

*Drought – National Drought Mitigation Center*

*Drought Network News (1994-2001)*

---

University of Nebraska - Lincoln

Year 1994

---

## Droughts over Homogeneous Regions of India: 1871—1990

B. Parathasarathy\*

A. A. Munot<sup>†</sup>

D. R. Kothawale<sup>‡</sup>

\*Indian Institute of Tropical Meteorology, Pune, India

<sup>†</sup>Indian Institute of Tropical Meteorology, Pune, India

<sup>‡</sup>Indian Institute of Tropical Meteorology, Pune, India

This paper is posted at DigitalCommons@University of Nebraska - Lincoln.

<http://digitalcommons.unl.edu/droughtnetnews/67>

# Droughts over Homogeneous Regions of India: 1871–1990\*

B. Parthasarathy, A. A. Munot, and D. R. Kothawale  
 Indian Institute of Tropical Meteorology  
 Pune, India

The summer monsoon (June through September), or southwest seasonal rains, contribute 78% of India's annual rainfall. It is the greatest climatic water resource of India. The country's agriculture and food production depend on these rains. Rainfed farming areas in India account for about 70% of the total arable land in the country, with nearly 100 million ha depending on the monsoon rains. The rains also contribute to power generation and industrial production.

It is well known that the summer Indian monsoon phenomenon is the result of a series of physical processes over the Asian region and adjoining seas during the pre-monsoon months, March–May. The fluctuations in the quantity of monsoon rainfall over different parts of the country have an important bearing on agriculture and living conditions. Many recent studies aimed at the understanding or prediction of monsoon rainfall behavior over India have considered the country as one unit—All-India. The Indian monsoon rainfall over different regions is known to have considerable spatial variability, which imposes certain limitations on the All-India average rainfall used at present. Monsoon rainfall also shows conspicuous episodic variations in its association with different circulation parameters. Parthasarathy et al. have divided the country into 5 homogeneous macroregions (Figure 1)

Region	No. of Sub-divisions	% Area of India	Mean JJAS Rainfall (mm)	% of Annual Amount	Standard Deviation (mm)	CV %
Northwest	6	22.0	490.0	89.9	132.4	27.0
West Central	8	33.4	933.2	86.3	126.0	13.5
Central Northeast	5	19.9	1002.4	83.3	112.7	11.2
Northeast	4	9.3	1419.2	68.7	121.3	8.6
Peninsular	6	15.4	659.4	57.0	98.3	14.9

Table 1. Statistical details of homogeneous regions of India, 1871–1990.

by analyzing the 29 subdivisional monsoon rainfall series (prepared on the basis of 306 fixed well-distributed rain gages in the plain regions of India, each one properly weighted) for 1871–1990, with similar rainfall characteristics and association with 12 regional/global circulation parameters. The statistical details of this analysis are presented in Table 1.

It is difficult to define drought (dry) conditions precisely over a region, but in general terms, it can be regarded as the condition in which water is insufficient to meet the requirements of plants, animals, and humans of that region. Therefore, a monsoon rainfall year over a region is classified as dry when  $R_i \leq R - S$  and wet when  $R_i \geq R + S$ , where  $R_i$  is the monsoon rainfall of the  $i$ th year,  $R$  the mean, and  $S$  the standard deviation of the series. This classification is considered rational for the tropical regions with high spatial and temporal variability of rainfall, where the crop growth and water requirement and management are tuned to the local conditions of the region.

Table 2 shows the drought years over different regions of India on a decadal basis. Table 2 shows that during the periods 1899–1925 and 1962–87, many below-normal rainfall years with drought conditions were observed.

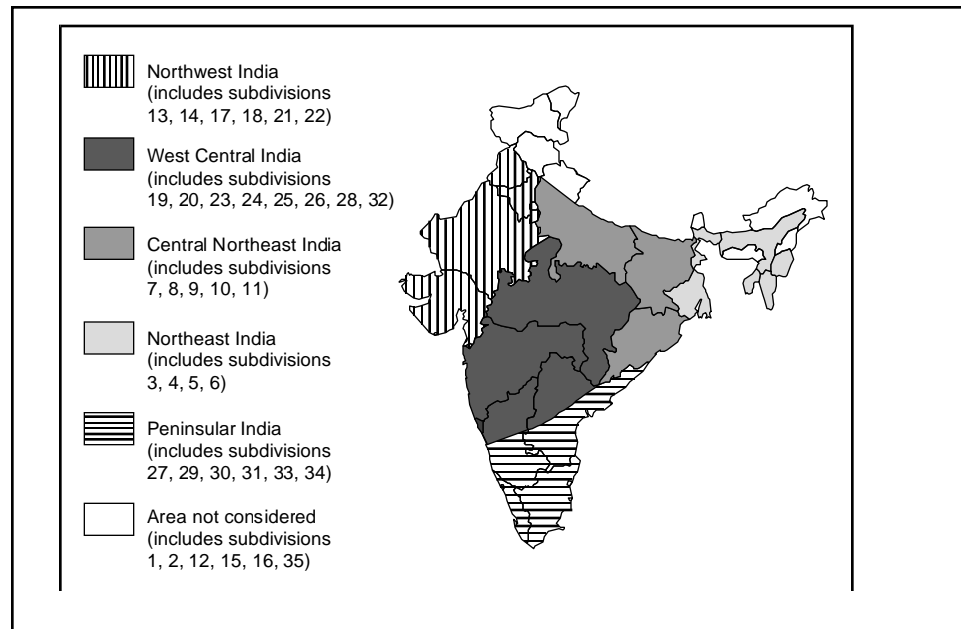


Figure 1. Homogeneous regions of India.

Decade	All-India	North-West	Central	Central NE	North-east	Peninsular
1871-80	1873	1877	1877	1873	1873	1873
	1877			1877		1876
				1878		1880
1881-90	—	—	—	—	1884	1881
						1884
1891-1900	1899	1899	1899	—	1891	1891
					1892	1899
					1896	
					1900	
1901-10	1901	1901	1902	1901	—	1905
	1904	1904	1904	1903		
	1905	1905	1905	1907		
1911-20	1911	1911	1911	1918	1914	1911
	1918	1915	1913			1913
	1920	1918	1918			1918
			1920			
1921-30	1928	1925	—	1928	1925	1930
1931-40	—	1938	—	1932	—	1934
		1939				
1941-50	1941	1948	1941	—	—	1952
1951-60	1951	1951	1951	1951	1957	—
				1954	1958	
				1959	1959	
1961-70	1965	1965	1965	1965	1961	—
	1966	1968	1966	1966	1962	
	1968		1968	1968	1967	
1971-80	1972	1972	1972	1972	1972	1972
	1974	1974	1974	1974	1975	1976
	1979		1979	1979	1980	
1981-90	1982	1982	1984	1987	1981	1987
	1985	1985	1985		1982	1990
	1986	1986	1987		1986	
	1987	1987				
Total	22	21	20	19	20	18

Table 2. Drought years over different regions of India, 1871–1990.