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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)

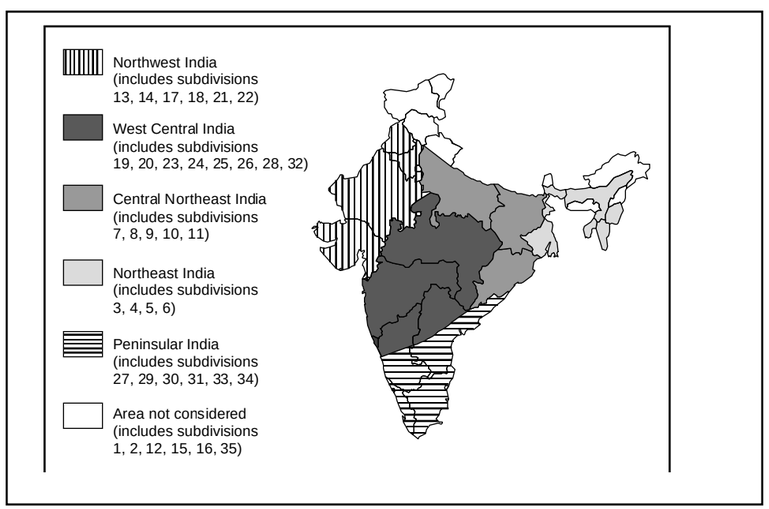

Figure 1. Homogeneous regions of India.

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 ith 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.

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

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

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