

*South-West Monsoon- 2007 : An Overview** (June 1 to September 30, 2007)

Introduction

Agriculture, the centre of the rural livelihood security system, forms the mainstay of the Indian economy. Despite decline of its share in the GDP, agriculture is still the largest employer and plays a significant role in the overall socio-economic development of the country. Due to a large rain dependent tract in the country, rain bearing monsoon plays a critical role in determining agricultural production in the country. There are two Indian monsoon seasons- (i) rainy South-West monsoon (June-September) and (ii) post-monsoon also known as North-East monsoon (October-December). The success or failure of the crops is more closely associated with the spatial and temporal distribution of rainfall during the South-West monsoon as it brings most of the rainfall (about 80 per cent of the total) during a year in the country. This article reviews the performance of South-West monsoon during 2007.

South-West Monsoon 2007-Highlights

- The long term mean date of South-West monsoon onset over Kerala is June 1, which has a standard deviation of about one week. Monsoon covers the whole country by July 15.
- During the year 2007, the South-West monsoon arrived over Kerala on May 28, 2007, four days ahead of the normal date.
- After a brief spell of hiatus during the early June in the advancement of monsoon due to the formation of a Super Cyclone "Gonu" over the East-Central

* Prepared in the Division of Rural Economics, Department of Economic Analysis and Policy.

Arabian Sea, the South-West monsoon covered the North-Eastern States by June 10, peninsular and central India by June 25 and subsequently the entire country on July 4, nearly 11 days ahead of the normal schedule.

- The South-West monsoon season rainfall over the country as a whole was 105 per cent of its Long Period Average (LPA). The LPA of South-West monsoon rainfall averaged over the country as a whole is about 890 mm (based on the 1941-1990 data) with a coefficient of variation of 10 per cent.
- Among the four broad homogeneous regions¹, while the South-West monsoon season rainfall was below normal in the North-West India (85 per cent of LPA), it was above normal in the South Peninsula (126 per cent of LPA), Central India (108 per cent of LPA) and North-East India (104 per cent of LPA).
- Five sub-divisions (West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh and East Madhya Pradesh²) experienced moderate drought²

¹ The four broad homogeneous regions are: 1) **North-West India** (Uttar Pradesh, Rajasthan, Haryana, Chandigarh and Delhi, Punjab, Uttaranchal, Himachal Pradesh and Jammu and Kashmir); 2) **Central India** (Madhya Pradesh, Chhattisgarh, Maharashtra, Orissa, Gujarat and Goa); 3) **South Peninsula** (Andhra Pradesh, Karnataka, Tamil Nadu and Pondicherry, Kerala, Lakshadweep and Andaman and Nicobar Islands); and 4) **North-East India** (Bihar, Jharkhand, West Bengal, Sikkim, Assam, Arunachal Pradesh, Meghalaya, Nagaland, Manipur, Mizoram, Tripura).

² According to India Meteorological Department, the departure of aridity index from the normal value is expressed in percentage and accordingly drought is categorised as severe (more than 50 per cent), moderate (26 per cent to 50 per cent) and mild (up to 25 per cent).

conditions (rainfall deficiency of 26 to 50 per cent) at the end of the season.

- This year, there was an unusual delay in the withdrawal of monsoon from extreme West Rajasthan due to cyclonic circulations, availability of moisture and sporadic rainfall over the region. The South-West monsoon withdrew from the Western parts of Rajasthan and some parts of Punjab and Haryana on September 30, 2007. The normal date of withdrawal from West Rajasthan is September 15.
- South-West monsoon withdrew entirely from the country, Bay of Bengal and Arabian Sea on October 22, 2007. Simultaneously, the North-East monsoon rains commenced over Tamil Nadu and adjoining States of South Peninsula on October 22, 2007.

Forecast of South-West Monsoon

India Meteorological Department (IMD) has been adopting a two-stage forecast strategy for the South-West monsoon rainfall since 2003. The first forecast for South-West monsoon rainfall comes out in the month of April using the data up to March. It also issues updated forecasts using the data up to May in the month of June, which also includes forecast for the July rainfall over the country as a whole and seasonal rainfall over the four broad homogeneous regions of India. IMD in its first stage Long Range Forecast issued on April 19, 2007 had indicated that the rainfall during the South-West Monsoon Season (June-September) 2007 for the country as a whole was likely to

be 95 per cent of the Long Period Average (LPA) with a model error +/-5 per cent. Subsequently, in the update issued on June 29, 2007, the Long Range Forecast for the South-West monsoon season rainfall was placed at 93 per cent of the LPA with a model error of +/- 4 per cent. Actual precipitation during the South-West monsoon at 105 per cent of the LPA turned out to be better than the IMD's initial and updated forecasts (Table 1).

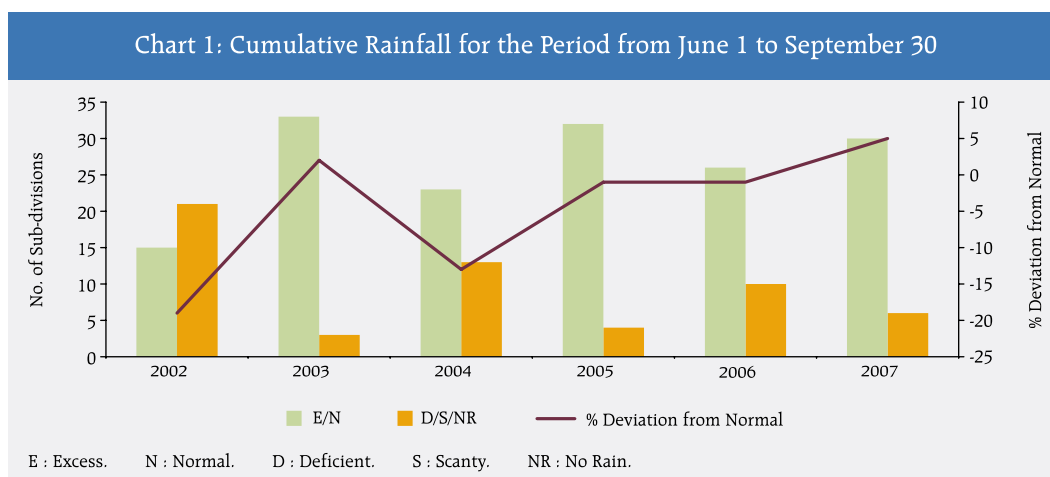
Cumulative Rainfall During South-West Monsoon 2007

The season ended with the area-weighted rainfall for the country as a whole at 105 per cent of the LPA, more than the upper bound of the IMD's long range forecast. Of the 36 meteorological sub-divisions, cumulative rainfall was excess/normal in 30 sub-divisions (26 sub-divisions during last year) and deficient/scanty/no rain in 6 sub-divisions (10 sub-divisions during last year) (Chart 1, Table 2 and Statement 1).

Year	IMD's Forecast (% of LPA)	Actual Rainfall (% of LPA)	Kharif foodgrains production (% change)
1997	92	102	-2.4
1998	99	106	0.5
1999	111	96	2.5
2000	99	92	-3.2
2001	98	92	9.8
2002 *	101	81	-22.2
2003	96	102	34.1
2004	100	87	-11.7
2005	98	99	6.3
2006	92	99	0.6
2007	93	105	1.6

* : Drought year
Source : IMD, Ministry of Agriculture, Government of India.

Monsoon activity was subdued in the beginning of the season. Large rainfall deficiency was observed during the first week of June, third and fourth week of July and third week of August. During the rest of the season rainfall was well-distributed in time. Cumulative rainfall over the country



**Table 2: Distribution of Sub-divisions
According to Category of Rainfall**

Category of Rainfall	Sub-divisions
Excess	Gangetic West Bengal, Orissa, Bihar, Uttaranchal, Gujarat Region, Daman, Dadra and Nagar Haveli, Saurashtra and Kutch, Madhya Maharashtra, Coastal Andhra Pradesh, Rayalaseema, North and South Interior Karnataka, Kerala, Lakshadweep.
Normal	Andaman and Nicobar Islands, Assam and Meghalaya, Nagaland, Manipur, Mizoram and Tripura, Sub-Himalayan West Bengal and Sikkim, Jharkhand, East Uttar Pradesh, Jammu and Kashmir, West Rajasthan, East Rajasthan, West Madhya Pradesh, Konkan and Goa, Marathwada, Vidarbha, Chhattisgarh, Telangana, Tamilnadu and Pondicherry, and Coastal Karnataka.
Deficient	Arunachal Pradesh, West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh, and East Madhya Pradesh.

Source : India Meteorological Department.

as a whole remained always above normal since the last week of June. The month-wise distribution shows that rainfall was above normal in June (19 per cent) and September (18 per cent), while it was only marginally below normal during July (3 per cent) and August (1 per cent) (Chart 2 and Table 3).

**Table 3: Month-wise Rainfall
during S-W Monsoon**

Month	Per cent Departure from Normal	
	2006	2007
June	-13	19
July	-2	-3
August	5	-1
September	-1	18

Source : IMD.

Among the four homogeneous regions, the South-West monsoon rainfall over North-West India was below its LPA by 15 per cent. However, over the South Peninsula, Central India and North-East India seasonal rainfall was above its LPA by 26, 8 and 4 per cent, respectively. The above-average performance of the monsoon rainfall over the country was mainly due to the excess rainfall observed over South Peninsula and Central India as may be seen from the Table 4.

District Level Cumulative Rainfall During South-West Monsoon 2007

Out of 513 meteorological districts for which data were available, 72 percent of the

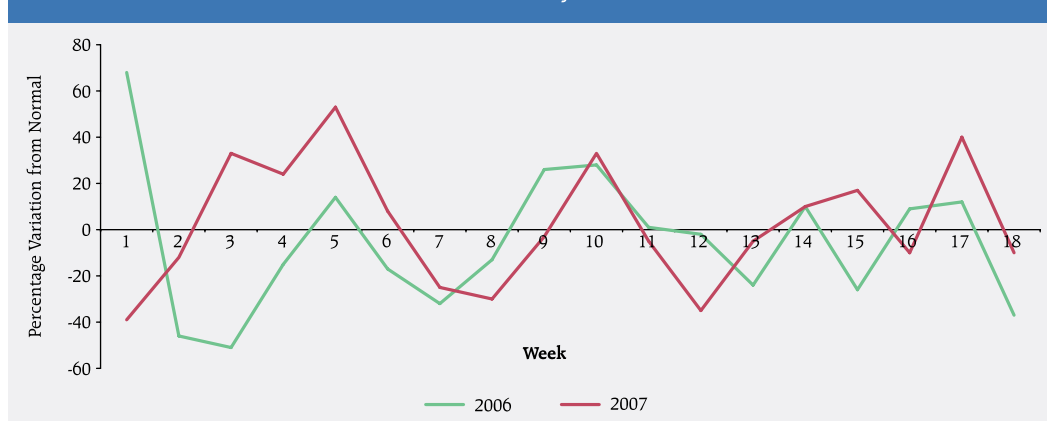
Chart 2: Weekly Rainfall

Table 4: Region –wise Rainfall during the South-West Monsoon 2007

Region	Normal (mm)	Actual (mm)		Percentage Departure	
		2006	2007	2006	2007
All-India	892.2	886.6	936.9	-1	5
North-West India	611.6	573.7	520.8	-6	-15
Central India	993.9	1152.2	1073.8	16	8
South Peninsula	722.6	684.6	907.3	-5	26
North-East India	1427.3	1177.6	1485.9	-17	4

Source : IMD

meteorological districts received excess/normal rainfall and the remaining 28 per cent received deficient/scanty rainfall during the season. Seventy seven districts (15 per cent) experienced moderate drought conditions and 30 districts (6 per cent) experienced severe drought conditions at the end of the season. Some of the North-Western and Central Region States such as Uttar Pradesh (68 per cent), Haryana (89 per cent), Punjab (69 per cent), Himachal Pradesh (58 per cent), Rajasthan (44 per cent), Madhya Pradesh (53 per cent) and Chhattisgarh (31 per cent) witnessed deficient/scanty rainfall in a significant proportion of the total districts in the State (Statement II).

Reservoir Status

In India the Central Water Commission monitors the total live water storage in the 81 major reservoirs having full reservoir level (FRL) of 151.77 billion cubic metres

(BCM), which accounts for around 72 per cent of the total reservoir capacity of the country. As on September 27, 2007 water stock in these 81 major reservoirs was 79 per cent of the FRL (Table 5). However, this was lower than 87 per cent during the corresponding period of the previous year but higher than the average of 67 per cent during the last 10 years. Satisfactory water storage position augurs well for the ongoing rabi season.

Progress of Sowing

The sowing position of kharif crops has improved during 2007-08 (as on October 19, 2007) with reported sown area of 104.1 per cent of the normal which was about 2.8 per cent higher than the previous year. Improvement in sown area for many crops has been due to the satisfactory monsoon and prevailing remunerative market prices. While foodgrains crops such as pulses and rice have shown improvement in area sown, coarse grains except in the

Table 5: Reservoir Status

Status As On	27.09.2003	27.09.2004	27.09.2005	27.09.2006	27.9.2007
Total Live Storage (BCM)	78.696	84.397	103.300	132.541	120.448
Percentage to Live Capacity at FRL	52	56	75	87	79

Source : Central Water Commission

case of maize, witnessed some decline. Among non-foodgrains, area covered under oilseeds, sugarcane and cotton increased (Table 6).

Table 6: Summary of Progress of Kharif Crop (Area Coverage)					
(Area in Million Hectares)					
Crop	Normal Area	Area Coverage			
		(as reported on October 19)			
		2007-08	2006-07	Difference	% change
Rice	38.2	37.3	37.1	0.2	0.5
Coarse Cereals	22.9	22.0	22.1	-0.1	-0.3
<i>of which:</i>					
Jowar	4.4	3.6	3.8	-0.2	-5.7
Maize	6.2	7.5	6.8	0.6	8.9
Bajra	9.4	8.7	9.3	-0.6	-6.3
Total Pulses	10.9	12.5	11.4	1.2	10.3
Total Kharif Oilseeds	15.4	17.8	16.8	0.9	5.5
<i>of which:</i>					
Sunflower	0.5	0.7	0.9	-0.1	-14.3
Sesamum	1.5	1.7	1.8	-0.1	-7.5
Groundnut	5.5	5.4	4.8	0.6	12.3
Soyabean	6.6	8.8	8.1	0.6	7.9
Sugarcane	4.2	5.1	4.8	0.3	5.6
Cotton	8.3	9.3	8.9	0.4	3.9
All Crops	100.8	104.9	102.1	2.8	2.8

Source : Ministry of Agriculture, Government of India.

Statement I : Basic Rainfall Data (Cumulative)								
Sub-Divisions	June 1 to September 30, 2007				June 1 to September 30, 2006			
	Actual (mm)	Normal (mm)	% deviation from Normal		Actual (mm)	Normal (mm)	% deviation from Normal	
1. Andaman & Nicobar Islands	1702.4	1755.2	-3	N	1305.0	1755.0	-26	D
2. Arunachal Pradesh	1461.9	1834.9	-20	D	1295.0	1835.0	-29	D
3. Assam & Meghalaya	1702.2	1885.3	-10	N	1189.0	1885.0	-37	D
4. Nagaland, Manipur, Mizoram & Tripura	1285.0	1240.9	4	N	979.0	1241.0	-21	D
5. Sub-Himalayan West Bengal and Sikkim	2063.0	1955.4	6	N	1708.0	1955.0	-13	N
6. Gangetic West Bengal	1648.6	1136.3	45	E	1335.0	1136.2	17	N
7. Orissa	1442.0	1164.9	24	E	1550.0	1165.0	33	E
8. Jharkhand	1217.7	1092.5	11	N	1209.0	1093.0	11	N
9. Bihar	1359.5	1039.2	31	E	910.0	1039.0	-12	N
10. East Uttar Pradesh	747.8	913.6	-18	N	701.0	914.0	-23	D
11. West Uttar Pradesh	473.2	772.8	-39	D	441.0	773.0	-43	D
12. Uttaranchal	1519.1	1223.1	24	E	955.0	1223.0	-22	D
13. Haryana, Chandigarh & Delhi	312.5	470.0	-34	D	288.0	470.0	-39	D
14. Punjab	355.4	501.8	-29	D	437.0	502.0	-13	N
15. Himachal Pradesh	498.0	773.7	-36	D	593.0	774.0	-23	D
16. Jammu & Kashmir	498.1	513.6	-3	N	679.0	514.0	32	E
17. West Rajasthan	231.4	262.8	-12	N	333.0	263.0	27	E
18. East Rajasthan	527.5	623.6	-15	N	690.0	624.0	11	N
19. West Madhya Pradesh	861.0	904.3	-5	N	1062.0	904.0	17	N
20. East Madhya Pradesh	765.3	1097.4	-30	D	903.0	1097.0	-18	N
21. Gujarat Region, Daman, Dadra & Nagar Haveli	1164.3	933.6	25	E	1449.0	934.0	55	E
22. Saurashtra & Kutch	889.2	485.7	83	E	700.0	486.0	44	E
23. Konkan and Goa	3316.6	2802.1	18	N	2997.0	2802.0	7	N
24. Madhya Maharashtra	904.9	700.1	29	E	1113.0	700.0	59	E
25. Marathwada	655.2	704.3	-7	N	724.0	704.0	3	N
26. Vidarbha	1075.1	976.2	10	N	1056.0	976.0	8	N
27. Chhattisgarh	1099.1	1205.8	-9	N	1077.0	1206.0	-11	N
28. Coastal Andhra Pradesh	747.2	575.2	30	E	576.0	575.0	0	N
29. Telangana	798.4	767.3	4	N	830.0	767.0	8	N
30. Rayalaseema	741.8	380.9	95	E	320.0	381.0	-16	N
31. Tamil Nadu & Pondicherry	338.9	315.6	7	N	248.2	316.0	-21	D
32. Coastal Karnataka	3588.0	3173.9	13	N	3092.0	3174.0	-3	N
33. North Interior Karnataka	686.3	490.9	40	E	433.0	491.0	-12	N
34. South Interior Karnataka	917.2	659.3	39	E	614.0	659.0	-7	N
35. Kerala	2783.2	2143.0	30	E	2021.0	2143.0	-6	N
36. Lakshadweep	1467.1	985.2	49	E	928.0	985.0	-6	N
All India	936.9	892.2	5	N	886.6	892.2	-1	N
E : Excess, i.e., +20% or more				13				6
N : Normal, i.e., +19% to -19%				17				20
D : Deficient, i.e., -20% to -59%				6				10
S : Scanty, i.e., -60% to -99%				0				0
NR: No Rain, i.e. -100%				0				0
Total				36				36

Source : India Meteorological Department.

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South-West
Monsoon-2007 :
An Overview

Statement II: Statewise Distribution of Per Cent of Districts with Excess, Normal, Deficient, Scanty and No Rainfall					
Sr. No.	State/UT	June 1 to September 30			
		2006		2007	
		E/N	D/S/NR	E/N	D/S/NR
1	A & N Island (UT) [2]	50	50	100	0
2	Arunachal Pradesh [13]	38	62	67	33
3	Assam [22]	43	57	100	0
4	Meghalaya [3]	33	67	100	0
5	Nagaland [4]	0	100	50	50
6	Manipur [3]	50	50	0	100
7	Mizoram [2]	100	0	100	0
8	Tripura [3]	67	33	100	0
9	Sikkim [1]	100	0	100	0
10	West Bengal [17]	88	12	94	6
11	Orissa [30]	97	3	100	0
12	Jharkhand [15]	82	18	92	8
13	Bihar [32]	60	40	88	12
14	Uttar Pradesh [64]	28	72	32	68
15	Uttaranchal [12]	42	58	73	27
16	Haryana [19]	5	95	11	89
17	Chandigarh (UT) [1]	0	100	0	100
18	Delhi (UT) [1]	0	100	100	0
19	Punjab [16]	47	53	31	69
20	Himachal Pradesh [12]	50	50	42	58
21	Jammu & Kashmir [11]	90	10	80	20
22	Rajasthan [32]	50	50	56	44
23	Madhya Pradesh [45]	62	38	47	53
24	Chhattisgarh [16]	56	44	69	31
25	Gujarat [25]	100	0	100	0
26	Dnh & Daman (Uts) [1]	100	0	100	0
27	Diu (UT) [1]	—	—	—	—
28	Goa [1]	100	0	100	0
29	Maharashtra [33]	97	3	97	3
30	Andhra Pradesh [23]	74	26	96	4
31	Tamilnadu [30]	43	57	90	10
32	Pondicherry (UT) [1]	0	100	100	0
33	Karnataka [27]	48	52	96	4
34	Kerala [14]	93	7	100	0
35	Lakshadweep (UT) [1]	100	0	100	0
36	All India [533]	59	41	72	28

- : Not Available.

Note : Figures in square brackets are the total number of districts in the respective States/UTs.

E : Excess (+20% or more deviation from the Long Period Average(LPA))

N : Normal (+19% to -19% deviation from the LPA)

D : Deficient (-20% to -59% deviation from the LPA)

S : Scanty (-60% to -99% deviation from the LPA)

NR : No Rain (-100% deviation from the LPA)

Source : India Meteorological Department.