

# Rainfall Patterns for India's Karnataka State Show Above-Normal Precipitation for 1994–98\*

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The Karnataka state, confined roughly within 11.5° N and 18.5° N latitude and 74° E and 78.5° E longitude, is situated on a table land at the point where the western and eastern Ghat range enclose the Nilgiri hill complex. It is enclosed by chains of mountains to its west, east, and south. The state consists mainly of plateau, with a higher elevation of 600 to 900 m amsl in small portions of the extreme north and northwest Karnataka and the whole of the southern half, an elevation of 300 to 600 m amsl in the north, and an elevation of less than 300 m amsl in the narrow coastal belt of the state (see map above). Using Koppen's climatic classification, the state is classified into three main parts, coastal Karnataka (CK), north interior Karnataka (NIK), and south interior Karnataka (SIK).

The state's normal rainfall (1930–70) is 1,212.5 mm. Annual rainfall of CK is 741.0 mm; NIK, 743.8 mm; and SIK, 1,064 mm. SIK is divided into two sections, based on the altitude: SIK (Plain) and SIK (Ghat). SIK (Plain) receives 743.5 mm and SIK (Ghat) receives 2,046 mm. The annual rainfall

and mean monthly rainfall of these four climatic zones are computed with daily rainfall data collected from the 1,069 rain gages that are installed in the zones. A distinguished bimodel pattern of rainfall can be observed in SIK (Plain) and NIK, and unimodel patterns are observed in the SIK (Ghat) and CK. SIK (Plain) receives 100.0 mm during May and 142.0 mm during October. May rainfall is useful for land preparation, and sowing can be started during subsequent rains. The sowing period is selected so that the maximum water use by plants coincides with the October rains. Similarly, NIK receives 143.8 mm during July and 156.3 mm during September. Sowing in this zone could be done during July, and the crop could be grown up to November. SIK (Ghat) and CK receive 803.2 mm and 1,256.0 mm, respectively, during July. Since most of these areas are forested, rain water generally is not needed for crops but is useful for storage in reservoirs for hydroelectric projects.

The arithmetic mean for annual rainfall for Karnataka for 1950–90 is 1,197.39 mm with a standard deviation of 190.9233 mm and a coefficient of variance of 15.94%. The annual rainfall follows a cycle of 16 years. During the first cycle, a negative mean deviation of 17.7% (1950–57) occurred in the first half cycle and a positive mean deviation of 13.4% (1958–64) occurred in the second half cycle. In the second cycle, a negative mean deviation of 6.3% (1965–73) and a positive mean deviation of 8.6% (1974–81) occurred. During the third half cycle, a negative mean deviation of 6.7% (1982–90) occurred. As a result of these cycles, the second half of the third cycle is expected to deviate positively. This has been supported with the rain received during 1991 and 1992. The rainfall data received during 1993 is still being processed, but it is expected to follow the same trend. The period of the second half cycle of the third cycle is expected to deviate positively. According to this analysis, the remaining 5 years of the third cycle (1994–98) are expected to receive above-normal rainfall.

Districts	50–57	%Dev.	58–64	% Dev.	65–72	% Dev.	73–81	% Dev.	82–90	% Dev.
Bangalore	793.9	0.0	856.2	7.9	855.1	7.8	969.1	22.1	755.3	-4.8
Belgaum			910.2	16.0	742.3	-5.4	857.9	9.3	660.9	-15.8
Bellary	888.5	54.5	635.5	10.5	554.6	-3.5	655.3	14.0	610.6	6.2
Bidar			1,045.5	15.2	732.5	-19.3	929.5	2.4	1,001.9	10.4
Bijapur			637.0	15.2	557.7	0.9	685.3	24.0	562.3	1.7
C. Magalore	2,086.0	4.8	2,175.1	9.3	1,791.3	-10.0	2,034.0	2.2	1,667.0	-16.2
Chitradurga	617.7	6.6	608.9	5.1	531.0	-8.3	592.4	2.3	556.9	-3.9
D. Kannada			4,498.8	14.4	3,846.2	-2.2	4,286.3	9.0	3,700.6	-5.9
Dharwar			783.4	13.4	729.3	5.5	808.9	17.0	664.3	-3.9
Gulbarga			883.9	25.9	684.4	-2.5	1,021.4	45.4	825.5	17.5
Hassan	963.8	-7.4	1,137.0	9.2	899.0	-13.6	1,057.7	1.6	858.2	-17.5
Kodagu			3,201.3	17.5	2,343.2	-14.0	2,818.2	3.4	2,281.9	-16.3
Kolar	753.0	3.1	733.5	0.4	711.6	-2.6	797.5	9.2	649.6	-11.1
Mandya	799.9	15.7	748.5	8.3	650.4	-5.9	729.7	5.6	655.6	-5.2
Mysore	742.4	-2.6	865.0	13.5	634.7	-16.7	821.0	7.8	678.2	-11.0
Raichur			622.0	3.4	559.8	-7.0	751.2	24.9	617.8	2.7
Shimoga	1,634.7	7.1	1,837.6	20.4	1,406.0	-7.9	1,489.0	-2.4	1,355.6	-11.2
Tumkur	695.7	1.1	703.4	2.3	676.8	-1.6	807.6	17.4	695.6	1.1
U. Kannada			3,248.4	17.5	2,676.4	-3.2	2,900.3	4.9	2,695.9	-2.5
<b>State</b>	<b>997.6</b>	<b>-17.7</b>	<b>1,375.3</b>	<b>13.4</b>	<b>1,135.9</b>	<b>-6.3</b>	<b>1,316.4</b>	<b>8.6</b>	<b>1,131.3</b>	<b>-6.7</b>

Table 1. Karnataka state rainfall deviations in different periods.