temperature

During the first fortnight of June day temperatures were appreciably above normal ($+4^{\circ}$ to $+5^{\circ}$ C above normal) on several days in Gangetic West Bengal, Orissa, Bihar, Madhya Pradesh, Vidarbha, coastal Andhra Pradesh and Telangana and was so in Rajasthan during the third week of the month. However, day temperatures as low as 8° to 11° C below normal were recorded at a few places in Madhya Pradesh from 22nd to 30th and on two to four days in plains of west Uttar Pradesh, Haryana, Punjab and Vidarbha between 25th and 30th.

3.2. July

3.2.1. Advance of monsoon

By 30 June, monsoon advance over the entire country outside west Rajasthan, where it set in after twentythree days on 24 July with the formation of a cyclonic circulation in the lower levels which was observed over west Rajasthan on 24th (Fig. 1).

3.2.2. Monsoon activity and associated synoptic features

During the month one depression and three low pressure areas besides eleven cyclonic circulations had developed over the Indian sub-continent and adjoining sea areas. Also the extreme north of the country was affected by five western disturbances during the month.

The synoptic features of the month are given in Table 4.

WEATHER

TABLE 4

Weather system	Period	Place of first location	Track followed	Place of dissipation	Special remarks
<i>Depression</i>	22nd evening-23rd evening	East Madhya Pradesh	West-north-westerly	Northwest Madhya Pradesh and neighbourhood	Appeared as a cyclonic circulation in the lower and mid-tropos. levels over west central Bay and adjoining coastal Andhra Pradesh on 16th
<i>Low pressure areas</i>					
(1) Low pressure area	6th-11th	Gangetic West Bengal and neighbourhood	Westerly/north-westerly	West Uttar Pradesh	First observed on 4th as a cyclonic circulation in the mid-tropos. levels over northwest Bay.
(2) Low pressure area	11th-12th	Gangetic West Bengal and adjoining Bihar Plateau	West-north-westerly	East Uttar Pradesh	
(3) Do.	12th-16th	North Bay and adjoining land areas	Westerly	East Madhya Pradesh and adjoining Vidarbha and west Madhya Pradesh	First appeared as a cyclonic circulation in mid trop. levels over west central and adjoining northwest Bay off north Andhra-south Orissa coast on 11th.
(4) Well marked low pressure area†	23rd evening-29th	Northwest Madhya Pradesh and neighbourhood	North-westerly	**Northeast Rajasthan & neighbourhood	Merged with the seasonal trough
<i>(A) Cyclonic circulations</i>					
(1) Lower levels	1st-3rd	Northwest Madhya Pradesh and adjoining south Uttar Pradesh	Easterly	Northeast Madhya Pradesh	
(2) Mid-tropos. levels	3rd-7th	East Central Arabian Sea off Karnataka-Goa-south Maharashtra coast	Southerly	East central Arabian Sea off Karnataka coast	
(3) Lower tropospheric levels/lower levels	7th-12th	North Pakistan & adjoining Punjab and neighbourhood	South-easterly	Punjab and adjoining north-west Rajasthan & neighbourhood	
(4) Lower tropospheric levels	11th-12th	Bihar plains and adjoining Sub-Himalayan West Bengal & Sikkim	—	<i>in situ</i>	
(5) Do.	15th-17th	Haryana and adjoining Rajasthan	—	<i>in situ</i>	
(6) Do.	17th-22nd	East Uttar Pradesh and adjoining northeast Madhya Pradesh	Westerly	Northwest Madhya Pradesh and adjoining south-west U. P.	Merged with the seasonal trough
(7) Lower & mid-tropospheric levels	17th-20th evening	Gujarat State and neighbourhood	—	<i>in situ</i>	
(8) Mid-tropospheric levels	25th-31st	Northwest Bay & neighbourhood	Southerly	—	It lay over west central and adjoining northwest Bay off north coastal Andhra Pradesh-south Orissa coast and extended between 0.3 and 5.8 kma.s. l. on 31st.
(9) Lower levels	27th evening-29th evening	Central Pakistan	North-easterly	Northwest Rajasthan & neighbourhood	
(10) Mid-tropos. levels	29th-31st	Gujarat and adjoining northeast Arabian Sea	North-easterly	Gujarat State and neighbourhood	

†Remnant of the depression.

**Associated cyclonic circulation upto mid-tropos. levels merged with the cyclonic circulation over Gujarat State and neighbourhood by 29th evening.

During the month, monsoon was vigorous on one to three days in Gangetic West Bengal, Orissa, Bihar plains, west Uttar Pradesh, Punjab, Himachal Pradesh, Rajasthan, Madhya Pradesh, Marathwada, Vidarbha and Telangana. It was active on four to six days over Arunachal Pradesh, Assam & Meghalaya, Orissa, hills of west Uttar Pradesh, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh and coastal Karnataka and on one to three days over the rest of the country outside Nagaland, Manipur, Mizoram & Tripura, plains of west Uttar Pradesh, Punjab, Saurashtra & Kutch, Rayalaseema and interior Karnataka, where the number of active days were none. Rainfall was generally widespread on 13 to 19 days in Sub-Himalayan West Bengal & Sikkim, hills of west Uttar Pradesh, Konkan & Goa and coastal Karnataka on 6 to 12 days in Andaman & Nicobar Islands, Assam & adjacent States, Gangetic West Bengal, Bihar, east Uttar Pradesh, Madhya Pradesh, Kerala and Lakshadweep. Rainfall was mainly scattered or isolated over Saurashtra & Kutch, Rayalaseema, Tamil Nadu and south interior Karnataka.

3.2.3. Rainfall during the month

It was excess in Gangetic West Bengal, Bihar plains, Rajasthan and west Madhya Pradesh; normal in Assam & adjacent States, Sub-Himalayan West Bengal & Sikkim, Orissa, Bihar plateau, Uttar Pradesh, Punjab, Himachal Pradesh, Jammu & Kashmir, east Madhya Pradesh and Vidarbha; deficient in Andaman & Nicobar Islands, Haryana, Gujarat region, Konkan & Goa, Madhya Maharashtra, Marathwada, Andhra Pradesh, Tamil Nadu, Karnataka, Kerala and Lakshadweep and scanty over Saurashtra & Kutch.

Significant amounts (cm) of rainfall were :

- | | | | |
|-------|---|-------|--|
| 1st: | Muzaffarpur 19, Alleppey 14, Mangalore AP 12, Honavar 11, Chitradurga & Kozhikode 10 each, Amini Devi, Jogindernagar, Karkala & Patna AP 9 each | 12th: | Senapur 12, Bhagalpur 11, Jammu & Trichur 9 each, Baghdogra, Dharmsala & Ganganagar 7 each |
| 2nd: | Chapra 15, Shirgaon 11, Poladpur 10, Dungarwadi 9, Kasargode, Patna AP & Sapaul 8 each | 13th: | Honavar 14, Kasargode 13, Shirali 12, Bagamandala, Dhamtari & Peermade 11 each, Kundapur 10, Silchar, Sandheads, Tezpur & Yelhanka AP 9 each, Ariyalur & Khairalmal 8 each |
| 3rd: | Moradabad & Port Blair 9 each | 14th: | Agumbe 18, Puttur 13, Bhawanipatna 11, Vengurla 10, Rajgarh 9, Panjim, Pendra & Khandala 8 each, Amini Devi, Dehra Dun, Jagdalpur & Beltangedi 7 each. |
| 4th: | Cherrapunji 14, Pasighat 8, Tezu 7 | 15th: | Khandala 25, Vengurla 20, Agumbe & Shirali 18 each, Kasargode, & Panjim 15 each, Lonavala 13, Karkala 12, Karwar & Mahabaleshwar 11 each, Bantwal 10 |
| 5th: | Sikandarabad 10, Cherrapunji 9, Sambalpur 7 | 16th: | Khandala 33, Dahanu 12, Bagamandala & Peermade 11 each, Karwar 10, Dehra Dun & Mercara 9 each, Bhira, Hosangabad & Mahabaleshwar 8 each |
| 6th: | Gaya AP 17, Tamini 13, Dungarwadi 12, Calcutta & Maya Bandar 11 each, Chapra, Dharmsala & Gangtok 10 each, Bhira, Haldwani & Uluberia 9 each | 17th: | Khandala 20, Ramgundam 13, Katra 12, Kunte 11, Mahabaleshwar 10, Agumbe & Shirali 9 each, Bhira, Dehra Dun & Pathankot 8 each |
| 7th: | Dehra Dun 29, Baijnath 17, Dharmsala 14, Shimla 10, Purulia 9, Bulandshahar & Panagarh 8 each | 18th: | Khandala 33, Akola 26, Billoli 20, Chinnoor & Nizamabad 19 each, Karimnagar 17, Amraoti 16, Bhira 14, Yellapur 12, Dharmsala & Majbat 11 each, Baghdogra & Pendra 10 each |
| 8th: | Salon 27, Deoria 14, Satna 12, Raibareilly & Tezu 11 each, Rajgarh & Sakti 10 each, Gangtok & Gaya AP 9 each, Raigarh & Pasighat 8 each | 19th: | Bhira 21, Igatpuri 17, Bilgram 16, Sudhagad 15, Gwalior, Mahabaleshwar & Yellapur 11 each, Agumbe & Narsinghpur 10 each |
| 9th: | Bhopal 13, Lucknow AP 12, Hasanganj 11, Jhalwar 10, Baghdogra, Kota & Sikar 9 each, Rajgarh & Unnao 8 each | 20th: | Agumbe 19, Bagamandala 16, Morena 15, Chandgad 14, Chiplun & Mahabaleshwar 11 each, Nimbahera 10 |
| 10th: | Badaun 16, Jhalwar 10, Aligarh 9, Datia 8, Fazilka, Pantnagar & Pasighat 7 each | 21st: | Naraj 30, Khurai 28, Agumbe 24, Sehere 21, Cuttack 17, Bhopal AP 14, Talasari 11, Balasore 10 |
| 11th: | Cherrapunji 16, Mukteswar 13, Lucknow AP 10, Chamoli & Pantnagar 8 each, Kanpur AP 7 | 22nd: | Amraoti & Phulbani 23 each, Jabalpur 13, Bolangir 11, Adilabad, Manali & Tikamgarh 10 each, Ambala & Bhopal AP 8 each |
| | | 23rd: | Amraoti 28, Adilabad 25, Cherrapunji 24, Sehere 23, Bhopal AP & Gondia 19 each, Katangi 15, Bilaspur 14, Basmatnagar & Vidisa 13 each |
| | | 24th: | Shajapur 21, Hosangabad & Tarana 18 each, Kurnool 16, Bhopal AP 14, Cherrapunji 13, Mandsaur & Raisen 12 each |
| | | 25th: | Cooch Behar 18, Erinpura Road 17, Ratlam 16, Cherrapunji 13, Arrah & Chittorgarh 12 each, Dungarpur & Ujjain 10 each, Darjeeling 8 |
| | | 26th: | Tonk 13, Ambarpur, Katra & Una 10 each, Sheopur 8, Darbhanga & Rawat Bhata 7 each |
| | | 27th: | Katra 14, Sheopur & Sriniketan 13 each, Dehra Gopipur 12, Baijnath, Kangra & Rawat Bhata 11 each, Koth AP 10, Jabalpur & Ranchi AP 9 each |
| | | 28th: | Jhalwar 19, Katra 10, Nimach 9, Bobbili, Jalandhar, Rawat Bhata & Ujjain 7 each |
| | | 29th: | Jogindernagar 13, Pasighat 12, Jalore 11, Rajur 9, Bhubaneswar AP 8 |
| | | 30th: | Katra 19, Dharmsala 13, Abu 11, Chapra 10, Kangra & Nurpur 8 each, Balasore 7 |
| | | 31st: | Baghdogra 11, Pasighat 9, Jharsuguda & Tadong 8 each, Gangtok & Jammu 7 each |

WEATHER

TABLE 5

Weather system	Period	Place of first location	Track followed	Place of dissipation	Special remarks
<i>Depressions</i>					
(1) Depression	8th-10th	Gujarat region & neighbourhood	West-north-westerly	Northeast Arabian Sea	Appeared as cyclonic circulation in the lower levels on 2nd evening over Gangetic West Bengal and neighbourhood
(2) Deep depression	11th-16th	West central and adjoining north-west Bay	Westerly/north-westerly	Merged with the seasonal trough over northwest M. P. & neighbourhood	Appeared as cyclonic circulation in lower and mid-tropospheric levels over west central Bay on 8th evening. The remnant became less marked over central Uttar Pradesh on 18th
(3) Depression	19th-21st	Northwest Bay	West-north-westerly/northerly and finally recurved to north-east	Northeast Madhya Pradesh and neighbourhood	Appeared as a mid-tropospheric levels cyclonic circulation on 16th evening over north Bay & neighbourhood. The remnant became unimportant over Sub-Himalayan West Bengal & Sikkim on 29th
<i>Low pressure areas</i>					
(1) Low pressure area	6th-7th	Northwest Bay & adjoining coastal Orissa	—	<i>in situ</i>	
(2) Do.	27th-29th	North and adjoining east central Bay	Northerly	North Bay	
<i>Cyclonic circulations</i>					
(1) Lower & mid-tropospheric levels	31 Jul-2 Aug	West central and adjoining northwest Bay off north coastal Andhra Pradesh-south Orissa coast	South-westerly	South Andhra-north Tamil Nadu	
(2) Lower levels	31 Jul-2 Aug	Bihar plains and neighbourhood	Westerly	East Uttar Pradesh	
(3) Mid-tropos. levels	3rd-6th	South Rajasthan and adjoining Gujarat	—	<i>in situ</i>	
(4) Lower tropospheric levels	12th-15th	South Rajasthan and adjoining Gujarat	—	<i>in situ</i>	
(5) Mid and upper tropospheric levels	16th evening-18th	Gujarat State and neighbourhood	—	<i>in situ</i>	
(6) Lower levels	18th-21st	Northwest Rajasthan and adjoining Punjab and neighbourhood	—	<i>in situ</i>	
(7) *Lower & mid-tropospheric levels	27th-31st	Gujarat Region & adjoining west Madhya Pradesh	Westerly	—	*Persisted over Gujarat State and adjoining northeast Arabian Sea on the last day of the month

3.2.4. Floods and damages during July

As per the reports of C.W.C. floods and damages occurred in most of the northern States during the month. Brahmaputra basin in Assam had floods between 18th and 23rd and from 25th onwards. In the first week of the month river *Fulaha* in Malda district was in floods. In Bihar river *Punpun* was in floods in the 1st week. Heavy rain/floods affected 1751 villages in 6 districts of Bihar; 4 human lives were lost and damages to crops and public utilities was estimated about Rs. 17.60 crores. In Uttar Pradesh the number of floods affected villages was 942 in 25 districts. 73 persons lost their lives. Heavy rains and release of water in *Chambal* river from Jawahar Sagar Dam caused floods in the low lying areas of Kota city and Sangod town in Rajasthan on 24th and 25th. It claimed 22 human lives in Kota town. In Maharashtra floods in rivers *Penganga* and *Wainganga* on 24th and 25th disrupted road communication near Bhandara and Penganga bridge. Also river *Narmada* flowed 2.44 m above the submerging road bridge at Mandla on 8th of this month.

3.3. August

3.3.1. Monsoon activity and associated synoptic features

During August three depressions, one of them deep, had developed, two over the Bay of Bengal and one over the land. Besides these two low pressure areas also formed over the Bay of Bengal. During the month extreme north of the country was affected by five western disturbances. A trough in mid and upper tropospheric westerlies had also influenced the weather over Western Himalayas on 13th and 14th of the month.

The details of the synoptic features are given in Table 5.

During the month, monsoon was vigorous on three to five days in Jammu & Kashmir, Madhya Maharashtra, coastal Andhra Pradesh and Telangana and on one to two days in Assam & Meghalaya, Sub-Himalayan West Bengal & Sikkim, Bihar plains, east Uttar Pradesh, Punjab, Rajasthan, Konkan & Goa, Vidarbha, interior Karnataka and Kerala. It was active on five to nine days in Assam & Meghalaya, west Madhya Pradesh, Konkan & Goa and coastal Karnataka and on one to four days in the rest of the country outside Bihar Plateau, Punjab, west Rajasthan, Gujarat region and Rayalaseema, where the number of active days were none. Generally widespread rainfall occurred on eight to fourteen days over Andaman & Nicobar Islands, Lakshadweep, northeast India outside Bihar plains, hills of west Uttar Pradesh, east Madhya Pradesh, Gujarat region, Konkan & Goa and coastal Karnataka. It was scattered or isolated over Tamil Nadu throughout the month.

3.3.2. Rainfall during the month

It was excess in Jammu & Kashmir, Madhya Maharashtra, Vidarbha, coastal Andhra Pradesh, Telangana, coastal and south interior Karnataka; normal in Andaman & Nicobar Islands, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura, east Uttar Pradesh,

Haryana, Punjab, Himachal Pradesh, west Madhya Pradesh, Konkan & Goa, north interior Karnataka, Kerala and Lakshadweep. It was deficient over the rest of the country.

Significant amounts (cm) of rainfall were :

1st	Amloh 18, Kandaghat 17, Dhuri 12, Shahapur 11, Brahmपुरi, Jogindernagar & Jammu 10 each, Devgarh, Jalandhar & Patiala 9 each, Ambala 8
2nd	Cooch Behar 19, Cherrapunji 17, Shirali 15, Ambejogai 11, Banswada 8, Dagloor & Zaheerabad 7 each
3rd	Cherrapunji 12, Pendra 11, Peint, Purulia & Sriniketan 9 each, Mangalore AP & Thanjavur 8 each
4th	Karwar 21, Kangra 20, Dharmasala 14, Khandala 13, Shirali 12, Kankavali & Nowgong 11 each, Goa (Dabolim) 10, Katra 8
5th	Honavar 23, Bhatkal 21, Agumbe 18, Mahabaleshwar & Jammu AP 15 each, Nurpur 13, Ramagundam 12, Panjim 10, Kasargode 9
6th	Khandala 47, Agumbe 19, Bhira 17, Banswada & Shirali 12 each, Chandrapur, Gwalior AP & Mercara 9 each
7th	Gaganbavda 24, Agumbe & Port Blair 17 each, Ratnagiri 16, Bagamandala & Vayittiri 15 each, Honavar, Kottayam & Sonegadh 10 each
8th	Khandala 65, Agumbe 36, Bagamandala 25, Belthangadi 20, Bombay AP 19, Bhira 18, Mahabaleshwar 17, Port Blair & Vayittiri 12 each
9th	Agumbe 28, Gaganbavda 25, Peermade 23, Bhira & Igatpuri 13 each, Mahabaleshwar & Minicoy 12 each, Cochin AP 10, Rajnandgaon 9
10th	Peermade 23, Khandala 20, Mahabaleshwar 14, Adilabad 13, Igatpuri 12, Parli 11, Bhira 9
11th	Peermade 21, Agumbe 16, Khargone 13, Gaganbavda 12, Igatpuri 11, Mercara 10, Mahabaleshwar 9
12th	Kothagudam & Peermade 21 each, Visakhapatnam 18, Shirali 16, Belthangadi 15, Nidadavole 14, Mahabaleshwar 13, Chandrapur 9, Bombay AP 8
13th	Khandala 31, Chandrapur 24, Sironcha 20, Agumbe 19, Nidadavole 17, Mahabaleshwar & Ramagundam 16 each, Dharmasala 15, Bhira 12, Machilipatnam 11
14th	Chandrapur 33, Jogindernagar 28, Dholpur & Sirpur 22 each, Ramagundam 14, Agumbe, Baijnath & Nagpur AP 13 each, Jhalwar & Jagdalpur 12 each
15th	Jabalpur & Shajapur 19 each, Indore 12, Mahabaleshwar 8, Murtizapur & Wardha 7 each

16th	Tarana 15, Najibabad, Nimach & Ujjain 14 each, Banswada & Rawat Bhata 13 each, Bhilwara & Dehra Dun 9 each, Shirali 8.
17th	Sawaimadhapur 26, Bijnore 25, Tezpur 17, Narwar & Tangla 10 each, Bansgaon 8, Khanda 7
18th	Dehra Dun 14, Balmau 13, Fatehpur 12, Ropar 10, Panna 9, Ambala, Baijnath & Daltonganj 8 each
19th	Ambala, Kathua, Jogindernagar & Meerut 9 each, Allahabad 8, Ambikapur, Banda & Paradip 7 each
20th	Mundali 28, Naraj 27, Sambalpur 17, Bhubaneswar AP 14, Daltonganj & Jogindernagar 7 each
21st	Hapur 16, Hasanpur 13, Bijnore 11, Dhuri, Kasauli & Sakti 10 each, Deogaon 9, Ali-garh 8, Jogindernagar 7
22nd	Chapra 17, Motihari 15, Patna AP, Nalagarh & Salempur 11 each, Farrukhabad 10, Mainpuri 8, Silchar 7
23rd	Cooch Behar 21, Supaul 18, Khajuraho 13, Rath 11, Motihari 10, Darjeeling & Jalpai-guri 9 each, Bijnore, Hardoi & Pantnagar 8 each
24th	Pasighat 15, Cherrapunji 12, Gorakhpur 9, Sidhi 8, Allahabad AP & Supaul 7 each
25th	Pasighat & Tikunia 12 each, Katernighat 10, Contai & Jogindrenagar 8 each
26th	Cooch Behar 13, Cherrapunji 11, Sandheads 10, Baghdogra & Pasighat 7 each
28th	Mangrol & Pondicherry 7 each
29th	Thanjavur 9
31st	Baghdogra 19

3.3.3. Flood and damages during August

As per reports of C. W. C. all the north Indian States and Andhra Pradesh came under floods, of these the worst hit region was Andhra Pradesh. The floods in the river *Godavari* from 14th to 17th affected a population of 8.49 lakhs in 3,299 villages, of which 614 villages were marooned in 13 districts. About 8.2 lakhs people had to be evacuated. It took a toll of 147 human lives and damaged crops and public utilities and properties worth Rs. 1,686.74 crores. North and south Bihar and Uttar Pradesh experienced floods during 1st week and in the second fortnight. During the month about 2,810 villages in 23 districts of Bihar and 2,904 villages in 39 districts of Uttar Pradesh were affected by floods. Number of human lives lost were 64 and 82 respectively. Reported damages to crops and public utilities and properties were worth Rs. 93.2 crores in Bihar and Rs. 53.6 crores in Uttar Pradesh. Floods occurred in Brahmaputra basin on 21st. The river *Ganga* was in floods at Farakka in West Bengal during the second fortnight and the river *Chambal* in Rajasthan during 15th to 18th. Parts of Kota city came under water and the road communications were disrupted. Following heavy rain during the first week, flash floods occurred in all the rivers and its tributaries in Jammu & Kashmir affecting Kathua, Jammu, Poonch, Rajouri, Udhampur and

Doda region. Damages to crops and properties were worth about Rs. 2.01 crores and the number of human lives lost reported to have been 5.

As per Press reports heavy rain in the second week also caused floods in Gadchiroli, Chandrapur, Nagpur and Wardha districts in Vidarbha which took a toll of 12 lives in Chandrapur district alone. The estimated cost of damages to crops and properties in the district was about Rs. 10 crores.

3.4. September

3.4.1. Withdrawal of southwest monsoon

The withdrawal of southwest monsoon commenced on 17 September and was complete from the Indian sub-continent outside Tamil Nadu and Kerala on 21 October (Fig. 2).

3.4.2. Monsoon activity and associated synoptic features

In the last week of September a depression formed over Bay of Bengal, track of which is shown in Fig. 4.

During the month the extreme north of the country was affected by five western disturbances.

The synoptic features of the month are given in Table 6.

During the month, monsoon was active to vigorous on seven to eleven days in Assam & Meghalaya, Gangetic West Bengal, south interior Karnataka and Kerala, on three to six days in Arunachal Pradesh, Sub-Himalayan West Bengal & Sikkim, Orissa, Bihar, east Uttar Pradesh, Madhya Maharashtra and Marathwada and on one to two days in Nagaland, Manipur, Mizoram & Tripura, hills of west Uttar Pradesh, east Madhya Pradesh, Andhra Pradesh and coastal Karnataka. Number of active days were none in plains of west Uttar Pradesh, northwest India, west Madhya Pradesh, Gujarat, Vidarbha and north interior Karnataka. Rainfall was generally widespread on fifteen to eighteen days in Andaman and Nicobar Islands and Lakshadweep, on six to eleven days in Assam & adjacent States, Sub-Himalayan West Bengal & Sikkim, hills of west Uttar Pradesh, Rayalaseema and coastal Karnataka and on one to five days in Gangetic West Bengal, Orissa, Bihar, plains of west Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, Jammu & Kashmir, east Madhya Pradesh, Konkan & Goa, Madhya Maharashtra, coastal Andhra Pradesh, Telangana, Tamil Nadu, south interior Karnataka and Kerala.

3.4.3. Rainfall during the month

It was excess in Rayalaseema and Kerala; normal in Andaman & Nicobar Islands, Arunachal Pradesh, Assam & Meghalaya, Gangetic West Bengal, Orissa, Bihar, Tamil Nadu, Kerala and Lakshadweep; deficient in Nagaland, Manipur, Mizoram & Tripura, Sub-Himalayan West Bengal & Sikkim, Uttar Pradesh, Haryana, Punjab, Himachal Pradesh, east Madhya Pradesh, Madhya Maharashtra, Marathwada, coastal Andhra Pradesh, coastal and north interior Karnataka and was scanty over the rest of the country.

TABLE 6

Weather system	Period	Place of first location	Track followed	Place of dissipation	Special remarks
<i>Depression</i>					
(1) Depression	25th-27th	Northwest Bay and neighbourhood	North-west/north-easterly	Gangetic West Bengal and adjoining Bihar	First observed as a cyclonic circulation in lower tropospheric levels over Bangla Desh and adjoining Gangetic West Bengal on 20th
<i>Low pressure areas</i>					
(1) Lower pressure areas	9th-15th	West central and adjoining north-west Bay and the adjoining land areas of coastal Andhra Pradesh and Orissa	North-westerly	East Uttar Pradesh and neighbourhood	Appeared as a cyclonic circulation in the lower and mid-tropospheric levels over west central Bay off coastal Andhra Pradesh on 5th
(2) Low pressure areas†	27th-28th	Gangetic West Bengal and adjoining Bihar	—	<i>in situ</i>	†Remnant of the depression
<i>Cyclonic circulations</i>					
(1) Lower and mid-tropos. levels*	1st-4th	Gujarat State and adjoining north-west Arabian Sea	—	Gujarat State and adjoining northeast Arabian Sea	*Developed on 27 August
(2) Do.	4th-8th evening	Bangla Desh and neighbourhood	Westerly	Bihar plains, and neighbourhood	
(3) Lower tropospheric levels	5th-7th	West Madhya Pradesh and adjoining Gujarat Region & southeast Rajasthan	—	<i>in situ</i>	
(4) Lower & mid-tropos. levels	10th-12th	South Rajasthan	North-easterly	Hills of West Uttar Pradesh and neighbourhood	
(5) Do.	12th-15th evening	Southwest Rajasthan and adjoining Gujarat	North-easterly	Northwest Rajasthan and adjoining Har-yana	
(6) Lower tropos. levels**	15th-19th evening	East Uttar Pradesh and neighbourhood	Easterly	Sub-Himalayan West Bengal and Sikkim	**Remnant of the pressure area over east Uttar Pradesh and neighbourhood
(7) Lower tropospheric levels	15th only	Sub-Himalayan West Bengal and Sikkim	—	Merged with the cyclonic circulation under S.No. 5 in evening;	
(8) Lower & mid-tropos. levels	14th-21st	Southwest Bay off Tamil Nadu coast	Westerly	Lakshadweep and adjoining southeast Arabian Sea	
(9) Do.	16th evening-17th	Southwest Bay off north Tamil Nadu coast	Westerly	Merged with the system under S.No. 10 over Karnataka and neighbourhood	
(10) Lower tropos. levels	18th-20th	South Andhra Pradesh	Westnorth-westerly	North interior Karnataka and neighbourhood	
(11) Do.	21st-30th	Northwest Rajasthan and neighbourhood	Quasi-stationary	Punjab and neighbourhood	

WEATHER

TABLE 6 (contd.)

Weather system	Period	Place of first location	Track followed	Place of dissipation	Special remarks
(12) Lower & mid-tropos. levels	22nd-24th evening	North Andaman Sea	North-westerly	Merged with the circulation of the system over northwest Bay and neighbourhood which became a depression	
(13) Lower tropos. levels	27th-30th	***North Andaman Sea	Westnorth-westerly	***Lay over west central Bay of Andhra coast	
(14) Do.	30th	Northeast Madhya Pradesh and neighbourhood	—	—	
(15) Do.	30th	North Andaman Sea	—	—	Moved from the east

Significant amounts (cm) of rainfall were :

1st	Bangalore AP 11, Ambur 10, Kancheepuram & Vallore 9 each, Malavelli 8	23rd	Chennapatna 12, Mysore 10, Belthangadi 9, Manaparai & Pasighat 8 each, Tiruthuraiipoondi 7
2nd	Jogindernagar & Tekkali 7 each	24th	Balasore 25, Digha & Sandheads 16 each, Contai 15, Paradip 13, Agumbe & Ponneri 8 each, Mysore 7
3rd	Champua 9, Pasighat 8	25th	Sandheads 59, Rajghat 29, Bijnore 21, Uluberia 17, Kunnamkulam, & Narsapur 15 each, Gingee 12, Yellapur 10, Bangalore AP 9, Pasighat 8, Najibabad, Satara & Trichur 7 each
4th	Baghdogra AP & Cooch Behar 17 each, Krishnanagar 16, Dibrugarh AP 11, Pasighat 7	26th	Uluberia 29, Calcutta 26, Kasargode & Harihara 12 each, Ganganavda & Pauri 9 each, Ambur & Konkavali 8 each
5th	Maya Bandar 9	27th	Berhampore 11, Badhana, Puri & Visakhatnam 8 each, Kalingapatnam 7
6th	Karkala 7	28th	Cherrapunji 22, Bijnore 16, Chamrajenagar 13, Atrauli, Bhadravatty & Purshotampur 11 each, Bareilly, Berhampore & Sawai-Madhpor 7 each
8th	Colgong 12, Taibpur 8, Nahan 7	29th	Ambala AP 15, Berhampore 13, Vaikom 9, Natham & Usilampatti 7 each
9th	Berhampore 11, Nirmal & Tiruvur 9 each, Basmatnagar 8, Kurnoor, Parkal & Zaheerabad 7 each	30th	Kardarighat 17, Banswara & Jogindernagar 10 each, Akhuapada, Alleppey & Kayamkulam 8 each, Aruppukottai & Vridhunagar 7 each
10th	Belgaon 10, Cooch Behar 9, Sonapur & Taibpur 8 each		
11th	Tangla 15, Barkot 12, Arrah & Sohella 10 each, Kursela 9, Dhanbad, Kailashahar, Kalimpong & Lumding 7 each		
12th	Jawa 16, Purnea 14, Cooch Behar 10, Baghdogra 9, Allahabad, Cherrapunji, Jabalpur & Pasighat 7 each		
13th	Puri 14, Sivganga 11, Allahabad AP & Silchar 9 each, Mussoorie & Sabour 8 each, Gondia 7		
14th	Cherrapunji 27, Darauli 14, Koraghar 9, Bagati (Magra) & Tezu 8 each, Konta, Jagayyapet & Pasighat 7 each		
15th	Supaul 19, Basua 14, Silchar 9, Tangla 8		
16th	Cooch Behar 13, Chennapatna 12, Bangalore AP 11, Malavalli 10, Gwalior 8, Gulbarga, Hosur & Sripalpur 7 each		
17th	Calcutta AP 14, Mandya & Mancompu 9 each, Jagalur 8, Kottayam 7		
18th	Shirali 11, Bhatkal & Sangareddy 8 each, Mannarghat 7		
19th	Sherthala 8, Chalisgaon, Hungund, Jamkhed, Khuldabad & Siruguppa 7 each		
20th	Long Island 9		
21st	Shirol 13, Kunnamkulam 9, Holenarsipur & Nilambur 8 each, Sono 7		
22nd	Trichur 11, Jajuri 9, Bangalore & Cunnore 8 each		

3.4.4. Floods and damages during September

As per reports of C.W.C. Bihar and Uttar Pradesh experienced floods in the 2nd and 3rd week of the month. The death toll in Uttar Pradesh due to floods and heavy rain rose to 61 during the month and that to 38 in Bihar. The number of villages affected by floods/heavy rains during the month were 1,425 in Bihar and 1,306 in Uttar Pradesh. Damages to crops and properties and public utilities were worth about Rs. 8.75 crores in Bihar during the month. According to press reports major rivers in Arunachal Pradesh were in spate during the second week. Heavy rain over Gangetic West Bengal from 23rd to 26th caused deluge in Calcutta and in the districts of Howrah, Hooghly, Midnapore and 24-Parganas. It claimed 18 lives and rendered roofless over 6.15 lakhs people.