

South-West Monsoon 2006: An Overview*

(June 1 to September 30, 2006)

INTRODUCTION

Agriculture in India continues to be monsoon dependent. There are two Indian monsoon seasons, viz., South-West, covering the period from June to September and North-East from October to December. However, the success or failure of the crops is more closely associated with the performance of the South-West monsoon, which accounts for 80 per cent of the country's annual rainfall. The vagaries of the South-West monsoon with regard to the time of onset, as also its temporal and spatial distribution have a profound impact on the agricultural economy of the country. As two-thirds of the cultivated area is still unirrigated, agronomic potential is largely determined by the progress and performance of the South-West monsoon.

SOUTH-WEST MONSOON 2006 - HIGHLIGHTS

- During the year 2006, the South-West monsoon arrived over Kerala on May 26, almost a week prior to the normal date. Monsoon covered the entire country by July 24, with a delay of 9 days.
- There was a prolonged hiatus during the South-West monsoon 2006 from June 7 to June 22, 2006. The second hiatus lasted for 8 days (July 1 to July 8, 2006).
- The South-West monsoon rainfall over the country as a whole was 99 per cent of the Long Period Average (LPA), which was higher than India Meteorological Department (IMD) forecast.

- Five sub-divisions (Andaman and Nicobar Islands, Arunachal Pradesh, Assam and Meghalaya, West Uttar Pradesh and Haryana experienced moderate drought¹ conditions (rainfall deficiency of 26 per cent to 50 per cent) at the end of the season.
- This year, the South-West monsoon withdrew from the entire country by October 17, 2006.

FORECAST OF SOUTH-WEST MONSOON

The IMD has been issuing two stage operational long range forecasts of the South-West monsoon rainfall since 2003 using statistical methods. The first forecast for South-West monsoon rainfall comes out in the month of April. IMD also issues updated forecasts by the end of June, which also includes forecast for the July rainfall over the country as a whole and seasonal rainfall over the four broad homogeneous regions² of India.

As per the long range forecast of IMD issued in April 2006, the South-West monsoon 2006 rainfall for the country as a whole was expected to be near normal at 93 per cent of LPA with a model error of +/- 5 per cent. The updated forecast issued on June 30, 2006 placed it at 92 per cent of LPA with a model error of +/- 4 per cent. The actual rainfall during the South-West monsoon was 99 per cent of the normal, as compared with the forecast of 92 per cent of the normal made by the IMD. Incidentally, IMD's forecast of South-West monsoon which has generally been off the mark turned out to be accurate in 2005 as the actual rainfall was 99 per cent of the normal, while the prediction was 98 per cent of normal (Table 1).

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¹ 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).

² The four broad homogeneous regions are: 1) **North-West India** (UP, Rajasthan, Haryana, Chandigarh and Delhi, Punjab, Uttaranchal, Himachal Pradesh, and J&K); 2) **Central India** (Madhya Pradesh, Chhatisgarh, Orissa, Maharashtra and Gujarat); 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 and Tripura).

Table 1: IMD's Forecast of South-West Monsoon Rainfall and Actual

(As Per cent of Normal)

Year	IMD's Forecast	Actual
1997	92	102
1998	99	106
1999	111	96
2000	99	92
2001	98	92
2002*	101	81
2003	96	102
2004	100	87
2005	98	99
2006	92	99

* Drought year.

Source : IMD.

CUMULATIVE RAINFALL 2006

The cumulative area-weighted rainfall during the South-West monsoon (June 1 to September 30, 2006) turned out to be 1 per cent below normal, and was same as that during the corresponding period of the previous year (June 1 to September 30, 2005).

Of the 36 meteorological sub-divisions, cumulative rainfall was excess/normal³ in 26 sub-divisions (32 sub-divisions during last year) and deficient/scanty[§]/no rain in 10 sub-divisions (4 sub-divisions during last year) (Chart 1, Table 2 and Statement 1).

Chart 1: South-West Monsoon Cumulative Rainfall (June 1 to September 30)

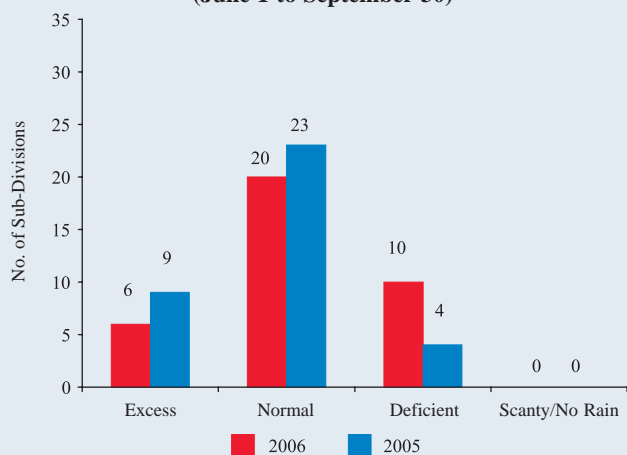


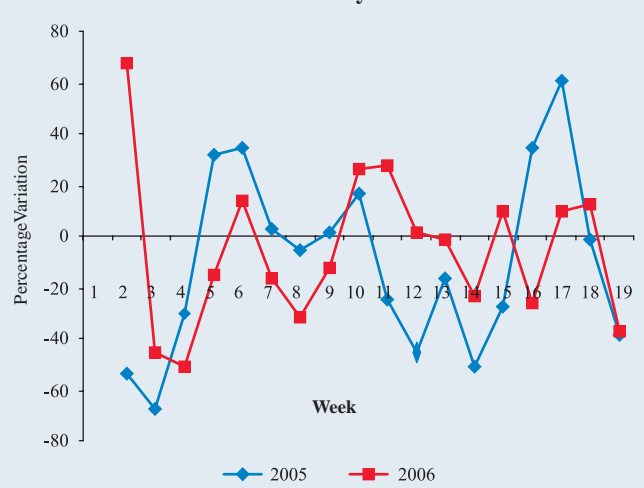
Table 2: South -West Monsoon

Year	Cumulative Rainfall: Above (+)/ Below (-) Normal (per cent)	Rainfall			
		Excess	Normal	Deficient	Scanty/ No Rain
		Number of Sub-Divisions (Total=36)			
1	2	3	4	5	6
2001	-8	1	30	5	0
2002	-19	1	14	19	2
2003	2	7	26	3	0
2004	-13	0	23	13	0
2005	-1	9	23	4	0
2006	-1	6	20	10	0

Source: IMD.

During the season, rainfall was not well distributed in time and space. Large rainfall deficiency was observed from the second to the fourth week of June and July, last week of August and during the middle of September, 2006 (Chart 2). The rainfall over the country as a whole was below normal in June (13 per cent below LPA) and near normal in July (2 per cent below LPA) and September (1 per cent below LPA). However, monsoon was active in August with excess rainfall (5 per cent above LPA) (Table 3). The excess rainfall during the first three weeks of August, especially over Central India, was responsible for the revival of the rainfall scenario over the country.

Chart 2: Weekly Rainfall



³ Excess: + 20 per cent or more; Normal: + 19 per cent to -19 per cent.

[§] Deficient: -20 per cent to -59 per cent; Scanty: -60 per cent to -99 per cent.

No Rain: -100 per cent (All with respect to the Long Period Average).

Table 3: Month-wise Rainfall during South-West Monsoon

Month	Per cent Departure from Normal	
	2005	2006
June	-12	-13
July	14	-2
August	-28	5
September	17	-1

Source : IMD.

Among the four homogeneous regions, South-West monsoon rainfall over North-West India (6 per cent) and South Peninsula (5 per cent) was below its LPA. Further, the largest deficiency was observed over North-East India (17 per cent). The near normal performance of the monsoon rainfall over the country was contributed mainly by the excess rainfall observed over Central India (16 per cent) as may be seen from the Table 4.

Table 4: Region-wise Rainfall during the South-West Monsoon-2006

Region	Actual (mm)	Normal (mm)	Percentage Departure
All-India	886.6	892.2	-1
North-West India	573.7	611.6	-6
Central India	1152.2	993.9	16
South Peninsula	684.6	722.6	-5
North-East India	1177.6	1427.3	-17

Source : IMD.

DISTRICT LEVEL CUMULATIVE RAINFALL DURING SOUTH-WEST MONSOON 2006

Out of 533 meteorological districts, 59 per cent of the meteorological districts received excess/normal rainfall, while the remaining 41 per cent received deficient/scanty rainfall during the season (Statement 2). Further, 130 districts (25 per cent) experienced moderate drought and 30 districts (6 per cent) experienced severe drought conditions at the end of the season.

RESERVOIR STATUS

The Central Water Commission monitors the total live water storage in the 76 major reservoirs accounting for around 63 per cent of the total reservoir capacity of the country. As on September 28, 2006, the total live water storage was 91 per cent of the Full Reservoir Level (FRL) and 111 per cent of last year's level. The water storage

Table 5: Reservoir Status

Status As On	28.09.2003	28.09.2004	28.09.2005	28.09.2006
Total Live Storage (BCM)	77.706	83.832	108.062	120.451
Percentage to Live Capacity at FRL	58	63	81	91

Source : Ministry of Water Resources, Government of India.

position during the corresponding period of last year stood at 81 per cent of FRL (Table 5).

PROGRESS OF SOWING

Agricultural production in India continues to be heavily dependent on the performance of South-West monsoon as it is crucial for production of major *kharif* crops, such as rice, coarse cereals, *kharif* pulses and oilseeds (mainly groundnut and soyabean). *Kharif* sowing during 2006 was affected due to uneven and delayed rainfall in some parts of the country. As a result, area coverage under *kharif* crops up to September 29, 2006 was around 2.1 per cent lower than a year ago (Table 6). The decline in area coverage was mainly on account of decline in sowing under coarse cereals and oilseeds. Rice witnessed only a marginal decline in area sown.

Table 6: Summary of Progress of *Kharif* Crop (Area Coverage)

(Area in Million Hectares)

Crop	Normal Area	Area Coverage (as reported on 29.9.06)			
		2006-07	2005-06	Difference	% change
Rice	38.2	36.1	36.3	-0.2	-0.5
Coarse Cereals	22.9	20.6	22.2	-1.5	-6.8
<i>Of which</i>					
Jowar	4.4	3.6	3.8	-0.1	-3.8
Maize	6.2	7.2	6.8	0.4	6.6
Bajra	9.4	8.0	9.4	-1.4	-14.6
Total Pulses	10.9	11.2	11.2	0.0	0.3
Total <i>Kharif</i> Oilseeds	15.4	16.4	17.4	-1.0	-5.6
<i>Of which</i>					
Sunflower	0.5	0.8	0.9	-0.1	-9.6
Sesamum	1.5	1.7	1.8	0.0	-2.3
Groundnut	5.5	4.7	5.6	-0.9	-15.3
Soyabean	6.6	8.1	7.8	0.3	4.0
Sugarcane	4.2	4.4	4.3	0.2	3.9
Cotton	8.3	8.9	8.4	0.4	5.1
All Crops	99.8	97.7	99.8	-2.0	-2.1

Source : Ministry of Agriculture, Government of India.

Statement 1 : Cumulative Rainfall

Sub-Divisions	June 1 to September 30, 2006				June 1 to September 30, 2005			
	Actual (mm)	Normal (mm)	% deviation from Normal		Actual (mm)	Normal (mm)	% deviation from Normal	
Andaman & Nicobar Islands	1304.5	1755.2	-26	D	1555.0	1755.2	-11	N
Arunachal Pradesh	1294.6	1834.9	-29	D	1602.9	1834.9	-13	N
Assam & Meghalaya	1188.9	1885.3	-37	D	1440.8	1885.3	-24	D
Nagaland, Manipur, Mizoram & Tripura	979.2	1240.9	-21	D	956.4	1240.9	-23	D
Sub-Himalayan West Bengal and Sikkim	1708.3	1955.4	-13	N	1813.1	1955.4	-7	N
Gangetic West Bengal	1334.7	1136.3	17	N	972.2	1136.3	-14	N
Orissa	1550.1	1164.9	33	E	1158.4	1160.0	0	N
Jharkhand	1209.1	1092.5	11	N	716.1	1104.6	-35	D
Bihar	910.2	1039.2	-12	N	819.0	1048.2	-22	D
East Uttar Pradesh	701.1	913.6	-23	D	747.1	913.6	-18	N
West Uttar Pradesh	440.8	772.8	-43	D	694.4	772.8	-10	N
Uttaranchal	955.3	1223.1	-22	D	1333.9	1223.1	9	N
Haryana, Chandigarh & Delhi	288.4	470.0	-39	D	474.8	470.0	1	N
Punjab	437.3	501.8	-13	N	464.1	501.8	-8	N
Himachal Pradesh	592.6	773.7	-23	D	709.4	773.7	-8	N
Jammu & Kashmir	678.9	513.6	32	E	449.8	513.6	-12	N
West Rajasthan	333.4	262.8	27	E	218.4	262.8	-17	N
East Rajasthan	689.7	623.6	11	N	584.5	623.6	-6	N
West Madhya Pradesh	1062.2	904.3	17	N	761.1	904.3	-16	N
East Madhya Pradesh	903.4	1097.4	-18	N	1312.7	1097.4	20	E
Gujarat Region, Daman, Dadra & Nagar Haveli	1448.9	933.6	55	E	1384.1	933.6	48	E
Saurashtra & Kutch	699.8	485.7	44	E	637.2	485.7	31	E
Konkan and Goa	2997.4	2802.1	7	N	3485.5	2802.1	24	E
Madhya Maharashtra	1112.5	700.1	59	E	1011.1	700.1	44	E
Marathwada	723.7	704.3	3	N	758.3	704.3	8	N
Vidarbha	1056.1	976.2	8	N	1049.8	976.2	8	N
Chhattisgarh	1077.5	1205.8	-11	N	1080.8	1205.8	-10	N
Coastal Andhra Pradesh	576.4	575.2	0	N	634.7	575.2	10	N
Telangana	829.9	767.3	8	N	966.9	767.3	26	E
Rayalaseema	320.3	380.9	-16	N	463.7	380.9	22	E
Tamil Nadu & Pondicherry	248.2	315.6	-21	D	294.2	315.6	-7	N
Coastal Karnataka	3092.4	3173.9	-3	N	2941.6	3173.9	-7	N
North Interior Karnataka	433.1	490.9	-12	N	609.4	490.9	24	E
South Interior Karnataka	613.6	659.3	-7	N	842.1	659.3	28	E
Kerala	2021.3	2143.0	-6	N	2245.1	2143.0	5	N
Lakshadweep	928.2	985.2	-6	N	1011.0	985.2	3	N
All India	886.6	892.2	-1	N	879.3	892.5	-1	N
Number of Sub-Divisions								
Excess				6				9
Normal				20				23
Deficient				10				4
Scanty				0				0
No Rain				0				0
Total				36				36

Excess: + 20 per cent or more; Normal: + 19 per cent to -19 per cent.

Deficient: -20 per cent to -59 per cent; Scanty: -60 per cent to -99 per cent.

No Rain: -100 per cent (All with respect to the Long Period Average).

Statement 2 : State-wise Distribution of No. of Districts according to Quantum of Rainfall

June 1, 2006 to September 30, 2006							
STATE/UT	E	N	D	S	NR	ND	TOTAL
A & N Islands (UT)	0	1	1	0	0	0	2
Arunachal Pradesh	2	3	5	3	0	0	13
Assam	0	9	12	0	0	1	22
Meghalaya	0	1	1	1	0	0	3
Nagaland	0	0	3	1	0	0	4
Manipur	0	1	1	0	0	1	3
Mizoram	1	1	0	0	0	0	2
Tripura	0	2	1	0	0	0	3
Sikkim	0	1	0	0	0	0	1
West Bengal	3	12	2	0	0	0	17
Orissa	21	8	1	0	0	0	30
Jharkhand	5	4	1	1	0	4	15
Bihar	1	14	10	0	0	7	32
Uttar Pradesh	0	18	41	5	0	0	64
Uttaranchal	0	5	5	2	0	0	12
Haryana	0	1	15	3	0	0	19
Chandigarh (UT)	0	0	1	0	0	0	1
Delhi (UT)	0	0	1	0	0	0	1
Punjab	3	4	8	0	0	1	16
Himachal Pradesh	1	5	5	1	0	0	12
Jammu & Kashmir	5	4	1	0	0	1	11
Rajasthan	10	6	16	0	0	0	32
Madhya Pradesh	15	13	17	0	0	0	45
Chhattisgarh	0	9	7	0	0	0	16
Gujarat	22	3	0	0	0	0	25
Dadra and Nagar Haveli & Daman (UTs)	0	1	0	0	0	0	1
Diu (UT)	0	0	0	0	0	1	1
Goa	0	1	0	0	0	0	1
Maharashtra	12	20	1	0	0	0	33
Andhra Pradesh	6	11	6	0	0	0	23
Tamilnadu	2	11	17	0	0	0	30
Pondicherry (UT)	0	0	1	0	0	0	1
Karnataka	3	10	14	0	0	0	27
Kerala	0	13	1	0	0	0	14
Lakshadweep (UT)	0	1	0	0	0	0	1
Total	112	193	195	17	0	16	533
Percent Distribution of Districts according to Category of Rainfall	22	37	38	3	0	0	100

E : Excess. N : Normal. D : Deficient.
S : Scanty. NR : No Rain. ND : No Data.

Source: India Meteorological Department.