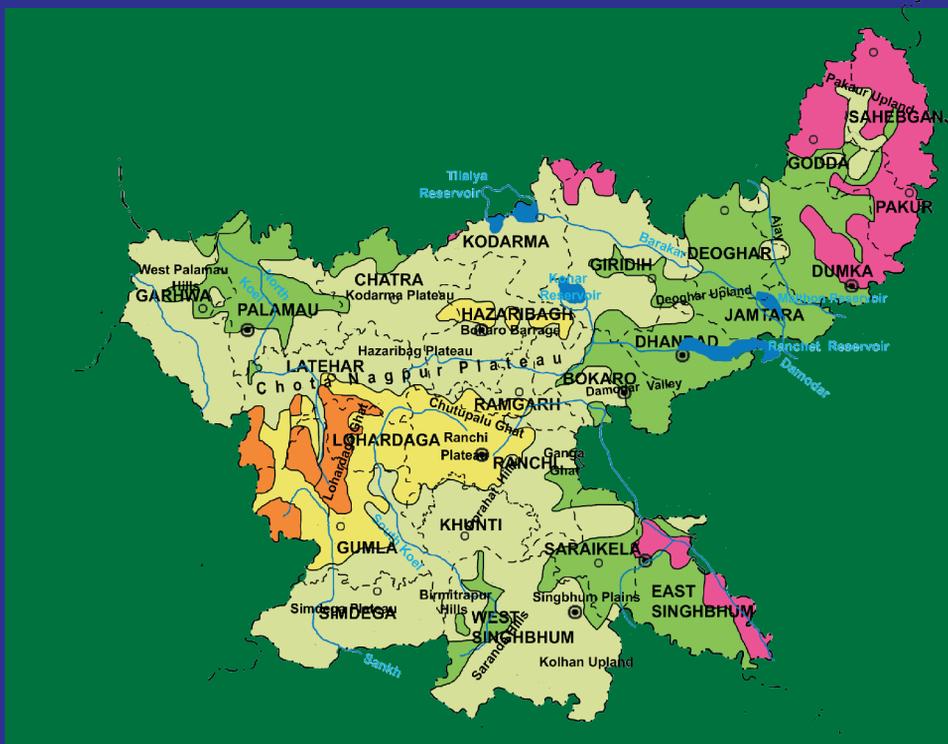




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भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

# झारखण्ड की जलवायु CLIMATE OF JHARKHAND



CLIMATOLOGICAL SUMMARIES OF STATES SERIES - No. 17

ISSUED BY

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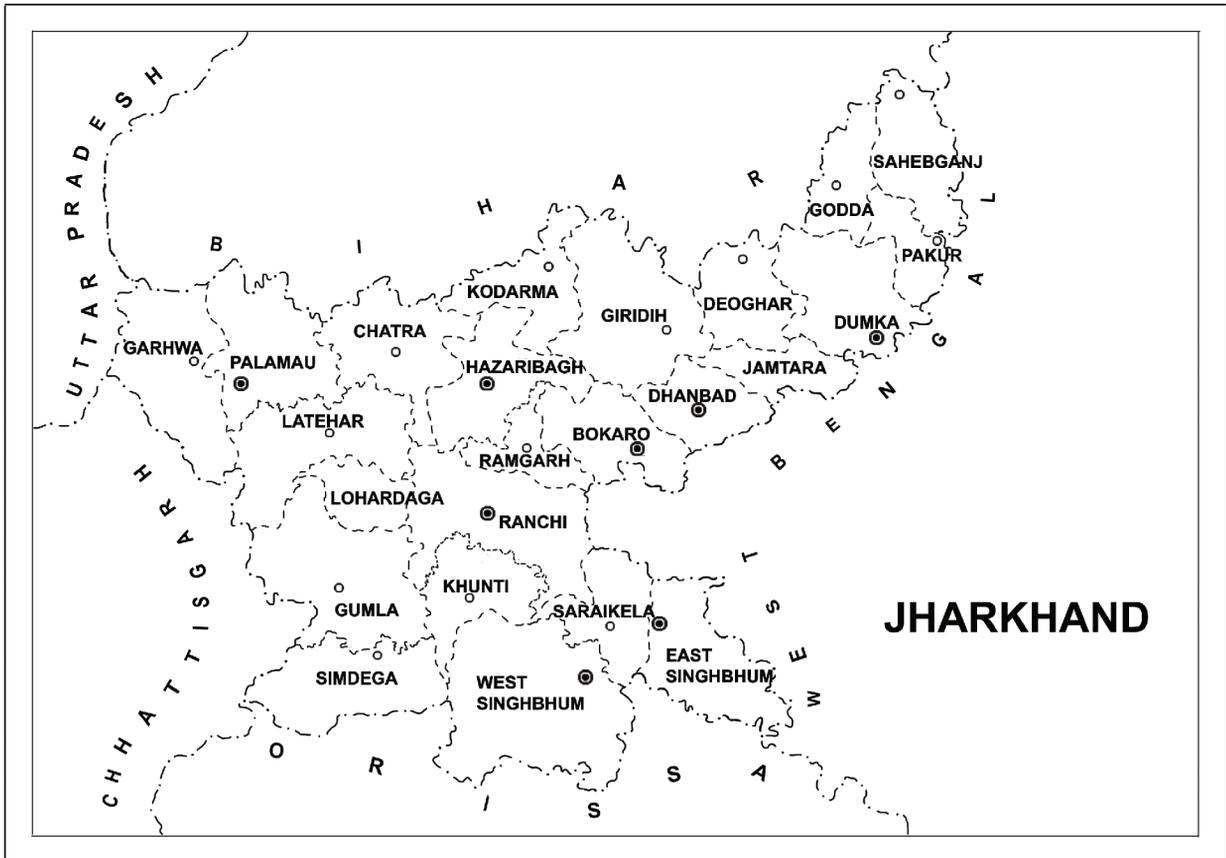
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# CLIMATE OF JHARKHAND



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# *P R E F A C E*



The importance of meteorology and its economic and social benefits are being increasingly realised all over the world. In our country also, various sectors like agriculture, aviation, power and energy, tourism, shipping, transport industry etc., require climatological information pertaining to different regions of the country, for planning and executing the different projects, with a view to derive maximum advantage from meteorological and/or climatological conditions. Keeping these requirements in view, it was decided by India Meteorological Department to publish a series of "Climatological Summaries" for each state in the country, incorporating the district climatological summaries. The seventeenth issue in the series of 'State Climatological Summaries' is "Climate of Jharkhand".

The present publication contains an extensive information on rainfall in Jharkhand state and in all districts of the state based on the available rainfall data for the period 1951-2000. The climatological data in respect of temperatures, wind, clouds and other weather parameters for the period from 1961-1990 and information on droughts, excessive rainfall, depressions and cyclonic storms are also included in the publication.

The climatological summary and related maps have been prepared by Shri S.M. Deshpande, Smt. U.S. Satpute, Smt. P.R. Iyer, Shri. R.S. Wayal, Smt. P.P. Bhagwat and Shri A.B. Dhule from "Climatological Publications Section" of the Office of the Additional Director General of Meteorology (Research), India Meteorological Department, Pune. The contributions of Shri K.K. Raina and Shri Philipose Abraham have been very vital.

The publication has been prepared by Dr. T.P. Singh, Director and reviewed by Dr. A.L. Koppar, DDGM(C). Dr.A.B. Mazumdar, LACD-ADGM(R) provided the overall guidance for this publication. I appreciate their sincere efforts.

NEW DELHI  
August, 2011

**AJIT TYAGI**  
DIRECTOR GENERAL OF METEOROLOGY

**INDIA METEOROLOGICAL DEPARTMENT  
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17	Abstract	The publication contains extensive information on the climate of Jharkhand and its districts based on rainfall, temperature, winds, clouds and other weather parameters. The information on droughts, excessive rainfall, depressions and cyclonic storms are also included in the publication.
18	Key words	State Summary, District Summary, Physical Features, Climatic Classification, Heaviest Rainfall, Highest Maximum Temperature, Lowest Minimum Temperature, Rainfall Variability, Seasonal Rainfall, Annual Rainfall, Mean Maximum Temperature, Mean Minimum Temperature.

# *INTRODUCTION*



The climatology of the state of Jharkhand in terms of various meteorological parameters is described in the first chapter. It is followed by a detailed description of the climate of each district in the succeeding chapters. In this publication, the districts of Jharkhand state which were in existence as on 1<sup>st</sup> January 2010, have been considered and the climatology of these districts, arranged in alphabetical order is presented.

The normals of meteorological parameters used for describing the climate are generally based on data for the period 1961 to 1990, except in the case of rainfall. The normals of rainfall are based on the data for the period 1951 to 2000. The extreme values of temperature and rainfall presented in the publication are based on the updated data upto the year 2010 and 2006 respectively. These data are obtained from National Data Centre, Pune.

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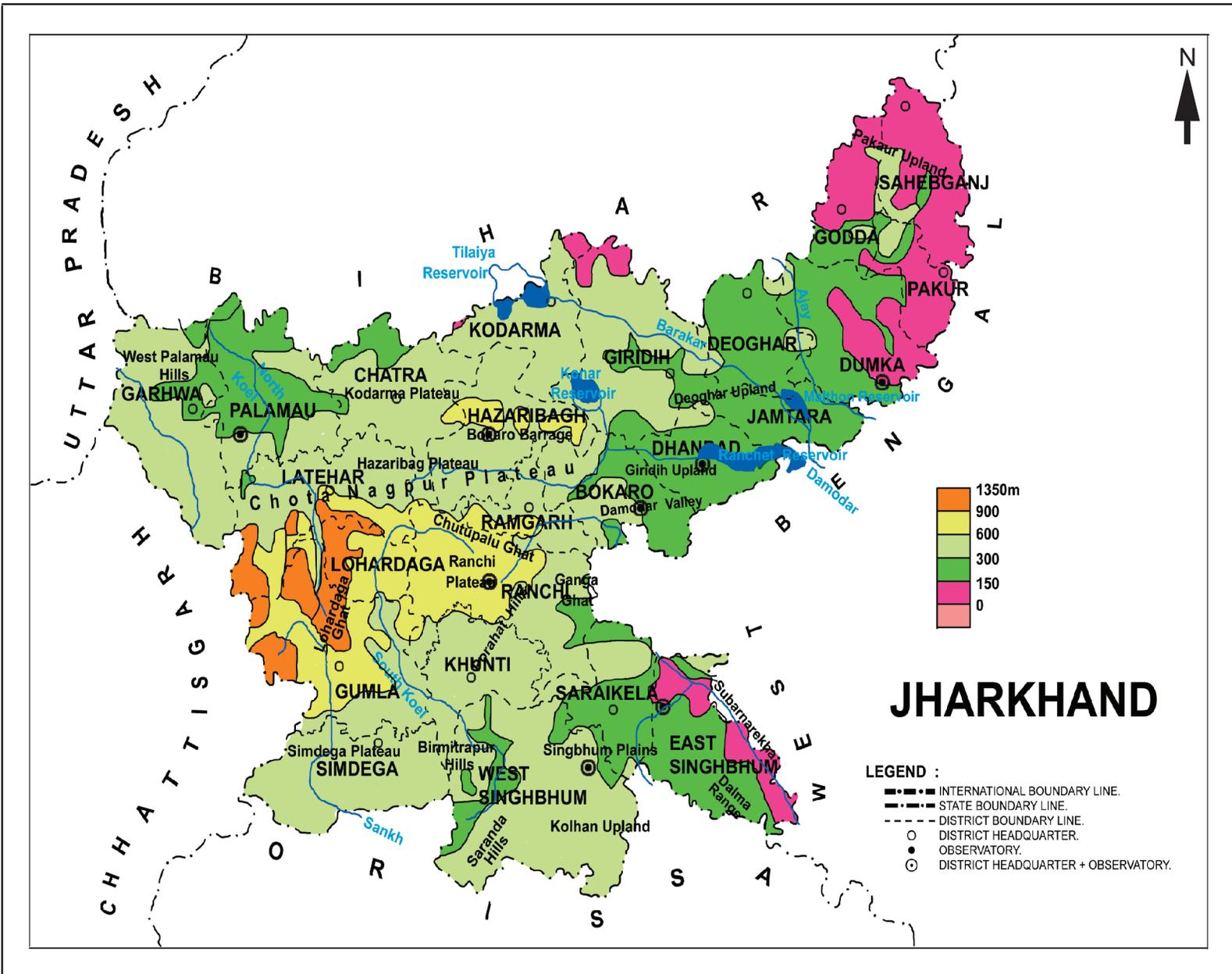
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FIG: 1 : PHYSICAL FEATURES OF JHARKHAND STATE

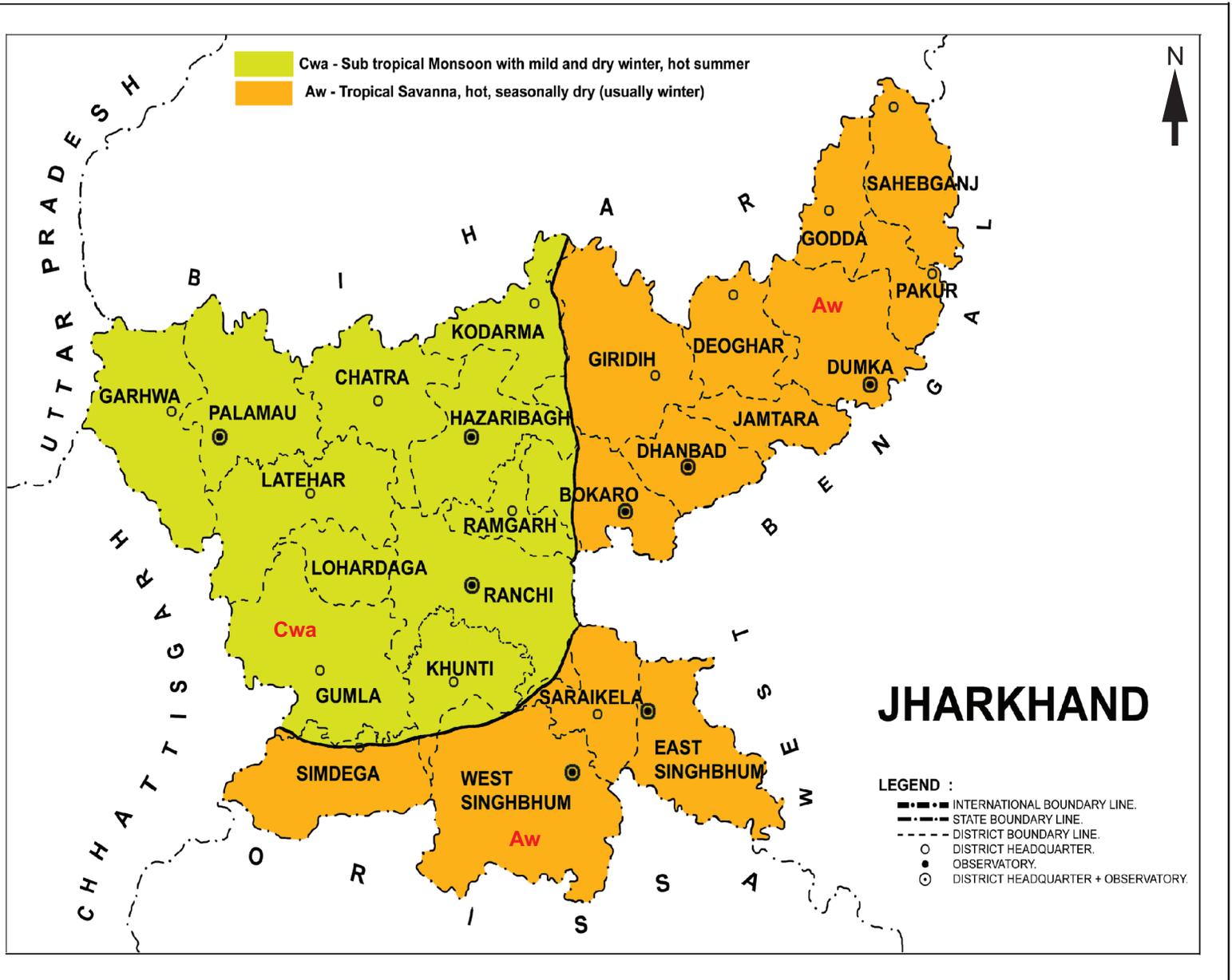


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**FIG:1(a) : INSET**

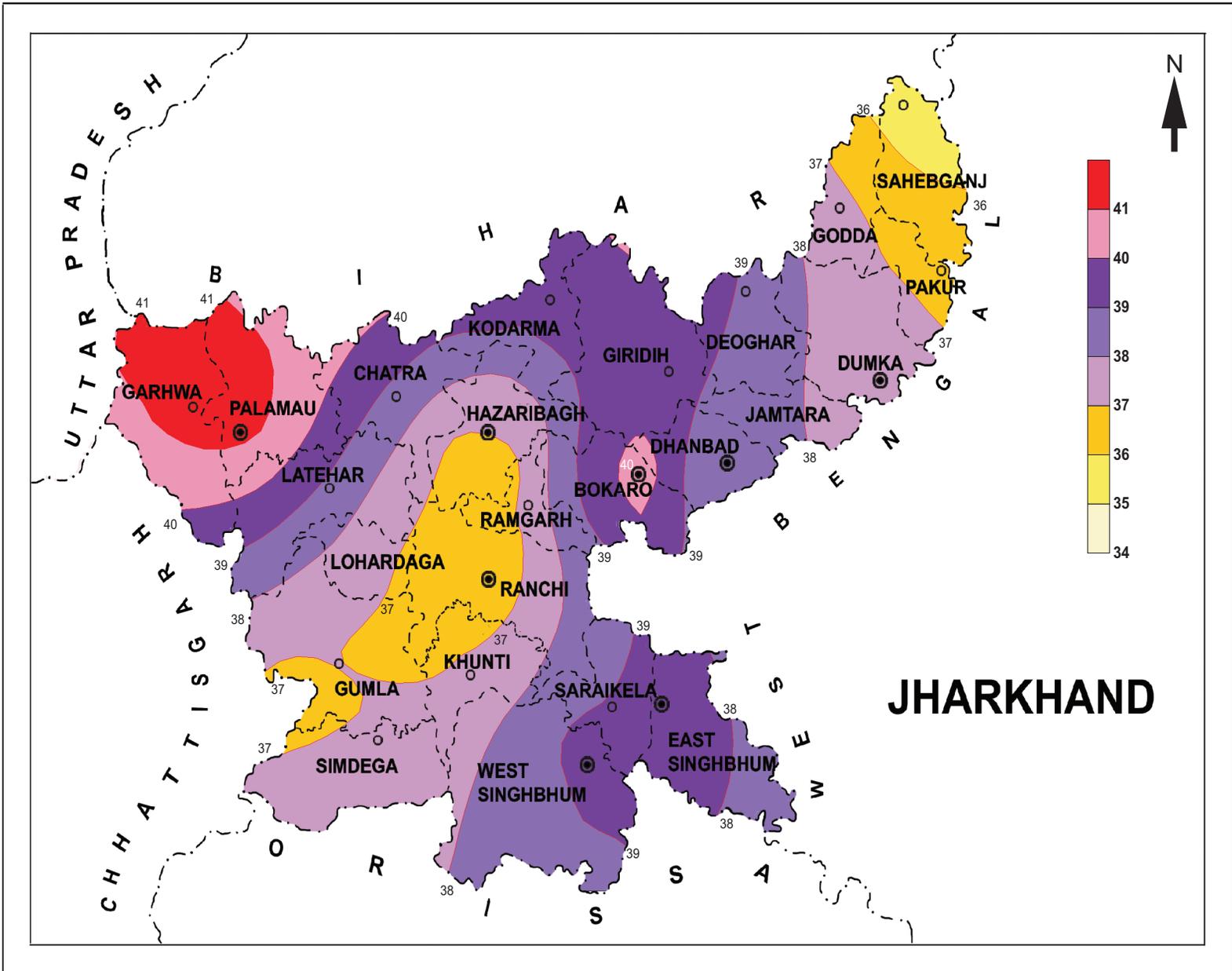


FIG. 2 : CLIMATIC CLASSIFICATION



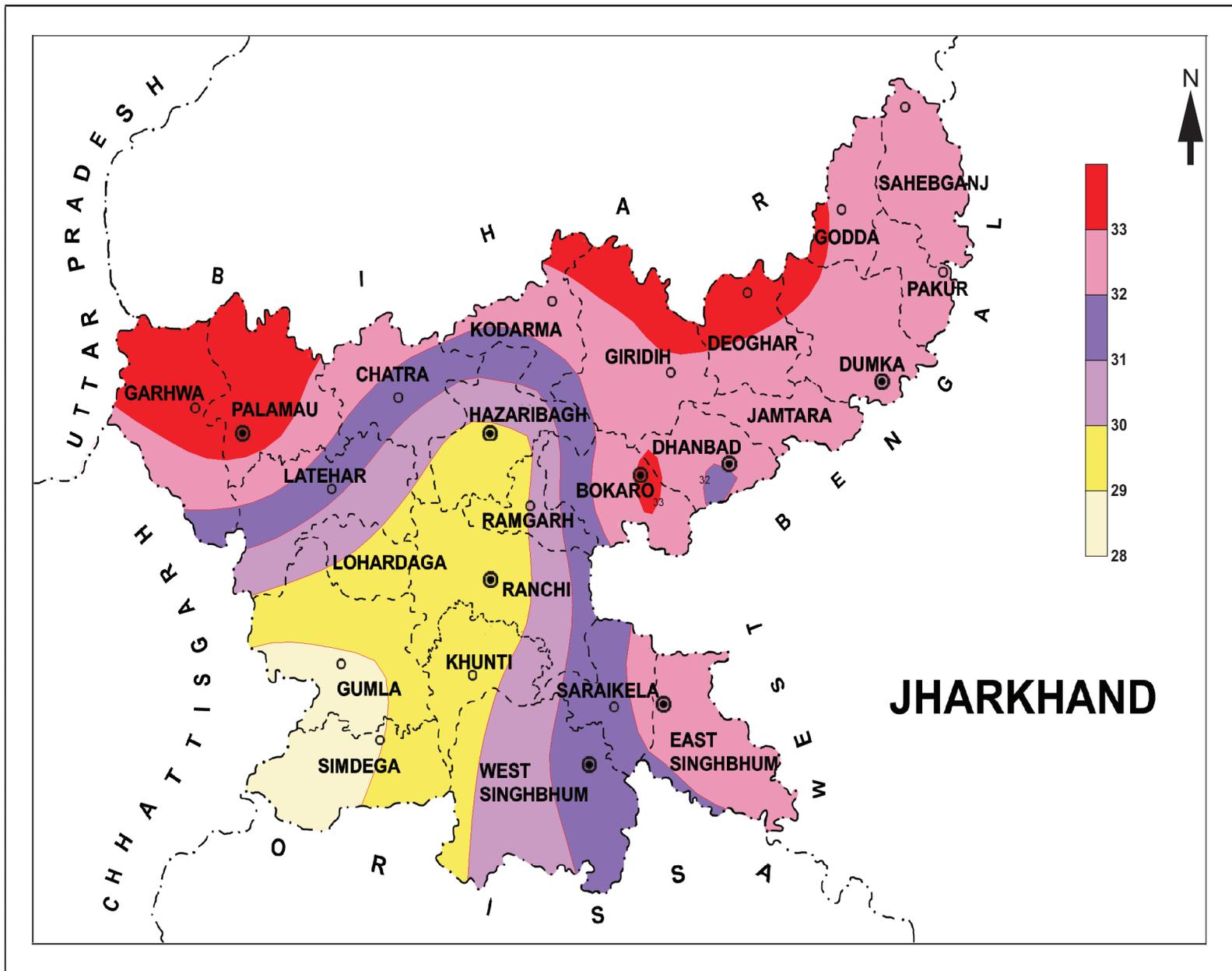
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FIG: 2(a) : MEAN MAXIMUM TEMPERATURE (°C) - MAY



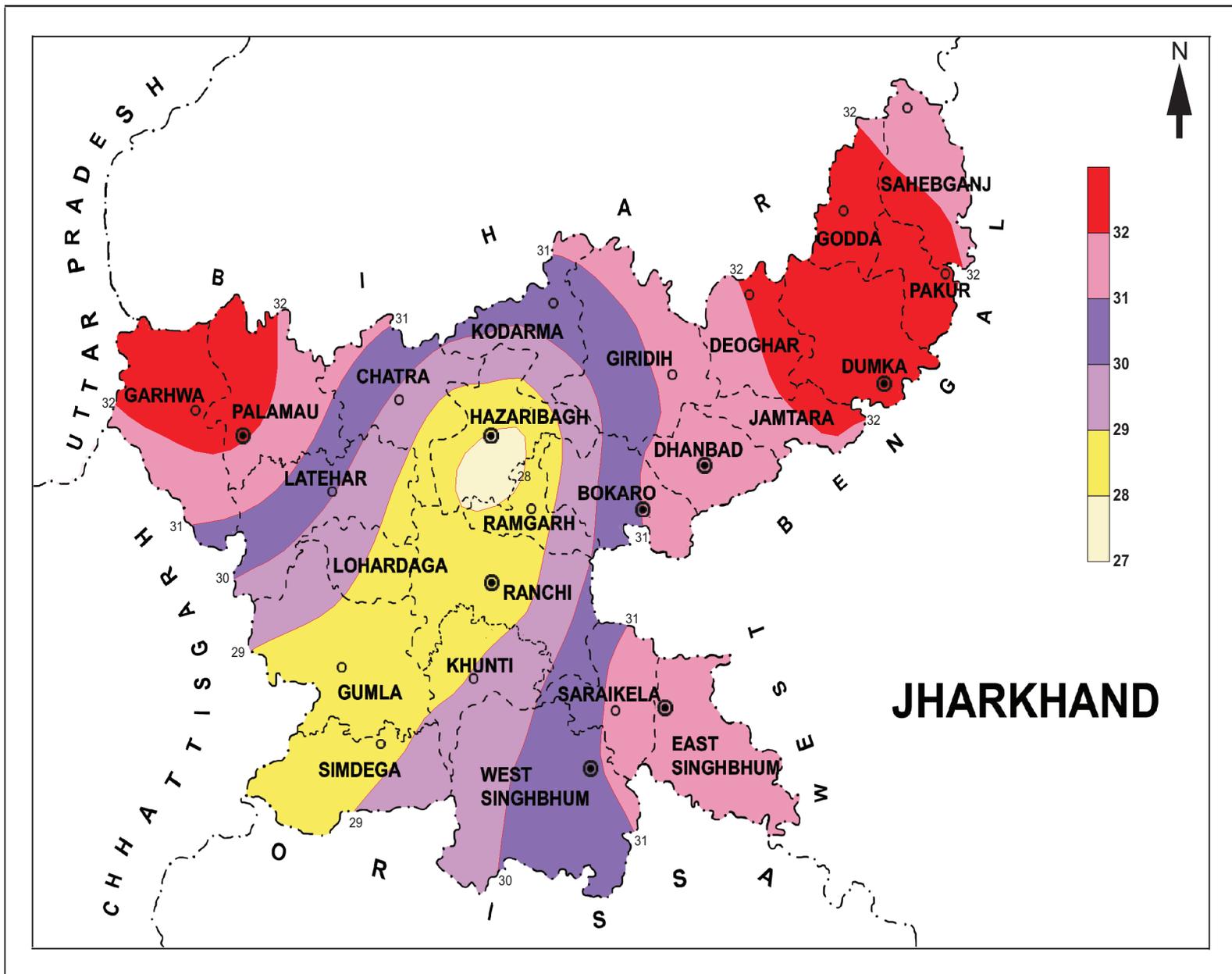
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FIG:2(b) : MEAN MAXIMUM TEMPERATURE (°C) - JULY



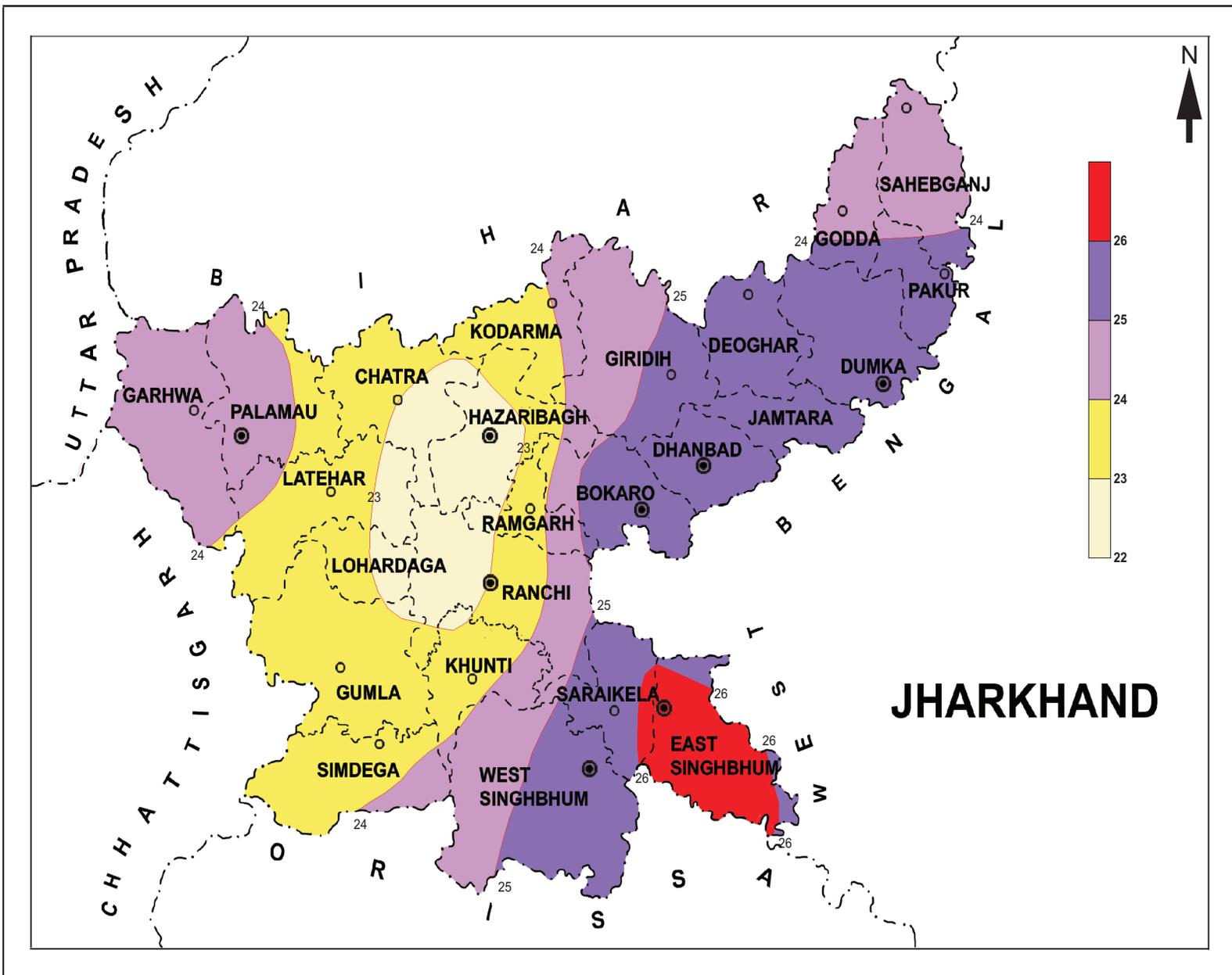
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FIG: 2(c) :MEAN MAXIMUM TEMPERATURE (°C) -OCTOBER



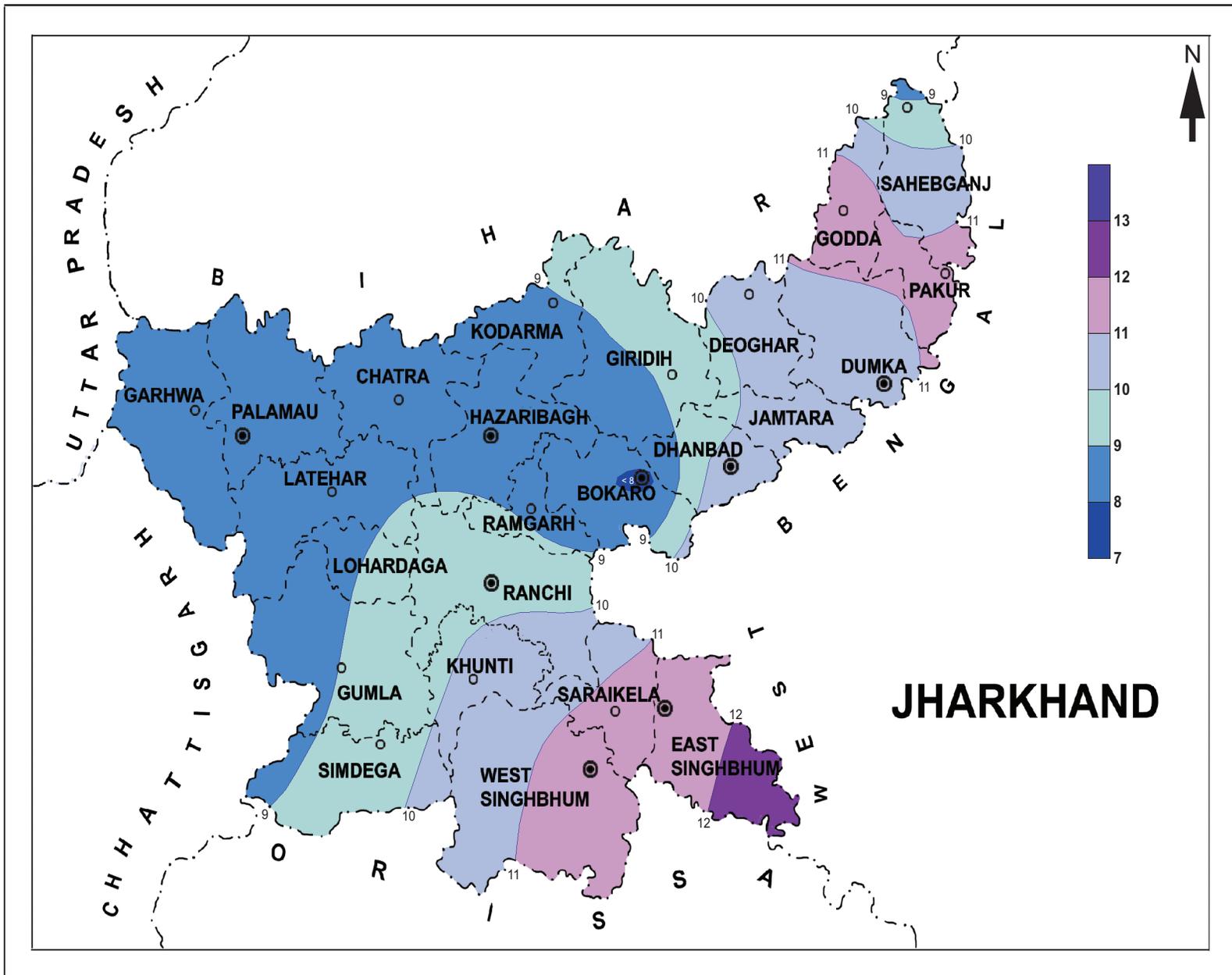
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FIG. 2(d) : MEAN MAXIMUM TEMPERATURE (°C) - JANUARY



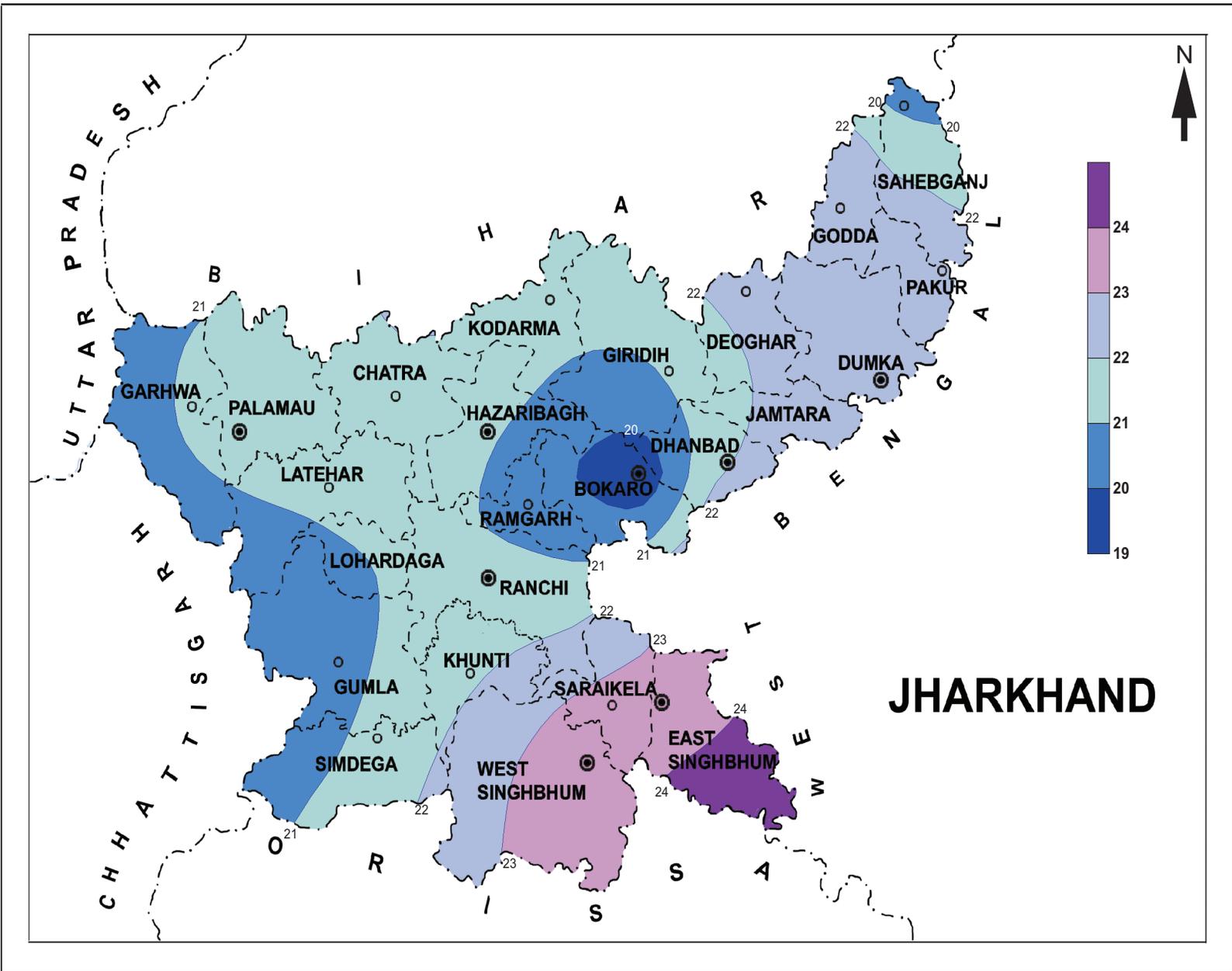
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FIG. 3(a) : MEAN MINIMUM TEMPERATURE (°C) - JANUARY



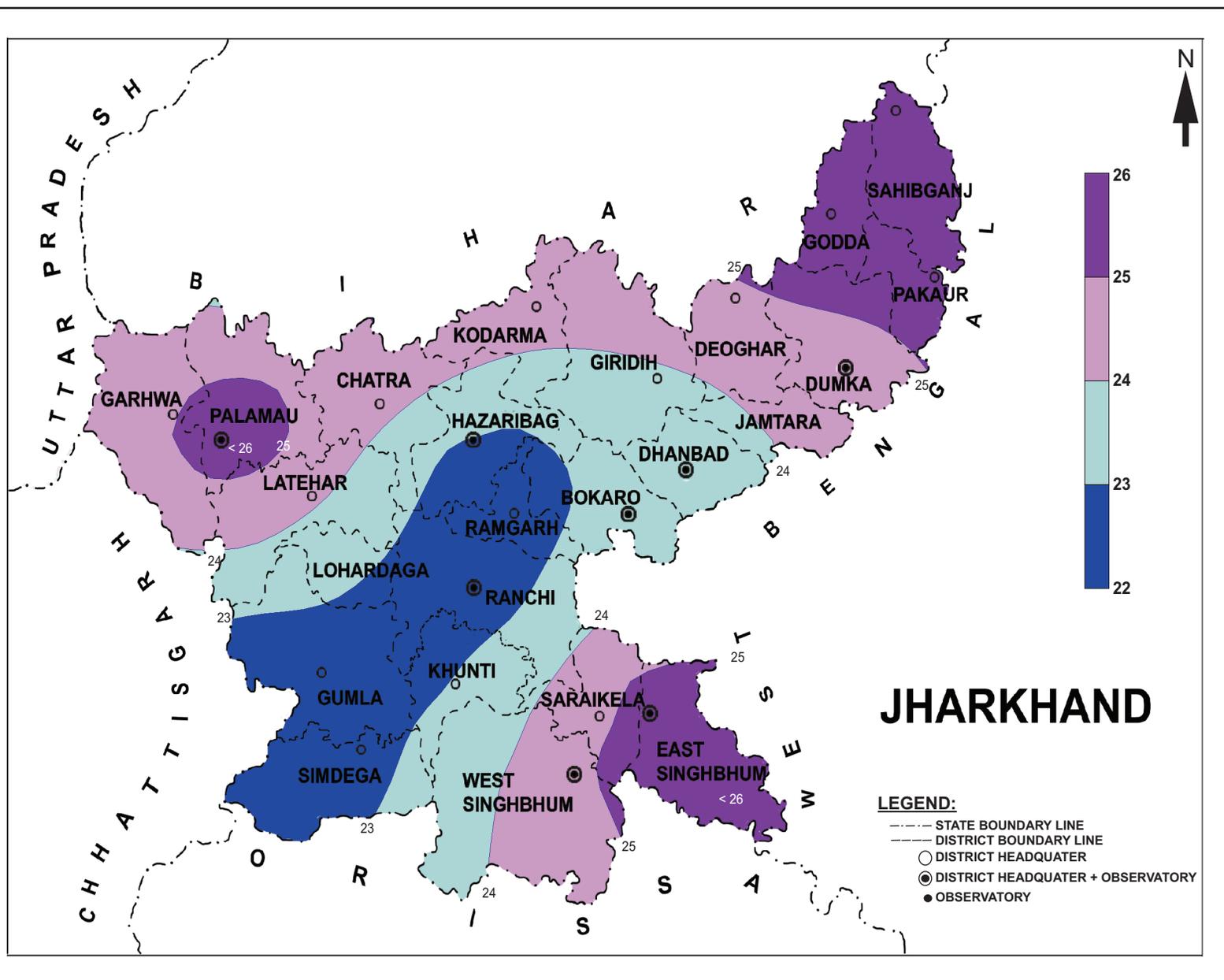
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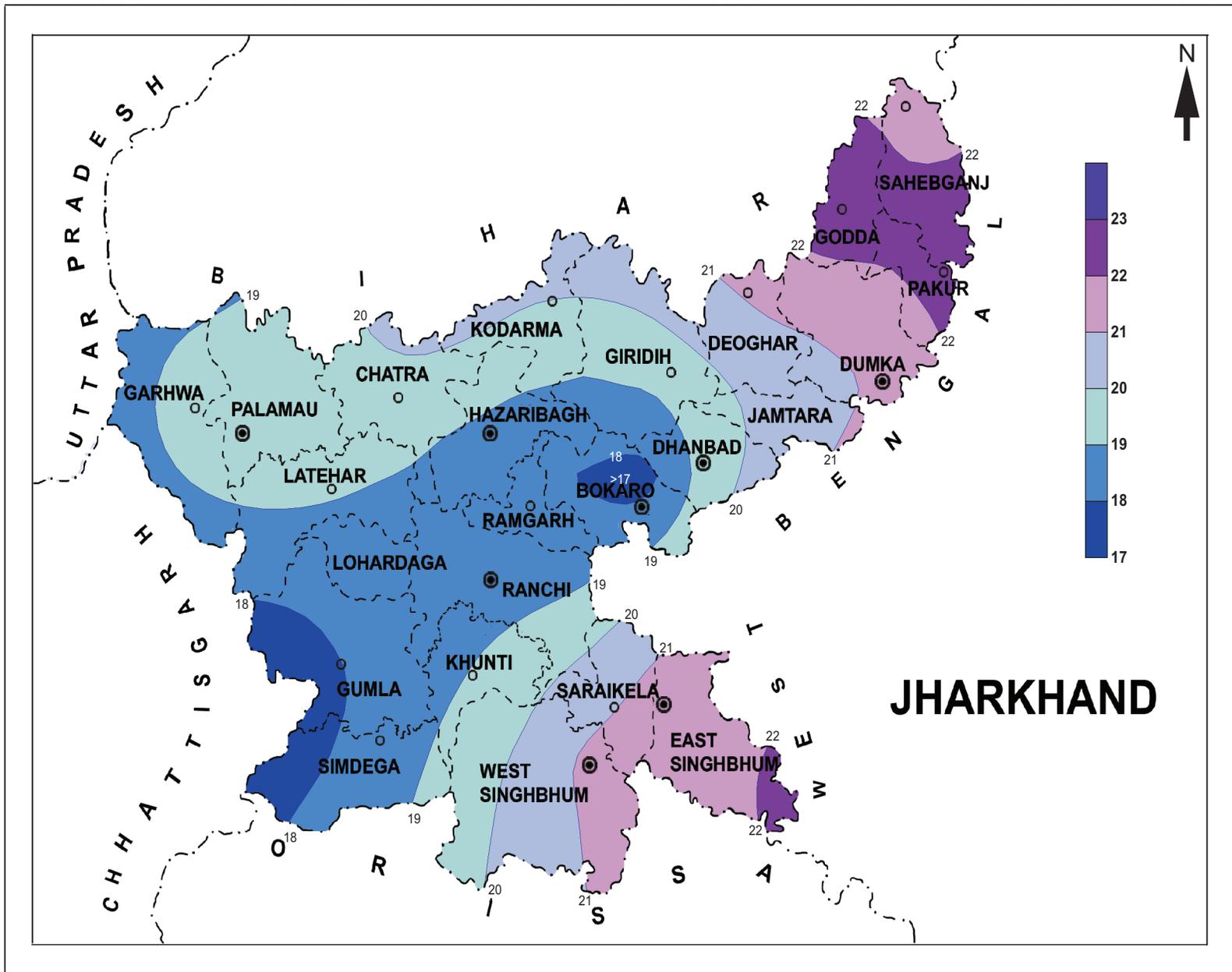
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FIG: 3(c) : MEAN MINIMUM TEMPERATURE (°C) - JULY



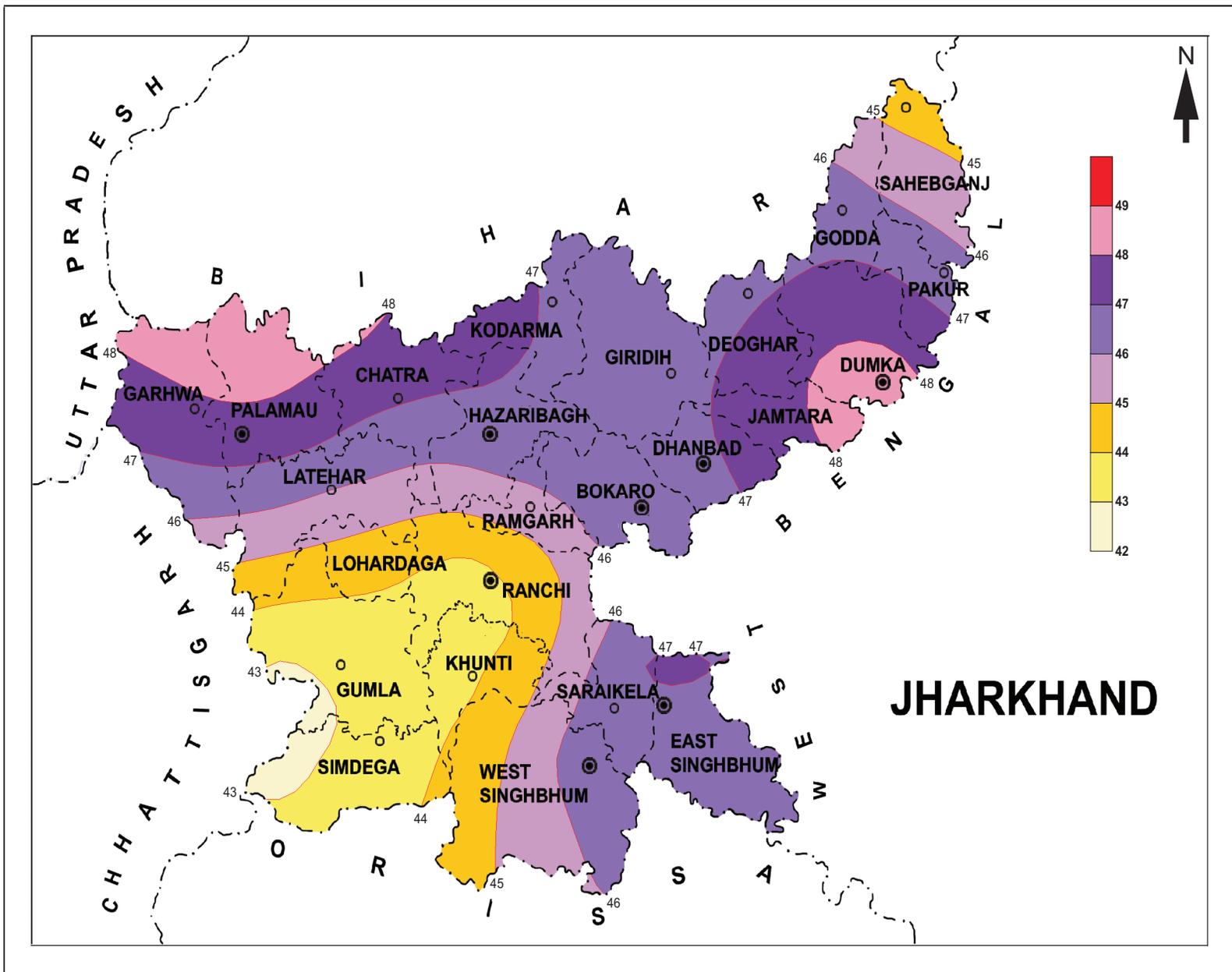
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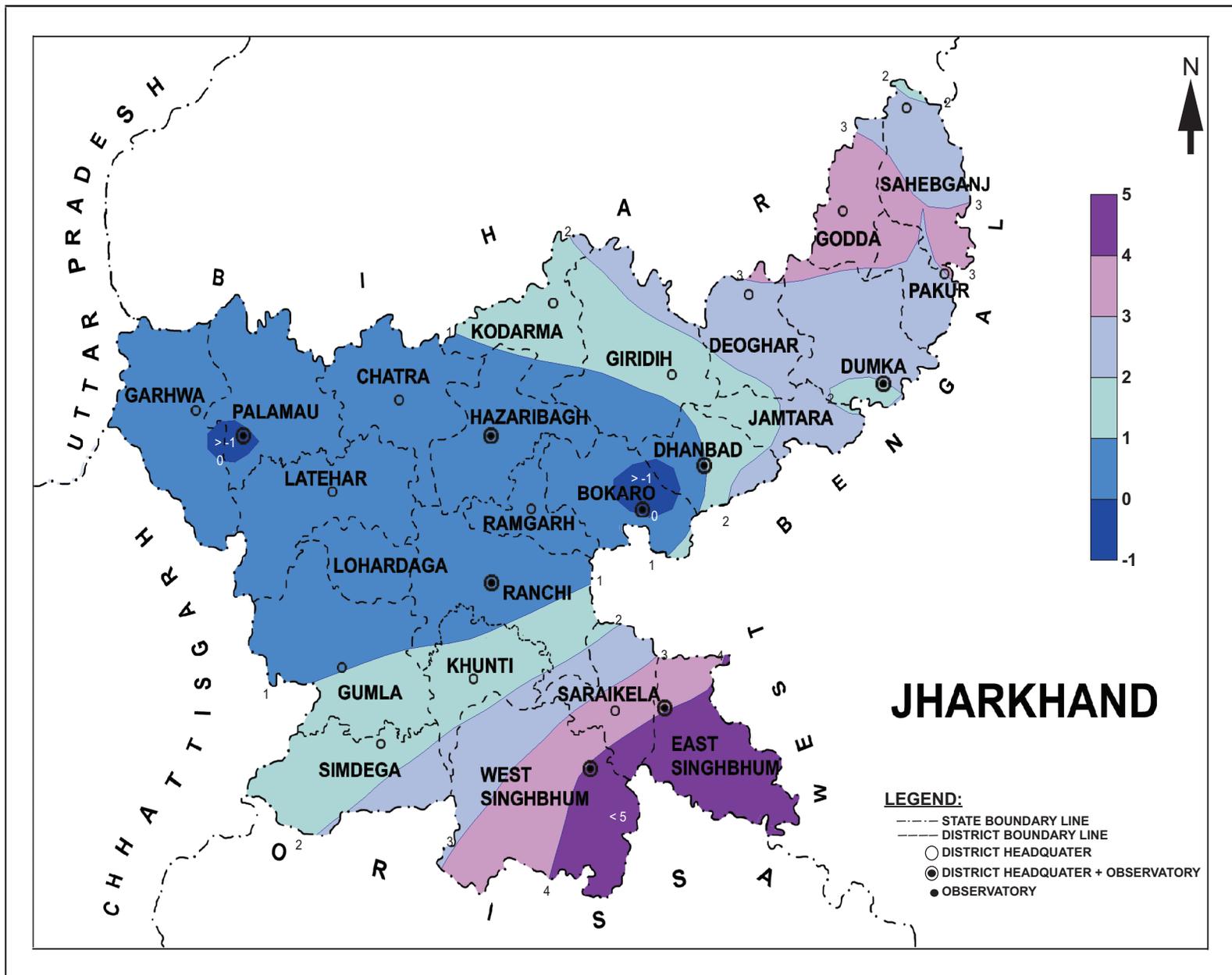
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FIG: 4 : HIGHEST MAXIMUM TEMPERATURE (°C) EVER RECORDED



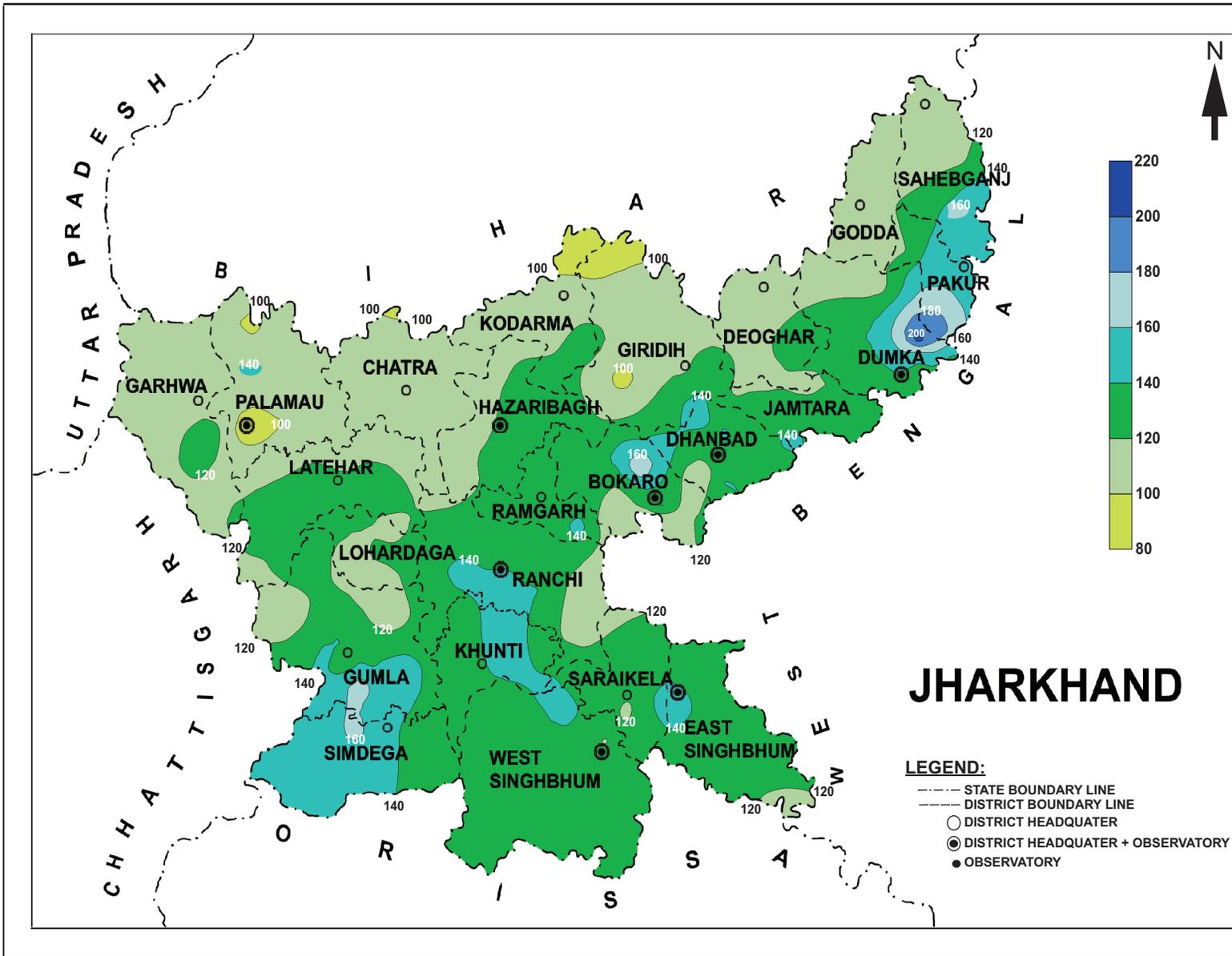
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FIG:5 : LOWEST MINIMUM TEMPERATURE (°C) EVER RECORDED



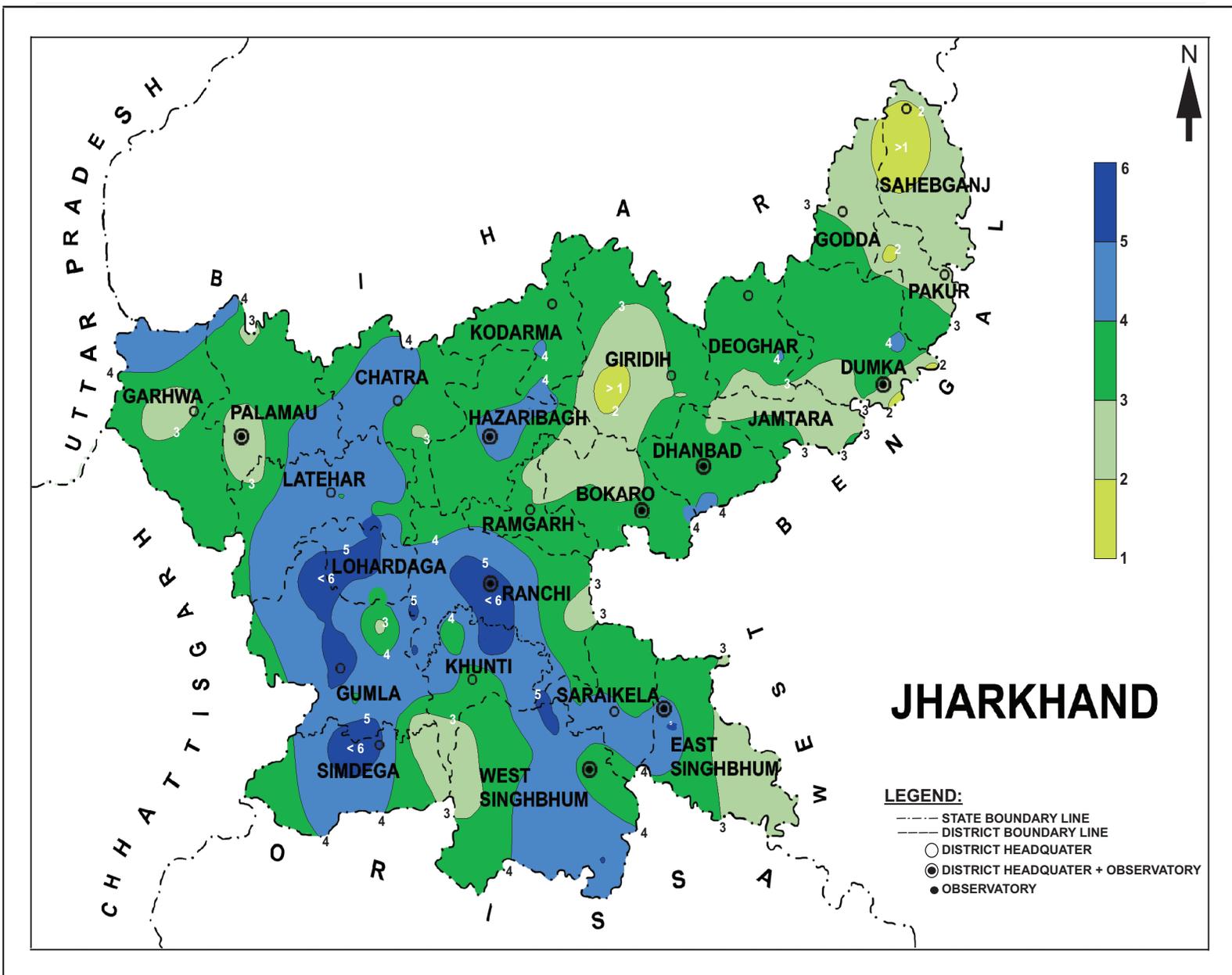
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FIG: 6 : ANNUAL NORMAL RAINFALL (cm)



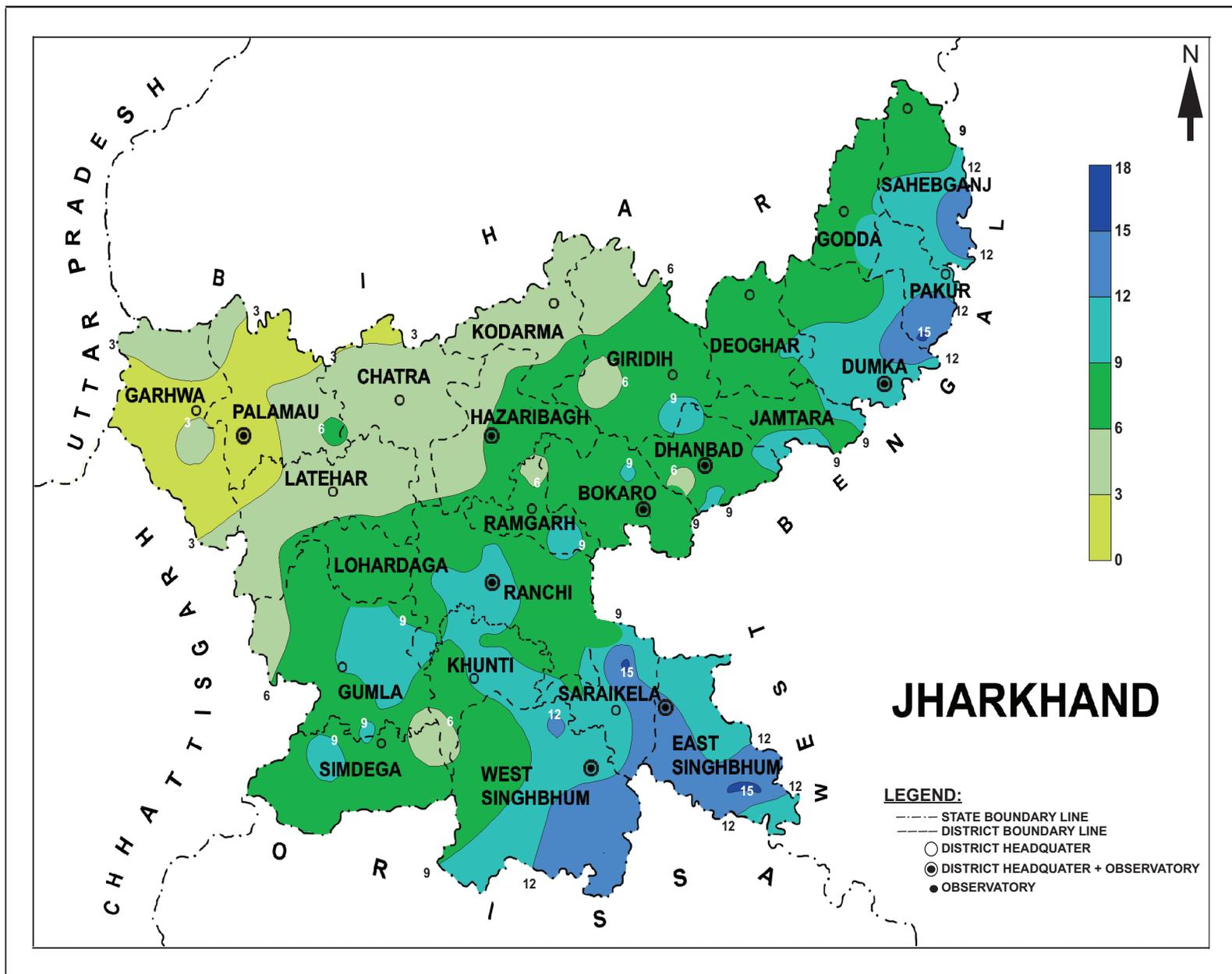
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FIG: 6(a) : SEASONAL RAINFALL (cm) - COLD WEATHER SEASON - DEC-JAN-FEB



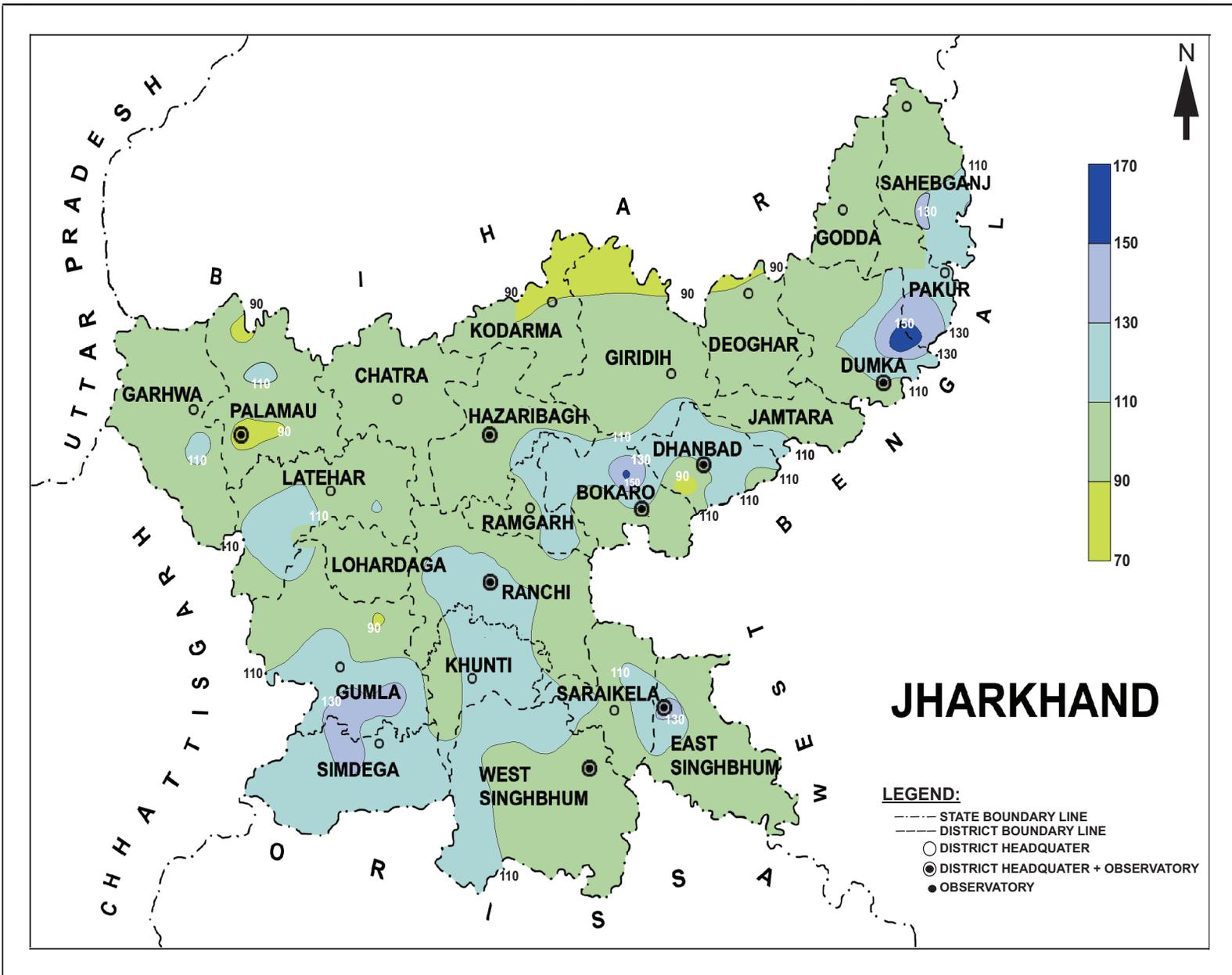
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FIG: 6(b) : SEASONAL RAINFALL (cm)- PRE-MONSOON (HOT WEATHER) SEASON-MARCH-MAY



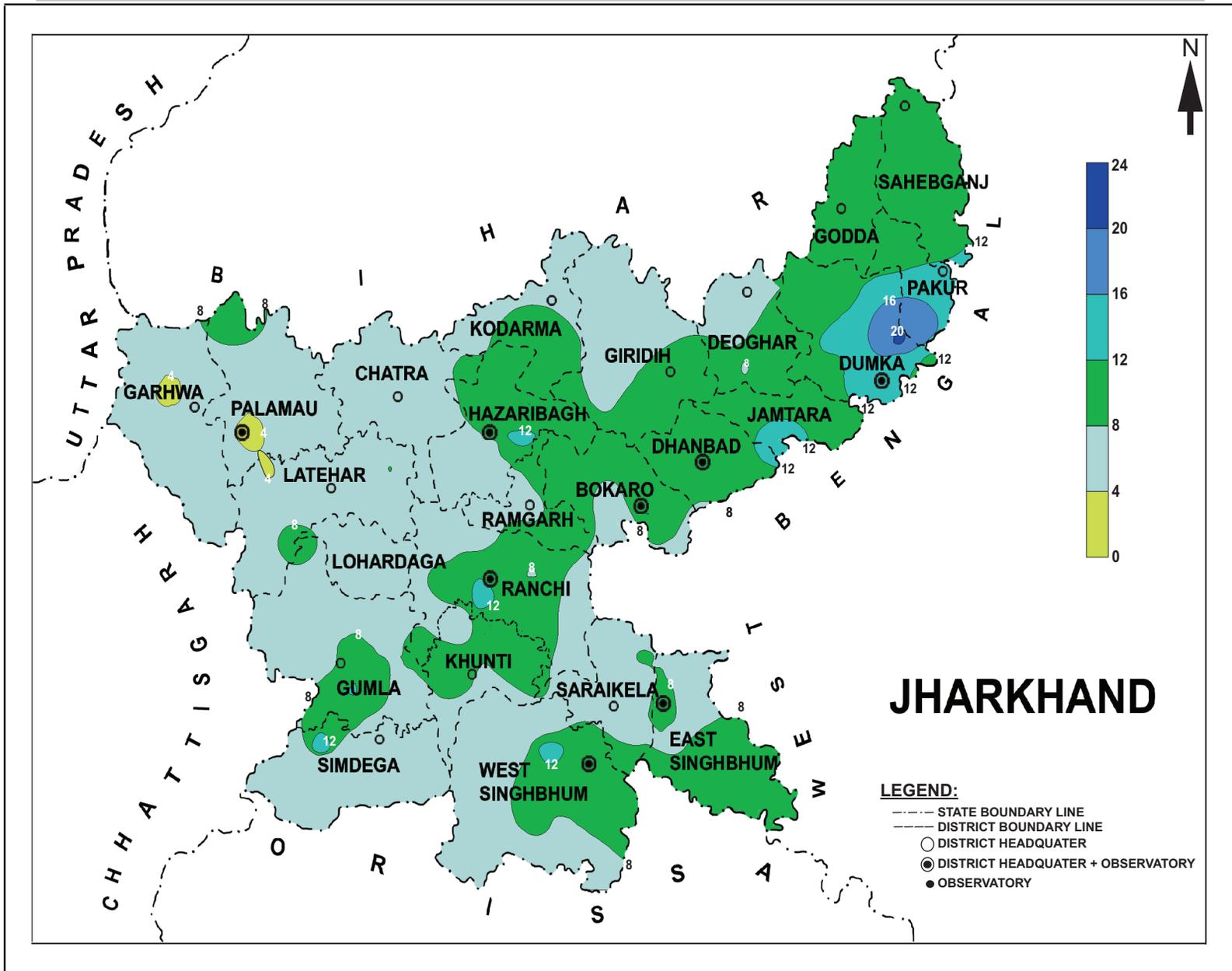
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FIG: 6(c) : SEASONAL RAINFALL (cm) - MONSOON SEASON - JUNE - SEPTEMBER



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FIG: 6(d) : SEASONAL RAINFALL (cm) - POSTMONSOON SEASON - OCTOBER-NOVEMBER



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**FIG: 7 : DISTRICT NORMALS OF SEASONAL AND ANNUAL RAINFALL (1951-2000)  
JHARKHAND**

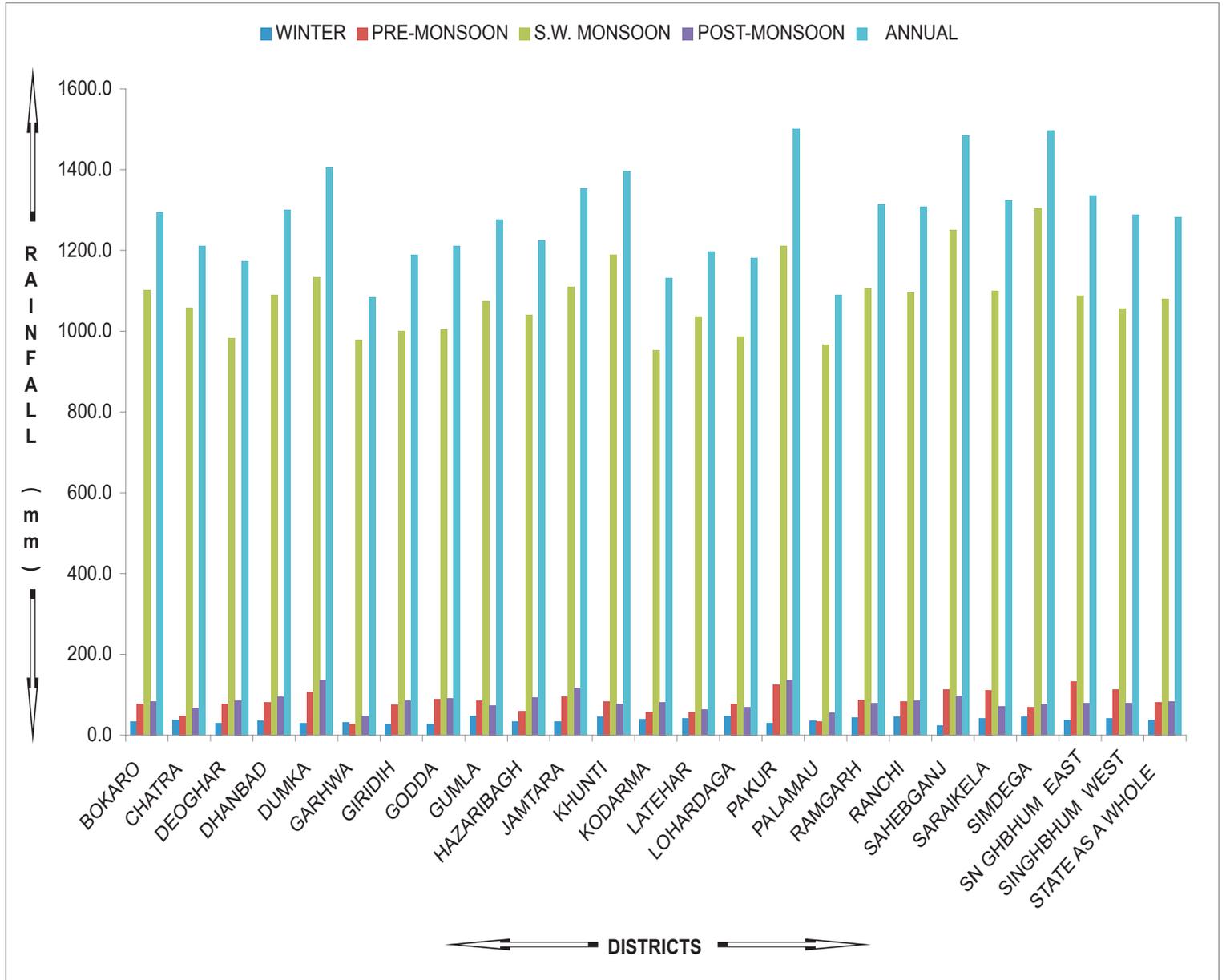
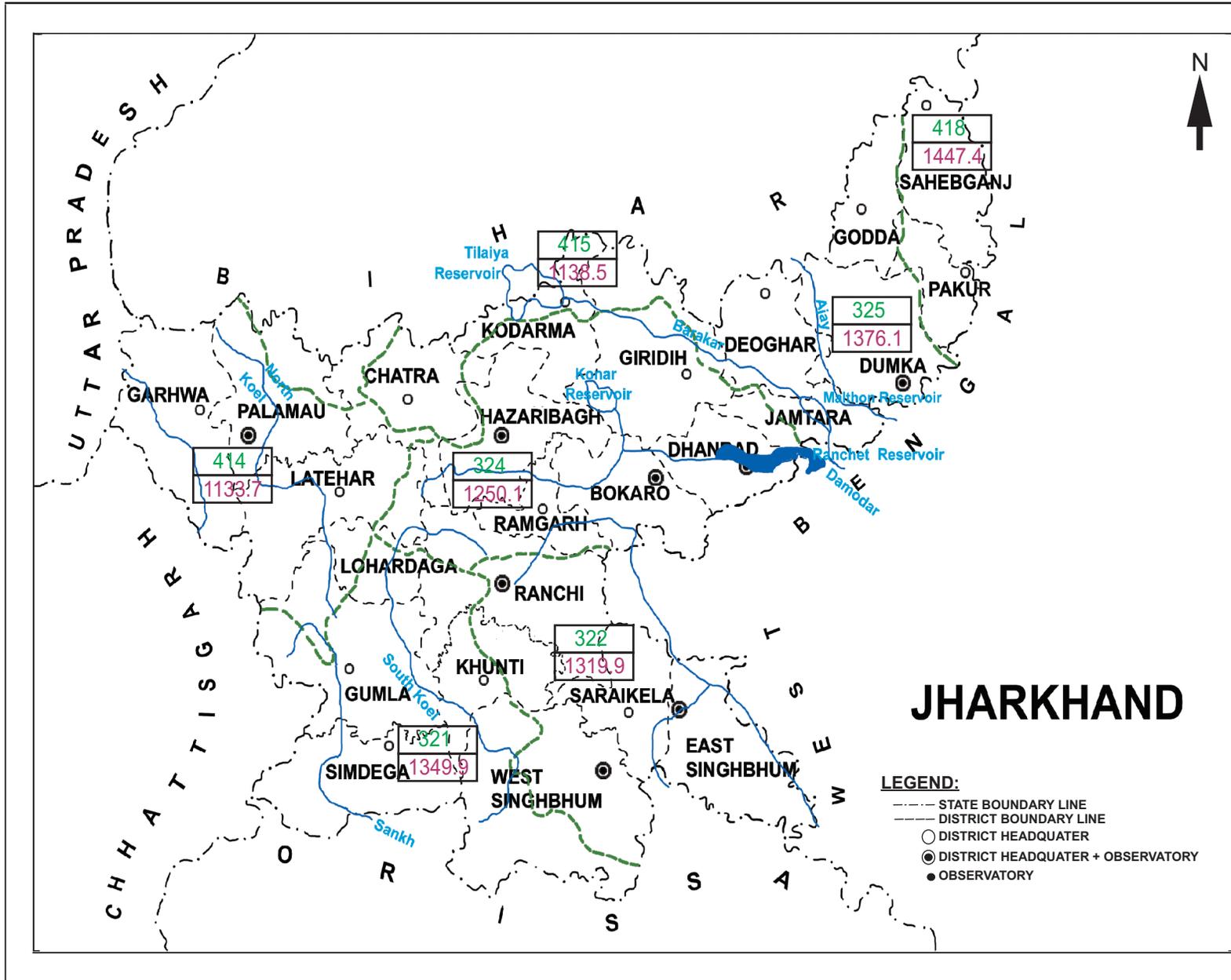
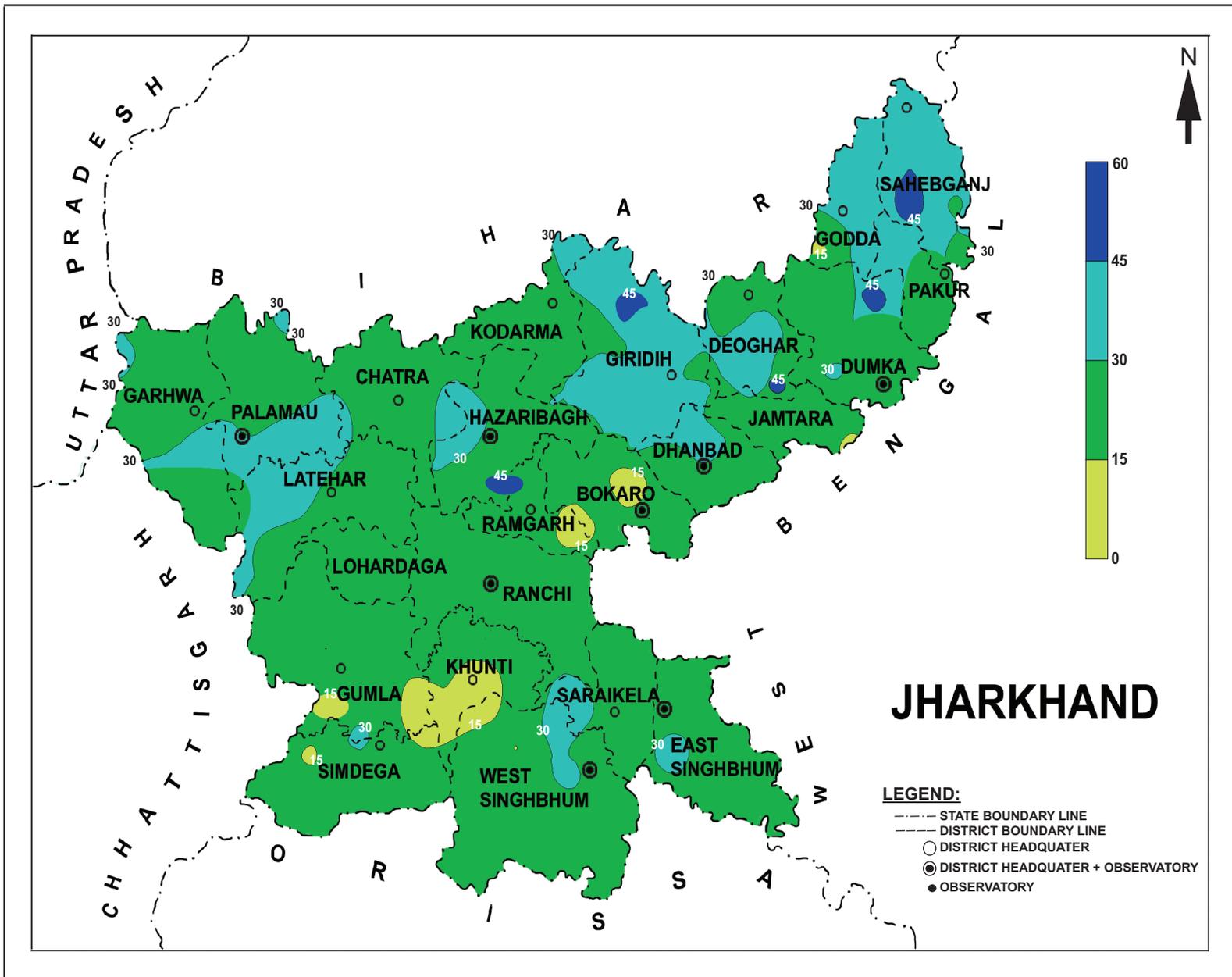


FIG: 8 : CATCHMENT AREAS WITH ANNUAL RAINFALL (mm)  
(321,322,324,325,414,415,418)



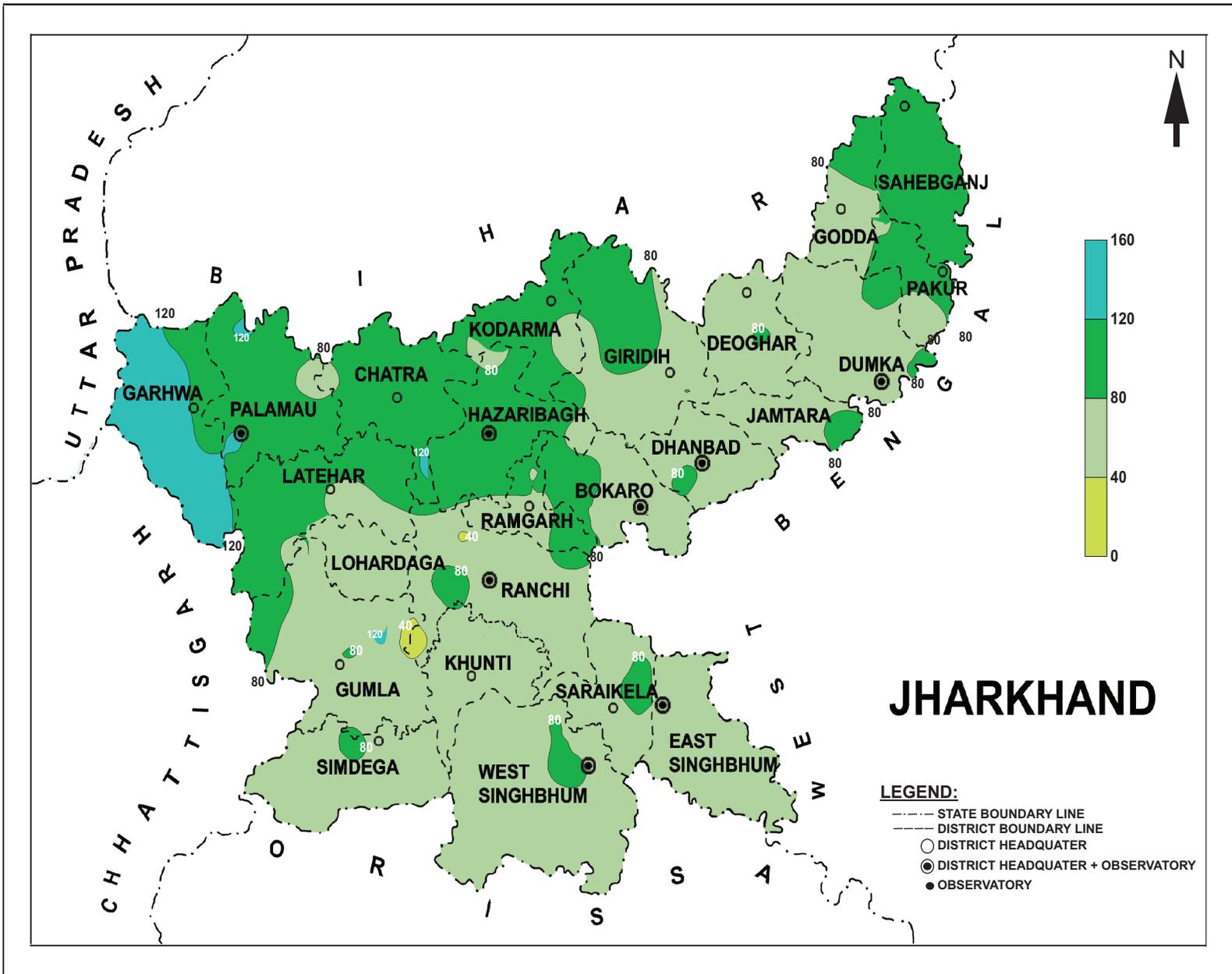
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FIG: 9 :COEFFICIENT OF RAINFALL VARIATION - ANNUAL



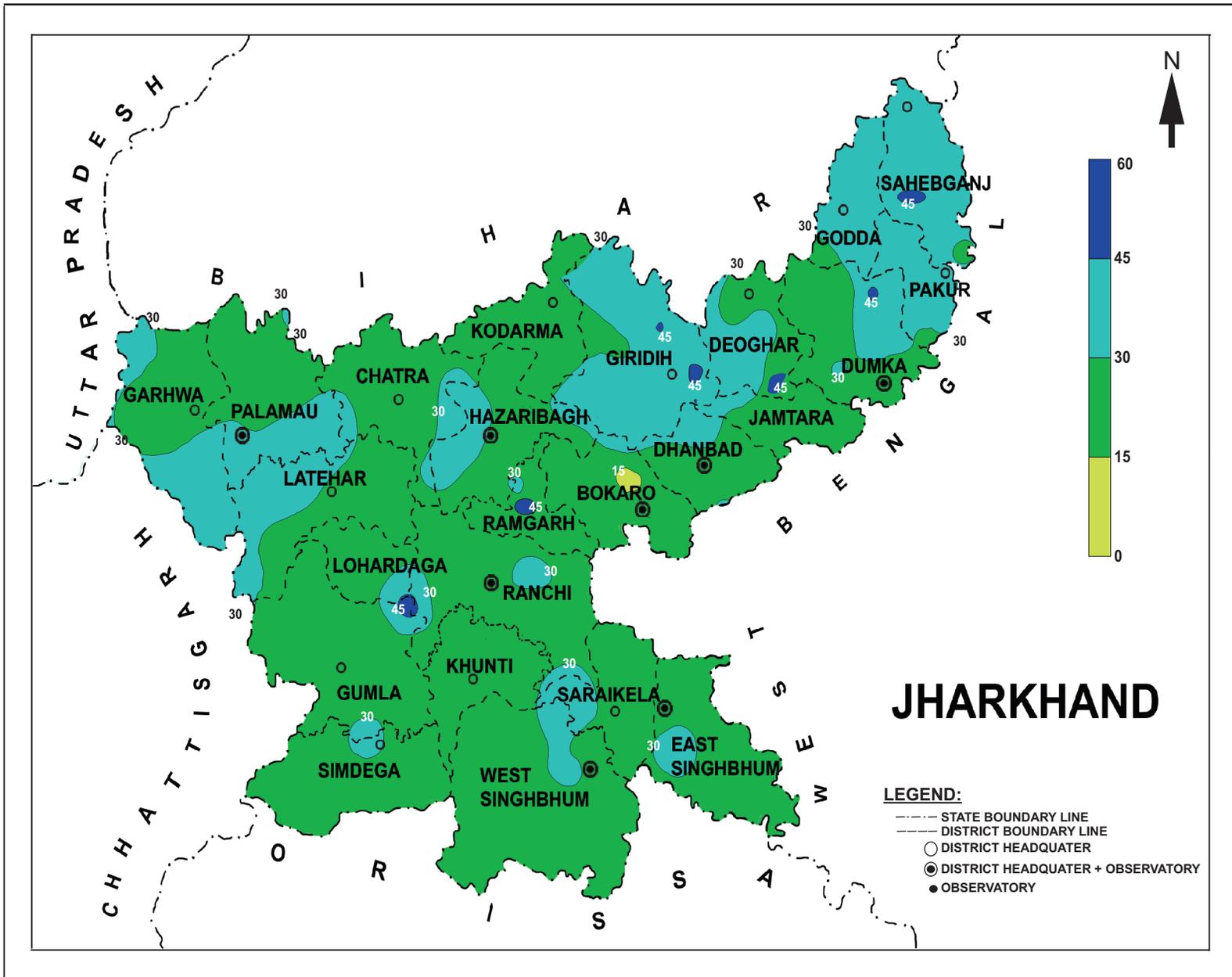
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FIG.9(a) : COEFFICIENT OF RAINFALL VARIATION - PRE-MONSOON SEASONL (MARCH-MAY)



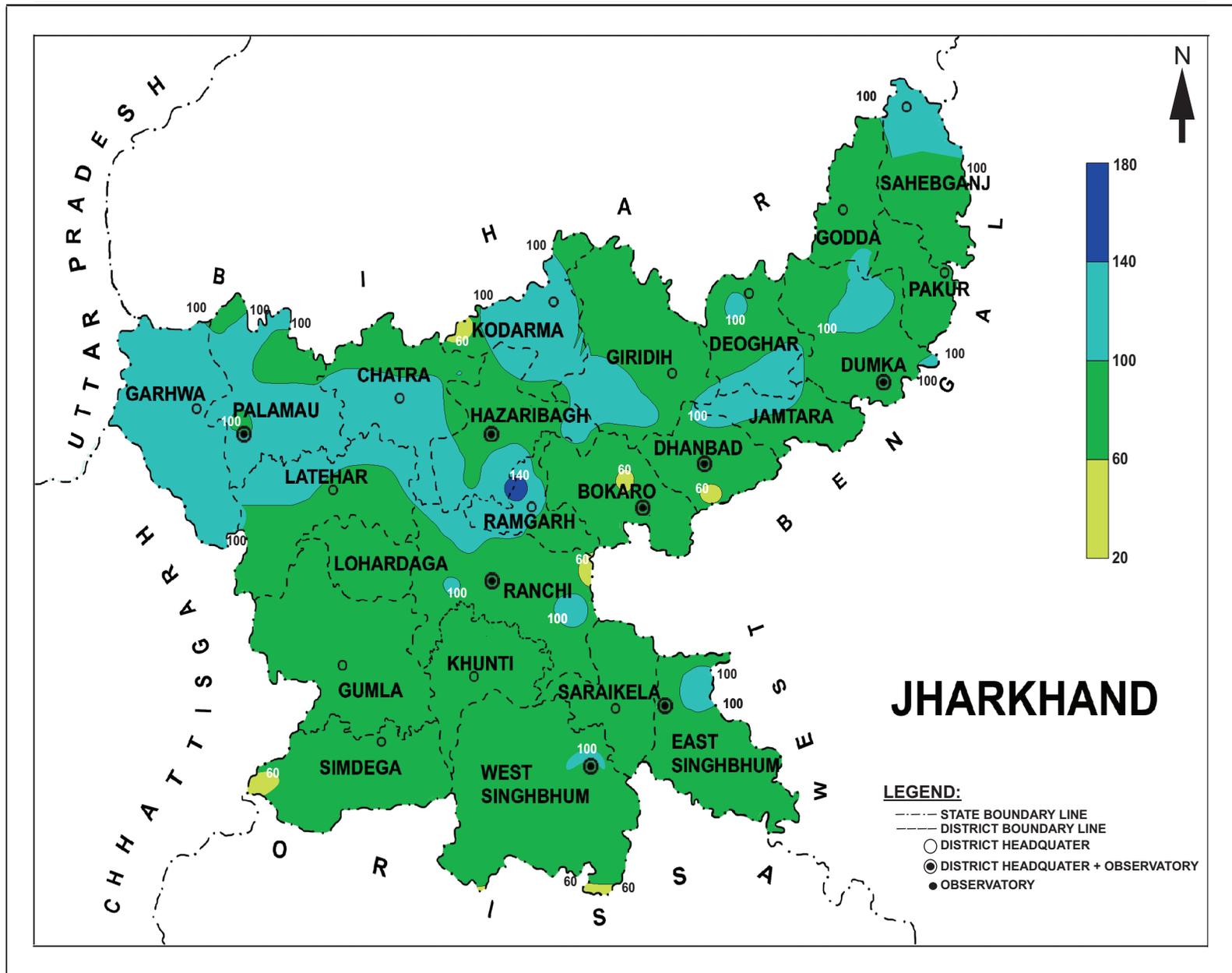
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FIG :9(b) :COEFFICIENT OF RAINFLL VARIATION - SOUTH WEST MONSOON SEASON (JUNE-SEPTEMBER)



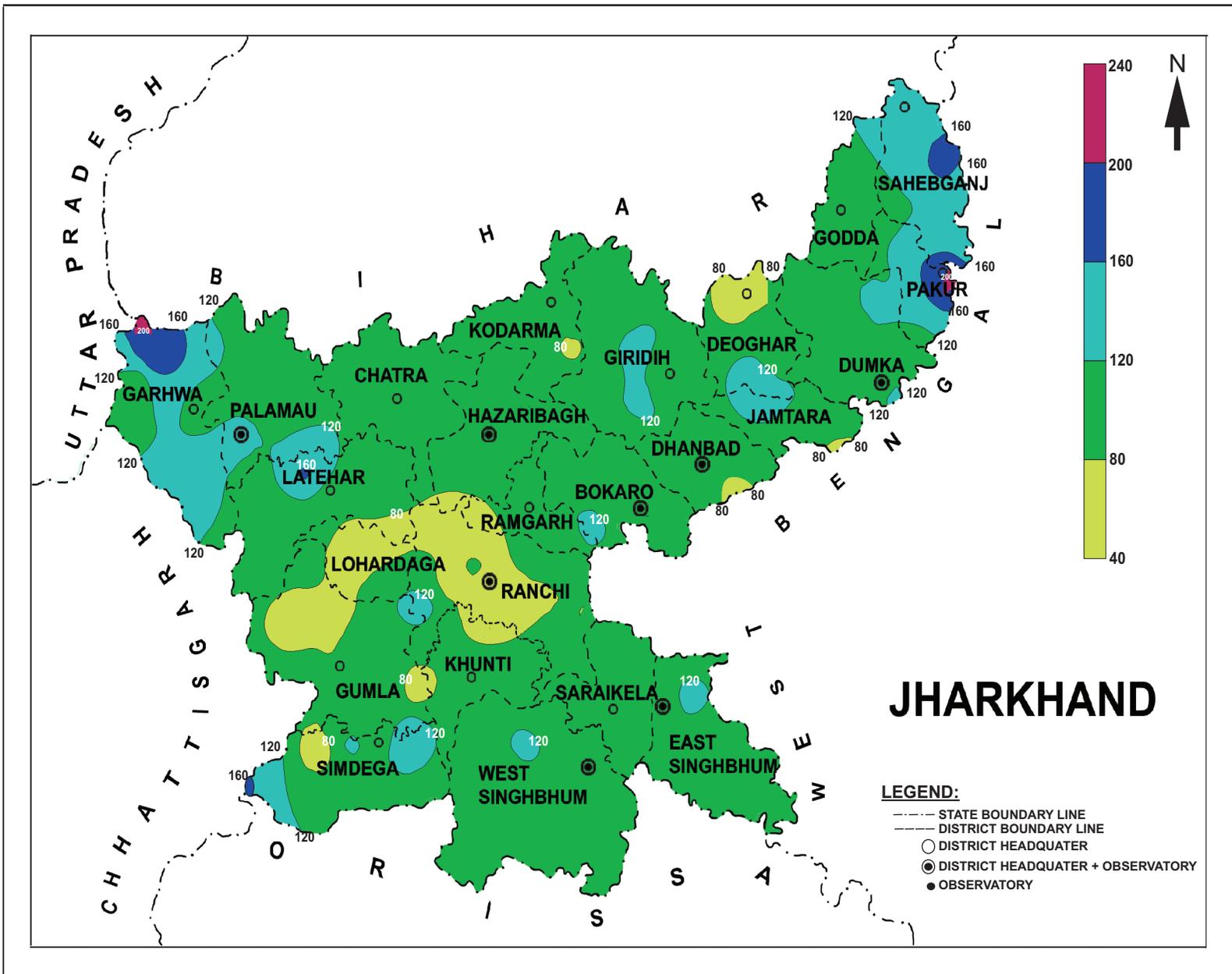
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FIG : 9(c) : COEFFICIENT OF RAINFALL VARIATION - POST-MONSOON SEASON (OCTOBER-NOVEMBER)



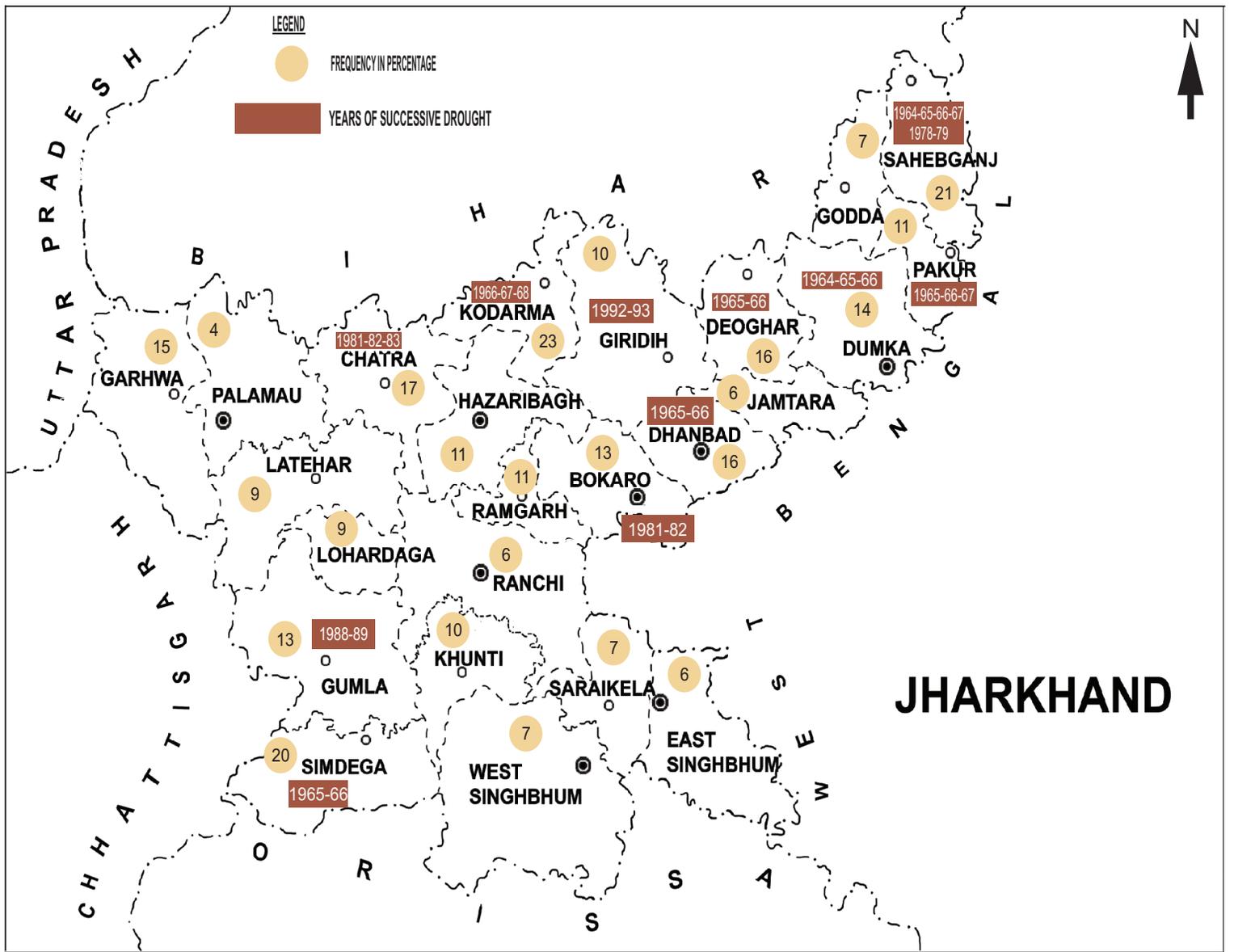
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FIG: 9(d) : COEFFICIENT OF RAINFALL VARIATION - WINTER SEASON  
(DECEMBER-JANUARY-FEBRUARY)



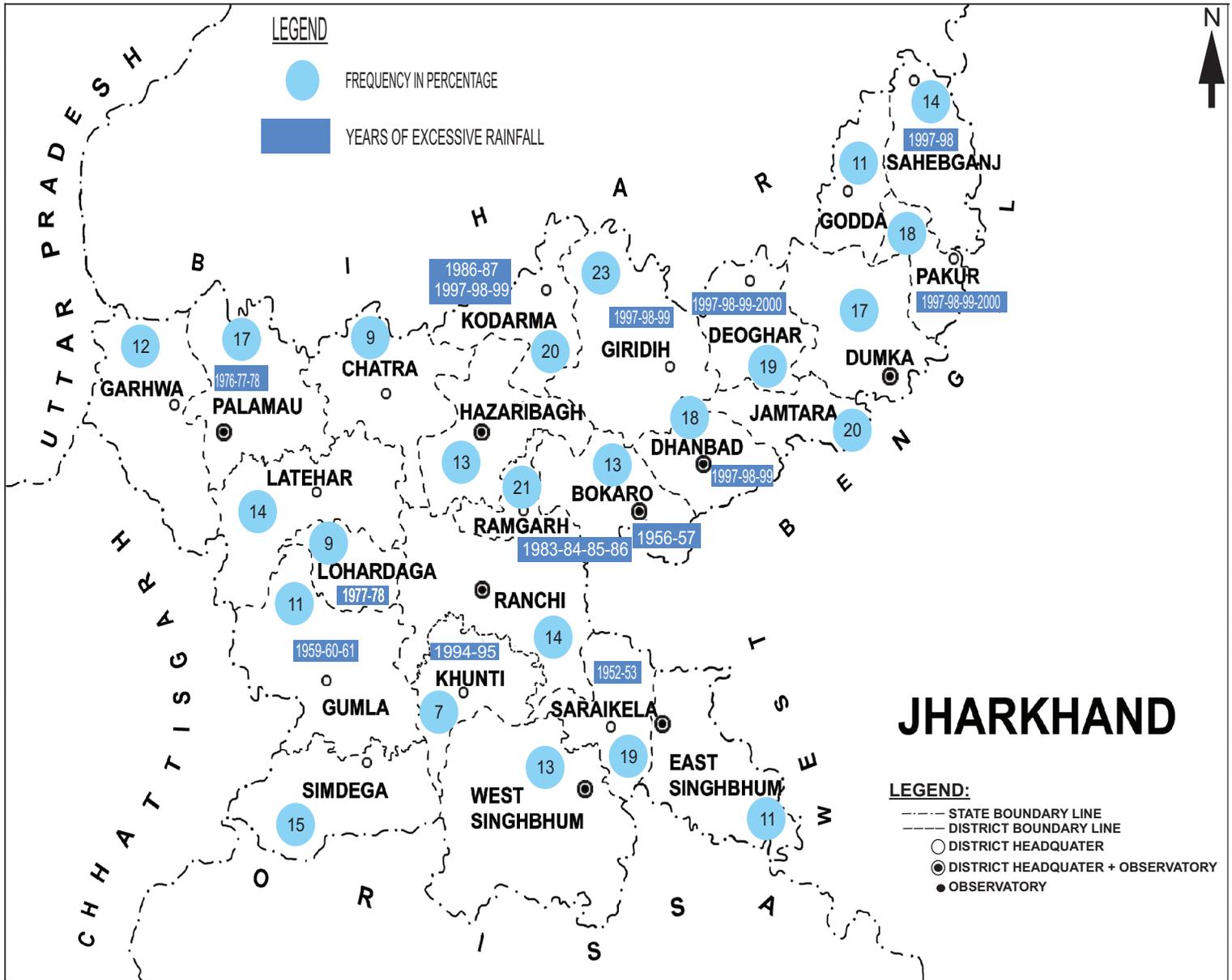
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**FIG:10 :AREA AFFECTED BY DROUGHT (1951-2000)  
JHARKHAND**



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**FIG: 11 :AREA AFFECTED BY EXCESSIVE RAINFALL (1951-2000)  
JHARKHAND**



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**STATE  
CLIMATOLOGICAL  
SUMMARY**

# *THE CLIMATE OF JHARKHAND*



## **Introduction**

The state of Jharkhand came into existence on 15<sup>th</sup> November 2000 after being carved out of southern part of the state of Bihar and became the 28<sup>th</sup> state of the Republic of India. Its name originates from the word “Jhar” which means bushes. Earlier, majority of the area was called Chhota Nagpur. The name Chhota Nagpur takes its origin as this was the land of Nagwanshis. The Jharkhand state is located in the eastern part of India. The total area of Jharkhand is 79,714 square kilometers. It is bounded by 21°59’N to 25°18’N latitude and 82°52’E to 87°54’E longitude. The state shares its boundary with Bihar to the north, Uttar Pradesh and Chattisgarh to the west, Orissa to the south and West Bengal to the east. It is a land locked state with coastline around 150 km away. The tropic of cancer passes through Kanke, few kilometers away from Ranchi, the capital city of the state.

Jharkhand state is blessed with small hills and rivers due to its varied topography. Major parts of the Jharkhand state lie on the Chhota Nagpur plateau. The Chhota Nagpur plateau is a series of hills ranges and flat topped plateau with dissecting river valleys. The upper watershed of the rivers, the Koel, Damodar, Brahmani, Kharkai and Subarnarekha lies within Jharkhand.

The river Damodar which is the largest and biggest in Jharkhand has a number of tributaries, some of the prominent ones being Bhera, Konar, Bokaro Khedia etc. The Damodar originates from Tori area of Latehar district in the Chhota Nagpur plateau. It flows eastward for about 592 km through the states of Jharkhand and West Bengal and joins the river Hooghly.

Earlier the Damodar used to flow through Bengal on a direct west to east course to join river Hooghly near Kalna. But later on, it has changed its course and now its lower reaches most of the water flows into the Mundeswari and Rupnarayan river. The remaining mass of water of the Damodar flows into the Hooghly, south of Kolkata. The whole land area' across which this river flows, has been named as the "Damodar Valley". This Valley comprises of the districts of Dhanbad, Hazaribagh, Chatra, Bokaro, Giridih and Kodarma in Jharkhand.

**Mayurakshi River:** Mayurakshi means the eye of the peacock. It rises from Trikot or Tiyyur in the Deoghar district and passes through Godda, Deoghar, Dumka and Sahebganj districts.

**Swarnrekha River:** Swarnrekha which means Golden line, is one of the significant river having reddish blue water. It rises from this state and flows across Bihar and Orissa. The total length of this river in Jharkhand state is 470 kilometers. Ranchi and Jamshedpur are situated on the banks of the Swarnrekha river.

**Barakar River:** Barakar is the most important and the largest tributary of the Damodar river in the eastern region of India. This river rises in the district of Hazaribagh and travels a distance of around 225 kms across the northern region of Chhota Nagpur plateau in the west to east direction across the districts of Hazaribagh, Dhanbad and Giridih.

**Ganga River:** The Ganga river plays a very important role in formation of Jharkhand state. It divides the previously undivided state of Bihar into two halves. The southern half is now known as Jharkhand state. A fertile land along the river is created through the silt deposits of the Ganga.

The state has meteorologically one sub-division only. There are twenty four districts in the state.

1. Bokaro 2. Chatra 3. Deoghar 4. Dhanbad 5. Dumka 6. East Singhbhum  
7. Garhwa 8. Giridih 9. Godda 10. Gumla 11. Hazaribagh 12. Jamtara 13. Khunti

14. Kodarma 15. Latehar 16. Lohardaga 17. Pakur 18. Palamau 19. Ramgarh 20. Ranchi 21. Sahebganj 22. Saraikela 23. Simdega 24. West Singhbhum.

## **Climate**

The year may be divided into four seasons. The winter season from December to February is followed by the pre-monsoon or hot weather season from March to May. The period from June to September constitutes the southwest monsoon season and the period of October and November is the post monsoon season.

Areas in the state under each climate pattern based on Koppen's classification are shown in Fig. 2. This broad classification is based on temperature and rainfall.

The districts located near the southern and western boundary of the state mainly comes under the climate type: Tropical Savanna, Hot, seasonally dry (usually winter) (Aw). Climate of Ranchi district situated in the center of the state comes under type subtropical monsoon, mild and dry winter, hot summer (Cwa) and districts in the northwestern part of the state come under the type Interior Mediterranean, mild winter, dry summer, hot summer (Csa) whereas, the region of Bokaro district and neighbourhood has climate type marginally varying between Tropical Savanna, Hot seasonal dry (usually winter) (Aw) and subtropical monsoon, mild and dry winter, hot summer (Cwa).

## **Sea Level Pressure and Winds**

The seasonal variation in atmospheric pressure over the state occurs in a systematic way with a maximum in the winter and a minimum in the southwest monsoon season. The pressure gradient over the state is generally weak except during late summer. During winter, the pressure is slightly higher over the west in morning while slightly low pressure is noticed over the west in the evening. The pressure increases from southwest to northeast during April. The winds, which are light and mainly from a northerly direction in January turn gradually anti-clockwise

and are replaced by light winds from northwesterly to southwesterly direction in April. With the advance of the summer, the pressure gradient increases and correspondingly the winds from south to southwest also strengthen, reaching the maximum value in June. In July, the pressure decreases from northeast to southeast over the state and correspondingly the winds become mainly southwesterly.

With the progress of the monsoon, westerly component of the wind becomes increasingly predominant. October onwards, the change over of the pressure and wind pattern to winter pattern commences. Table I gives the monthly mean wind speed in kilometer per hour and predominant wind direction in the morning and evening for observatory stations in the state.

## **Temperature**

Table II gives the mean maximum and minimum temperature at the observatory stations of the sub-division. Fig. 2(a,b,c,d) and 3(a,b,c,d) show the distribution of mean maximum and mean minimum temperatures respectively for selected months. Fig. 4 and 5 give the extremes of temperatures ever recorded based on data upto 2010.

Day temperatures are more or less uniform over the plains except during summer when temperatures rise westwards. In general, the temperatures at night are low in higher latitudes except during the southwest monsoon season when they are lower in southwestward of the state. Day and night temperatures are both lower over the plateau and at high level stations than over the plains.

May is the hottest month with the mean maximum temperature at about 39°C in the plains, with the plateau regions and elevated places recording 2°C to 3°C lower temperatures. Sometimes heat waves are also experienced in some part of the state in latter part of the pre-monsoon season.

The highest maximum temperature recorded at any individual station in the plains is 48.5°C at Dumka in Santhal Parganas on 6<sup>th</sup> May 1989, which is about 10°C higher than the normal of the warmest month.

January is the coldest month when the mean minimum temperatures for the state as a whole is 10.3 °C, varying from 9°C in the north to 12°C in the south. A much lower temperature may be experienced in the wake of western disturbances during winter. On such occasions minimum temperature may fall below the freezing point and are recorded at a few stations in the northern parts of Jharkhand. Sometimes cold waves prevail in some part of the state during the winter season. The lowest minimum temperature on record at any individual station (other than hill station) was -0.3°C at Bokraro observatory on 24 December 1966.

The maximum temperature rises rapidly from February onwards till June. The increase in maximum temperature in the period from February to May ranges from 9°C to 13°C at individual stations whereas minimum temperature rises by 10°C to 14°C as we proceed from East to West of the state. The maximum temperature falls from the beginning of June to the end of July by about 3°C to 5°C, whereas the minimum temperature falls only by about 1°C to 2°C. The minimum temperature falls only by about 1°C to 3°C from June to September. A slight rise in the maximum temperature is experienced due to more insolation in the month of September.

The night temperatures start falling rapidly after September while the day temperature follow this trend after October and both attain lowest values by January. The fall in minimum temperature and maximum temperature is about 9°C to 12°C and 5°C to 7°C respectively during these periods.

August has the smallest diurnal range of temperature of about 7°C in the state. The diurnal range increases rapidly after the withdrawal of monsoon. During the period from November to May, the diurnal range is of the order of 13°C to 16°C, being highest in March.

## **Humidity**

Table III gives the mean relative humidity at 0830 and 1730 hours IST for individual stations in the sub-division. The relative humidity is generally high during the period from June to October. It is about 47% in May rising to about 67% during

June. The relative humidity is least during summer afternoons when it is about 31%-39% making the summer very dry and hot. The diurnal variation is the highest during the month of January and February.

## **Cloudiness**

Table IV and IV(a) give the mean monthly and total cloud amount and mean number of days with clear and overcast skies at 0830 and 1730 hours IST respectively.

The period from November to March is generally cloudless or lightly clouded. Afternoons are however, comparatively more clouded than forenoons. During the southwest monsoon season (June – September), the skies are heavily clouded. On an average for about 10 days in July and 9 days in August the skies are heavily clouded and they remain clear on an average for 2 and 3 days respectively during these two months. By October, clouding decreases considerably over the entire state.

## **Rainfall**

Table V gives districtwise and statewise mean monthly and annual rainfall and number of rainy days (i.e. days with rainfall of 2.5 mm or more). Table V(a) gives mean monthly and mean annual rainfall and number of rainy days for hill stations. Fig. 6 and 6(a) to 6(d) depict the spatial distribution of the annual and seasonal rainfall for the respective representative months respectively over the state.

The total annual rainfall in the state is maximum over the region of Pakur, Simdega, Sahebganj and Dumka district, its neighbourhood and the extreme northeastern part of the state (Fig.6). The total annual rainfall for the state is 128.2 cm and the total annual number of rainy days are 63. Pakur district receives the maximum amount of rainfall (150.0 cm) in a year whereas Garhwa receives the minimum amount of rainfall (108.5 cm) in a year.

The pattern of spatial distribution of the rainfall over the state during the southwest monsoon season (Fig. 6(c)) generally resembles that of the spatial distribution of the annual rainfall (Fig. 6). From Fig. 6(d), it is observed that during the post monsoon season, the rainfall over the state decreases northwestwards. The southwest monsoon season is the main rainy season over the state. Of the total amount of rainfall, about 84% is received in the southwest monsoon season (June to September), about 3% is received in the winter season (December to February) and about 6% is received in the pre-monsoon (March-May) and 7% in post monsoon season (October and November).

The percentage of the seasonal number of rainy days with respect to the annual number of rainy days shows that 80% during the southwest monsoon season, 9% during the pre-monsoon season, 6% during the post monsoon season and 5% during the winter season. The state receives rainfall mainly due to low pressure areas and monsoon depressions originating in the Bay of Bengal during the southwest monsoon.

The southwest monsoon sets in over the southern parts of the state by about the beginning of second week of June and covers the entire state by the end of the second week of June. In the month of July and August, the state receives 26% and 24% respectively of its annual rainfall. The number of rainy days in a month ranges from 9 to 15 during the southwest monsoon season, with a maximum of about 15 in July and August each.

The withdrawal of the southwest monsoon begins from the northern parts of the state by the end of first week of October and the monsoon completely withdraws from the state by about the end of second week of October.

The most common rain giving systems over the state during the post monsoon season are the depressions and cyclonic storms originating in the Bay of Bengal. The storms and depressions cause heavy to very heavy rainfall and contribute substantially to the season's total rainfall. The state receives about 9 cm of rainfall during post monsoon season.

The state receives about 4 cm of rainfall during winter. This rainfall, though small in amount, is of utmost significance for agriculture. This rainfall occurs in association with induced low pressure areas over the region and its neighbourhood due to western disturbances moving from west to east, across the northern parts of the country.

The features of rainfall described above are also evident from Fig. 7, which shows the annual and seasonal rainfall for the individual districts as well as for the state and provides a measure for comparison of seasonal rainfall with the annual for both districtwise and statewise rainfall.

Table VI gives the monthly and annual rainfall for various river catchments (No. 321, 322, 324, 325, 414, 415 and 418) in the state. The annual rainfall of these river catchments is shown in Fig. 8. Table VI and Fig. 8 show that the river Ganga from its confluence with river Kosi to Bangladesh border has a catchment viz.No. 418 with a maximum rainfall of 144.7 cm. River Hooghly and River Mor has a catchment viz. No. 325 in the state, and receive a maximum amount of rainfall of 137.6 cm. A maximum rainfall of about 112 cm each is received in catchment No. 321 and 418 during the southwest monsoon season.

### **Rainfall Variability**

The spatial distribution of variation of annual rainfall over Jharkhand is depicted in Fig. 9. Coefficient of Variation (CV) which is expressed as percentage is defined as:

$$\text{C.V.} = \frac{\text{Standard deviation } (\sigma)}{\text{Normal (N)}} \times 100$$

It is observed from Fig. 9 that the values of CV of annual rainfall range between 3% and 58% over the entire state of Jharkhand.

The spatial distribution of CV of seasonal rainfall over Jharkhand is shown in Fig. 9(a), 9(b), 9(c) and 9(d) for the seasons: pre-monsoon season (March to May),

southwest monsoon season (June to September), post monsoon season (October and November) and the winter season (December to February) respectively.

It is observed that the values of CV range between 24% to 160% (Fig. 9(a)) in the pre-monsoon season. The regions of extreme northwest Jharkhand exhibit the highest variability with values of CV exceeding 160% while the southern regions of the state exhibit the least CV at about 70%.

During the southwest monsoon season the rainfall variability is low with CV ranging between 5% to 60% (Fig. 9(b)). The rainfall variability is highest in extreme northeast regions of the state while the southern region of the state has low CV values at about 25%.

During the post monsoon season the values of CV range between 9% to 175% (Fig. 9(c)). The gradient of CV is quite steep. The regions of extreme north, northwest and northeast exhibit the highest variability with northwest region recording the highest variability of 140%, while southern regions of state exhibit the least CV at about 55%.

During the winter season the values of CV show a steep gradient with range between 40% to 215% (Fig. 9(d)). The extreme northeast and northwest regions exhibit the highest variability with values of CV at about 175%. The central regions of state show low variability of about 70%.

The variability of annual rainfall over Jharkhand state ranges between 3% to 58% (Fig. 9). As the variability of annual rainfall and rainfall during the southwest monsoon over Jharkhand is relatively low, while as the variability of seasonal rainfall for the other three seasons are very high with CV values exceeding 150%, over some parts of the state, the contribution of southwest monsoon rainfall to the annual rainfall is highest over the state.

## Droughts

Meteorologically, drought over an area or a place may be defined as a situation when the annual rainfall over the area or place is less than 75% of the normal. It is classified as “Moderate drought” if the rainfall deficit is between 25% and 50% and “Severe drought” when it is more than 50%. Areas where frequency of drought as defined above is 20% of the years examined are classified as “drought areas” and areas having drought condition for more than 40% of the years under consideration represent “chronically drought affected areas”.

There is not a single district in the state during 1951-2000, which satisfies the criteria for “drought area” or “chronically drought affected area”.

All the districts of the state were affected by drought during some year or the other during the period 1951-2000. The details of yearwise occurrence of drought over each district are given below. The figures within the brackets against each district indicate the number of occasions during the 50 year period when these districts were affected by drought.

During the 50 year period from 1951-2000, drought conditions as prevailed over the state are described below :-

Sahebganj (9), Chatra, Dhanbad, Kodarma and Simdega (8 each), Deoghar (7), Dumka and Gumla (6 each), Bokaro, Garhwa, Hazaribagh and Pakur (5 each), Giridih, Lohardaga, Latehar, Khunti and Ramgarh (4 each), Godda, East Singhbhum, West Singhbhum, Ranchi and Saraikela (3 each), Palamau, and Jamtara (2 each).

Occurrence of drought conditions in successive years is not frequent in the state. However, individual occurrence of drought not only depends upon the order of the rainfall deficiency in a single year, but also on the continued occurrence of deficient rain in successive years, even though the deficiency in each successive year may not be as high as in a single year. The following table (i) depicts districtwise years of successive drought during the 50 year period 1951-2000.

**Table (i)**

<b>Sr. No.</b>	<b>Name of Affected districts</b>	<b>Years of Successive Drought</b>
1.	Bokaro	1981-1982
2.	Chatra	1981-1982-1983
3.	Deoghar	1965-1966
4.	Dhanbad	1965-1966
5.	Dumka	1964-1965-1966
6.	Giridih	1992-1993
7.	Gumla	1988-1989
8.	Kodarma	1966-1967-1968
9.	Pakur	1965-1966-1967
10.	Sahebganj	1964-1965-1966-1967, 1978-1979
11.	Simdega	1965-1966

Fig. 10 shows the percentage frequency of drought and years of successive drought in the districts during the period 1951-2000. The following table (ii) shows the years of severe drought for various districts, with the actual rainfall expressed as percentage of normal rainfall given in brackets, against each district.

**Table (ii)**

<b>Sr. No.</b>	<b>Affected Districts</b>	<b>Years of Severe Drought (Rainfall less than 50%)</b>
1.	Chatra	1966 (48%)
2.	Garhwa	1966 (48%)
3.	Giridih	1966 (48%)
4.	Gumla	1979 (43%)
5.	Simdega	1965 (47%)

It is observed that the lowest annual rainfall was in Gumla district (43% of the normal rainfall) in the year 1979.

Incidence of widespread and fairly widespread drought over the state in the year 1966, 1979 and 1992 respectively was noticed. The state was worst affected by drought in the year 1966 when 16 districts of the state reported drought.

There was no drought anywhere in the state in the following 20 years: 1952, 1953, 1956, 1959, 1960, 1963, 1971, 1973, 1975, 1977, 1980, 1984, 1986, 1987, 1990, 1994, 1996, 1997, 1998, 1999. The district Sahebganj experienced the maximum number (9 years) of drought conditions during the 50 year period followed by Chatra, Dhanbad, Kodarma, and Simdega (8 years each).

### **Excessive Rainfall**

Rainfall sufficiently in excess of the normal is a predominant factor for occurrence of floods, particularly in high rainfall regions. For the purpose of present description, annual rainfall of 125% or more of the normal is considered as excessive rainfall.

Fig. 11 shows the percentage frequency of excessive rainfall and of successive years of excessive rainfall during the period 1951-2000. It is seen from figure that the frequency of excessive rainfall is generally lower in the southwestern region of the state.

The following table (iii) gives the districtwise excessive rainfall years and the highest annual rainfall (expressed as percentage of normal) with the years of occurrence.

**Table (iii)**

<b>Sr. No.</b>	<b>Districts</b>	<b>Years of Excessive Rainfall</b>	<b>Highest amount of Rainfall expressed as % of normal with year</b>
1.	Bokaro	1953, 1956, 1957, 1961, 1995	193.2 cm in 1956 (150%)
2.	Chatra	1978, 1984, 1986, 1994	188.9 cm in 1978 (156%)
3.	Deoghar	1959, 1968, 1984, 1987, 1997, 1998, 1999, 2000	191.4 cm in 2000 (163%)

**Table (iii) – (contd...)**

<b>Sr. No.</b>	<b>Districts</b>	<b>Years of Excessive Rainfall</b>	<b>Highest amount of Rainfall expressed as % of normal with year</b>
4.	Dhanbad	1959, 1971, 1973, 1978, 1984, 1995, 1997, 1998, 1999	204.2 cm in 1999 (157%)
5.	Dumka	1952, 1956, 1959, 1973, 1978, 1993, 1999	253.0 cm in 1999 (180%)
6.	East Singhbhum	1973, 1975, 1977, 1994, 1999	184.5 cm in 1999 (138%)
7.	Garhwa	1956, 1961, 1994, 1998	163.8 cm in 1961 (151%)
8.	Giridih	1961, 1963, 1980, 1984, 1987, 1995, 1997, 1998, 1999	183.1 cm in 1984 (154%)
9.	Godda	1968, 1970, 1987, 1995, 1999	222.8 cm in 1999 (184%)
10.	Gumla	1952, 1959, 1960, 1961, 1998	217.1 cm in 1961 (170%)
11.	Hazaribagh	1959, 1961, 1984, 1986, 1991, 1999	175.3 cm in 1984 (143%)
12.	Jamtara	1956, 1959, 1968, 1978, 1980, 1993, 1998	244.9 cm in 1959 (181%)
13.	Khunti	1994, 1995, 1999	224.6 cm in 1995 (161%)
14.	Kodarma	1959, 1978, 1986, 1987, 1997, 1998, 1999	162.8 cm in 1998 (144%)
15.	Latehar	1953, 1956, 1961, 1967, 1994, 1997	179.6 cm in 1994 (150%)
16.	Lohardaga	1970, 1977, 1978, 1997	165.4 cm in 1978 (140%)
17.	Pakur	1959, 1963, 1980, 1987, 1997, 1998, 1999, 2000	252.1 cm in 1999 (168%)
18.	Palamau	1956, 1961, 1971, 1976, 1977, 1978, 1987, 1994	191.7 cm in 1961 (176%)
19.	Ramgarh	1956, 1961, 1981, 1983, 1984, 1985, 1986, 1999	217.0 cm in 1981 (165%)
20.	Ranchi	1959, 1971, 1973, 1977, 1990, 1994, 1997	197.5 cm in 1994 (151%)
21.	Sahebganj	1959, 1987, 1995, 1997, 1998, 2000	264.3 cm in 2000 (178%)

**Table (iii) – (contd...)**

<b>Sr. No.</b>	<b>Districts</b>	<b>Years of Excessive Rainfall</b>	<b>Highest amount of Rainfall expressed as % of normal with year</b>
22.	Saraikela	1952, 1953, 1956, 1959, 1975, 1977, 1989, 1999	198.5 cm in 1956 (150%)
23.	Simdega	1956, 1959, 1975, 1988, 1990, 1994	285.7 cm in 1994 (191%)
24.	West Singhbhum	1952, 1956, 1959, 1977, 1984, 1994	185.5 cm in 1956 (144%)

From the above table, it is seen that during the 50 year period, 1951-2000, there were 35 years in which some districts or the other in the state recorded excessive rainfall. Of these, Simdega district received highest excessive rainfall amounting to 191% of the annual normal rainfall in 1994. The Dhanbad and Giridih district have got maximum number (09) of excessive rainfall years. Khunti has got minimum number (3) of such rainfall years. In 1959, a large number of districts (13) of the state experienced excessive rainfall. The successive year of excessive rainfall against each district are listed below:

#### **Successive years of Excessive Rainfall (Districtwise)**

<b>Sr. No.</b>	<b>Successive years of Excessive Rainfall</b>	<b>Districts</b>
1.	1956-1957	Bokaro
2.	1997-1998-1999-2000	Deoghar
3.	1997-1998-1999	Dhanbad
4.	1997-1998-1999	Giridih
5.	1959-1960-1961	Gumla
6.	1994-1995	Khunti
7.	1986-1987, 1997-1998-1999	Kodarma
8.	1977-1978	Lohardaga
9.	1997-1998-1999-2000	Pakur
10.	1976-1977-1978	Palamau
11.	1983-1984-1985-1986	Ramgarh
12.	1997-1998	Sahebganj
13.	1952-1953	Saraikela

The heaviest one day rainfall on record at any station in the state was 601.4 mm on 25 September 1999 at Taljhari in Sahebganj district.

### **Cyclonic storms and depressions**

Table VII depicts the total number of storms/depressions which affected the state during the period 1891-2010. The cyclonic storms and depressions which affect India, mostly originate and/or intensify over the Bay of Bengal, mainly during the months of May to November. They usually travel northwestwards or westwards and cross the east coast of India. In general, storms and depressions weaken on entering land. Jharkhand though an inland state, the coast is about 150 km away. The state therefore does not experience the full fury of severe storms/depressions like the coastal regions. However, in association with these systems, heavy to very heavy rainfall occurs over the affected districts. During the course of their movement, they sometimes turn or recurve towards north or northeast. This point of turning or recurving progressively shifts westwards till September. In May, these disturbances recurve while still out in Bay of Bengal. Hence, exceptionally few of them cross the coast and travel inland, affecting the weather of the state.

During the months from December to April, the state was not affected by Bay storms/depressions even on a single occasion since 1891, but during the month of November, it was affected four times. The number of storms/depressions that affected the state in September and October was 89 and 29 respectively, while the maximum number being 143 in the month of August. The monsoon depressions during June to September, generally form over the Bay of Bengal and traveling westwards or northwestwards, across Orissa, Jharkhand, Chattisgarh, Bihar, Madhya Pradesh and Uttar Pradesh. During the period 1891-2010, total 450 storms /depressions influenced the weather of Jharkhand state. The Bay of Bengal storms/depressions progressively form in the lower latitudes, with the advance of the year.

The tracks of the Bay cyclones are observed in more southerly latitudes in October and November, influencing the weather of Jharkhand during the period. One cyclonic storm, which originated in southwest Bay of Bengal on 15<sup>th</sup> November 1946 deserves a mention due to its long travel, through both, Bay of Bengal and Arabian

Sea and back across Orissa. The storm entered Tamil Nadu from southwest Bay of Bengal, then emerged into the Arabian Sea near Manglore, it again crossed the Konkan coast to enter into the main land. As it travelled over land, it passed through Orissa before it finally emerged into the Head Bay of Bengal and thereafter dissipated there.

Majority of storms and depressions cross Orissa coast, north of Puri, which is the most susceptible region for the landfall of storms/depressions that affect the Jharkhand state.

## **Other Weather Phenomena**

### **(a) Thunderstorms and Dust storms**

Convective activity is essential for the occurrence of thunderstorms and dust storms. With the advance of the summer, thunder activity becomes pronounced due to heating of the land. When the moisture in the atmosphere is insufficient, dry thunderstorms or dust storms occur. The maximum number of thunderstorms occur with approach of the monsoon current, while the dust storms are mainly confined to the summer months of April to mid June. Hail storms occur rather rarely in the state, during the months of February to June. Squalls occasionally occur in the state, mainly during the pre-monsoon and early southwest monsoon months. On an average, the frequency of days of squalls and thunderstorms are maximum for Ranchi (A). Thunderstorm activity attains its maximum in June. During the winter season, the state may experience thunderstorm activity resulting from low pressure areas induced due to eastward moving upper air disturbances known as “Western Disturbances”. Thunderstorm activity is minimum in December.

### **(b) Fog**

Fog is experienced during the rainy months of July to September, when the air is almost saturated and is easily cooled below the dew point while rising over high elevations. Favourable conditions for formation of radiation fog such as light to calm wind, clear skies, low temperatures etc., do exist after the withdrawal of the monsoon till March, their frequency of occurrence being maximum during the months of December and January.

**TABLE – I**  
**MEAN WIND SPEED (kmph) AND PREDOMINANT WIND DIRECTION**

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
<b>JHARKHAND</b>														
Bokaro	a m e	3.3 W W/NW/SW/N	4.1 W W/NW/SW	5.0 W NW/W	6.4 W/SW NW/W/SW	7.5 SE/SW/E/W SE/E/W/SW	7.5 E/SE/SW/W SE/E/SW/W	6.7 E/SE/SW/W E/SE/SW/W	6.4 E/SE/SW/W E/SE/SW/W	5.4 SE/E SE/E	3.2 C/W/SW C/W/SW	2.8 W/C/NW W/NW	2.9 W/NW/C/SW W/NW/SW	5.1
Chaibasa	a m e	1.8 C/SW C	2.3 C/SW C/SW	3.0 C/SW C/SW	4.1 C/SW C/SW	4.4 C/SW C/SW	5.0 C/SW C/SW	4.1 C/SW C/SW	3.5 C/SW C/SW	2.9 C/SW C/SW	2.1 C/SW C	2.0 C C	1.8 C C	3.1
Daltonganj	a m e	2.8 C/SW C/NW	3.0 C/SW C/NW	4.0 C/SW NW	4.7 C/SW NW	5.4 C/SW NW	5.8 C/W NW/NE	5.2 C/SW SW	5.0 C/SW C/NE	4.6 C/SW NE	3.5 C/SW C/NE	2.5 C/SW C/NE	2.3 C/SW C/NW	4.1
Dhanbad	a m e	5.3 C/NW C/NW	6.6 C/NW C/NW	5.8 C/W C/NW	6.6 C/SE C/NW	6.7 SE SE	6.8 SE SE	6.9 C/SE C/SE	6.3 C/SE C/SE	6.0 C/SE C/SE	4.3 C/SE C	3.9 C/NE/NW C	4.4 C/NW C	5.8
Dumka	a m e	4.7 W C/W	4.7 W C/W	4.9 W W	5.6 W/E W	6.1 E E	6.3 E E	6.2 E/W E	6.5 E E	6.1 E/W E	5.2 W/E C/E	4.4 W C/W	4.4 W C/W	5.4
Hazaribagh	a m e	7.0 NW NW	7.4 NW NW	9.4 NW NW	10.1 SW/NW NW	10.0 SW NW	10.0 SW NW	10.0 SW NW	10.4 SE SE/NW	11.0 NW/SE NW/SE	9.0 NW NW	8.6 NW NW	8.7 NW NW	9.3

**TABLE – I (Contd...)**  
**MEAN WIND SPEED (kmph) AND PREDOMINANT WIND DIRECTION**

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
<b>JHARKHAND</b>														
Jamshedpur (A)	a m e	3.0 C/NW C/NW	3.6 C/NW C/NW	4.4 C/NW C/NW	5.4 C/W C/NW	6.0 C/SW E	6.4 C/SW E	5.7 C/SW C/E	5.4 C/E/SW C/E	4.8 C/E/W C/E	3.5 C/NW C/E	3.2 C/NW C	2.9 C/NW C	4.5
Jamshedpur	a m e	3.3 C/NW C/E	4.1 C/NW C/NW	5.0 C/W C/NW	6.1 C/W C/NW	6.7 C/W C/SE	7.0 C/W C/SE	6.3 C/W C/SE	6.0 C/W C/E	5.3 C/W C/E	4.0 C/W C/E	3.2 C/NW C	2.9 C/NW C	5.0
Ranchi (A)	a m e	7.2 C/NW NW	8.3 NW/C NW	9.1 NW/C NW	9.5 SW NW	10.0 SW NW	10.8 SW NW	10.6 SW SW	10.7 SW E	9.9 SW SE	7.6 C/NE N/NW/NE	7.3 C/N NW/N	7.1 C/NW NW	9.0
State Mean	a	4.3	4.9	5.6	6.5	7.0	7.3	6.9	6.7	6.2	4.7	4.2	4.2	5.7

a Mean Wind Speed in kms per hour  
m Predominant wind direction in the morning  
e Predominant wind direction in the evening  
C Calm  
Var Variable

**TABLE-II**  
**MEAN DAILY MAXIMUM AND MEAN DAILY MINIMUM TEMPERATURE (°C)**  
**JHARKHAND**

<b>STATION</b>		<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>ANNUAL</b>
Bokaro	Max	25.9	28.6	34.0	39.5	41.1	37.8	33.3	32.1	32.3	31.2	29.1	26.4	32.6
	Min	7.4	8.9	13.5	18.9	23.1	24.0	23.1	22.5	21.8	17.4	11.2	7.1	16.6
Chaibasa	Max	25.8	28.9	34.2	38.5	39.3	35.6	31.6	31.2	31.5	30.9	28.4	25.9	31.8
	Min	11.5	14.4	19.2	23.9	25.7	26.0	24.9	24.7	24.1	21.2	15.8	11.5	20.2
Daltonganj	Max	24.6	27.6	33.4	38.6	41.0	38.5	33.4	32.7	32.8	32.1	29.1	25.4	32.4
	Min	8.6	11.4	15.6	21.4	25.2	26.8	25.3	24.9	24.0	19.9	13.9	9.1	18.8
Dhanbad	Max	25.4	28.3	33.6	37.9	38.1	35.2	31.7	31.2	31.4	31.3	29.0	25.6	31.6
	Min	10.5	13.0	17.6	21.9	23.4	23.9	23.2	23.0	22.5	19.6	15.1	10.8	18.7
Dumka	Max	25.7	28.9	34.3	38.4	37.9	35.5	32.6	32.3	32.7	32.5	30.1	26.5	32.3
	Min	10.3	13.2	17.6	22.5	24.4	25.1	24.5	24.2	23.9	21.1	15.8	11.0	19.5
Hazaribagh	Max	22.1	25.1	30.1	35.0	36.9	33.6	29.3	28.7	28.8	27.9	25.3	22.4	28.8
	Min	8.7	11.9	16.3	21.1	23.4	23.8	22.8	22.5	22.0	18.5	13.5	9.1	17.8
Jamshedpur (A)	Max	26.1	29.1	34.3	38.6	39.2	36.0	32.2	31.8	32.2	31.5	29.1	26.1	32.2
	Min	11.5	14.5	18.5	23.5	25.9	25.9	25.3	25.1	24.5	21.4	16.3	11.5	20.3
Jamshedpur	Max	26.5	29.5	34.8	38.8	39.3	36.2	32.6	32.1	32.6	32.2	30.0	26.8	32.6
	Min	11.6	14.2	18.6	23.4	25.8	26.2	25.5	25.3	24.9	21.5	16.3	11.5	20.4
Ranchi (A)	Max	22.7	25.4	31.1	35.4	36.8	33.3	29.2	28.5	28.8	28.3	25.7	22.9	29.0
	Min	10.0	12.4	16.9	21.3	23.3	23.5	22.5	22.2	21.6	18.6	14.1	10.1	18.0
State Mean	Max	25.0	27.9	33.3	37.9	38.8	35.7	31.8	31.2	31.5	30.9	28.4	25.3	31.5
	Min	10.0	12.7	17.1	22.0	24.5	25.0	24.1	23.8	23.3	19.9	14.7	10.2	18.9

**TABLE III  
MEAN RELATIVE HUMIDITY(%)  
JHARKHAND**

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Bokaro	M	62	57	49	42	50	69	84	85	83	76	65	60	65
	E	56	49	42	39	44	66	82	84	82	75	63	56	61
Chaibasa	M	68	61	51	50	57	68	81	82	81	74	68	68	67
	E	50	40	29	28	38	60	76	79	76	64	55	51	54
Daltonganj	M	74	67	55	42	44	61	79	81	79	75	73	73	67
	E	52	43	32	26	28	53	76	79	74	62	55	54	53
Dhanbad	M	65	57	48	51	64	77	87	88	85	75	65	64	69
	E	48	40	32	32	43	65	80	82	78	67	57	52	56
Dumka	M	65	57	49	53	64	75	83	83	81	75	67	65	68
	E	54	46	39	39	51	69	81	81	80	71	62	58	61
Hazaribagh	M	63	56	45	43	50	70	86	88	84	73	64	64	66
	E	51	45	34	30	35	60	80	82	79	67	57	55	56
Jamshedpur (A)	M	73	63	51	51	58	71	82	83	82	77	71	73	70
	E	46	37	29	28	37	62	77	79	76	64	56	52	54
Jamshedpur	M	72	64	53	54	60	72	82	83	81	75	71	73	70
	E	52	42	32	34	42	65	79	80	77	69	63	59	58
Ranchi (A)	M	62	55	41	40	50	71	87	88	83	70	60	62	64
	E	42	36	27	27	36	62	82	83	78	61	51	47	53
State Mean	M	67	60	49	47	55	70	83	85	82	74	67	67	67
	E	50	42	33	31	39	62	79	81	78	67	58	54	56

M: MORNING

E: EVENING

**TABLE – IV**  
**MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AND MEAN CLOUD AMOUNT \*\* (OKTA OF THE SKY) AT 0830 HOURS IST**

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
<b>JHARKHAND</b>														
Bokaro	a	12	9	9	8	8	2	0	0	1	8	9	14	80
	b	0	0	0	0	0	3	5	5	3	1	0	0	17
	c	1.5	1.3	1.4	1.5	1.8	4.0	5.5	5.4	4.4	2.3	1.3	1.0	2.6
Chaibasa	a	23	20	23	21	20	8	2	2	6	16	21	24	186
	b	3	3	2	2	2	11	17	14	8	5	3	2	72
	c	1.5	1.4	1.2	1.4	1.7	4.7	6.5	6.4	4.7	2.5	1.5	1.3	2.9
Daltonganj	a	22	19	22	20	20	10	7	9	11	21	24	24	209
	b	2	2	1	1	1	5	9	8	4	2	1	2	38
	c	1.4	1.3	1.3	1.2	1.2	3.4	5.0	4.5	3.6	1.6	0.9	1.1	2.2
Dhanbad	a	24	20	23	19	17	6	1	2	7	19	24	27	189
	b	1	2	2	2	3	8	12	10	9	4	2	1	56
	c	1.0	1.3	1.3	1.8	2.4	5.0	6.4	6.1	4.6	2.2	1.0	0.8	2.8
Dumka	a	26	23	27	25	22	13	9	10	15	22	26	27	245
	b	0	0	0	0	0	1	3	2	1	1	0	0	8
	c	0.8	0.8	0.8	0.8	1.4	2.9	3.8	3.7	2.7	1.4	0.6	0.7	1.7
Hazaribagh	a	23	19	23	21	19	8	1	1	5	18	22	23	183
	b	1	1	1	1	3	9	10	9	6	3	1	1	46
	c	1.1	1.2	1.1	1.3	1.9	4.3	6.0	5.8	4.5	2.0	1.1	1.1	2.6
Jamshedpur (A)	a	18	16	19	15	11	2	0	0	1	11	16	19	128
	b	1	1	1	1	1	6	9	9	6	3	1	1	40
	c	1.7	1.7	1.7	1.8	2.6	5.5	6.8	6.7	5.6	3.0	1.9	1.5	3.4
Jamshedpur	a	22	19	21	18	17	4	0	0	3	15	19	23	161
	b	1	1	1	1	0	5	7	6	4	2	1	1	30
	c	1.4	1.3	1.3	1.2	1.6	4.4	5.9	5.7	4.4	2.3	1.4	1.4	2.7
Ranchi (A)	a	19	15	17	15	15	3	1	1	2	12	16	18	134
	b	1	1	1	1	0	5	9	9	5	3	1	1	37
	c	1.6	1.7	1.7	1.6	2.0	5.0	6.6	6.7	5.2	2.7	1.7	1.5	3.2
State Mean	a	21	18	20	18	17	6	2	3	6	16	20	22	169
	b	1	1	1	1	1	6	9	8	5	3	1	1	38
	c	1.3	1.3	1.3	1.4	1.8	4.4	5.8	5.7	4.4	2.2	1.3	1.1	2.7

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount.

\*\* Okta = Unit, equal to area of one eighth of the sky used in specifying cloud amount.  
 For Example: 1 Okta means 1/8<sup>th</sup> of the sky covered.

**TABLE – IV (a)**  
**MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AND MEAN CLOUD AMOUNT \*\* (OKTA OF THE SKY) AT 1730 HOURS IST**

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
<b>JHARKHAND</b>														
Bokaro	a	12	9	9	7	5	1	0	0	0	5	11	16	75
	b	0	1	0	0	0	3	5	5	3	1	0	0	18
	c	1.5	1.6	1.5	1.9	2.4	4.5	5.6	5.4	4.7	2.6	1.4	0.9	2.8
Chaibasa	a	21	19	21	14	21	4	1	2	4	14	21	23	155
	b	2	2	2	3	6	15	21	18	14	6	2	2	93
	c	1.5	1.5	1.8	2.6	3.5	6.0	6.9	6.8	5.9	3.0	1.4	1.4	3.5
Daltonganj	a	19	19	20	16	14	5	3	3	5	15	20	21	160
	b	2	1	1	1	2	8	11	11	7	2	1	1	48
	c	1.6	1.5	1.7	2.0	2.4	5.1	6.1	5.9	5.0	2.2	1.2	1.2	3.0
Dhanbad	a	26	22	23	19	16	5	1	2	6	19	24	26	189
	b	3	3	3	4	6	14	16	14	13	4	2	2	84
	c	1.1	1.5	1.6	2.0	3.0	5.6	6.6	6.2	5.2	2.4	1.2	0.8	3.1
Dumka	a	23	20	24	20	14	6	3	4	7	19	23	25	188
	b	0	0	0	0	1	1	2	2	1	1	0	0	8
	c	1.0	1.1	1.1	1.7	2.3	4.1	4.8	4.4	3.8	1.9	1.0	0.9	2.3
Hazaribagh	a	21	18	21	17	14	5	1	1	3	12	18	23	154
	b	2	2	1	2	3	11	13	11	8	3	2	1	59
	c	1.4	1.5	1.6	2.0	2.6	5.3	6.3	6.1	5.3	2.4	1.4	1.1	3.1
Jamshedpur (A)	a	15	11	12	6	3	1	0	0	0	6	12	16	82
	b	1	1	1	2	4	11	13	11	9	4	1	1	59
	c	1.8	2.2	2.6	3.6	4.4	6.5	7.1	7.0	6.3	3.7	2.2	1.8	4.1
Jamshedpur	a	19	16	16	10	8	2	0	0	1	11	16	20	119
	b	1	1	1	1	2	8	8	6	5	2	1	1	37
	c	1.3	1.5	1.8	2.5	3.1	5.3	6.1	5.8	5.0	2.7	1.5	1.3	3.2
Ranchi (A)	a	14	12	12	7	5	1	1	1	1	6	12	14	86
	b	1	1	1	1	1	6	9	8	6	2	1	1	38
	c	2.1	2.2	2.4	3.2	3.6	6.0	6.7	6.7	6.1	3.4	2.2	1.9	3.9
State Mean	a	19	16	18	13	11	3	1	1	3	12	17	20	134
	b	1	1	1	1	3	9	11	9	7	3	1	1	48
	c	1.5	1.6	1.8	2.4	3.0	5.4	6.2	6.0	5.3	2.7	1.5	1.3	3.2

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount.

\*\* Okta = Unit, equal to area of one eighth of the sky used in specifying cloud amount.  
 For Example: 1 Okta means 1/8<sup>th</sup> of the sky covered.

**TABLE – V**  
**MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS**  
**JHARKHAND**

<b>DISTRICT</b>		<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>ANNUAL</b>
Bokaro	a	13.1	13.7	14.4	20.7	41.1	200.7	318.6	318.0	258.5	69.5	13.8	6.4	1288.3
	b	1.1	1.1	1.1	1.8	3.0	9.5	15.4	15.0	11.4	3.4	0.8	0.5	64.1
Chatra	a	14.8	12.5	10.6	11.7	25.9	173.7	333.6	308.2	243.3	58.5	8.0	9.9	1210.7
	b	1.3	1.2	1.0	0.6	1.6	7.5	14.8	14.5	10.6	2.9	0.4	0.7	57.1
Deoghar	a	13.1	12.3	11.9	16.5	48.3	167.5	293.0	273.5	247.9	76.2	9.4	4.5	1174.1
	b	1.0	1.1	0.9	1.2	3.1	8.9	14.7	14.2	10.9	3.5	0.6	0.4	60.5
Dhanbad	a	12.2	16.9	17.0	17.5	46.0	195.0	323.1	308.6	263.7	86.6	8.4	5.5	1300.5
	b	1.2	1.4	1.4	1.5	3.2	9.7	16.1	15.8	12.0	4.0	0.6	0.5	67.4
Dumka	a	11.4	14.2	13.6	21.9	70.4	202.2	353.4	296.9	280.3	125.2	11.7	4.2	1405.4
	b	0.8	1.1	1.0	1.7	4.1	10.4	16.4	15.1	11.8	4.8	0.6	0.3	68.1
East Singhbhum	a	14.7	18.4	21.0	35.2	76.6	243.9	294.9	318.6	229.4	65.1	14.0	4.9	1336.7
	b	1.1	1.3	1.6	2.6	4.5	10.6	14.5	15.5	11.1	3.8	0.7	0.4	67.7
Garhwa	a	14.4	11.8	9.1	4.8	13.8	141.3	302.3	311.3	223.8	39.3	7.3	5.3	1084.5
	b	1.2	0.9	0.9	0.4	0.9	6.5	14.0	14.8	10.2	2.2	0.3	0.4	52.7
Giridih	a	8.8	14.3	12.9	17.9	44.4	197.1	307.7	263.0	233.4	75.3	9.3	4.9	1189.0
	b	0.8	1.1	1.0	1.4	2.8	8.6	14.4	13.8	10.5	3.2	0.5	0.5	58.6
Godda	a	11.7	9.3	9.6	20.4	58.8	185.1	307.4	270.7	240.7	82.4	8.0	6.5	1210.6
	b	0.8	0.8	0.8	1.3	3.7	8.8	14.3	13.3	10.2	3.5	0.5	0.5	58.5
Gumla	a	19.5	19.3	22.0	20.0	42.2	197.9	335.1	307.1	232.7	61.8	11.9	7.7	1277.2
	b	1.7	1.7	2.0	1.7	3.4	10.2	16.4	16.5	11.8	3.7	0.7	0.6	70.4
Hazaribagh	a	12.8	12.9	12.4	13.1	33.4	182.2	315.7	303.5	239.4	84.2	8.7	7.3	1225.6
	b	1.0	1.1	1.0	1.2	2.3	8.4	15.3	14.8	10.8	3.5	0.5	0.6	60.5
Jamtara	a	11.8	18.6	13.9	20.1	60.1	205.4	332.1	299.9	271.4	105.5	10.7	3.7	1353.2
	b	0.8	1.2	1.0	1.6	3.7	9.5	15.3	15.1	11.5	4.1	0.5	0.3	64.6
Khunti	a	18.7	17.1	18.0	20.0	45.6	221.3	358.7	355.5	253.9	61.4	14.9	10.2	1395.3
	b	1.3	1.6	1.4	1.8	3.8	10.9	17.2	17.2	13.3	3.6	0.8	0.9	73.8
Kodarma	a	14.9	14.1	11.3	7.5	38.6	183.3	266.4	268.3	234.4	70.1	11.8	10.1	1130.8
	b	1.3	1.2	0.9	0.6	2.2	8.1	13.7	13.4	10.6	3.3	0.6	0.9	56.8
Latehar	a	17.1	17.6	19.2	9.2	28.3	172.9	339.9	295.6	227.1	54.0	9.1	7.6	1197.6
	b	1.4	1.5	1.5	0.9	1.7	7.7	15.3	15.1	10.9	3.0	0.5	0.6	60.1
Lohardaga	a	16.9	17.9	21.1	19.1	37.7	187.1	320.4	264.4	215.5	55.4	14.6	11.5	1181.6
	b	1.6	1.6	2.0	1.6	2.9	9.3	16.4	15.3	11.5	3.5	0.8	0.7	67.2
Pakur	a	11.6	11.8	13.3	26.3	84.8	205.0	369.8	306.7	328.7	124.7	12.3	5.3	1500.3
	b	0.8	1.0	0.9	1.7	4.7	10.3	16.2	14.1	12.1	4.7	0.6	0.3	67.4
Palamau	a	15.8	13.8	10.9	7.5	14.7	148.9	308.8	291.4	217.4	48.1	6.3	5.4	1089.0
	b	1.3	1.3	1.1	0.7	1.1	6.8	14.6	14.5	10.1	2.6	0.4	0.5	55.0
Ramgarh	a	14.5	19.0	21.2	21.1	44.5	222.7	333.7	308.8	240.3	67.0	11.4	10.7	1314.9
	b	1.2	1.4	1.0	1.6	2.7	9.4	15.1	14.6	10.7	3.0	0.6	0.6	61.9
Ranchi	a	15.8	20.8	19.4	20.5	43.2	207.8	330.1	315.4	241.9	73.5	10.7	8.6	1307.7
	b	1.4	1.6	1.8	1.7	3.2	10.1	16.1	16.1	12.0	3.8	0.7	0.6	69.1
Sahebganj	a	11.2	6.1	11.6	20.8	80.0	233.8	372.8	304.4	340.1	89.0	7.9	7.0	1484.7
	b	0.7	0.6	0.8	1.3	3.9	9.7	14.8	13.9	11.2	3.6	0.4	0.4	61.3
Saraikela	a	16.4	19.5	21.7	31.0	58.4	224.6	318.1	318.8	238.2	62.6	8.6	5.1	1323.0
	b	1.4	1.4	1.6	2.0	3.9	10.3	14.9	15.2	11.3	3.4	0.6	0.5	66.5

**TABLE – V (Condd..)**  
**MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS**  
**JHARKHAND**

<b>DISTRICT</b>		<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>ANNUAL</b>
Simdega	a	22.0	13.2	14.5	16.7	38.6	248.1	431.2	344.3	279.9	65.1	11.3	10.9	1495.8
	b	1.4	1.1	1.3	1.3	2.7	10.4	17.7	16.9	12.8	3.2	0.7	0.6	70.1
West	a	15.0	19.0	21.8	25.9	64.4	211.7	302.9	327.0	215.0	66.2	12.6	6.7	1288.2
Singhbhum	b	1.2	1.4	1.6	1.9	4.1	9.7	14.4	15.2	11.0	3.8	0.7	0.4	65.4
State Mean	a	14.5	15.2	15.5	18.6	47.5	198.3	327.9	303.3	249.9	73.6	10.5	7.1	1281.9
	b	1.2	1.2	1.2	1.4	3.1	9.2	15.3	15.0	11.3	3.5	0.6	0.5	63.5

a : Normal Rainfall (mm)

b : Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

**TABLE – V(a)**  
**MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS**  
**HILL STATIONS**

<b>STATIONS</b>		<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DEC</b>	<b>ANNUAL</b>
Panki	a	13.4	10.0	7.7	3.0	12.7	149.4	310.8	298.8	197.5	43.2	7.8	0.5	1059.3
	b	1.1	1.1	1.0	0.3	0.9	7.3	13.2	13.4	9.4	2.2	0.3	0.3	50.5
Panki	a	11.0	28.6	24.1	19.2	25.7	127.4	323.6	312.7	186.4	52.0	8.8	8.6	1128.1
(Hydro)	b	1.4	2.6	1.5	0.9	1.9	7.5	14.9	12.4	10.0	2.8	0.8	0.7	57.4

Hill stations not considered for sub-divisional mean.

**TABLE – VI**  
**MEAN RAINFALL (mm) OVER DIFFERENT RIVER CATCHMENTS OF JHARKHAND**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Jul</i>	<i>Aug</i>	<i>Sep</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Annual</i>
<b>1. <u>River Brahmani and Baitarni combined (Catchment No. 321)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Bokaro, Gumla, Lohardaga, Ranchi, Simdega, West Singhbhum													
	17.4	18.4	19.9	20.1	45.7	209.6	354.0	338.0	241.2	65.9	11.6	8.3	1349.9
<b>2. <u>River Subarnrekha and stream between River Baitarni and Subarnrekha (Catchment No. 322)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
East Singhbhum, Khunti, Ranchi, Saraikela,													
	15.9	19.7	21.6	26.8	57.5	220.3	314.4	315.2	242.1	69.1	11.5	5.8	1319.9
<b>3. <u>River Damodar (Catchment No. 324)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Bokaro, Chatra, Dhanbad, Giridih, Hazaribagh, Kodarma, Latehar, Lohardaga, Palamau, Ramgarh, Ranchi													
	12.7	13.9	14.5	16.7	40.7	197.7	319.1	295.2	247.0	77.0	9.7	6.0	1250.1
<b>4. <u>River Hooghly and River Mor (Catchment No. 325)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Deoghar, Dumka, Giridih, Jamtara, Pakur													
	11.8	14.6	13.4	21.1	66.0	198.9	344.5	299.5	279.3	110.6	11.7	4.6	1376.1
<b>5. <u>River Son (Catchment No. 414)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Chatra, Garhwa, Gumla, Hazaribagh, Latehar, Palamau													
	16.3	15.8	14.4	8.9	20.7	156.2	320.3	295.9	220.7	50.0	8.0	6.6	1133.7
<b>6. <u>River Ganga between its confluence with river Son and River Kosi, (excluding river Kosi) (Catchment No. 415)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Chatra, Deoghar, Dumka, Godda, Hazaribagh, Kodarma, Palamau													
	13.8	11.7	10.4	13.0	36.5	160.0	299.6	276.9	233.3	69.6	7.4	6.3	1138.5
<b>7. <u>River Ganga from its confluences with River Kosi to Bangladesh Border (Catchment No. 418)</u></b>													
<b>Districts/parts of districts within this Catchment:</b>													
Pakur, Sahebganj													
	12.9	8.4	12.7	23.7	82.7	221.5	363.2	292.0	307.8	108.8	8.6	5.3	1447.4

**TABLE – VII**  
**STORMS AND DEPRESSIONS AFFECTING JHARKHAND STATE**  
**DURING 1891 – 2010**

<i>MONTH</i>	<i>NO. OF STORMS/ DEPRESSIONS</i>
January	NIL
February	NIL
March	NIL
April	NIL
May	13
June	63
July	109
August	143
September	89
October	29
November	4
December	NIL
<b>Total</b>	<b>450</b>

**DISTRICT  
CLIMATOLOGICAL  
SUMMARIES OF  
JHARKHAND**

## **BOKARO DISTRICT**



The climate of this district is characterized by hot and dry summer season, humid and not so hot monsoon season and a bracing cold winter. The year may be divided into four seasons. The cold season starts from late November and extends upto the end of February. This is followed by the hot season, which continues till second week of June when the southwest monsoon arrives over the district. June to September is the period of southwest monsoon season. The post monsoon months October and November constitute a transition period from the monsoon to the winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for ten raingauge stations for the period ranging from 10 to 43 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1288.3 mm. The annual rainfall in the district varies over a small range. The rainfall in the southwest monsoon season is about 85% of the annual normal rainfall, July and August being the months with the highest rainfall with an average value of 318.3 mm. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1956 when it amounted to 150% of the normal. In the year 1979, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 60% of the normal. In the fifty year period under consideration, there were 8 years in which the rainfall was less than 80% of the normal. Considering the district as a whole, there were two occasions of two consecutive years of such low rainfall. It is seen from Table 2 that the annual rainfall was between 1001 mm and 1500 mm in 26 years out of 40.

On an average there are 64 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 60 at Jaridih to 68 at Bokaro.

The heaviest rainfall recorded in 24 hours at any station in the district was 374.1 mm at Peterbar (Hydro) on 18 July 1957.

## **TEMPERATURE**

There is one meteorological observatory in the district at Bokaro. The record of temperatures and other meteorological parameters that prevail at this station may be taken as representative of the climatic conditions in the district as a whole. The cold season starts from the end of November when both day and night temperatures decrease rapidly with the advance of the season. December to January is the coldest part of the year when the mean maximum temperature is about 26.1°C and the mean minimum temperature is about 7.2°C. During winter months, in association with the passage of western disturbances, cold waves/spells of cold weather affect the district and minimum temperature drops down to 2°C during this period. Summer season commences by about the middle of March when temperatures begin to rise. May is the hottest month when the mean maximum temperature is 41.1°C and the mean minimum temperature is 23.1°C. In the latter part of the summer season i.e. May and June the maximum temperatures may sometimes reach about 45°C on individual days. The day temperatures drop rapidly, with the advance of the southwest monsoon into the district towards the second week of June. However, the nights are warm. The day temperature begins to decrease with the withdrawal of the monsoon by about first week of October, while the drop in the night temperature is appreciable.

The highest maximum temperature ever recorded at Bokaro was 46.6°C on 20 May 1972. The lowest minimum temperature ever recorded was -0.3°C on 24 December 1966.

## **HUMIDITY**

The relative humidity is generally high about 80% during the monsoon months. It is comparatively less during the rest of the year and remains between 55% to 65%. The driest part of the year is the summer season when humidity is about 40% in the afternoon.

## **CLOUDINESS**

The skies are heavily clouded or overcast during the monsoon season. In the winter and early part of the summer season the skies are generally clear or lightly clouded. Cloudiness increases from April, particularly in the afternoon.

## **WINDS**

Winds are generally light throughout the year with some strengthening in force in the later part of summer and southwest monsoon season. In May and in the monsoon season winds are predominantly from east and southeast direction. In October winds are generally calm or mainly from west and southwest direction. From November southeasterly component decreases and westerly component increases and winds blow from west/southwest direction during winter and early summer season.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon months move in northwesterly direction towards the district or its neighborhood causing heavy rain and thunderstorms. Dust storms occur occasionally during the southwest monsoon season. Fog occurs occasionally during the post monsoon and winter season.

Tables 3, 4 and 5 give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Bokaro.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
BOKARO**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bermon	17	a	7.2	15.2	9.7	16.2	32.7	191.1	320.6	256.5	249.2	59.7	9.2	6.8	1174.1	141	70	134.8	10 Jul 2003
		b	0.6	1.0	1.0	1.5	2.3	9.7	17.5	15.2	10.8	2.7	0.7	0.6	63.6	(1978)	(1982)		
Bokaro	19	a	13.5	16.6	12.8	23.5	36.4	179.1	324.7	306.4	241.8	72.8	6.9	6.2	1240.7	-	-	216.2	06 Jul 1953
		b	1.2	1.7	1.1	2.5	2.9	8.9	17.1	15.7	11.5	3.8	0.7	0.5	67.6				
Chandankiary	31	a	12.2	13.6	13.4	21.6	55.6	201.3	342.0	313.9	190.8	62.4	7.8	7.2	1241.8	184	53	325.0	26 Jul 1968
		b	1.1	0.8	1.1	1.4	3.3	9.9	15.1	14.4	9.7	3.5	0.4	0.6	61.3	(1994)	(1982)		
Chas	43	a	11.8	13.7	15.8	17.4	36.7	174.2	282.4	294.0	254.4	82.8	17.3	6.5	1207.0	144	56	231.9	12 Aug 1935
		b	0.9	1.1	1.0	1.6	2.6	9.7	15.5	15.4	11.9	3.5	0.7	0.4	64.3	(1953)	(1966)		
Gomia	36	a	11.8	13.6	21.2	19.4	39.6	206.4	324.7	310.0	245.8	77.2	10.4	6.3	1286.4	149	54	239.6	24 Jun 1996
		b	1.3	1.2	1.3	1.9	2.7	9.7	16.5	15.0	10.9	3.3	0.6	0.4	64.8	(1978)	(1966)		
Jaridih	24	a	15.3	13.7	13.5	25.3	33.4	169.6	303.6	257.4	199.5	67.1	4.0	6.9	1109.3	139	49	155.5	10 Jul 1987
		b	1.2	1.2	1.3	2.1	3.0	8.5	15.5	13.5	10.3	2.7	0.3	0.5	60.1	(1984)	(1979)		
Kasmar	30	a	16.2	19.1	12.1	22.3	40.0	187.7	282.4	296.6	225.4	84.4	13.9	9.9	1210.0	126	69	185.0	23 Jul 1997
		b	1.5	1.1	1.1	1.6	3.2	9.2	14.2	15.5	10.6	3.8	0.9	0.7	63.4	(1990)	(1966)		
Nawadih	10	a	13.2	10.8	22.2	19.2	57.2	303.6	370.1	464.2	459.9	61.5	37.7	2.8	1822.4	111	97	292.0	27 Sep 1995
		b	0.8	0.7	0.9	1.3	3.0	10.3	13.5	15.4	15.3	2.7	1.1	0.4	65.4	(1998)	(1995)		
Peterbar (Hydro)	42	a	16.5	17.1	16.9	19.0	31.5	166.5	280.1	261.3	222.5	77.1	5.8	3.8	1118.1	230	37	374.1	18 Jul 1957
		b	1.4	1.6	1.4	1.8	2.7	9.0	14.7	14.3	11.3	4.2	0.7	0.4	63.5	(1957)	(1989)		
Peterbar	10	a	13.0	3.7	6.1	23.4	47.5	227.1	355.2	419.4	295.6	49.6	25.1	7.8	1473.5	142	105	215.0	23 Jul 1997
		b	0.9	0.2	0.9	1.9	4.3	10.5	14.6	15.9	12.1	3.9	1.4	0.7	67.3	(1997)	(1998)		
Bokaro (District)		a	13.1	13.7	14.4	20.7	41.1	200.7	318.6	318.0	258.5	69.5	13.8	6.4	1288.3	150	60		
		b	1.1	1.1	1.1	1.8	3.0	9.5	15.4	15.0	11.4	3.4	0.8	0.5	64.1	(1956)	(1979)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 – 2000)**  
**(BOKARO)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	2	1401 – 1500	5
801 – 900	2	1501 – 1600	2
901 – 1000	3	1601 – 1700	2
1001 – 1100	4	1701 – 1800	2
1101 – 1200	6	1801 - 1900	0
1201 – 1300	8	1901 - 2000	1
1301 – 1400	3		

**(Data available for 40 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(BOKARO)**

<b>MONTH</b>	<b>Mean Maximum Temperature</b>	<b>Mean Minimum Temperature</b>	<b>Highest Maximum ever recorded</b>		<b>Lowest Minimum ever recorded</b>		<b>Relative Humidity (%)</b>	
	<b>°C</b>	<b>°C</b>	<b>°C</b>	<b>Date</b>	<b>°C</b>	<b>Date</b>	<b>0830 IST</b>	<b>1730 IST</b>
January	25.9	7.4	31.8	1958 Jan 27	1.5	1966 Jan 23	62	56
February	28.6	8.9	37.2	1967 Feb.22	2.2	Feb 1950	57	49
March	34.0	13.5	41.8	1974 Mar 31	6.0	1972 Mar 04	49	41
April	39.5	18.9	45.1	1974 Apr 26	9.4	1968 Apr 01	42	39
May	41.1	23.1	46.6	1972 May 20	17.2	1951 May 02	50	44
June	37.8	24.0	46.1	1966 Jun 10	18.3	1959 Jun 09	69	66
July	33.3	23.1	40.4	1972 Jul 05	18.6	1971 Jul 29	84	82
August	32.1	22.5	37.2	1971 Aug 10	17.2	1971 Aug28	85	84
September	32.3	21.8	38.1	1964 Sep 04	16.0	1971 Sept 30	83	82
October	31.2	17.4	36.9	1966 Oct. 04	10.6	1967 Oct 31	76	75
November	29.1	11.2	34.4	1966 Nov. 01	4.8	1972 Nov 23	65	63
December	26.4	7.1	31.5	1967 Dec. 02	-0.3	1966 Dec 24	60	56
Annual	32.6	16.6	46.6	1972 May 20	-0.3	1966 Dec 24	65	61

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(BOKARO)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.3	4.1	5.0	6.4	7.5	7.5	6.7	6.4	5.4	3.2	2.8	2.9	5.1

**TABLE - 5**  
**Special Weather Phenomena**  
**(BOKARO)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.3	0.0	0.2	1.0	1.9	2.6	2.2	1.1	0.4	0.2	0.0	10.1
Hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dust storm	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3
Fog	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.3	0.8

## *CHITRA DISTRICT*



The climate of this district is characterised by dry hot summer and well distributed rainfall during monsoon season. The year may be divided into four seasons. The cold season starts from late November and extends upto end of February. This is followed by the hot season which continues till about the first week of June. The southwest monsoon arrives over the district in the second week of June. June to September is the period of southwest monsoon season. The post monsoon months October and November constitute a transition period from the monsoon to the winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for six raingauge stations for the period ranging from 13 to 41 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1210.7 mm. The rainfall in the southwest monsoon season constitutes about 87% of the annual normal rainfall, July being the month with the highest rainfall with an average value of 333.6 mm. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1978 when it amounted to 156% of the normal. In the year 1966, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 48% of the normal. In the same fifty year period there were 11 years when rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion of three consecutive years and two occasions of two consecutive years of such low

rainfall. It is seen from Table 2 that the annual rainfall was between 901 mm and 1500 mm in 34 years out of 46.

On an average there are 57 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 55 at Hunterganj and Simaria to 61 at Chatra.

The heaviest rainfall recorded in 24 hours at any station in the district was 467.4 mm at Hunterganj on 01 Aug 1917.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the neighbouring Daltonganj observatory. The cold season starts from the end November and continues till middle of March, when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is at about 25°C and the mean minimum temperature is at about 9°C. In winter months, sometimes cold waves, which affect the district in the wake of western disturbances passing across north India, minimum temperatures may sometimes go down to near the freezing point of water and frost may occur in the higher and more exposed part of the district. Temperature begins to rise rapidly from March till the second week of June. May is the hottest month with the mean maximum temperature at about 41°C and the mean minimum temperature at about 25°C. In the later part of the summer season i.e. May and June the maximum temperatures may sometimes reach about 46°C. From April till the onset of monsoon, days are discomfortable except in late night and early morning hours when temperature drops to a comfortable level. Day temperatures drop while the night temperature is comparatively small and are as high as in May with the advance of the southwest monsoon into the district towards the second week of June. The day temperatures begin to decrease while the drop in

the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months and it is about 75% to 80%. During the post monsoon and winter season air is generally dry and mildly humid however, it is comparatively less during the rest of the year. The driest part of the year is the summer season with humidity in the afternoon being about 25% to 30%.

## **CLOUDINESS**

During the monsoon season, skies are heavily clouded or overcast. In the post monsoon, winter and early part of the summer season, the skies are generally clear or lightly clouded, however cloudiness increases during the later part of the day particularly in the afternoon. Rest of the year the skies are generally clear or lightly clouded. Clouding gradually decreases in the post monsoon season.

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in latter part of summer and southwest monsoon months. In association with thunderstorms during March to May and during the monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In southwest monsoon season winds are mainly from southwesterly or westerly direction. Rest of the year winds are mainly calm or blow from southwesterly/westerly direction in the morning and northwesterly/northeasterly in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon affect the weather of the district and its neighbourhood. These depressions cause gusty winds and widespread heavy rain during their northwestward movement or westward movement after crossing the coast. Severe thunderstorms occur during summer months and even during the monsoon. Rainfall is often associated with these thunderstorms. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of winter months.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
CHATRA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Chatra	41	a	16.6	18.0	10.0	5.9	22.1	166.4	328.4	294.2	232.6	49.8	4.5	5.9	1154.4	184	62	370.3	02 Aug 1917
		b	1.4	1.6	1.3	0.7	1.7	8.0	15.7	14.9	11.2	3.1	0.4	0.5	60.5	(1978)	(1966)		
Hunterganj	32	a	21.3	17.2	11.8	4.7	12.9	143.2	340.4	309.9	235.4	58.4	5.6	7.3	1168.1	165	32	467.4	01 Aug 1917
		b	1.5	1.3	1.1	0.4	0.9	6.2	15.3	14.3	10.1	2.9	0.4	0.3	54.7	(1994)	(1966)		
Itkhor	36	a	13.4	10.9	8.1	11.4	23.0	184.9	293.4	306.4	198.5	72.7	13.2	10.4	1146.3	176	40	220.9	16 Sep 1976
		b	1.2	1.3	0.8	1.1	1.9	7.3	14.3	14.5	10.2	3.6	0.6	0.8	57.6	(1987)	(1966)		
Pratappur	13	a	8.9	13.5	8.0	38.8	39.1	200.4	415.1	404.0	349.3	57.2	14.8	22.1	1571.2	148	62	400.0	29 Apr 1987
		b	0.9	1.0	0.7	0.5	1.5	7.0	14.4	15.1	11.7	2.2	0.5	1.4	56.9	(1987)	(1996)		
Simaria	25	a	10.3	7.3	10.0	4.0	28.4	189.2	340.3	287.2	225.4	58.3	7.6	10.1	1178.1	163	64	238.2	10 Jul 1968
		b	1.0	0.9	1.0	0.5	1.8	7.7	14.3	13.7	9.9	2.6	0.4	0.7	54.5	(1986)	(1992)		
Tandwa	31	a	18.1	7.9	15.4	5.5	29.8	158.0	284.2	247.3	218.5	54.6	2.5	3.7	1045.5	169	50	259.1	09 Sep 1925
		b	1.5	1.0	1.3	0.6	1.5	8.9	15.0	14.3	10.7	3.0	0.3	0.5	58.6	(1961)	(1992)		
Chatra (District)		a	14.8	12.5	10.6	11.7	25.9	173.7	333.6	308.2	243.3	58.5	8.0	9.9	1210.7	156	48		
		b	1.3	1.2	1.0	0.6	1.6	7.5	14.8	14.5	10.6	2.9	0.4	0.7	57.1	(1978)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 – 2000)**  
**(CHATRA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
501 – 600	1	1201 – 1300	5
601 – 700	0	1301 – 1400	4
701 – 800	1	1401 – 1500	4
801 – 900	6	1501 – 1600	1
901 – 1000	5	1601 – 1700	1
1001 – 1100	12	1701 – 1800	1
1101 - 1200	4	1801 – 1900	1

**(Data available for 46 years only)**

## *DEOGHAR DISTRICT*



The climate of this district is similar to Dumka district situated in the lower plateau region of Chhota Nagpur with a hot dry summer, a good rainy season and cool winter. The year may be divided into four seasons. The winter season is from December to February, summer from March to first week of June and southwest monsoon season is from June to September. The period from October to November constitute post monsoon season

### **RAINFALL**

Records of rainfall in the district are available for six raingauge stations for the period ranging from 11 to 39 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1174.1 mm. The rainfall in the southwest monsoon season constitutes about 84% of the annual normal rainfall, July being the month with the highest rainfall with an average value of 293.0 mm. The variation in the annual rainfall from year to year is large. In the fifty year period 1951 to 2000, the highest annual rainfall was in 2000 when it amounted to 163% of the normal. In the year 1955, the annual rainfall in the district was the lowest in the fifty years period amounting to only 51% of the normal. In the same fifty year period there were 11 years when the rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion when such a low rainfall occurred for three consecutive years and two occasions of two consecutive years. It is seen from Table 2 that the annual rainfall was between 901 mm and 1400 mm in 25 years out of 43.

On an average there are 61 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 55 at Madhupur to 68 at Mohanpur.

The heaviest rainfall recorded in 24 hours at any station in the district was 520.0 mm at Kairo on 21 September 2000.

## **TEMPERATURE**

There is no meteorological observatory in the district, hence the climatic description is based on the meteorological records of the neighbouring observatory Dumka. The cold season starts from December when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is about 26°C and the mean minimum temperature is about 10°C. In winter months, sometimes when cold waves affect the district in the wake of western disturbances passing across north India, minimum temperature may sometimes go down to 4°C. Temperatures begin to rise rapidly from March to the second week of June. May is the hottest month with the mean maximum temperature at about 38°C and the mean minimum temperature at about 24°C. In the latter part of the summer season i.e. April and May the maximum temperatures may sometimes reach about 46°C on individual days. With the advance of the southwest monsoon into the district, from the second week of June, day temperature drops appreciably while drop in night temperature is comparatively very small. With the withdrawal of the monsoon by about first week of October, the day temperature begin to decrease while the drop in the night temperature is appreciable.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid, the relative humidity being well above 80%. During the rest of the year the relative humidity is generally lower than southwest monsoon period. The humidity in

morning is higher than in the afternoon. Summer is the driest part of the year when the relative humidity is about 50%.

## **CLOUDINESS**

During the monsoon months skies are heavily clouded to overcast. During the winter months and post monsoon season, sky is generally clear or lightly clouded. In April and May, cloudiness increase particularly in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year. During the monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In post monsoon, winter and summer season winds mainly blow from west direction. Towards the end of summer season, the winds blow from easterly direction and remain predominant during southwest monsoon months.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood during their northwestward to westward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur in the pre-monsoon months and southwest monsoon season. Its frequency is more in latter part of summer and early part of monsoon season. Hailstorms and dust storms occur occasionally in summer. Fog occurs occasionally in morning in the winter season.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
DEOGHAR**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Deoghar	32	a	12.8	17.5	8.7	14.2	55.0	159.4	290.6	268.3	269.4	76.2	8.8	3.3	1184.2	224	28	264.2	23 Sep 1917
		b	1.1	1.4	0.6	0.9	3.3	8.1	14.5	13.1	10.5	3.6	0.7	0.4	58.2	(1987)	(1955)		
Kairo	30	a	4.4	9.7	13.2	18.6	47.6	177.6	285.7	272.8	249.6	64.0	10.6	2.6	1156.4	254	41	520.0	21 Sep 2000
		b	0.4	0.9	0.9	1.4	2.9	8.9	14.1	14.0	10.4	3.1	0.6	0.2	57.8	(1999)	(1982)		
Madhupur	30	a	14.2	8.5	10.9	12.3	43.3	191.7	298.9	256.6	230.3	65.4	9.6	3.4	1145.1	161	40	350.0	21 Sep 2000
		b	0.9	0.8	0.9	1.1	2.7	8.9	13.9	13.1	9.3	3.1	0.5	0.3	55.5	(1956)	(1966)		
Mohanpur	11	a	12.4	11.9	13.6	15.7	45.8	133.7	270.6	280.0	238.9	59.5	4.9	9.8	1096.8	165	72	196.0	25 Sep 1999
		b	1.2	1.2	1.1	1.1	3.3	9.3	15.7	17.3	12.5	3.6	0.5	1.0	67.8	(1999)	(1992)		
Sarath	38	a	13.3	10.1	9.1	14.4	46.2	166.6	283.3	271.3	231.6	87.9	10.4	3.5	1147.7	171	43	400.0	03 Jul 1979
		b	0.9	1.0	0.7	1.2	3.2	8.7	14.9	13.6	11.4	3.6	0.6	0.3	60.1	(1959)	(1965)		
Sarawan	39	a	21.3	16.2	15.9	23.8	52.1	176.3	328.6	292.1	267.6	104.3	11.8	4.7	1314.7	182	67	454.4	21 Sep 2000
		b	1.3	1.3	1.0	1.4	3.1	9.2	15.2	14.0	11.2	3.9	0.7	0.3	62.6	(1998)	(1952)		
Deoghar) (District)		a	13.1	12.3	11.9	16.5	48.3	167.5	293.0	273.5	247.9	76.2	9.4	4.5	1174.1	163	51		
		b	1.0	1.1	0.9	1.2	3.1	8.9	14.7	14.2	10.9	3.5	0.6	0.4	60.5	(2000)	(1955)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(DEOGHAR)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
501 – 600	2	1301 – 1400	4
601 – 700	1	1401 – 1500	2
701 – 800	3	1501 – 1600	2
801 – 900	3	1601 – 1700	2
901 – 1000	2	1701 – 1800	1
1001 – 1100	6	1801 – 1900	1
1101 – 1200	7	1900 – 2000	1
1201 – 1300	6		

**(Data available for 43 years only)**

## *DHANBAD DISTRICT*



The climate of this district is characterized by general dryness, except in the southwest monsoon season. The year may be divided into four main seasons. The cold season is from December to February and is followed by the summer season from March to the first week of June. The period from June to September is the southwest monsoon season. November is the transitional month between monsoon and winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for ten raingauge stations for period ranging from 15 to 45 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1300.5 mm. In general the regions near the northern border of the district get higher rainfall than other parts of the district. During the monsoon season, June to September the district receives rainfall of about 84% of the annual rainfall. July is the rainiest month with an average rainfall at about 323.1 mm. The variation in the rainfall from year to year is large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 157% of the annual normal occurred in 1999, while the lowest annual rainfall which was 64% of the normal occurred in 1966. In the fifty year period under consideration there were 11 years in which the annual rainfall in the district was less than 80% of the normal. There was one occasion when such a low rainfall has occurred in two consecutive years and one occasion of three consecutive years. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 30 years out of 49 under consideration.

On an average there are 67 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 55 at Ketras to 77 at Jharia.

The heaviest rainfall recorded in 24 hours at any station in the district was 287.2 mm at Gobindpur on 27 August 1980.

## **TEMPERATURE**

There is only one observatory in the district at Dhanbad. The records of temperature, other climatological parameters and climatic conditions prevailing at this station may be taken as representative of the climatic condition in the district as a whole. The temperatures begin to decrease progressively from November. January is the coldest month of the year with the mean maximum temperature at 25.4°C and the mean minimum temperature at 10.5°C. In association with cold waves, which affect the district during the winter months in the wake of western disturbances, when it moves across north India, the minimum temperature may go down to about 4°C on individual days. Temperatures rise rapidly after February till the first week of June. May is the hottest month with the mean maximum temperature at 38.1°C and the mean minimum temperature at 23.4°C. In May and early part of June before the onset of the southwest monsoon, maximum temperature may reach upto 46°C on some days. With the advance of the southwest monsoon into the district by about second week of June the maximum temperature decreases and weather becomes slightly cool and continues to be so throughout the season. With the withdrawal of the monsoon by about the first week of October, temperatures begin to decrease while drop in night temperature is appreciable.

The highest maximum temperature and the lowest minimum temperature ever recorded at Dhanbad were 46.7°C on 21 May 1978 and 2.3°C on 14 January 1989 respectively.

## **HUMIDITY**

The relative humidity is high about 80%, during the southwest monsoon season. It is comparatively less in the rest of the year. The summer months are the driest part of the year when the humidity in afternoon is about 35%.

## **CLOUDINESS**

In the winter and early part of the summer, skies are generally clear or lightly clouded. The cloudiness increases from April, particularly in the afternoons. The skies are heavily clouded or overcast during the southwest monsoon season. On some days in winter months the skies are heavily clouded to overcast in the wake of western disturbances.

## **WINDS**

Winds are generally light to moderate in the later part of summer and southwest monsoon season. In May and in the monsoon season winds are predominantly from southeast direction. In October winds are mainly calm and from this month southeasterly component decreases and northwesterly wind increases. In winter and the first half of summer winds mainly blow from northwest direction.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during post monsoon and southwest monsoon affect the weather of the district and its neighbourhood during their northwesterly movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms in latter part of summer and in June are sometimes accompanied with hail. Dust storms occasionally occur in latter part of

summer and before the onset of southwest monsoon in June. Fog occurs occasionally in winter season.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Dhanbad observatory.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
DHANBAD**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bagmara	35	a	8.3	14.4	14.8	19.1	40.4	180.1	282.5	291.0	223.8	76.5	4.2	4.1	1159.2	181	41	169.0	03 Sep 1970
		b	1.0	1.2	0.9	1.4	2.9	8.5	14.1	14.3	10.9	2.9	0.4	0.3	58.8	(1988)	(1955)		
Bliapur	23	a	11.5	17.3	9.9	20.1	49.1	244.7	299.2	343.8	331.0	79.9	4.9	7.1	1418.5	177	51	205.8	27 Aug 1980
		b	1.2	1.5	0.6	1.6	3.2	10.8	15.2	16.3	12.7	2.9	0.4	0.6	67.0	(1995)	(1979)		
Dhanbad	36	a	14.6	15.5	17.6	17.2	43.1	187.5	319.3	303.3	285.0	86.7	8.1	2.4	1300.3	151	59	272.0	08 Aug 1913
		b	1.0	1.4	1.4	1.4	2.9	10.0	16.4	15.5	12.2	4.5	0.8	0.3	67.8	(1989)	(1965)		
Dhanbad (Obsy)	40	a	15.0	22.4	21.6	22.2	54.4	211.7	367.5	317.4	279.4	107.1	8.4	6.6	1433.7	162	55	234.0	27 Sep 1978
		b	1.3	1.6	2.1	2.1	3.8	11.0	18.1	16.3	12.1	4.8	0.8	0.5	74.5	(1990)	(1965)		
Gobindpur	41	a	9.5	16.8	22.0	17.9	50.7	210.2	333.6	308.7	268.0	93.6	11.8	6.7	1349.5	160	46	287.2	27 Aug 1980
		b	1.0	1.6	1.7	1.6	3.6	10.2	16.1	15.6	12.6	4.1	0.8	0.4	69.3	(1984)	(1951)		
Jharia	23	a	13.7	20.1	22.5	18.2	61.1	222.9	299.6	303.2	237.7	59.9	8.1	10.0	1277.0	147	62	194.8	27 Sep 1995
		b	1.5	1.7	2.3	1.7	4.4	11.5	16.9	17.8	13.2	3.7	0.9	1.0	76.6	(1984)	(1976)		
Ketras	15	a	13.5	16.1	13.8	2.7	21.3	90.1	292.2	264.0	203.3	91.3	7.5	2.3	1018.1	139	54	204.5	08 Aug 1955
		b	1.4	1.1	1.0	0.3	1.2	5.8	14.2	14.8	11.0	4.2	0.3	0.2	55.5	(1959)	(1967)		
Nirsa	45	a	10.5	14.5	17.1	14.8	48.1	177.6	306.1	297.4	236.3	87.3	12.5	6.1	1228.3	161	58	212.4	28 Sep 1978
		b	1.1	1.4	1.5	1.3	3.8	9.9	16.1	15.4	11.5	4.8	0.8	0.5	68.1	(1999)	(1966)		
Topchanchi	44	a	12.9	16.0	15.9	18.3	44.2	198.7	360.4	319.3	292.8	98.3	8.6	4.7	1390.1	152	69	274.4	27 Sep 1995
		b	1.3	1.4	1.5	1.5	3.6	10.3	18.0	17.0	13.1	4.3	0.7	0.5	73.2	(1999)	(1966)		
Tundi	45	a	12.7	15.9	14.6	24.1	47.3	226.4	370.1	338.1	279.3	85.0	9.9	5.1	1428.5	182	41	270.4	02 Jul 2002
		b	0.8	1.1	1.1	1.9	3.0	9.4	15.6	14.8	10.7	3.6	0.6	0.4	63.0	(1997)	(1965)		
Dhanbad (District)		a	12.2	16.9	17.0	17.5	46.0	195.0	323.1	308.6	263.7	86.6	8.4	5.5	1300.5	157	64		
		b	1.2	1.4	1.4	1.5	3.2	9.7	16.1	15.8	12.0	4.0	0.6	0.5	67.4	(1999)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(DHANBAD)**

Range in mm	No. of years	Range in mm	No. of years
801 – 900	3	1501 – 1600	5
901 – 1000	6	1601 – 1700	3
1001 – 1100	3	1701 – 1800	2
1101 – 1200	3	1801 – 1900	3
1201 – 1300	11	1901 – 2000	1
1301 – 1400	4	2001 – 2100	1
1401 – 1500	4		

**(Data available for 49 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(DHANBAD)**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	25.4	10.5	32.2	1950 Jan 22	2.3	1989 Jan 14	65	48
February	28.3	13.0	38.3	1950 Feb 21	4.8	1989 Feb 20	57	40
March	33.6	17.6	41.3	1973 Mar 31 1986 Mar 31	8.2	1990 Mar 05	48	32
April	37.9	21.9	45.5	1980 Apr 24	9.6	1990 Apr 05	51	32
May	38.1	23.4	46.7	1978 May 21	13.5	1987 May 05	64	43
June	35.2	23.9	46.2	1966 Jun 10	17.2	1990 Jun 16	77	65
July	31.7	23.2	44.0	1962 Jul 22	17.8	1989 Jul 31 1990 Jul 30	87	80
August	31.2	23.0	38.8	1987 Aug 19	16.4	1989 Aug 03	88	82
September	31.4	22.5	37.4	1982 Sep 23	17.2	1986 Sep 27	85	78
October	31.3	19.6	37.1	1982 Oct 01	11.2	1990 Oct 31	75	67
November	29.0	15.1	35.9	1977 Nov 07	8.0	1990 Nov 28	65	57
December	25.6	10.8	32.8	1966 Dec 01	4.1	1961 Dec 26	64	52
Annual	31.6	18.7	46.7	1978 May 21	2.3	1989 Jan 14	69	56

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(DHANBAD)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.3	6.6	5.8	6.6	6.7	6.8	6.9	6.3	6.0	4.3	3.9	4.4	5.8

**TABLE - 5**  
**Special Weather Phenomena**  
**(DHANBAD)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	0.9	2.1	3.3	4.4	6.0	5.5	4.5	4.5	1.5	0.1	0.0	33.2
Hail	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Dust storm	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Fog	5.3	3.8	2.5	1.0	0.1	0.1	0.3	0.2	0.4	0.4	2.4	4.6	21.1

## *DUMKA DISTRICT*



The climate of this district resembles that of the lower plateau regions of Chhota Nagpur, with a hot dry summer, a good rainy season and cool winter. The year may be climatologically divided into four seasons. The winter season is from December to February, the summer from March to first week of June and the southwest monsoon season from June to September. The period from October to November constitute the transitional period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for thirteen rain gauge stations for period ranging from 15 to 42 years. The details of the rainfall at these stations and for the district as a whole are given in Table 1 and 2. The average annual rainfall in the district is 1405.4 mm. During the monsoon season June to September the district receives rainfall of about 81% of the annual rainfall. July is the rainiest month with average rainfall of 353.4mm. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 180% of the annual normal occurred in 1999, while the lowest annual rainfall which was 58% of the normal occurred in 1985. In the fifty year period there were eight years in which the annual rainfall in the district was less than 80% of the normal. There is one occasion when such a low rainfall has occurred in four consecutive years. It is seen from Table 2 that the rainfall was between 1101 mm and 1700 mm in 28 years out of 42.

On an average there are 68 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 61 at Amjora and Sariahat to 78 at Gopikandar.

The heaviest rainfall recorded in 24 hours at any station in the district was 517.0 mm at Katikund on 28 July 1986.

## **TEMPERATURE**

There is only one observatory in the district located at Dumka. The meteorological data and climatic conditions prevailing at this station may be taken to be broadly representative of the whole district. The cold season starts from December when temperatures begin to drop rapidly and continues till February. January is the coldest month of the year with the mean maximum temperature at 25.7°C and the mean minimum temperature at 10.3°C. In association with cold waves which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to 4°C on individual days. By March, temperature begins to rise rapidly till the first week of June. May is the hottest month with the mean maximum temperature at 37.9°C and the mean minimum temperature at 24.4°C. On individual days in the months of May and early part of June, the maximum temperature may be high as 47°C. In April and May day temperatures are almost equally high. During the latter part of summer until the onset of the monsoon by the first week of June, days are uncomfortable, with hot dusty winds. Day temperatures come down appreciably with the onset of the southwest monsoon in the second week of June. Night temperatures in June are however, generally high as in May. The day temperature begins to decrease while there is an appreciable drop in night temperature with the withdrawal of the monsoon by about first week of October. Daily range of temperature is of the order of 15°C to 17°C during winter and summer, while in southwest monsoon season, it is only 8°C to 10°C.

The highest maximum temperature ever recorded at Dumka was 48.5°C on 06 May 1989 and the lowest minimum temperature ever recorded was 1.9°C on 24 January 1973.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid with the relative humidity well above 80%. Air is generally mildly humid in post monsoon and winter season. The rest of the year, the relative humidity in the afternoon is generally lower than value in the morning. Summer is the driest part of the year with the relative humidity in the afternoon at about 40%.

## **CLOUDINESS**

Skies are heavily clouded to overcast during monsoon months (June to September). Skies are generally clear or lightly clouded during winter months. In April and May, cloudiness increases particularly in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year. The district may experience gusty winds during southwest monsoon season when depressions affect the weather of the district. In the post monsoon, winter and summer season winds mainly blow from westerly direction. Towards the end of summer season winds blow from the easterly direction and this wind strengthens and predominates during monsoon season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal, during the southwest monsoon season, affect the weather of the district and its neighbourhood during their northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur in pre-monsoon months and southwest monsoon season. Its frequency is more in latter part of summer and early part of southwest monsoon season. Occasionally hail storm occur in latter part of summer. Dust storms also occur occasionally in April and May. Fog occasionally occurs in the morning of winter months.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Dumka observatory.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
DUMKA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Amjora	15	a	23.4	11.2	10.0	16.1	41.2	139.8	267.5	261.3	251.2	127.0	7.8	0.2	1156.7	204	14	205.7	05 Oct 1959
		b	1.0	0.8	0.9	1.1	2.6	8.8	14.9	14.9	10.6	4.7	0.6	0.1	61.0	(1959)	(1964)		
Assobani	18	a	20.1	10.8	17.0	26.3	55.3	183.3	352.5	300.4	232.0	124.0	13.3	1.2	1336.2	159	52	315.0	09 Aug 1942
		b	1.2	0.8	1.6	2.1	3.9	9.9	17.0	16.7	10.9	4.5	0.5	0.1	69.2	(1956)	(1965)		
Dumka (Obsy)	42	a	14.9	14.3	15.3	24.3	73.0	208.6	326.7	303.2	246.0	132.7	12.9	6.0	1377.9	156	59	300.8	27 Sep 1978
		b	1.1	1.2	1.4	1.9	4.8	10.4	16.2	15.3	11.6	5.4	0.8	0.4	70.5	(1971)	(1985)		
Dumka/Jama	30	a	5.4	11.6	8.1	25.3	71.2	182.2	294.1	247.3	244.1	99.9	6.3	2.9	1198.4	202	55	298.6	25 Sep 1999
		b	0.6	1.0	0.8	2.1	4.8	10.7	16.2	14.4	11.8	4.7	0.4	0.2	67.7	(1999)	(1979)		
Gopikandar	20	a	12.5	20.9	10.2	32.9	101.8	289.7	561.0	442.0	419.4	190.5	22.5	8.0	2111.4	159	47	500.0	10 Oct 1975
		b	0.6	1.2	0.5	1.7	5.1	11.7	18.2	17.8	14.3	5.7	0.5	0.5	77.8	(1995)	(1976)		
Jama	17	a	8.0	13.2	17.0	12.7	51.3	221.0	452.6	301.3	308.9	126.8	11.8	5.6	1530.2	148	80	311.6	27 Sep 1979
		b	0.4	1.1	1.0	1.1	2.7	11.1	16.9	13.5	11.7	4.5	0.6	0.5	65.1	(1980)	(1998)		
Jarmindi	40	a	15.8	14.5	17.8	26.6	64.8	199.8	327.3	305.0	278.9	118.8	10.7	4.4	1384.4	162	68	355.0	02 Oct 1959
		b	1.0	1.2	1.2	1.9	4.1	9.5	16.4	15.1	12.1	4.7	0.7	0.2	68.1	(1959)	(1965)		
Katikund	40	a	17.1	14.2	15.4	19.2	85.5	215.2	375.6	318.8	265.7	133.9	10.0	1.6	1472.2	191	66	517.0	28 Jul 1986
		b	1.2	1.2	1.2	1.7	4.8	10.7	16.9	16.1	12.3	5.4	0.5	0.2	72.2	(1999)	(1966)		
Masalia	20	a	6.0	23.3	16.7	20.8	69.2	200.7	326.0	258.6	297.0	134.3	10.2	7.1	1369.9	152	55	293.2	27 Sep 1978
		b	0.7	1.7	1.0	2.0	4.2	11.6	17.0	15.6	12.4	5.2	0.5	0.5	72.4	(1978)	(1980)		
Ramgarh	19	a	5.9	12.5	10.9	21.4	82.3	208.5	330.9	278.3	284.1	112.4	9.1	7.7	1364.0	182	53	221.2	07 Oct 1986
		b	0.5	0.9	0.6	1.6	4.8	9.9	15.7	13.1	11.5	4.4	0.4	0.6	64.0	(1999)	(1976)		
Ranishwar	28	a	6.6	19.3	19.7	22.9	86.1	202.9	361.6	303.1	264.0	122.1	17.7	6.8	1432.8	152	52	402.2	04 Jul 1980
		b	0.8	1.2	0.9	1.7	4.1	10.1	15.9	15.6	11.6	4.3	0.7	0.5	67.4	(1999)	(1965)		
Sariahat	19	a	7.8	11.9	9.9	15.4	60.6	179.2	306.3	275.3	282.9	94.6	6.9	1.3	1252.1	168	76	295.5	24 Sep 1999
		b	0.6	0.9	0.5	1.1	3.1	9.2	15.7	13.8	11.0	4.1	0.4	0.1	60.5	(1999)	(1979)		
Sikaripara	29	a	4.3	6.5	8.2	20.8	72.9	197.6	311.6	265.2	270.3	111.2	13.2	1.3	1283.1	152	62	220.0	17 Sep 2004
		b	0.3	0.8	0.8	1.7	4.8	11.1	16.0	14.9	11.8	4.6	0.6	0.2	67.6	(1999)	(1994)		
Dumka (District)		a	11.4	14.2	13.6	21.9	70.4	202.2	353.4	296.9	280.3	125.2	11.7	4.2	1405.4	180	58		
		b	0.8	1.1	1.0	1.7	4.1	10.4	16.4	15.1	11.8	4.8	0.6	0.3	68.1	(1999)	(1985)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

- Based on all available data upto 2006. \*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(DUMKA)**

Range in mm	No. of years	Range in mm	No. of years
801 – 900	1	1701 – 1800	1
901 – 1000	3	1801 – 1900	2
1001 – 1100	3	1901 – 2000	2
1101 – 1200	5	2001 – 2100	0
1201 – 1300	6	2101 – 2200	1
1301 – 1400	6	2201 – 2300	0
1401 – 1500	5	2301 – 2400	0
1501 – 1600	4	2400 – 2500	0
1601 – 1700	2	2501 – 2600	1

**(Data available for 42 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(DUMKA)**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	25.7	10.3	33.5	1990 Jan 30	1.9	1973 Jan 24	65	54
February	28.9	13.2	37.0	1967 Feb 22	2.0	1974 Feb 07	57	46
March	34.3	17.6	43.0	1986 Mar 31	6.0	1972 Mar 06	49	39
April	38.4	22.5	46.5	1989 Apr 28	14.0	1986 Apr 09	53	39
May	37.9	24.4	48.5	1989 May 06	14.7	1972 May 17	64	51
June	35.5	25.1	47.2	1966 Jun 10	18.0	1973 Jun 14 1974 Jun 02	75	69
July	32.6	24.5	41.7	1982 Jul 05	13.6	1974 Jul 02	83	81
August	32.3	24.2	38.8	1979 Aug 12	17.0	1974 Aug 29 1975 Aug 20	83	81
September	32.7	23.9	38.3	1986 Sep 06	14.0	1973 Sep 20	81	80
October	32.5	21.1	37.8	1982 Oct 14	12.0	1973 Oct 30	75	71
November	30.1	15.8	36.0	1982 Nov 23 1988 Nov 06	5.0	1973 Nov 30	67	62
December	26.5	11.0	32.0	1991 Dec 28	3.0	1973 Dec 30	65	58
Annual	32.3	19.5	48.5	1989 May 06	1.9	1973 Jan 24	68	61

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(DUMKA)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.7	4.7	4.9	5.6	6.1	6.3	6.2	6.5	6.1	5.2	4.4	4.4	5.4

**TABLE - 5**  
**Special Weather Phenomena**  
**(DUMKA)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.2	0.1	0.8	0.9	0.7	0.3	0.5	0.4	0.2	0.0	0.0	4.1
Hail	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dust storm	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Fog	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3

## EAST SINGHBHUM DISTRICT



The climate of this district is characterized by a hot summer, well distributed rainfall during the southwest monsoon season and mild winter in post monsoon season. The year may be divided into four seasons. The cold season is from December to February. The hot season from March to first week of June and the rainy season is from June to September. October and November constitute the transitional period between southwest monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for twelve rain gauge stations for period ranging from 12 to 49 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1336.7.mm. During the southwest monsoon months, June to September the district receives about 81% of the annual normal rainfall. August is the rainiest month with an average rainfall of 318.6 mm. The variation in the rainfall from year to year is not much large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 138% of the annual normal occurred in 1999, while the lowest annual rainfall which was 58% of the normal occurred in 1979. In this fifty year period under consideration there were three years in which the annual rainfall in the district was less than 80% of the annual normal. However, none of them were consecutive years. It is seen from Table 2 that the rainfall was between 1101 mm and 1600 mm in 35 years out of 47 years for which continuous data is available.

On an average there are 68 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 62 at Patamada to 74 at Jamshedpur observatory and Jamshedpur (Aero) observatory.

The heaviest rainfall recorded in 24 hours at any station in the district was 500.0 mm at Mosabani on 30 May 1975.

## **TEMPERATURE**

There are two meteorological observatories in the district namely Jamshedpur and Jamshedpur (Aero Obsy). The records of temperatures, other climatological parameters at these stations may be taken as representative of the climatic condition in the district as a whole. Temperatures begin to decrease progressively from November. December and January are the coldest part of the year with the mean maximum temperature at 26.4°C and the mean minimum temperature at 11.5°C. In association with cold waves which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to about 6°C. Temperatures begin to rise steadily after mid February till first week of June. May and early part of June before the onset of southwest monsoon constitute the hottest part of the year when the mean maximum temperature is at about 39.2°C and the mean minimum temperature at about 25.9°C. On some days in May and in early part of June, maximum temperature may reach about 45°C or above. The maximum temperatures decrease and weather becomes appreciably cool with the advance of the southwest monsoon by about the second week of June and continues to be so throughout the season in the district. Temperatures begin to decrease from November. Daily range of temperature is of the order of 13°C to 16°C during winter and summer season, while in southwest monsoon season, it is only 7°C to 10°C.

The highest maximum temperature ever recorded at Jamshedpur (Obsy) is 47.7°C on 20 May 1972. The lowest minimum temperature ever recorded at Jamshedpur is 3.9°C on 20 January 1934.

## **HUMIDITY**

The relative humidity is generally high about 80% in the southwest monsoon months and 70% in the post monsoon months. In other months, relative humidity ranges from 50% to 60%. In the summer afternoon, the relative humidity is of the order of 30% to 40%.

## **CLOUDINESS**

In the southwest monsoon months skies are generally heavily clouded to overcast. In October and latter part of summer there is moderate cloudiness, the afternoons being more cloudy than the mornings. In the winter months skies are generally clear except on some days in the wake of western disturbances when skies are heavily clouded.

## **WINDS**

Winds are generally light with slight increase in force in the latter part of summer and southwest monsoon season. In summer and southwest monsoon season winds are southwesterly or westerly in the morning and easterly or southeasterly in the evening. In winter months winds are mainly calm or northwesterly. In post monsoon months winds prevail from northwesterly and westerly direction.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon affect the weather of the district and its neighbourhood during their northwesterly or westerly movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms in summer are sometimes accompanied with

hailstorms and squalls. Occasional dust storm occurs in summer months. Fog occasionally occurs in the morning hours of winter months.

Tables 3, 4 and 5 and 3(a), 4(a) and 5(a) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Jamshedpur (Aero Obsy) and Jamshepur observatory.

**TABLE - 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**EAST SINGHBHUM**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bahragora	41	a	9.0	13.6	11.7	31.4	57.9	157.5	261.1	267.6	221.3	73.8	11.7	1.5	1118.1	161	52	215.9	01 Sep 1907
		b	0.7	1.1	1.2	2.7	4.3	9.4	14.0	14.2	11.6	4.4	0.6	0.2	64.4	(1956)	(1965)		
Chakulia	27	a	8.2	17.0	14.1	42.6	94.1	254.0	306.8	305.1	201.0	77.7	12.7	1.6	1334.9	145	53	209.5	27 Jun 1988
		b	1.1	1.2	1.1	3.5	5.4	10.8	14.7	16.1	10.1	3.8	0.6	0.2	68.6	(1985)	(1966)		
Dalbargarh	26	a	10.1	20.7	17.2	38.6	77.1	232.3	269.1	308.3	201.8	66.3	13.5	8.1	1263.1	137	82	192.0	28 Jun 1997
		b	0.9	1.3	1.3	2.6	5.2	12.0	15.5	16.3	12.0	4.0	0.8	0.8	72.7	(1981)	(1991)		
Dymania/Dumaria	18	a	13.3	20.7	19.6	41.9	71.6	266.1	278.9	267.9	179.4	55.0	4.4	3.8	1222.6	122	74	192.0	25 Jun 1988
		b	1.1	1.1	1.6	3.2	4.1	11.3	13.9	14.8	10.2	3.8	0.4	0.5	66.0	(1985)	(1987)		
Ghatsila	28	a	12.9	12.2	16.0	22.4	69.2	216.3	282.8	288.3	262.2	80.2	10.5	1.3	1274.3	142	50	193.0	02 Sep 1907
		b	1.2	1.2	1.6	1.9	4.7	11.3	14.8	15.8	13.2	4.6	0.5	0.1	70.9	(1953)	(1965)		
Ghatsila (Hydro)	19	a	22.8	22.3	34.7	32.5	110.4	263.2	295.8	348.2	238.7	29.7	18.5	2.9	1419.0	133	---	318.2	28 Jun 1997
		b	1.3	1.8	2.0	2.4	5.8	11.0	13.7	17.3	10.2	2.3	0.8	0.6	69.2	(1997)			
Jamshedpur (Obsy)	49	a	15.0	22.0	26.4	35.7	62.1	249.1	327.7	334.8	236.6	81.8	15.1	6.6	1412.9	132	53	260.0	28 Jun 1997
		b	1.4	1.8	2.0	2.5	4.6	11.0	16.4	16.1	12.3	4.7	0.9	0.5	74.2	(1953)	(1954)		
Jamshepur (Aero) Obsy	47	a	17.8	23.5	28.3	31.4	64.7	242.6	315.6	337.1	245.5	76.1	10.9	10.1	1403.6	142	58	332.8	26 Sep 1981
		b	1.5	1.7	2.3	2.7	4.9	11.1	16.0	15.7	11.7	4.5	0.8	0.8	73.7	(1971)	(1979)		
Jamshedpur/Tata	12	a	23.9	14.3	26.5	36.4	80.1	286.9	368.2	396.5	279.1	50.1	41.0	10.7	1613.7	115	70	300.0	28 Jun 1997
		b	1.0	0.9	1.3	2.4	4.0	9.6	14.0	13.8	11.1	2.9	1.2	0.5	62.7	(1997)	(1969)		
Mosabani	26	a	11.2	19.9	22.5	48.9	98.6	278.4	262.6	349.8	242.6	84.6	4.2	3.2	1426.5	160	59	500.0	30 May 1975
		b	1.0	1.5	1.9	2.9	4.4	10.6	12.9	16.0	10.3	3.9	0.2	0.3	65.9	(1985)	(1979)		
Patamada	35	a	13.8	14.8	15.2	30.1	52.9	233.5	264.3	300.1	229.0	44.2	10.5	3.8	1212.2	179	55	224.0	31 Aug 2001
		b	1.0	1.0	0.9	2.3	3.1	10.0	14.4	15.4	10.6	2.6	0.3	0.3	61.9	(1975)	(1979)		
Potka	41	a	18.4	20.0	20.4	31.1	80.5	247.0	306.1	318.9	215.2	61.6	14.8	4.8	1338.8	180	60	297.2	31 Aug 2001
		b	1.2	1.3	1.7	2.1	4.1	9.7	14.2	14.7	10.0	3.7	0.8	0.4	63.9	(1999)	(1979)		
Singhbhum East (District)		a	14.7	18.4	21.0	35.2	76.6	243.9	294.9	318.6	229.4	65.1	14.0	4.9	1336.7	138	58		
		b	1.1	1.3	1.6	2.6	4.5	10.6	14.5	15.5	11.1	3.8	0.7	0.4	67.7	(1999)	(1979)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(EAST SINGHBHUM)**

Range in mm	No. of years	Range in mm	No. of years
701 – 800	1	1301 – 1400	10
801 – 900	1	1401 – 1500	1
901 – 1000	1	1501 – 1600	8
1001 – 1100	3	1601 – 1700	1
1101 – 1200	11	1701 – 1800	4
1201 – 1300	5	1801 – 1900	1

**(Data available for 47 years only)**

**TABLE – 3**  
**Normals of Temperature and Relative Humidity**  
**(JAMSHEDPUR)**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	26.5	11.6	33.0	1990 Jan 31	3.9	1934 Jan 20	72	52
February	29.5	14.2	37.4	1966 Feb 28 1974 Feb 25	5.0	1934 Feb	64	42
March	34.8	18.6	41.7	1955 Mar 31	10.3	1967 Mar 01	53	32
April	38.8	23.4	45.7	1985 Apr 25	16.0	1968 Apr 01	54	34
May	39.3	25.8	47.7	1972 May 20	19.0	1966 May 09 1977 May 17	60	42
June	36.2	26.2	47.2	1942 Jun 11	21.0	1968 Jun 05	72	65
July	32.6	25.5	40.0	1982 Jul 06	21.4	1965 Jul 10	82	79
August	32.1	25.3	38.0	1986 Aug 10	21.4	1967 Aug 10	83	80
September	32.6	24.9	36.8	1987 Sep 30	18.7	1984 Sep 29	81	77
October	32.2	21.5	38.2	1980 Oct 27	13.7	1966 Oct 27	75	69
November	30.0	16.3	35.5	1981 Nov 05	6.1	1934 Nov 30	71	63
December	26.8	11.5	31.5	1977 Dec 02	4.7	1973 Dec 26	73	59
Annual	32.6	20.4	47.7	1972 May 20	3.9	1934 Jan 20	70	58

**TABLE – 4**  
**Mean Wind Speed in km/hr.**  
**(JAMSHEDPUR)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.3	4.1	5.0	6.1	6.7	7.0	6.3	6.0	5.3	4.0	3.2	2.9	5.0

**TABLE – 5**  
**Special Weather Phenomena**  
**(JAMSHEDPUR)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	1.3	1.5	3.5	4.7	5.8	4.5	3.7	3.4	1.3	0.0	0.0	30.0
Hail	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Dust storm	0.0	0.2	0.5	1.3	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	4.0
Squall	0.0	0.0	0.1	0.7	1.1	0.3	0.0	0.0	0.0	0.1	0.0	0.0	2.3
Fog	2.6	0.6	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.1	2.4	6.3

**TABLE – 3(a)**  
**Normals of Temperature and Relative Humidity**  
**(JAMSHEDPUR (A))**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	26.1	11.5	34.6	2009 Jan 26	4.4	2003 Jan 15	73	46
February	29.1	14.5	38.6	2006 Feb 27	6.0	1977Feb 01	63	37
March	34.3	18.5	42.5	2004 Mar 23	10.0	1998 Mar 31	51	29
April	38.6	23.5	46.3	2010 Apr 19	16.2	1965 Apr 02	51	28
May	39.2	25.9	46.5	1970 May 15	17.7	1966 May 09	58	37
June	36.0	25.9	46.6	1958 Jun 06	16.4	1986 Jun 21	71	62
July	32.2	25.3	39.7	1982 Jul 06	20.7	2005 Jul 20	82	77
August	31.8	25.1	38.6	2000 Aug 09	18.4	1975 Aug 05	83	79
September	32.2	24.5	36.0	1968 Sep 03 1988 Sep 14	18.9	1964 Sep 07	82	76
October	31.5	21.4	35.8	1974 Oct 19	11.2	1980 Oct 26	77	64
November	29.1	16.3	34.8	1981 Nov 05	6.6	2001 Nov 19	71	56
December	26.1	11.5	32.5	2002 Dec 19	4.5	1990 Dec 30	73	52
Annual	32.2	20.3	46.6	1958 Jun 06	4.4	2003 Jan 15	70	54

**TABLE – 4(a)**  
**Mean Wind Speed in km/hr.**  
**(JAMSHEDPUR (A))**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.0	3.6	4.4	5.4	6.0	6.4	5.7	5.4	4.8	3.5	3.2	2.9	4.5

**TABLE – 5(a)**  
**Special Weather Phenomena**  
**(JAMSHEDPUR (A))**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.6	1.8	3.1	4.9	7.8	11.1	10.9	9.9	9.4	3.2	0.1	0.1	62.9
Hail	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5
Dust storm	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.9
Squall	0.0	0.1	0.3	0.5	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Fog	1.3	1.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.1	1.2	4.3

## *GARHWA DISTRICT*



The climate of this district is characterised by dry hot summer and well distributed rainfall during monsoon season. The year may be divided into four main seasons. The cold season is from the end of November to February followed by hot season upto first week of June and the southwest monsoon season is from second week of June to September. October and November is a transitional period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for eight raingauge stations for period ranging from 11 to 33 years. The average rainfall in the district as a whole is 1084.5 mm. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. About 90% of the annual rainfall in the district is received in the southwest monsoon months June to September. August is the rainiest month with an average rainfall of 311.3 mm. The variation in the rainfall from year to year is not large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 151% of the normal occurred in 1961, while the lowest annual rainfall which was only 48% of the normal occurred in 1966. In the same fifty year period there were five years in which the rainfall in the district was less than 80% of the normal, none of them being consecutive. It is seen from Table 2 that the rainfall was between 901 and 1300 mm in 23 years out of 34.

On an average there are 53 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 49 at Bhavnathpur and Meral to 58 at Bhandaria.

The heaviest rainfall recorded in 24 hours at any station in the district was 350.0 mm at Ghurki on 05 August 1997.

## **TEMPERATURE**

There is no meteorological observatory in the district. The description which follows, is based on the meteorological data of Daltonganj observatory in the neighbouring district. The cold season starts from mid November and continues till about the middle of March. January is the coldest month with the mean maximum temperature at about 25°C and the mean minimum temperature at about 9°C. In association with cold waves which affect the district in the winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to freezing point of water and frost may occur occasionally in the higher and more exposed parts of the district. By March temperatures begin to rise steadily till the second week of June. On individual days in the month of May and June, the maximum temperature may be as high as 46°C. May is the hottest month with the mean maximum temperature at about 41°C and the mean minimum temperature at about 25°C. Days are generally uncomfortable, from April till the onset of the monsoon, except in the early morning and late night when the temperature drops to about a comfortable level. The weather cools down appreciably and temperature decreases with the onset of the southwest monsoon into the district by about second week of June. However, night temperatures in June are as high as in May.

## **HUMIDITY**

The relative humidity is generally lower in the afternoon than in the morning except in the southwest monsoon months when the air is generally humid with the relative humidity of the order of 75% to 80%. In post monsoon and winter seasons air is generally mild humid. Summer season is the driest part of the year with relative humidity in the afternoon at about 25% to 30%.

## **CLOUDINESS**

During monsoon months skies are heavily clouded to overcast. In the post monsoon and winter months skies are generally clear or lightly clouded. In April and May the cloudiness increases particularly in the afternoons.

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in the latter part of summer and southwest monsoon months. In association with thunderstorms during summer and monsoon seasons when depressions affect the weather of the district, the district may experience gusty winds. In the southwest monsoon season winds are mainly from southwesterly or westerly direction. In the rest of the year winds are mainly calm or blow from southwesterly or westerly directions in the morning and northwesterly or northeasterly direction in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the district and its neighbourhood during their northwestward or westward movement. This causes gusty winds and widespread heavy rain. Severe thunderstorms occur during summer months, even during the monsoon, rainfall is often associated with thunderstorms. Dust storms occur occasionally during summer. Fog may sometimes occur in the morning of winter months.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
GARHWA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bhandaria	31	a	16.8	15.2	8.9	2.5	14.2	176.8	333.1	324.8	227.2	49.8	6.5	5.0	1180.8	185	54	250.0	18 Jun 1994
		b	1.5	1.2	1.1	0.3	1.0	7.8	15.3	15.9	10.9	2.6	0.3	0.4	58.3	(1994)	(1954)		
Bhavnathpur	29	a	15.0	28.1	11.0	7.3	18.2	123.2	290.7	272.2	231.2	34.9	7.8	3.8	1043.4	143	22	287.0	22 Aug 1933
		b	1.4	0.9	0.9	0.7	0.8	6.0	13.2	13.0	10.0	1.9	0.2	0.3	49.3	(2000)	(1964)		
Garhwa	33	a	16.4	9.6	10.5	6.8	10.3	120.9	287.6	292.9	225.7	52.9	2.4	5.4	1041.4	157	42	228.6	28 Jul 1906
		b	1.5	1.0	1.0	0.6	0.7	5.9	14.3	14.7	10.5	2.7	0.3	0.5	53.7	(1961)	(1966)		
Ghurki	15	a	8.7	3.5	4.9	8.0	15.5	146.4	315.6	320.6	215.5	30.0	8.8	5.6	1083.1	159	40	350.0	05 Aug 1997
		b	0.7	0.4	0.6	0.5	0.8	6.1	14.5	14.3	9.7	1.9	0.3	0.5	50.3	(1994)	(1996)		
Maziauon	11	a	5.8	6.5	2.9	0.3	12.6	152.4	279.3	324.4	179.1	13.9	8.6	8.0	993.8	148	64	135.0	03 Aug 1994
		b	0.8	0.5	0.3	0.0	0.9	7.3	13.5	15.4	9.6	1.3	0.3	0.7	50.6	(1994)	(1992)		
Meral	15	a	10.0	7.0	5.9	0.7	19.0	112.4	267.1	309.5	225.9	26.0	7.5	2.4	993.4	132	74	155.0	12 Jul 1999
		b	0.7	0.9	0.7	0.1	1.3	5.9	12.9	13.8	10.0	2.0	0.1	0.1	48.5	(1994)	(1992)		
Nagerutari	31	a	22.4	10.5	8.7	5.1	10.0	123.6	274.7	299.1	210.0	40.4	5.8	4.1	1014.4	164	31	217.4	22 Aug 1933
		b	1.7	1.1	0.8	0.3	0.9	6.1	13.6	14.9	10.7	2.2	0.3	0.4	53.0	(1961)	(1965)		
Ranka	31	a	20.2	14.1	19.6	7.3	10.6	174.8	370.5	346.6	276.1	66.9	11.3	7.9	1325.9	181	34	306.6	07 Aug 1920
		b	1.4	1.2	1.5	0.7	0.9	6.7	14.9	16.2	10.2	2.9	0.4	0.5	57.5	(1998)	(1966)		
Garhwa (District)		a	14.4	11.8	9.1	4.8	13.8	141.3	302.3	311.3	223.8	39.3	7.3	5.3	1084.5	151	48		
		b	1.2	0.9	0.9	0.4	0.9	6.5	14.0	14.8	10.2	2.2	0.3	0.4	52.7	(1961)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951- 2000)**  
**(GARHWA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
501 – 600	1	1101 – 1200	6
601 – 700	2	1201 – 1300	5
701 – 800	1	1301 – 1400	2
801 – 900	2	1401 – 1500	1
901 – 1000	7	1501 – 1600	0
1001 – 1100	5	1601 – 1700	2

**(Data available for 34 years only)**

## *GIRIDIH DISTRICT*



The climate of this district is similar to Dhanbad district. On the whole the climate of this district is generally dry throughout the year except during southwest monsoon season with cold winter. The year may be divided into four seasons. The cold season starts by December and extends to the month of February. This is followed by the hot season which continues to about the beginning of June when the southwest monsoon arrives over the district. The period from June to September is the southwest monsoon season. The post monsoon month, October and November constitute a transition period from the monsoon to the winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for twelve raingauge stations for the period ranging from 12 to 43 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1189.0 mm. The rainfall in the southwest monsoon season constitutes about 84% of the annual normal rainfall, July being the month with the highest rainfall with an average value of 307.7 mm. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1984 when it amounted to 154% of the normal. In the year 1966, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 48% of the normal. In this fifty year period there were 6 years in which rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion each of three and two consecutive years of such low rainfall.

It is seen from Table 2 that the annual rainfall was between 901 mm and 1400 mm in 23 years out of 39.

On an average there are 59 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 51 at Birni to 67 at Pirtand.

The heaviest rainfall recorded in 24 hours at any station in the district was 403.4 mm at Dumri on 18 July 1975.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the neighbouring observatory at Dhanbad. The cold season starts from December when both day and night temperatures decrease rapidly with the advance of the season. December is the coldest month, when the mean maximum temperature is about 25°C and the mean minimum temperature is about 10°C. In winter months, during cold waves, which affect the district in the wake of western disturbances passing across north India, minimum temperatures may sometimes go down to 4°C. Temperature begins to rise rapidly from February upto first week of June. May is the hottest month with the mean maximum temperature at about 38°C and the mean minimum temperature at about 23°C. In the latter part of the summer season i.e. May and June the maximum temperature may sometimes reach about 45°C. With the advance of the southwest monsoon into the district by about the second week of June, day temperature drops rapidly while drop in night temperature is comparatively small. The day temperature begins to decrease while the drop in the night temperature is appreciable, with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months and is about 80%. It is comparatively less during the rest of the year. The driest part of the year is the summer season, when humidity is about 35% in the afternoon.

## **CLOUDINESS**

In the winter and early part of the summer season the skies are generally clear or lightly clouded, however cloudiness increases later, particularly in the afternoon. During the monsoon season, skies are heavily clouded or overcast. In the rest of the year the skies are generally clear or lightly clouded. Clouding gradually decreases in the post monsoon season.

## **WINDS**

Winds are generally light to moderate with in the later part of summer and southwest monsoon season. In May and monsoon season winds are predominantly from southeast direction. In October winds are mainly calm and from this month southeasterly component decreases and northwesterly wind increases. In winter and the first half of summer winds mainly blow from the northwesterly direction.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the monsoon and post monsoon month move in a northwesterly direction towards the district or its neighbourhood, causing widespread heavy rain and gusty winds. Duststorms and thunderstorms sometimes associated with squall occur occasionally during the summer. But the highest incidence of thunderstorms is during the monsoon months. Fog occurs sometimes during the cold season.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
GIRIDIH**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bagodari	42	a	9.7	7.5	10.8	13.2	39.2	190.3	304.0	263.1	215.7	83.2	1.1	5.2	1143.0	186	46	254.0	19 Jul 1943
		b	0.8	0.9	0.7	1.1	2.7	8.7	15.1	14.9	10.9	3.4	0.1	0.4	59.7	(1990)	(1966)		
Bengabad	36	a	10.2	22.8	15.5	18.5	45.4	209.1	309.1	286.8	258.2	93.4	11.3	5.3	1285.6	158	56	320.0	27 Sep 1995
		b	1.2	1.6	1.2	1.6	3.0	9.2	15.1	14.9	11.3	3.6	0.7	0.5	63.9	(1984)	(1965)		
Birni	25	a	3.4	4.9	9.5	12.2	27.6	127.9	323.8	178.9	180.7	42.4	1.6	2.5	915.4	234	82	375.0	21 Sep 2000
		b	0.5	0.5	0.7	1.0	2.6	7.4	14.1	11.8	9.6	2.1	0.3	0.3	50.9	(1986)	(1968)		
Deori	27	a	13.6	10.9	12.2	18.4	37.1	209.7	285.3	220.1	219.3	61.9	5.8	4.8	1099.1	207	22	397.2	01 Jul 1985
		b	1.2	1.3	0.8	1.3	2.8	8.0	13.9	12.0	9.5	3.0	0.3	0.5	54.6	(1984)	(1964)		
Dhanwar	35	a	10.7	8.4	11.2	17.2	36.7	194.8	307.7	284.6	205.0	65.9	3.5	2.9	1148.6	156	44	231.9	08 Jun 1941
		b	0.8	0.6	1.0	1.1	2.2	8.6	14.2	12.9	9.3	2.6	0.3	0.4	54.0	(1987)	(1966)		
Dumri	43	a	12.4	11.4	15.8	22.7	42.0	221.3	366.9	289.9	265.3	78.7	14.3	5.4	1346.1	175	48	403.4	18 Jul 1975
		b	1.1	1.2	1.2	1.9	2.5	10.0	16.0	14.8	11.4	3.4	0.7	0.4	64.6	(1997)	(1966)		
Gandey	35	a	6.8	17.9	11.9	18.5	50.5	230.6	270.9	232.7	238.5	91.9	11.7	3.7	1185.6	195	41	306.5	03 Oct 1963
		b	0.7	1.2	1.2	1.6	3.5	9.8	15.2	13.1	10.5	3.6	0.6	0.3	61.3	(1980)	(1966)		
Gaus	12	a	6.8	21.3	8.0	16.0	49.4	190.3	297.5	265.1	228.4	62.3	9.3	12.2	1166.6	138	91	135.4	09 Jul 1997
		b	0.7	1.1	0.6	1.3	2.1	8.2	12.2	14.2	9.6	2.8	0.5	1.1	54.4	(1999)	(1995)		
Giridih	25	a	10.4	19.3	16.5	21.0	74.1	261.2	390.1	331.0	276.0	86.7	16.7	7.4	1510.4	187	66	403.0	27 Aug 1980
		b	1.2	1.5	1.0	1.9	4.1	8.3	15.5	14.3	11.5	3.6	0.8	0.8	64.5	(1984)	(1989)		
Jamua	22	a	8.6	15.4	13.4	21.1	43.6	199.9	235.9	272.8	248.8	87.1	15.7	2.7	1165.0	153	48	260.0	22 Sep 2000
		b	0.9	0.9	0.9	1.5	2.2	8.6	12.0	13.5	10.4	3.7	0.7	0.4	55.7	(1999)	(1964)		
Pirtand	26	a	7.9	20.8	23.9	27.2	58.4	217.5	343.1	305.8	290.8	76.4	14.3	3.4	1389.5	143	60	370.0	27 Sep 1995
		b	0.7	1.4	1.7	1.7	3.5	9.3	16.0	15.8	12.3	3.6	0.7	0.3	67.0	(1990)	(1975)		
Thisari	22	a	4.5	10.5	5.7	8.5	28.5	112.4	257.5	225.7	174.6	74.1	6.8	3.1	911.9	180	64	173.3	21 Sep 1983
		b	0.4	1.2	0.6	0.8	2.1	6.7	14.1	13.0	9.9	3.4	0.5	0.6	53.3	(1987)	(1991)		
Giridih (District)		a	8.8	14.3	12.9	17.9	44.4	197.1	307.7	263.0	233.4	75.3	9.3	4.9	1189.0	154	48		
		b	0.8	1.1	1.0	1.4	2.8	8.6	14.4	13.8	10.5	3.2	0.5	0.5	58.6	(1984)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(GIRIDIH)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
501 – 600	1	1201 – 1300	6
601 – 700	1	1301 – 1400	1
701 – 800	2	1401 – 1500	3
801 – 900	1	1501 – 1600	4
901 – 1000	4	1601 – 1700	2
1001 – 1100	4	1701 – 1800	1
1101 – 1200	8	1801 – 1900	1

**(Data available for 39 years only)**

## *GODDA DISTRICT*



The climate of this district is similar to Dumka district, with a hot dry summer, a good rainy season and cool winter. The year may be divided into four seasons. The winter season is from December to February, followed by summer from March to first week of June. The southwest monsoon season is from June to September. The period from October to November constitutes post monsoon season or transition period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for eight stations for the period ranging from 12 to 43 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1210.6 mm. The rainfall in the southwest monsoon season constitutes about 83% of the annual normal rainfall, July being the month with the highest rainfall with an average value of 307.4 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1999 when it amounted to 184% of the normal. In the year 1965 the annual rainfall in the district was the lowest and amounted to only 64% of the normal. In this fifty year period there were 6 years in which the rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion of two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 1001 mm and 1500 mm in 32 years out of 45.

On an average there are 59 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 51 at Mehrama to 65 at Palojoor.

The heaviest rainfall recorded in 24 hours at any station in the district was 450.0 mm at Boriojoor on 24 September 1999.

## **TEMPERATURE**

There is no meteorological observatory in the district at Godda. So the description that follows is based on the records of the neighboring observatory Dumka. The cold season starts from December when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is about 26°C and the mean minimum temperature is about 10°C. In winter months, during cold waves which affect the district in the wake of western disturbances, passing across north India, minimum temperatures may sometimes go down to about 4°C on individual days. Temperatures begin to rise rapidly from March till first week of June. May is the hottest month with the mean maximum temperature at about 38°C and the mean minimum temperature at about 24°C. In the latter part of the summer season i.e. May and early part of June the maximum temperatures may sometimes reach about 46°C on individual days. The latter part of summer until the onset of the monsoon by first week of June, days are uncomfortable with hot dusty winds. Day temperature drops while night temperature remains high as May with the advance of the southwest monsoon into the district from the second week of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid with the relative humidity well above 80%. Air is generally mildly humid in post monsoon and winter season. During the rest of the year the relative humidity in the afternoon is generally

lower than in morning. Summer is the driest part of the year with the relative humidity at about 40% in the afternoon.

## **CLOUDINESS**

During the monsoon months, skies are overcast to heavily clouded. In the winter months skies are generally clear or lightly clouded. In April and May, cloudiness increases particularly in the afternoons.

## **WINDS**

Winds are generally light to moderate throughout the year. In the monsoon season, when depressions affect the weather of the district, the district may experience gusty winds. In winter, summer season and post monsoon, winds mainly blow from westerly direction. Towards the end of summer season easterly wind appears and this wind strengthens and is predominant during monsoon months.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood during their northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur in pre-monsoon months and southwest monsoon season, its frequency is more in latter part of summer and early part of the monsoon season. Hailstorm and dust storm occur occasionally in latter part of summer season. Fog occurs occasionally in morning in winter season.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
GODDA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Boriojor	35	a	7.4	8.6	7.7	29.8	63.9	196.9	362.0	313.4	269.5	76.9	5.7	6.7	1348.5	208	62	450.0	24 Sep 1999
		b	0.6	0.7	0.5	1.5	3.8	9.4	14.8	14.0	9.7	3.2	0.2	0.4	58.8	(1970)	(1967)		
Godda	42	a	15.3	11.2	11.3	28.2	56.4	176.8	313.9	236.1	216.4	75.8	10.5	8.5	1160.4	210	38	300.0	25 Sep 1999
		b	1.0	0.9	0.9	1.5	3.5	8.6	14.5	12.4	10.6	3.7	0.6	0.6	58.8	(1999)	(1966)		
Mehgawan	43	a	11.5	10.0	11.7	18.2	66.9	193.0	307.5	267.8	237.2	80.3	11.3	6.0	1221.4	162	45	251.7	16 Aug 1921
		b	1.0	0.9	0.9	1.5	3.6	8.7	13.3	12.7	9.8	3.3	0.5	0.5	56.7	(1990)	(1965)		
Mehrama	35	a	8.4	4.1	7.4	23.0	59.7	159.3	285.3	231.4	237.9	65.3	4.8	3.7	1090.3	186	54	229.0	28 Sep 1995
		b	0.6	0.5	0.7	1.5	3.5	7.4	12.9	11.3	9.2	2.9	0.3	0.5	51.3	(1987)	(1967)		
Palojor	12	a	17.7	6.6	8.0	17.1	66.9	202.1	289.6	291.2	219.5	84.8	8.2	1.4	1213.1	134	88	292.1	30 Jun 1963
		b	1.0	0.7	1.1	1.6	4.8	10.0	15.1	15.0	10.8	4.3	0.9	0.2	65.5	(1968)	(1962)		
Pariyahat	40	a	14.4	11.6	9.1	14.2	43.9	176.1	301.6	260.0	208.4	87.7	6.5	8.1	1141.6	218	52	349.9	26 Jun 1984
		b	1.0	1.0	0.8	1.0	2.9	8.4	14.6	13.6	9.9	3.2	0.5	0.4	57.3	(1984)	(1975)		
Pathargama	32	a	8.9	9.9	12.5	18.0	43.3	161.1	275.0	279.2	245.2	84.6	4.2	6.9	1148.8	191	49	330.0	12 Sep 1999
		b	0.6	1.0	0.8	1.2	3.0	8.1	13.2	13.1	9.7	3.2	0.3	0.6	54.8	(1969)	(1965)		
Sundarpahadi	26	a	9.8	12.4	9.2	14.9	69.2	215.2	324.3	286.8	291.3	103.7	12.5	10.5	1359.8	162	53	270.0	27 Sep 1995
		b	0.8	0.6	0.6	1.0	4.2	9.5	16.1	14.3	11.9	4.0	0.5	0.6	64.1	(1999)	(1981)		
Godda (District)		a	11.7	9.3	9.6	20.4	58.8	185.1	307.4	270.7	240.7	82.4	8.0	6.5	1210.6	184	64		
		b	0.8	0.8	0.8	1.3	3.7	8.8	14.3	13.3	10.2	3.5	0.5	0.5	58.5	(1999)	(1965)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(GODDA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	1	1501 – 1600	0
801 – 900	2	1601 – 1700	2
901 – 1000	5	1701 – 1800	1
1001 – 1100	11	1801 – 1900	0
1101 – 1200	4	1901 – 2000	1
1201 – 1300	9	2001 – 2100	0
1301 – 1400	5	2101 – 2200	0
1401 – 1500	3	2201 – 2300	1

**(Data available for 45 years only)**

## *GUMLA DISTRICT*



The climate of this district is characterized by dry hot summer, mild humid post monsoon season and well distributed rainfall during the monsoon season. The year may be divided into four seasons. The summer season is from March to first week of June. The period from second week of June to September is the southwest monsoon season. October is a transitional month between southwest monsoon and winter conditions. The winter season is from the end of November to February.

### **RAINFALL**

Records of rainfall in the district are available for eleven raingauge stations for period ranging from 13 to 46 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district as a whole is 1277.2 mm. July is the rainiest month of the year with an average rainfall of 335.1 mm. The variation in the rainfall from year to year is large. About 84% of annual rainfall is received during southwest monsoon months June to September. In the fifty year period from 1951 to 2000, there were 45 years for which annual data is available. Among these, the highest annual rainfall amounting to 170% of the annual normal occurred in 1961, while the lowest annual rainfall which was only 43% of the normal, occurred in 1979. There were nine years in this period when annual rainfall was less than 80% of the normal and there was one occasion each when such a low rainfall occurred in two consecutive years. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 32 years out of 45.

On an average there are 70 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 60 at Chainpur to 77 at Palkot.

The heaviest rainfall recorded in 24 hours at any station in the district was 261.1 mm at Chainpur on 06 October 1936.

## **TEMPERATURE**

As there is no meteorological observatory in the district, the climatological description of the district which follows is based on the data of meteorological data of Ranchi observatory in the neighbouring district, where similar climatological conditions prevail. Temperatures begin to drop rapidly from mid November. January is the coldest month with the mean maximum temperature at about 23°C and the mean minimum temperature at about 10°C. In association with cold waves which affect the district in the winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to 5°C on individual days. Temperatures begin to rise steadily after February till first week of June. May is the hottest month of the year with mean maximum temperature at about 37°C and mean minimum temperature at about 23°C. On some days in latter part of summer and early part of June the maximum temperature may be above 40°C. The weather cools down with the advance of the southwest monsoon into the district by about second week of June. The temperatures begin to drop appreciably with the withdrawal of the monsoon by first week of October.

## **HUMIDITY**

In the southwest monsoon season the air is generally humid with the relative humidity above 80%. The air is generally dry in winter and summer season. The driest part of the year is summer season when the relative humidity is low, especially in the afternoon, when they are about 30%.

## **CLOUDINESS**

During the southwest monsoon months skies are generally heavily clouded to overcast. In the rest of the year skies are generally clear or lightly clouded. On some days in winter, when western disturbances affect the weather of the district, skies are heavily clouded. Cloudiness increases in later part of summer especially in the afternoon.

## **WINDS**

Winds are generally light to moderate with some increase in force in later part of summer and southwest monsoon season and light in the rest of the year. In winter months winds are mainly from northwesterly direction. In April south-westerlies winds begin to appear and become predominant with the advance of the monsoon season. In southwest monsoon season though winds blow from southwesterly or westerly direction, on some days in the afternoon winds blow from directions southeasterly or easterly. In October, northerly and northwesterly winds appear and strengthen in the winter season

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood during their northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms during the period February to June are sometimes accompanied by squally weather, less frequently with hail and dust storm. Fog occurs occasionally in winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**GUMLA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Basiya	13	a	25.3	14.8	30.2	18.4	53.0	212.5	401.8	313.2	258.6	61.4	14.6	8.0	1411.8	135	68	247.3	25 Jul 2000
		b	1.8	2.0	2.5	1.9	5.3	10.9	17.2	15.8	13.2	4.0	0.6	0.6	75.8	(1994)	(1992)		
Bharno	32	a	23.5	21.8	25.3	17.5	35.1	191.0	325.9	321.5	247.1	64.6	8.5	8.8	1290.6	171	53	223.6	06 Sep 1965
		b	2.0	1.8	1.9	1.7	3.1	10.4	15.8	16.5	12.2	3.7	0.5	0.6	70.2	(1953)	(1968)		
Bishnupur	46	a	23.3	20.8	22.2	21.9	32.6	189.4	321.5	315.9	232.9	64.6	10.0	11.3	1266.4	183	50	258.8	30 Aug 1944
		b	2.4	1.7	2.1	1.9	2.4	10.6	16.7	16.7	12.0	3.7	0.7	0.8	71.7	(1959)	(1979)		
Chainpur	44	a	17.3	19.0	17.8	13.8	24.1	137.8	290.1	286.5	209.7	57.4	3.9	5.3	1082.7	174	18	261.1	06 Oct 1936
		b	1.6	1.5	1.6	1.2	1.9	7.6	15.2	15.2	10.2	3.6	0.3	0.5	60.4	(1961)	(1988)		
Ghaghra	34	a	16.9	24.2	22.8	20.5	37.0	158.6	304.0	258.8	201.5	57.7	12.6	10.3	1124.9	150	52	228.4	24 Oct 2003
		b	1.7	2.4	2.1	1.7	2.8	8.9	15.8	15.3	11.2	3.5	0.8	0.8	67.0	(1977)	(1992)		
Gumla	34	a	29.2	21.7	27.0	29.4	47.1	198.6	351.5	322.7	246.7	77.8	18.1	7.5	1377.3	136	67	238.8	31 Aug 1925
		b	2.1	1.6	2.2	2.0	3.3	10.4	16.9	17.1	13.2	4.2	0.8	0.5	74.3	(1952)	(1964)		
Gumla (Hydro)	15	a	22.4	31.0	30.8	18.9	39.1	220.3	305.7	304.7	192.8	63.4	16.6	2.6	1248.3	115	89	175.8	30 Jul 2004
		b	1.6	2.8	3.0	2.0	3.1	10.4	17.0	16.7	10.1	3.7	0.8	0.3	71.5	(1980)	(1981)		
Kamdara	16	a	13.4	20.5	10.8	17.1	46.0	201.4	370.7	342.1	251.5	54.6	18.1	6.9	1353.1	137	62	185.4	18 Sep 1995
		b	1.3	1.5	1.3	1.3	3.3	10.5	16.5	17.2	11.7	3.1	1.1	0.7	69.5	(1994)	(1992)		
Palkot	33	a	18.0	16.5	24.5	19.0	47.7	220.0	374.8	346.0	251.2	77.0	11.8	5.4	1411.9	173	65	207.3	01 Sep 1914
		b	1.5	1.5	1.9	1.9	4.1	11.0	17.9	18.1	13.3	4.7	0.8	0.3	77.0	(1961)	(1992)		
Raidih	32	a	15.1	19.0	11.0	21.3	46.5	259.2	393.6	363.6	256.4	58.3	7.1	9.7	1460.8	150	71	147.4	10 Sep 1998
		b	1.6	1.6	1.3	1.7	3.9	11.6	18.4	18.6	12.7	3.4	0.8	0.5	76.1	(1994)	(1965)		
Sisai	13	a	10.4	3.5	19.3	22.4	55.8	188.4	246.4	202.9	211.2	43.4	10.1	8.6	1022.4	144	116	221.2	11 Sep 1970
		b	1.2	0.4	1.6	1.1	4.2	9.9	12.8	14.8	10.4	2.7	0.9	0.7	60.7	(1970)	(1994)		
Gumla (District)		a	19.5	19.3	22.0	20.0	42.2	197.9	335.1	307.1	232.7	61.8	11.9	7.7	1277.2	170	43		
		b	1.7	1.7	2.0	1.7	3.4	10.2	16.4	16.5	11.8	3.7	0.7	0.6	70.4	(1961)	(1979)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(GUMLA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
501 – 600	1	1401 – 1500	8
601 – 700	1	1501 – 1600	2
701 – 800	0	1601 – 1700	2
801 – 900	3	1701 – 1800	2
901 – 1000	3	1801 – 1900	0
1001 – 1100	3	1901 – 2000	0
1101 – 1200	6	2001 – 2100	0
1201 – 1300	5	2101 – 2200	1
1301 – 1400	8		

**(Data available for 45 years only)**

## *HAZARIBAGH DISTRICT*



The climate of this district is mild hot summer, cool winter and well distributed rainfall in southwest monsoon season. The year may be divided into four seasons. The cold season starts from late November and extends to the month of February, followed by the summer season which continues to about the beginning of June, when the monsoon arrives over the district. The period from June to September is of the southwest monsoon season. The post monsoon months October and November constitute a transition period from the monsoon to the winter season.

### **RAINFALL**

Records of rainfall in the district are available for twelve raingauge stations for period ranging from 10 to 50 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1225.6mm. During the monsoon season June to September the district receives about 85% of the annual rainfall. July is the rainiest month with an average rainfall of 315.7 mm. The rainfall from year to year in the district has some variation. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 143% of the annual normal occurred in 1984, while the lowest annual rainfall which was 57% of the normal occurred in 1966 In the fifty year period there were 8 years in which the annual rainfall in the district was less than 80% of the normal and none of them were consecutive. It is seen from Table 2 that the rainfall was between 1001 mm and 1500 mm in 32 years out of 46.

On an average there are 61 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 53 at Chauparan and Katkamsandy to 68 at Hazaribagh observatory.

The heaviest rainfall recorded in 24 hours at any station in the district was 316.4 mm at Bakkagaoni on 16 September 1976.

## **TEMPERATURE**

There is a meteorological observatory in the district located at Hazaribagh. The description that follows is based on the records of this observatory. The cold season starts from the end of November when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month of the year with the mean maximum temperature at 22.1°C and the mean minimum temperature at 8.7°C. In winter months, during cold waves which affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to 2°C to 3°C on individual days. From March, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature at 36.9°C and the mean minimum temperature at 23.4°C. In latter part of the summer season i.e. May and June, the maximum temperature may sometimes reach to about 45°C. The day temperature drops rapidly while the drop in night temperature is comparatively low with the advance of the southwest monsoon into the district towards the middle of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

The highest maximum temperature ever recorded at Hazaribagh was 46.6°C on 14 June 1975 and the lowest minimum temperature ever recorded was 0.5°C on 24 December 1961.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months and is about 80%. It is comparatively less during rest of the year. The driest part of the year is the summer season, when humidity is less than 35% in the afternoon.

## **CLOUDINESS**

During the monsoon season, the sky is heavily clouded or overcast. In the rest of the year the sky is clear or lightly clouded. Clouding is generally more in the afternoon.

## **WINDS**

Winds are generally light to moderate in the summer and monsoon season. During the period October to May, winds blow mostly from northwest. During the monsoon season, the winds are mostly from directions southwest or southeast in the mornings and from northwest in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon months move in a northwesterly direction towards the district or its neighbourhood causing widespread heavy rain and gusty winds. Dust storms and thunderstorms sometimes associated with squall occur occasionally during summer. But the highest incidence of thunderstorms is during the monsoon months. Fog occasionally occurs during the cold season.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Hazaribagh observatory.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
HAZARIBAGH**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Barhi	46	a	13.8	14.0	15.9	13.9	33.6	178.3	342.9	299.6	223.5	82.7	7.5	8.0	1233.7	155	57	295.1	04 Aug 1943
		b	1.4	1.4	1.2	1.2	2.5	7.6	15.0	14.1	10.3	3.5	0.4	0.6	59.2	(1996)	(1974)		
Bakkagaoni	29	a	10.2	13.8	6.7	13.5	31.8	184.0	341.8	294.4	249.7	69.1	8.4	8.0	1231.4	160	49	316.4	16 Sep 1976
		b	0.9	1.4	0.8	1.1	2.3	8.6	16.4	16.5	11.3	3.5	0.7	0.7	64.2	(1961)	(1966)		
Barkatha	28	a	17.6	16.8	11.7	20.2	33.4	198.1	288.2	294.4	249.1	115.9	6.5	7.8	1259.7	223	52	170.0	01 Sep 1978
		b	1.2	1.3	1.2	1.3	2.2	8.6	15.0	14.8	11.1	3.3	0.5	0.6	61.1	(1978)	(1966)		
Bishnugarh	28	a	7.4	8.4	10.6	16.0	40.2	196.8	340.2	290.4	269.1	85.6	13.2	6.4	1284.3	153	56	241.2	05 Oct 1978
		b	0.7	0.8	1.0	1.5	2.6	9.2	15.7	14.7	11.4	3.3	0.7	0.6	62.2	(1978)	(1966)		
Chauparan	28	a	9.4	13.8	10.1	7.3	22.0	199.6	288.9	249.4	180.5	72.9	5.0	8.3	1067.2	153	59	238.4	16 Jun 1968
		b	0.8	1.3	1.0	1.0	1.8	7.2	13.3	12.9	9.6	3.0	0.4	0.8	53.1	(1961)	(1970)		
Churchu	15	a	10.4	7.5	6.0	7.5	32.3	188.3	375.3	374.0	302.1	76.4	18.5	4.3	1402.6	134	47	200.0	23 Jun 1996
		b	0.7	0.5	0.5	0.8	2.0	9.4	17.2	17.1	13.1	4.4	0.7	0.4	66.8	(1997)	(2000)		
Hazaribagh (Obsy)	50	a	18.6	18.0	16.9	15.8	45.9	190.5	317.9	312.7	226.7	70.4	10.4	9.3	1253.1	159	59	249.2	24 Jun 1911
		b	1.5	1.7	1.8	1.3	3.1	9.5	16.2	15.9	11.3	4.0	0.7	0.7	67.7	(1995)	(1966)		
Ichak	28	a	9.2	17.8	10.1	11.6	43.1	220.7	326.3	327.6	239.9	71.0	11.8	9.3	1298.4	182	24	225.6	06 Jul 1986
		b	0.9	1.3	0.6	1.1	2.6	7.8	15.9	14.7	10.5	3.3	0.4	0.6	59.7	(1986)	(1964)		
Katkamsandy	14	a	11.8	14.5	18.7	8.1	14.0	130.4	331.0	320.2	190.6	68.7	12.0	12.6	1132.6	173	43	189.1	06 Jul 1986
		b	1.0	1.2	1.3	1.0	1.5	6.7	14.4	12.5	9.0	3.0	0.7	1.0	53.3	(1986)	(1995)		
Keridari	35	a	10.9	14.6	10.5	6.0	23.9	160.7	285.8	259.8	197.9	89.3	5.8	9.4	1074.6	182	53	202.0	06 Jul 1986
		b	1.0	1.2	1.0	0.6	2.0	7.9	14.6	14.2	9.4	2.8	0.5	0.7	55.9	(1961)	(1996)		

**TABLE – 1 (contd...)  
NORMALS AND EXTREMES OF RAINFALL  
HAZARIBAGH**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Pachamba	22	a	23.0	4.6	24.1	17.4	37.9	185.5	280.5	270.0	250.7	92.1	3.5	0.2	1189.5	163	60	300.7	12 Jun 1949
		b	1.1	0.7	0.9	1.6	2.3	9.4	14.6	14.4	11.5	3.9	0.3	0.1	60.8	(1959)	(1966)		
Pirtand	10	a	11.4	10.6	8.0	19.6	42.1	153.3	269.4	349.1	293.6	116.5	1.5	3.8	1278.9	130	60	165.4	24 Sep 1965
		b	1.1	0.5	0.8	1.7	2.5	8.7	15.0	16.1	10.9	4.2	0.2	0.3	62.0	(1968)	(1966)		
Hazaribagh (District)		a	12.8	12.9	12.4	13.1	33.4	182.2	315.7	303.5	239.4	84.2	8.7	7.3	1225.6	143	57		
		b	1.0	1.1	1.0	1.2	2.3	8.4	15.3	14.8	10.8	3.5	0.5	0.6	60.5	(1984)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(HAZARIBAGH)**

Range in mm	No. of years	Range in mm	No. of years
701 – 800	1	1301 – 1400	4
801 – 900	1	1401 – 1500	7
901 – 1000	4	1501 – 1600	3
1001 – 1100	10	1601 – 1700	3
1101 – 1200	5	1701 – 1800	2
1201 – 1300	6		

**(Data available for 46 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(HAZARIBAGH)**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
			°C	Date	°C	Date	0830 IST	1730 IST
January	22.1	8.7	30.6	1881 Jan 31	0.9	1980 Jan 07 1981 Jan 12	63	51
February	25.1	11.9	33.6	1967 Feb 22	1.7	1974 Feb 08	56	45
March	30.1	16.3	39.1	1983 Mar 20	2.9	1981 Mar 05	45	34
April	35.0	21.1	41.7	1956 Apr 22	10.6	1968 Apr 01	43	30
May	36.9	23.4	43.9	1897 May 8	15.6	1977 May 22	50	35
June	33.6	23.8	46.6	1975 Jun 14	18.3	1975 Jun 02	70	60
July	29.3	22.8	39.6	1975 Jul 08	18.9	1984 Jul 24	86	80
August	28.7	22.5	39.1	1981 Aug 30	20.0	1967 Aug 29	88	82
September	28.8	22.0	33.3	1960 Sep 24 1932 Sep 1943 Sep 1945 Sep	16.5	1982 Sep 28	84	79
October	27.9	18.5	34.0	1966 Oct 04	9.7	1972 Oct 12	73	67
November	25.3	13.5	31.7	1896 Nov 01	4.4	1879 Nov 25	64	57
December	22.4	9.1	31.9	1996 Dec 30	0.5	1961 Dec 24	64	55
Annual	28.8	17.8	46.6	1975 Jun 14	0.5	1961 Dec 24	66	56

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(HAZARIBAGH)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
7.0	7.4	9.4	10.1	10.0	10.0	10.0	10.4	11.0	9.0	8.6	8.7	9.3

**TABLE - 5**  
**Special Weather Phenomena**  
**(HAZARIBAGH)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	1.2	1.4	2.0	3.5	6.0	5.9	6.4	4.9	1.2	0.1	0.0	33.0
Hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dust storm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squall	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Fog	0.4	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.4	0.5	0.2	0.2	2.2

## *JAMTARA DISTRICT*



The climate of this district is similar to Dumka district, with a hot dry summer, a good rainy season and cool winter. The year may be divided in to four seasons. The winter season is from late November to February, summer from March to first week of June and south-west monsoon season from June to September. The period from October to November is post monsoon season, which is transitional period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for four stations for the period ranging from 14 to 39 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1353.2 mm. The rainfall in the southwest monsoon season constitutes about 82% of the annual normal rainfall. July is the rainiest month with an average rainfall of 332.1 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1959 when it amounted to 181% of the normal. In the year 1976, the annual rainfall in the district was the lowest amounting to only 66% of the normal. In this fifty year period there were 4 years in which the rainfall in the district was less than 80% of the normal. Considering the district as a whole, there was one occasion of two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 1101 mm and 1600 mm in 20 years out of 35.

On an average there are 65 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 61 at Kundahit and Mala/Nala to 69 at Jamtara.

The heaviest rainfall recorded in 24 hours at any station in the district was 300.1 mm at Mala/Nala on 14 August 1964.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the neighbouring observatory Dumka. The cold season starts from December when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is about 26°C and the mean minimum temperature is about 10°C. In winter months, during cold waves which affect the district in the wake of western disturbances passing across north India, minimum temperature may sometimes go down to 4°C. Temperatures begin to rise rapidly from the month of March till first week of June. May is the hottest month with the mean maximum temperature at about 38°C and the mean minimum temperature at about 24°C. In the latter part of the summer season i.e. May and early part of June the maximum temperature may sometimes reach about 46°C on individual days. During the latter part of summer until the onset of the monsoon by about the first week of June, days are uncomfortable with hot dusty winds. Day temperatures drop appreciably while night temperatures remain as high as in May with the advance of the southwest monsoon into the district from the second week of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid with the value of relative humidity well above 80%. Air is generally mildly humid in post monsoon and winter season. During the rest of the year the relative humidity in the afternoon is

generally lower than in the morning. Summer is the driest part of the year with the relative humidity at about 40% in the afternoon.

## **CLOUDINESS**

During the southwest monsoon months skies are heavily clouded to overcast. During the winter months and post monsoon season, sky is generally clear or lightly clouded. In April and May, cloudiness increases particularly in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year. During the monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In post monsoon, winter and summer season, winds mainly blow from westerly direction. Towards the end of summer season easterly wind appears and this wind strengthens and remains predominant during monsoon season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood, during their northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur in pre-monsoon months and southwest monsoon season. Its frequency is more in latter part of summer and early part of monsoon season. Hailstorm and dust storm occur occasionally in latter part of summer. Fog, occasionally occurs in morning of winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**JAMTARA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Jamtara	39	a	12.3	21.2	19.3	16.7	64.7	211.2	342.9	334.0	288.3	131.0	12.6	5.7	1459.9	199	61	292.4	23 Sep 1916
		b	1.1	1.3	1.5	1.4	3.8	9.7	16.0	16.0	11.6	4.9	0.8	0.5	68.6	(1959)	(1964)		
Kundahit	36	a	18.3	12.4	10.2	14.8	50.3	191.5	323.4	306.1	222.9	87.8	11.1	1.7	1250.5	161	65	253.8	27 Sep 1978
		b	0.9	0.9	0.8	1.2	3.0	9.2	15.0	15.4	10.2	4.0	0.6	0.2	61.4	(1968)	(1964)		
Mala/Nala	25	a	5.6	15.4	14.8	17.2	64.3	183.6	307.0	269.8	270.4	104.0	8.7	3.8	1264.6	186	57	300.1	14 Aug 1964
		b	0.3	1.0	0.7	1.3	3.7	9.1	15.0	14.0	11.9	3.8	0.4	0.2	61.4	(1980)	(1966)		
Narayanpur	14	a	11.0	25.4	11.1	31.7	61.2	235.1	355.0	289.7	303.9	99.3	10.3	3.4	1437.1	140	82	276.2	27 Sep 1995
		b	0.9	1.8	0.9	2.4	4.1	10.0	15.2	14.9	12.3	3.8	0.3	0.4	67.0	(1999)	(1975)		
Jamtara (District)		a	11.8	18.6	13.9	20.1	60.1	205.4	332.1	299.9	271.4	105.5	10.7	3.7	1353.2	181	66		
		b	0.8	1.2	1.0	1.6	3.7	9.5	15.3	15.1	11.5	4.1	0.5	0.3	64.6	(1959)	(1976)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(JAMTARA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
801 – 900	1	1701 – 1800	3
901 – 1000	1	1801 – 1900	0
1001 – 1100	4	1901 – 2000	0
1101 – 1200	4	2001 – 2100	2
1201 – 1300	7	2101 – 2200	1
1301 – 1400	5	2201 – 2300	0
1401 – 1500	2	2301 – 2400	0
1501 – 1600	2	2401 – 2500	1
1601 – 1700	2		

**(Data available for 35 years only)**

## *KHUNTI DISTRICT*



The climate of this district is characterized by a dry hot summer, mild humid post monsoon season and well distributed rainfall during the monsoon season. The year may be divided into four seasons. The summer season is from March to first week of June. The period from June to September is the southwest monsoon season and October is a transitional month between monsoon and winter conditions. The winter season is from December to February.

### **RAINFALL**

The records of rainfall are available for six raingauge stations for period ranging from 14 to 46 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1395.3 mm. During the monsoon season June to September the district receives rainfall of about 85% of the annual rainfall. July and August are the rainiest months with an average rainfall of about 357.1 mm. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 161% of the annual normal occurred in 1995, while the lowest annual rainfall which was 63% of the normal occurred in 1991. In the fifty year period there were only 4 years in which the annual rainfall in the district was less than 80% of the normal and none of them were consecutive. It is seen from Table 2 that the rainfall was between 1101 mm and 1700 mm in 33 years out of 40.

On an average there are 74 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 65 at Kurra to 84 at Murhu.

The heaviest rainfall recorded in 24 hours at any station in the district was 350.0 mm at Adkhi on 04 August 1988.

## **TEMPERATURE**

There is no meteorological observatory in the district is at Khunti. The temperature and other meteorological data recorded at Ranchi observatory in the neighbouring district may be taken as representative of the climatic conditions in the district as a whole. Temperatures begin to drop rapidly from mid November. January is the coldest month of the year with the mean maximum temperature at about 23°C and the mean minimum temperature at about 10°C. In association with cold waves which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to 5°C on individual days. Temperatures begin to rise rapidly after February till first week of June. May is the hottest month with the mean maximum temperature at about 37°C and mean minimum temperature at about 24°C. On some days in April, May and early part of June, the maximum temperature may be well above 40°C on individual days. The weather cools down with the advance of the southwest monsoon season into the district by about the second week of June. The temperature begins to drop appreciably with the withdrawal of monsoon by first week of October.

## **HUMIDITY**

In the southwest monsoon season air is generally humid with the relative humidity above 80%. The air is generally dry in winter and summer seasons. The summer months are the driest part of the year with the relative humidity especially in the afternoon of the order of 30%.

## **CLOUDINESS**

In the southwest monsoon season skies are heavily clouded to overcast. Cloudiness decreases from October. In winter and early part of summer skies are generally clear or lightly clouded. Some days in winter, when western disturbances

affect the weather of the district skies are heavily clouded. Cloudiness increases in latter part of summer, especially in the afternoon.

## **WINDS**

Winds are generally light to moderate in latter part of summer and southwest monsoon season and light in the rest of the year. In winter months, winds are mainly from northwesterly direction. In April south-westerlies begin to appear and become predominant with the advance of the monsoon season. In southwest monsoon season though winds blow from southwesterly or westerly direction. On some days in the afternoon, winds blow from southeasterly or easterly directions. In October, northerly and northwesterly winds appear and strengthen in the winter season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood during their westward or northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms during the period February to June are sometimes accompanied by squally weather, less frequently with hail and dust storm. Fog occurs frequently in winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**KHUNTI**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Adkhi	20	a	27.1	14.5	5.8	18.1	36.6	191.8	379.0	338.7	286.8	64.9	18.1	14.9	1396.3	149	60	350.0	04 Aug 1988
		b	1.7	1.3	0.5	1.2	3.3	10.6	16.0	15.6	13.8	3.4	0.7	1.1	69.2	(1988)	(1983)		
Khunti	46	a	22.7	24.4	24.2	17.4	45.4	243.2	379.8	360.3	267.6	71.0	17.2	9.5	1482.7	211	57	215.0	11 Sep 1970
		b	1.6	2.0	2.1	1.6	4.0	11.7	18.4	17.6	13.5	4.0	1.0	0.8	78.3	(1994)	(1965)		
Kurra	15	a	11.8	13.7	25.6	17.3	49.7	214.5	314.3	317.0	264.7	61.7	2.6	6.4	1299.3	128	53	195.6	24 Jun 1966
		b	0.8	1.4	1.6	1.2	3.5	9.7	14.2	15.1	11.8	3.9	0.4	0.9	64.5	(1970)	(1965)		
Murhu	18	a	14.7	13.1	15.6	24.1	63.7	206.5	329.8	428.8	261.2	59.3	18.1	2.3	1437.2	129	101	169.6	24 Oct 2003
		b	1.1	1.5	1.3	2.3	5.1	11.8	18.5	20.7	16.1	3.7	1.2	0.5	83.8	(1965)	(1967)		
Rania	14	a	10.7	11.3	15.6	18.1	34.3	224.1	400.0	336.5	216.5	52.9	15.8	17.1	1352.9	162	88	131.0	26 Jul 1996
		b	0.9	1.4	1.7	2.7	3.7	12.3	20.2	18.6	12.4	3.4	0.8	1.3	79.4	(1994)	(1987)		
Thoraya	19	a	25.3	25.5	20.9	25.2	44.0	247.4	349.2	351.4	226.8	58.7	17.6	11.1	1403.1	147	63	160.0	13 Jun 1988
		b	1.4	1.7	1.4	1.6	3.0	9.5	16.2	15.3	12.0	3.3	0.9	0.7	67.0	(1987)	(1991)		
Khunti (District)		a	18.7	17.1	17.9	20.0	45.6	221.3	358.7	355.5	253.9	61.4	14.9	10.2	1395.3	161	63		
		b	1.3	1.6	1.4	1.8	3.8	10.9	17.3	17.2	13.3	3.6	0.8	0.9	73.8	(1995)	(1991)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(KHUNTI)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
801 – 900	1	1601 – 1700	3
901 – 1000	2	1701 – 1800	0
1001 – 1100	1	1801 – 1900	1
1101 – 1200	4	1901 – 2000	1
1201 – 1300	7	2001 – 2100	0
1301 – 1400	2	2100 – 2200	0
1401 – 1500	10	2201 - 2300	1
1501 – 1600	7		

**(Data available for 40 years only)**

## *KODARMA DISTRICT*



The climate of this district is similar to Hazaribagh district. On the whole the climate of this district is mild hot summer, cold winter and well distributed rainfall during southwest monsoon season. The year may be divided into four seasons. The cold season starts from the end of November and extends to the month of February. This is followed by the summer season, which continues to about the beginning of June, when the southwest monsoon arrives over the district. The period from June to September is the southwest monsoon season. The post monsoon months, October and November constitute a transition period from the monsoon to the winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for four raingauge stations for the period ranging from 11 to 31years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1130.8 mm. The rainfall in the southwest monsoon season constitutes about 84% of the annual normal rainfall, July and August being the months with the highest rainfall with an average value of 267.3 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1951 to 2000, the highest annual rainfall was in 1998 when it amounted to 144% of the normal. In the year 1966, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 58% of the normal. In the same fifty year period there were 9 years in which the rainfall was less than 80%. Considering the district as a whole, there was one occasion of three consecutive years of such low rainfall. It is seen from Table 2 that the annual rainfall was between 901 mm and 1400 mm in 19 years out of 35.

On an average there are 57 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 49 at Satgawan to 60 at Jaynagar and Sarkachchu.

The heaviest rainfall recorded in 24 at any station in the district was 351.3 mm at Sarkachchu on 22 September 2000.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the neighbouring Hazaribagh observatory. The cold season starts from the end of November when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month of the year with the mean maximum temperature at 22°C and the mean minimum temperature at 9°C. In winter months, during cold waves which affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to 2°C-3°C on individual days. Temperature begins to rise rapidly from March till first week of June. May is the hottest month with the mean maximum temperature at about 37°C and the mean minimum temperature at about 23°C. In latter part of the summer season i.e. May and June, the maximum temperature may sometimes reach about 45°C. The day temperature drops rapidly while the drop in night temperatures is comparatively low, with the advance of the southwest monsoon into the district from the middle of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months at about 80%. It is comparatively less during rest of the year. The driest part of the year is the summer season, when humidity is less than 35% in the afternoon.

## **CLOUDINESS**

During the monsoon season the sky is heavily clouded or overcast. In the rest of the year the sky is clear or lightly clouded. Cloudiness is generally more in the afternoon.

## **WINDS**

Winds are generally light to moderate in the summer and monsoon season. During the period October to May, winds blow mostly from northwest direction. During the monsoon season, the winds are mostly from directions southwest or southeast in the morning and from northwest in the afternoon.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon months move in a northwesterly direction towards the district or its neighbourhood causing widespread heavy rain and gusty winds. Dust storms and thunderstorms sometimes associated with squall occur occasionally during summer. But the highest incidence of thunderstorms is during the monsoon months. Fog occurs occasionally during the cold season.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**KODARMA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Jaynagar	20	a	9.4	20.9	9.3	9.8	28.4	193.6	289.9	250.7	227.1	67.4	13.2	11.7	1131.4	143	64	156.0	08 Sep 1976
		b	1.2	1.7	0.8	0.8	2.4	8.6	14.5	13.1	11.6	3.3	0.6	1.1	59.7	(1997)	(1976)		
Kodarma	31	a	21.0	12.2	12.9	9.9	28.6	172.7	270.7	268.2	217.8	86.4	8.0	7.5	1115.9	168	59	313.4	01 Aug 1947
		b	1.6	0.9	1.0	0.8	1.6	8.6	14.4	14.1	11.0	3.5	0.6	0.5	58.6	(1998)	(1966)		
Sarkachchu	11	a	10.0	15.8	15.6	6.4	67.7	229.4	271.2	320.9	270.0	72.4	18.8	13.7	1311.9	136	58	351.3	22 Sep 2000
		b	1.1	1.5	1.0	0.6	3.0	8.9	13.4	14.5	10.1	3.6	0.8	1.4	59.9	(1997)	(1992)		
Satgawan	28	a	19.3	7.7	7.5	3.8	29.7	137.7	233.8	233.6	222.7	54.0	7.0	7.3	964.1	164	35	228.6	12 Sep 1953
		b	1.3	0.8	0.7	0.2	1.6	6.5	12.5	11.8	9.7	2.7	0.3	0.7	48.8	(1987)	(1968)		
Kodarma (District)		a	14.9	14.1	11.3	7.5	38.6	183.3	266.4	268.3	234.4	70.1	11.8	10.1	1130.8	144	58		
		b	1.3	1.2	0.9	0.6	2.2	8.1	13.7	13.4	10.6	3.3	0.6	0.9	56.8	(1998)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(KODARMA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
601 – 700	2	1101 – 1200	1
701 – 800	3	1201 – 1300	5
801 – 900	4	1301 – 1400	0
901 – 1000	5	1401 – 1500	3
1001 – 1100	8	1501 – 1600	3
		1601 – 1700	1

**(Data available for 35 years only)**

## *LATEHAR DISTRICT*



The climate of this district is characterised by dry hot summer and well distributed rainfall in the monsoon season. The year may be divided into four main seasons. The cold season is from the end of November to February followed by hot season upto first week of June and the southwest monsoon season is from second week of June to September. October to November is a transitional period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for eight raingauge stations for period ranging from 14 to 46 years. The average annual rainfall in the district as a whole is 1197.6 mm. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. During the monsoon months June to September the district receives rainfall of about 86% of the annual rainfall. July is the rainiest month with an average rainfall of 339.9 mm. The variation in the rainfall from year to year is not much large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 150% of the normal occurred in 1994, while the lowest annual rainfall which was only 55% of the normal occurred in 1966. In the same fifty year period there were seven years in which the annual rainfall in the district was less than 80% of the normal. During the same period there was one occasion of three consecutive years of such a low rainfall. It is seen from Table 2 that the rainfall was between 1001 mm and 1400 mm in 27 years out of 43.

On an average there are 60 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 54 at Manika to 63 at Chandwa, Latehar (Hydro) and Mahuadaur.

The heaviest rainfall recorded in 24 hours at any station in the district was 364.0 mm at Mahuadaur on 27 June 1923.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description which follows, is based on the climatological data of neighbouring observatory Daltonganj in Palamau district. The cold season starts from the end of November and continues till about the middle of March. January is the coldest month with the mean maximum temperature at about 25°C and the mean minimum temperature at about 9°C. In association with cold waves which affect the district in the winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to freezing point of water and frost may occur occasionally in the higher and most exposed parts of the district. By March temperature begins to rise steadily till the second week of June. On individual days in the month of May and early part of June, the maximum temperature may be as high as 46°C. May is the hottest month with the mean maximum temperature at about 41°C and the mean minimum temperature at about 25°C. Days are uncomfortable except in late night and early morning hours, when temperature drops to a comfortable level from April till the onset of monsoon. The weather cools down appreciably and day temperatures decrease with the onset of the southwest monsoon into the district by about second week of June. However, night temperatures in June are as high as in May.

## **HUMIDITY**

The relative humidity is generally lower in the afternoon than in the morning except in the southwest monsoon months when there is little difference between the two. In the southwest monsoon months the air is generally humid relative humidity of the order of 75% to 80%. In the post monsoon and winter season air is generally dry

and mild humid. Summer season is the driest part of the year with relative humidity in the afternoons at about 25% to 30%.

## **CLOUDINESS**

During monsoon months skies are heavily clouded to overcast. In winter months skies are generally clear or lightly clouded. In April and May the cloudiness increases particularly in the afternoons.

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in the latter part of summer and southwest monsoon months. In association with thunderstorms during summer and monsoon seasons when depressions affect the weather of the district, the district may experience gusty winds. In the southwest monsoon season winds are mainly from southwesterly to westerly direction. In the rest of the year winds are mainly calm or blow from southwesterly or westerly directions in the morning and northwesterly or northeasterly direction in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the district and its neighbourhood during their northwestward or westward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Severe thunderstorms occur during summer months and even during the monsoon, rainfall is often associated with thunderstorm. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**LATEHAR**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Balumath	46	a	16.4	22.3	18.2	8.5	26.5	174.8	315.7	289.2	224.8	73.5	8.6	8.4	1186.9	147	24	316.2	19 Jul 1949
		b	1.6	1.7	1.5	0.8	1.9	8.1	14.8	15.2	10.6	3.5	0.5	0.7	60.9	(1999)	(1990)		
Balumath (Hydro)	14	a	10.6	22.5	35.2	12.6	33.0	155.4	289.5	247.5	211.3	67.0	18.8	9.9	1113.3	127	95	164.5	23 Oct 1982
		b	1.1	2.0	2.4	1.4	1.8	7.5	15.5	13.4	10.8	2.5	1.0	0.9	60.3	(1987)	(1980)		
Barwadih	32	a	14.8	8.7	11.1	3.4	8.1	138.1	329.0	307.4	244.4	42.3	1.6	4.7	1113.6	202	36	234.5	15 Sep 1993
		b	1.1	0.9	1.3	0.3	0.9	6.9	14.0	15.3	10.7	2.6	0.2	0.3	54.5	(1994)	(1966)		
Chandwa	32	a	16.6	14.9	16.0	9.6	22.3	192.7	362.6	336.7	241.1	65.0	3.5	5.6	1286.6	149	61	224.6	23 Jul 1991
		b	1.5	1.2	1.5	0.8	1.9	8.9	16.2	15.8	11.3	3.6	0.3	0.4	63.4	(1961)	(1992)		
Latehar	34	a	15.8	15.0	21.7	8.6	19.0	162.3	368.2	288.5	232.0	60.5	6.2	7.6	1205.4	143	40	332.7	28 Jul 1953
		b	1.3	1.3	1.7	0.8	1.4	7.4	15.7	15.3	11.5	3.7	0.5	0.5	61.1	(1997)	(1966)		
Latehar (Hydro)	21	a	17.6	26.0	20.2	13.1	83.3	184.3	330.9	276.5	228.1	51.6	15.0	10.1	1256.7	190	57	192.6	22 Jun 1993
		b	1.6	1.9	1.5	1.4	2.6	7.3	15.7	15.2	11.6	2.8	0.8	0.8	63.2	(1997)	(1992)		
Mahuadaur	43	a	15.7	18.4	13.4	12.0	22.1	177.4	339.8	315.0	225.8	49.2	4.3	7.4	1200.5	193	55	364.0	27 Jun 1923
		b	1.5	1.5	1.2	1.0	1.8	8.9	16.4	15.5	10.9	3.4	0.3	0.5	62.9	(1967)	(1964)		
Manika	16	a	29.0	12.9	17.6	5.8	12.2	198.0	383.2	304.4	209.7	23.0	14.9	6.7	1217.4	170	29	287.4	08 Jul 1994
		b	1.7	1.1	0.9	0.7	1.0	6.7	14.3	15.3	9.7	1.5	0.6	0.6	54.1	(1994)	(1990)		
Latehar (District)		a	17.1	17.6	19.2	9.2	28.3	172.9	339.9	295.6	227.1	54.0	9.1	7.6	1197.6	150	55		
		b	1.4	1.5	1.5	0.9	1.7	7.7	15.3	15.1	10.9	3.0	0.5	0.6	60.1	(1994)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(LATEHAR)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
601 – 700	2	1201 – 1300	9
701 – 800	0	1301 – 1400	5
801 – 900	3	1401 – 1500	3
901 – 1000	3	1501 – 1600	2
1001 – 1100	4	1601 – 1700	2
1101 – 1200	9	1701 – 1800	1

**(Data available for 43 years only)**

## *LOHARDAGA DISTRICT*



The climate of this district is characterized by dry hot summer, mild humid in post monsoon season and well distributed rainfall in the southwest monsoon season. The year may be divided into four seasons. The summer season is from March to first week of June. The period from June to September is of southwest monsoon season. October is a transitional month between monsoon and winter conditions. The winter season is from the end of November to February.

### **RAINFALL**

Records of rainfall in the district are available for five raingauge stations for period ranging from 12 to 41 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average rainfall in the district as a whole is 1181.6 mm. During the southwest monsoon season June to September the district receives 84% of the annual normal rainfall. July is the rainiest month with an average rainfall of 320.4 mm. The variation in the rainfall from year to year is not much large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 140% of the normal occurred in 1978, while the lowest annual rainfall which was only 63% of the normal occurred in 1992. In this fifty year period there were five years in which the rainfall in the district was less than 80% of the normal and none of them were consecutive years. It is seen from Table 2 that the rainfall was between 901 mm and 1400 mm in 32 years out of 43.

On an average there are 67 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 65 at Bhandara and Kuru to 70 at Lohardaga.

The heaviest rainfall recorded in 24 hours at any station in the district was 251.5 mm at Kuru on 18 July 1975.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description which follows is based on the data of observatory in the neighbouring district viz. Ranchi. Temperature begins to drop rapidly from mid November. January is the coldest month with the mean maximum temperature at about 23°C and the mean minimum temperature at about 10°C. In association with cold waves which affect the district in winter months, in the wake of western disturbances which move across north India and the minimum temperature may go down upto 5°C on individual days. After February temperatures rise steadily till first week of June. May is the hottest month with the mean maximum temperature at about 37°C and mean minimum temperature at about 23.0°C. On some days in April, May and early part of June the maximum temperature may sometimes rise upto about 40°C. The weather cools down with the advance of the southwest monsoon into the district by about second week of June. Temperatures begin to drop appreciably with the withdrawal of the monsoon by first week of October.

## **HUMIDITY**

In the southwest monsoon season air is generally humid with value of relative humidity generally above 80%. The air is generally dry in winter and summer season. The summer months are the driest part of the year with value of relative humidity especially in the afternoon of the order of 30%.

## **CLOUDINESS**

During the southwest monsoon months skies are heavily clouded to overcast. From October the cloudiness decreases. In winter and early part of summer skies are generally clear or lightly clouded. In winter on some days when western disturbances affect the district skies are heavily clouded. Cloudiness increases in latter part of summer especially in the afternoon.

## **WINDS**

Winds are generally light to moderate in later part of summer and southwest monsoon season and light in the rest of the year. In winter months winds are mainly from northwesterly direction. In April south-westerlies winds begin to appear and become predominant with the advance of the monsoon season. In southwest monsoon season though winds blow from southwesterly or westerly direction, on some days in the afternoon winds blow from directions southeasterly or easterly. In October, northerly and northwesterly winds appear and strengthen in winter season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the district and its neighbourhood during their westward or northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season.

Thunderstorms during the period February to June are sometimes accompanied by squally weather, less frequently with hail and dust storm. Fog occurs occasionally in winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**LOHARDAGA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bhandara	12	a	12.6	12.3	22.7	15.9	33.1	206.2	345.1	254.3	198.0	53.8	14.5	13.1	1181.6	137	56	183.6	21 Jun 1989
		b	1.2	1.3	2.0	1.0	2.8	9.4	16.4	13.3	11.8	4.1	0.8	0.8	64.9	(1994)	(1992)		
Kisko	30	a	18.0	17.4	15.0	17.7	36.2	162.1	303.5	279.6	237.7	44.6	12.6	13.1	1157.5	134	57	210.0	15 Sep 1993
		b	1.5	1.6	1.6	1.6	2.8	9.3	16.2	16.5	11.6	2.6	0.8	0.8	66.9	(1977)	(1992)		
Kuru	37	a	14.1	16.5	20.5	18.1	38.8	186.5	300.5	289.5	230.3	57.4	13.0	8.7	1193.9	164	40	251.5	18 Jul 1975
		b	1.4	1.6	2.1	1.5	2.5	8.9	15.5	15.3	11.0	3.3	0.8	0.7	64.6	(1978)	(1987)		
Lohardaga	41	a	20.8	22.9	25.2	23.0	39.5	191.0	330.7	272.6	218.7	59.7	12.0	8.9	1225.0	152	68	248.7	26 Sep 1906
		b	1.9	1.9	2.3	2.0	2.9	9.4	16.9	15.8	11.8	3.7	0.6	0.6	69.8	(1978)	(1968)		
Senha	21	a	19.0	20.5	22.2	20.6	40.7	189.5	322.1	226.2	192.7	61.6	21.0	13.9	1150.0	128	81	161.0	06 Aug 1997
		b	1.9	1.8	1.8	1.7	3.4	9.3	16.8	15.6	11.4	3.7	1.1	0.8	69.3	(1994)	(1984)		
Lohardaga (District)		a	16.9	17.9	21.1	19.1	37.7	187.1	320.4	264.4	215.5	55.4	14.6	11.5	1181.6	140	63		
		b	1.6	1.6	2.0	1.6	2.9	9.3	16.4	15.3	11.5	3.5	0.8	0.7	67.2	(1978)	(1992)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(LOHARDAGA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	1	1201 – 1300	3
801 – 900	3	1301 – 1400	6
901 – 1000	5	1401 – 1500	3
1001 – 1100	7	1501 – 1600	2
1101 – 1200	11	1601 – 1700	2

**(Data available for 43 years only)**

## *PAKUR DISTRICT*



The climate of this district is similar to Dumka district in the lower plateau region of Chhota Nagpur with hot dry summer, good rainy season and cool winter. The year may be divided in to four seasons. The winter season is from December to February, the summer from March to first week of June and southwest monsoon season is from June to September. The period from October to November constitutes post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for five rain gauge stations for the period ranging from 22 to 44 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1500.3 mm. The variation in annual rainfall from year to year is in a small range. The rainfall in the southwest monsoon season constitutes about 81% of the annual normal rainfall, July being the month with the highest rainfall with an average value of 369.8 mm. The annual rainfall in the district varies over a small range. In the fifty years period 1951 to 2000, the highest annual rainfall was in 1999 when it amounted to 168% of the normal. In the year 1992, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 58% of the normal. In this fifty year period there were 7 years in which the rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion of three consecutive years of such low rainfall. It is seen from Table 2 that the annual rainfall was between 1201 mm and 1800 mm in 27 years out of 44.

On an average there are 67 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 63 at Pakuria to 71 at Amarpara.

The heaviest rainfall recorded in 24 hours at any station in the district was 396.0 mm at Pakuria on 20 September 2000.

## **TEMPERATURE**

There is no meteorological observatory in the district at Pakur. So the description that follows is based on the records of the neighbouring observatory at Dumka. The cold season starts from December when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is about 26°C and the mean minimum temperature is about 10°C. In winter months, during cold waves which affect the district in the wake of western disturbances passing across north India, minimum temperatures may sometimes go down to about 4°C on individual days. From March, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature at about 38°C and the mean minimum temperature at about 24°C. In the latter part of the summer season i.e. May and early part of June, the maximum temperature may sometimes reach about 46°C on individual days. During the latter part of summer until the onset of the monsoon by first week of June, days are discomfortable with hot dusty winds. The day temperatures drop while drop in night temperature is comparatively small with the advance of the southwest monsoon into the district towards the middle of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid, with the relative humidity well above 80%. Air is generally mildly humid in post monsoon and winter season. During the rest of the year the relative humidity in the afternoon is generally lower than in the morning. Summer is the driest part of the year when the relative humidity is about 40% in the afternoon.

## **CLOUDINESS**

During the monsoon months (June-September) skies are heavily clouded to overcast. During the winter month, skies are generally clear or lightly clouded. In April and May, cloudiness increases particularly in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year. During the monsoon season, when depressions affect the weather of the district, the district may experience gusty winds. In post monsoon, winter and summer season winds mainly blow from westerly direction. Towards the end of summer season, easterly wind appears and this wind strengthens and is predominant during monsoon season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighborhood during their northwestward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorm occurs in pre-monsoon months and southwest monsoon season. Its frequency is more in later part of summer and early part of monsoon season. Hailstorm and dust storm occur occasionally in latter part of summer. Fog occurs occasionally in the morning of winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**PAKUR**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Amarpara	34	a	16.8	15.4	14.6	41.6	98.9	253.6	430.2	411.4	400.6	172.1	16.2	5.9	1877.3	174	42	332.4	20 Jul 1999
		b	1.1	1.0	1.0	1.9	4.7	10.3	16.3	15.7	12.8	5.3	0.7	0.3	71.1	(1999)	(1965)		
Hiranpur	43	a	8.8	10.9	11.9	24.6	76.8	213.1	356.6	288.7	290.2	118.0	10.4	5.5	1415.5	177	39	316.2	27 Jul 1921
		b	0.7	1.0	0.9	1.7	4.3	10.6	16.5	15.1	12.2	4.6	0.5	0.3	68.4	(1980)	(1951)		
Mahespur	44	a	18.5	12.2	18.9	35.9	87.1	221.9	353.2	313.3	329.4	126.4	13.6	7.5	1537.9	165	61	375.0	28 Sep 1995
		b	1.0	0.9	1.0	2.4	5.2	10.6	16.4	14.5	11.9	4.6	0.6	0.4	69.5	(1959)	(1967)		
Pakur	29	a	12.1	13.4	10.3	18.0	80.3	180.8	364.3	262.2	274.8	126.6	6.4	2.6	1351.8	170	67	383.0	27 Sep 1995
		b	0.9	1.1	0.8	1.4	4.7	10.0	16.2	12.5	11.5	5.0	0.4	0.2	64.7	(1999)	(1951)		
Pakuria	22	a	1.8	7.1	10.7	11.4	81.1	155.5	344.9	257.8	348.7	80.6	14.9	4.9	1319.4	210	53	396.0	20 Sep 2000
		b	0.4	0.8	0.7	1.0	4.4	10.0	15.8	12.8	12.0	4.2	0.7	0.3	63.1	(2000)	(1992)		
Pakur (District)		a	11.6	11.8	13.3	26.3	84.8	205.0	369.8	306.7	328.7	124.7	12.3	5.3	1500.3	168	58		
		b	0.8	1.0	0.9	1.7	4.7	10.3	16.2	14.1	12.1	4.7	0.6	0.3	67.4	(1999)	(1992)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(PAKUR)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
801 – 900	1	1701 – 1800	3
901 – 1000	3	1801 – 1900	3
1001 – 1100	1	1901 – 2000	3
1101 – 1200	2	2001 - 2100	1
1201 – 1300	6	2101 – 2200	1
1301 – 1400	4	2201 – 2300	0
1401 – 1500	5	2301 - 2400	0
1501 – 1600	5	2401 - 2500	1
1601 – 1700	4	2501 – 2600	1

**(Data available for 44 years only)**

## *PALAMAU DISTRICT*



The climate of this district is characterised by dry hot summer and well distributed rainfall during monsoon season. The year may be divided into four main seasons. The cold season is from the end of November to February, followed by the hot season upto first week of June and the southwest monsoon season is from second week of June to September. October to mid November is the transitional period between monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for sixteen raingauge stations for period ranging from 10 to 49 years out of which two are hill stations. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1089.0 mm. During the monsoon season June to September the district receives rainfall of about 89% of the annual rainfall. July and August are the rainiest months with an average rainfall of 308.8 mm. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 176% of the annual normal occurred in 1961, while the lowest annual rainfall which was 60% of the normal occurred in 1992. In the fifty year period there were six years in which the annual rainfall in the district was less than 80% of the normal. There was one occasion when such a low rainfall occurred in two consecutive years. It is seen from Table 2 that the rainfall was between 901 mm and 1300 mm in 33 years out of 48.

On an average there are 55 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 44 at Chainpur to 77 at Netarhat.

The heaviest rainfall recorded in 24 hours at any station in the district was 440.0 mm at Manatu on 19 August 2003.

## **TEMPERATURE**

There is only one observatory in the district located at Daltonganj. The meteorological data and climatological conditions prevailing at this station can be taken as representative of the whole district. The cold season starts from the end of November and continues till about the middle of March. January is the coldest month of the year with the mean maximum temperature at 24.6°C and the mean minimum temperature at 8.6°C. In association with cold waves which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to freezing point of water and frost may occur occasionally in the higher and more exposed parts of the district. Temperature begins to rise steadily by March till the second week of June. May is the hottest month with the mean maximum temperature at 41.0°C and the mean minimum temperature at 25.2°C. On individual days in the months of May and early part of June, the maximum temperature may be as high as 46°C. From April till the onset of the monsoon days are generally discomfortable, however in the late night and in the early morning hours, the temperature drops down to a comfortable level. The weather cools down appreciably and day temperature decreases with the onset of the southwest monsoon into the district by about second week of June. However, night temperatures in June are as high as in May. Daily range of temperature is of order of 15°C to 17°C during winter and summer season, while in southwest monsoon season, it is only 8°C to 11°C.

The highest maximum temperature ever recorded at Daltonganj was 47.8°C on 06 May 1978 and the lowest minimum temperature ever recorded was 0°C on 03 January 1923.

## **HUMIDITY**

The relative humidity is generally lower in the afternoon than in the morning, except in the southwest monsoon months when there is little difference between the two. In the southwest monsoon months the air is generally humid with the relative

humidity of the order of 75% to 80%. In post monsoon and winter seasons, air is generally dry and mild humid. Summer season is the driest part of the year with the relative humidity in the afternoon being about 25% to 30%.

## **CLOUDINESS**

During monsoon months, skies are heavily clouded to overcast. In post monsoon and winter season skies are generally clear or lightly clouded. In April and May, cloudiness increases particularly in the afternoons.

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in latter part of summer and southwest monsoon months. In association with thunderstorms during March to May and during the monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In southwest monsoon season winds are mainly from southwesterly or westerly direction. In the rest of the year winds are mainly calm or blow from southwesterly/westerly direction in the morning and northwesterly/northeasterly in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon affect the weather of the district and its neighbourhood during their northwestward or westward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Severe thunderstorms occur during summer months and even during the monsoon, rainfall is often associated with thunderstorms. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of the winter months.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Daltonganj observatory.

**TABLE - 1  
NORMALS AND EXTREMES OF RAINFALL  
PALAMAU**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bishrampur	39	a	16.3	10.6	8.1	6.2	13.8	126.1	309.0	312.1	228.4	43.0	4.2	6.2	1084.0	179	58	238.0	28 Aug 1991
		b	1.3	1.1	1.0	0.6	0.9	5.6	14.3	14.2	10.2	1.9	0.3	0.5	51.9	(1994)	(1966)		
Chainpur	11	a	10.4	5.5	3.5	1.2	4.9	166.0	256.8	249.2	173.5	27.8	7.3	3.6	909.7	143	26	240.0	18 Jun 1994
		b	1.0	0.8	0.5	0.2	0.5	5.5	12.1	13.7	7.8	1.2	0.3	0.4	44.0	(1994)	(1992)		
Chattarpur	32	a	16.3	16.7	7.3	4.8	10.1	131.6	293.0	311.6	207.4	47.5	5.5	4.3	1056.1	143	16	261.9	29 Jul 1921
		b	1.4	1.3	0.9	0.5	0.9	5.8	13.6	14.7	9.6	3.0	0.3	0.4	52.4	(1964)	(1989)		
Daltonganj	10	a	14.5	5.8	4.2	3.6	11.0	169.0	257.0	286.8	159.1	27.0	6.9	3.6	948.5	156	57	206.0	23 Jun 1996
		b	1.0	0.7	0.7	0.5	1.1	6.2	13.4	13.8	8.4	1.7	0.6	0.4	48.5	(1994)	(1992)		
Daltonganj (Obsy)	49	a	19.3	18.7	14.9	12.2	21.0	151.3	316.2	300.9	201.4	51.5	8.4	7.7	1123.5	164	48	290.8	23 Jul 1920
		b	1.5	1.8	1.6	1.0	1.6	7.1	15.5	15.2	10.4	3.0	0.5	0.7	59.9	(1971)	(1966)		
Garu	31	a	19.9	20.3	17.4	10.1	15.9	180.0	384.7	342.0	245.3	61.1	6.0	6.8	1309.5	146	51	355.6	20 Jun 1911
		b	1.9	1.5	1.9	0.8	1.0	9.4	16.6	15.9	11.9	2.9	0.4	0.4	64.6	(1961)	(1992)		
Hariharganj	31	a	15.8	9.2	8.9	3.5	8.0	142.0	304.6	304.3	232.3	47.0	5.5	6.1	1087.2	208	36	292.1	15 Sep 1948
		b	1.4	0.9	0.9	0.3	0.8	5.7	14.6	14.3	10.4	2.3	0.2	0.4	52.2	(1961)	(1992)		
Hariharganj (Hydro)	20	a	11.9	14.1	9.5	4.3	13.5	131.1	248.2	258.3	189.0	46.4	8.4	4.6	939.3	143	43	195.3	11 Sep 1987
		b	0.8	1.1	0.8	0.6	0.8	6.2	13.6	12.0	9.4	2.8	0.3	0.4	48.8	(1999)	(1992)		
Hussainabad	28	a	13.0	8.4	6.9	9.4	7.7	122.4	277.8	239.5	210.8	43.9	5.9	5.0	950.7	152	42	226.6	23 Sep 1962
		b	1.1	0.8	0.7	0.6	0.7	6.2	13.7	12.8	9.7	2.6	0.3	0.3	49.5	(1959)	(1964)		
Japla (Hydro)	23	a	15.1	20.6	13.7	11.8	27.1	135.2	333.9	266.9	243.9	42.8	11.5	8.1	1130.6	144	56	181.0	11 Sep 1987
		b	1.3	1.9	1.1	0.9	1.8	7.1	15.0	13.4	10.2	2.4	0.6	0.9	56.6	(1978)	(1979)		
Lesliganj	43	a	17.2	15.5	9.8	8.1	12.9	127.3	295.0	274.4	179.8	46.4	5.4	5.6	997.4	173	37	255.0	10 Aug 1991
		b	1.3	1.3	0.7	0.5	1.1	6.2	13.5	13.8	8.8	2.5	0.3	0.6	50.6	(1978)	(1960)		
Manatu	34	a	17.5	13.1	11.6	5.3	18.4	141.0	290.3	267.0	249.3	46.8	3.4	5.0	1068.7	178	30	440.0	19 Aug 2003
		b	1.6	1.4	1.3	0.5	1.5	7.2	15.1	14.9	10.2	2.7	0.3	0.5	57.2	(1994)	(1999)		
Netarhat	17	a	18.9	21.4	24.4	17.6	27.6	224.1	434.9	346.5	282.3	89.8	6.7	4.0	1498.2	150	67	429.3	19 Jul 1964
		b	1.9	1.8	2.1	1.4	2.3	10.4	19.0	18.9	13.4	5.1	0.3	0.5	77.1	(1961)	(1966)		
Patan	33	a	15.2	13.3	12.0	6.6	14.0	137.5	322.5	319.9	240.5	52.5	3.5	5.4	1142.9	141	66	323.9	19 Aug 1907
		b	1.2	1.4	1.3	0.8	1.0	6.6	14.1	15.1	10.6	2.7	0.3	0.4	55.5	(1961)	(1998)		
Palamau (District)		a	15.8	13.8	10.9	7.5	14.7	148.9	308.8	291.4	217.4	48.1	6.3	5.4	1089.0	176	60		
		b	1.3	1.3	1.1	0.7	1.1	6.8	14.6	14.5	10.1	2.6	0.4	0.5	55.0	(1961)	(1992)		

**TABLE – 1 (contd...)**  
**NORMALS AND EXTREMES OF RAINFALL**  
**PALAMAU**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
<b>HILL STATIONS</b>																			
Panki	27	a	13.4	10.0	7.7	3.0	12.7	149.4	310.8	298.8	197.5	43.2	7.8	5.0	1059.3	164	42	186.6	26 Jul 1962
		b	1.1	1.1	1.0	0.3	0.9	7.3	13.2	13.4	9.4	2.2	0.3	0.3	50.5	(1953)	(1964)		
Panki (Hydro)	16	a	11.0	28.6	24.1	19.2	25.7	127.4	323.6	312.7	186.4	52.0	8.8	8.6	1128.1	122	87	186.0	15 Sep 1993
		b	1.4	2.6	1.5	0.9	1.9	7.5	14.9	12.4	10.0	2.8	0.8	0.7	57.4	(1985)	(1980)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

Hill stations not considered for district mean.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(PALAMAU)**

Range in mm	No. of years	Range in mm	No. of years
601 – 700	2	1301 – 1400	0
701 – 800	0	1401 – 1500	4
801 – 900	5	1501 – 1600	1
901 – 1000	4	1601 – 1700	1
1001 – 1100	13	1701 – 1800	0
1101 – 1200	11	1801 – 1900	1
1201 – 1300	5	1901 – 2000	1

**(Data available for 48 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(DALTONGANJ)**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	24.6	8.6	34.2	2006 Jan 18	0.0	1923 Jan 03	74	52
February	27.6	11.4	40.6	2006 Feb 26	0.6	1905 Feb 03	67	43
March	33.4	15.6	43.9	2004 Mar 24	5.6	1898 Mar 05	55	32
April	38.6	21.4	46.5	2010 Apr 18	11.2	1968 Apr 01	42	26
May	41.0	25.2	47.8	1978 May 06	17.8	1932 May 06	44	28
June	38.5	26.8	46.9	1994 Jun 01	18.6	1964 Jun 22	61	53
July	33.4	25.3	43.8	1965 Jul 03	18.2	1964 Jul 14	79	76
August	32.7	24.9	40.2	1976 Aug 26	20.6	1916 Aug 12	81	79
September	32.8	24.0	39.7	1983 Sep 23	17.2	1899 Sep 29	79	74
October	32.1	19.9	40.0	1974 Oct 13	10.0	1921 Oct 30	75	62
November	29.1	13.9	36.5	1979 Nov 29	5.0	1970 Nov 30	73	55
December	25.4	9.1	33.2	2006 Dec 07	1.7	1913 Dec 30	73	54
Annual	32.4	18.8	47.8	1978 May 06	0.0	1923 Jan 03	67	53

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(DALTONGANJ)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.3	3.0	4.0	4.7	5.4	5.8	5.2	5.0	4.6	3.5	2.5	2.3	4.1

**TABLE - 5**  
**Special Weather Phenomena**  
**(DALTONGANJ)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.4	0.3	0.6	0.5	1.2	1.6	1.6	0.7	0.1	0.0	0.0	7.1
Hail	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dust storm	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Fog	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4

## *RAMGARH DISTRICT*



The climate of this district is mild hot summer, cool winter and well distributed rainfall in southwest monsoon season. The year may be divided into four seasons. The cold season starts by December and extends to the month of February, followed by the summer season which continues to about the beginning of June, when the monsoon arrives over the district. The period from June to September is of the southwest monsoon season. The post monsoon months October and November constitute a transition period from the monsoon to the winter conditions.

### **RAINFALL**

Records of rainfall in the district are available for four raingauge stations for period ranging from 15 to 37 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1314.9 mm. During the monsoon season June to September the district receives about 84% of the annual rainfall. July is the rainiest month with an average rainfall of 333.7 mm. The rainfall from year to year in the district has some variation. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 165% of the annual normal occurred in 1981, while the lowest annual rainfall which was 61% of the normal occurred in 1974. In this fifty year period there were 8 years in which the annual rainfall in the district was less than 80% of the normal and none of them were consecutive. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 25 years out of 38.

On an average there are 62 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 58 at Mandu to 67 at Gola.

The heaviest rainfall recorded in 24 hours at any station in the district was 261.0 mm at Mandu on 06 June 1986.

## **TEMPERATURE**

There is no meteorological observatory in the district at Ramgarh. The description that follows is based on the records of Hazaribagh observatory in the neighbouring district. The cold season starts from the end of November when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month of the year with the mean maximum temperature at about 22°C and the mean minimum temperature at about 9°C. In winter months, during cold waves which affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to about 2°C to 3°C on individual days. From March, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature at about 37°C and the mean minimum temperature at about 24°C. In latter part of the summer season i.e. May and June, the maximum temperature may sometimes reach to about 45°C on individual days. The day temperature drops rapidly while the drop in night temperatures is comparatively low with the advance of the southwest monsoon into the district towards the middle of June. The day temperature begins to decrease while the drop in the night temperature is appreciable with the withdrawal of the monsoon by about first week of October.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months and is about 80%. It is comparatively less during rest of the year. The driest part of the year is the summer season, when humidity is less than 35% in the afternoon.

## **CLOUDINESS**

During the monsoon season, the sky is heavily clouded or overcast. In the rest of the year the sky is clear or lightly clouded. Clouding is generally more in the afternoon.

## **WINDS**

Winds are generally light to moderate in the summer and monsoon season. During the period October to May, winds blow mostly from northwest. During the monsoon season, the winds are mostly from directions southwest or southeast in the mornings and from northwest in the afternoons.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon months move in a northwesterly direction towards the district or its neighbourhood causing widespread heavy rain and gusty winds. Dust storms and thunderstorms sometimes associated with squall occur occasionally during summer. But the highest incidence of thunderstorms is during the monsoon months. Fog occasionally occurs during the cold season.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**RAMGARH**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Gola	37	a	14.3	18.8	20.8	27.2	68.6	249.5	368.6	339.0	280.0	81.3	11.3	6.3	1485.7	146	55	245.1	11 Jun 1946
		b	1.3	1.5	1.4	1.7	3.2	9.9	16.2	15.3	11.6	3.3	0.6	0.5	66.5	(1981)	(1974)		
Mandu	30	a	11.1	13.7	10.2	18.3	40.6	211.2	331.5	279.8	215.4	60.9	11.8	10.6	1215.1	174	57	261.0	06 Jun 1986
		b	1.0	1.1	0.7	1.2	2.6	8.7	14.9	14.2	9.8	2.7	0.6	0.8	58.3	(1986)	(1969)		
Pathrathu	15	a	18.0	32.8	43.2	16.4	27.8	239.3	320.2	319.5	216.8	59.1	16.9	18.9	1328.9	166	63	167.3	19 Jul 1999
		B	1.2	1.8	1.2	1.5	2.0	10.9	14.7	14.9	10.6	3.2	0.7	0.9	63.6	(1999)	(1989)		
Ramgarh	28	a	14.7	10.8	10.6	22.6	40.8	190.7	314.6	297.1	248.8	66.5	5.5	7.1	1229.8	142	62	228.6	06 Oct 1917
		b	1.1	1.3	0.9	2.0	3.0	8.0	14.6	14.1	10.7	2.8	0.4	0.4	59.3	(1999)	(1992)		
Ramgarh (District)		a	14.5	19.0	21.2	21.1	44.5	222.7	333.7	308.8	240.3	67.0	11.4	10.7	1314.9	165	61		
		b	1.2	1.4	1.0	1.6	2.7	9.4	15.1	14.6	10.7	3.0	0.6	0.6	61.9	(1981)	(1974)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(RAMGARH)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
801 – 900	2	1401 – 1500	4
901 – 1000	2	1501 – 1600	2
1001 - 1100	7	1601 – 1700	3
1101 – 1200	4	1701 – 1800	2
1201 – 1300	3	1801 – 1900	2
1301 – 1400	5	1901 - 2000	1
		2001 – 2100	0
		2101 - 2200	1

**(Data available for 38 years only)**

## *RANCHI DISTRICT*



The climate of this district is characterized by a dry hot summer, mild humid post monsoon season and well distributed rainfall during the monsoon season. The year may be divided into four seasons. The summer season is from March to first week of June. The period from June to September is the southwest monsoon season and October is a transitional month between monsoon and winter conditions. The winter season is from December to February.

### **RAINFALL**

The district has a good network of nineteen raingauge stations, records of which are available for period ranging from 13 to 45 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1316.1 mm. During the monsoon season June to September the district receives rainfall of about 84% of the annual rainfall. July and August are the rainiest months with an average rainfall of about 330.0 mm. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 146% of the annual normal occurred in 1994, while the lowest annual rainfall which was 68% of the normal occurred in 1992. In the fifty year period there were only 5 years in which the annual rainfall in the district was less than 80% of the normal and none of them were consecutive. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 37 years out of 49.

On an average there are 69 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 61 at Chancho and Mandar to 80 at Itki.

The heaviest rainfall recorded in 24 hours at any station in the district was 382.0 mm at Mandar (Hydro) on 11 July 1990.

## **TEMPERATURE**

The only meteorological observatory in the district is at Ranchi. The temperature and other meteorological data for this station may be taken as representative of the climatic conditions in the district as a whole. Temperatures begin to drop rapidly from mid November to January. January is the coldest month of the year with the mean maximum temperature at 22.7°C and the mean minimum temperature at 10°C. In association with cold waves which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to 5°C on individual days. Temperatures begin to rise rapidly after February till first week of June. May is the hottest month with the mean maximum temperature at 36.8°C and mean minimum temperature at 23.3°C. On some days in April, May and early part of June, the maximum temperature may be above 40°C on individual days. The weather cools down with the advance of the southwest monsoon season into the district by about the second week of June. The temperature begins to drop appreciably with the withdrawal of monsoon by first week of October.

The highest maximum temperature ever recorded at Ranchi (A) was 43.4°C on 29 April 1989 and the lowest minimum temperature ever recorded was 0.6°C on 14 December 1994.

## **HUMIDITY**

In the southwest monsoon season air is generally humid with the relative humidity above 80%. The air is generally dry in winter and summer seasons. The summer months are the driest part of the year with the relative humidity especially in the afternoon of the order of 30%.

## **CLOUDINESS**

In the southwest monsoon season skies are heavily clouded to overcast. Cloudiness decreases from October. In winter and early part of summer skies are generally clear or lightly clouded. Some days in winter, when western disturbances affect the weather of the district skies are heavily clouded. Cloudiness increases in latter part of summer, especially in the afternoon.

## **WINDS**

Winds are generally light to moderate in latter part of summer and southwest monsoon season and light in the rest of the year. In winter months, winds are mainly from northwesterly direction. In April south-westerlies begin to appear and become predominant with the advance of the monsoon season. In southwest monsoon season though winds blow from southwesterly or westerly direction. On some days in the afternoon winds blow from southeasterly or easterly directions. In October, northerly and northwesterly winds appear and strengthen in the winter season.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood during their westward or northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms during the period February to June are sometimes accompanied by squally weather, less frequently with hail and dust storm. Fog occurs frequently in winter months.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Ranchi (A) observatory.

**TABLE - 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**RANCHI**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Angara	20	a	14.2	18.3	13.0	23.0	41.3	197.1	309.0	312.4	220.6	50.3	19.0	10.6	1228.8	208	53	300.0	29 Jun 1994
		b	1.3	1.7	1.2	1.8	3.8	9.6	15.1	15.6	11.0	2.6	0.8	0.8	65.3	(1994)	(1987)		
Bandu	28	a	11.0	8.2	12.0	15.7	31.0	243.7	316.1	336.0	254.7	61.1	9.5	6.8	1305.8	137	81	165.0	25 Jun 1962
		b	1.0	0.9	1.5	1.4	2.6	10.9	15.5	16.7	12.6	3.3	0.4	0.9	67.7	(1987)	(1964)		
Bero	13	a	13.6	18.0	10.5	23.7	35.7	181.5	316.2	274.2	275.9	68.3	8.2	12.4	1238.2	159	77	175.0	17 Sep 1976
		b	0.9	1.6	1.6	1.7	2.4	8.9	16.4	17.7	12.1	3.5	0.5	0.7	68.0	(1970)	(1975)		
Chancho	17	a	15.6	28.0	10.0	8.7	28.1	211.9	353.9	533.6	209.4	61.3	11.5	8.7	1480.7	255	56	118.0	02 Jul 2002
		b	1.1	1.0	0.9	1.0	2.4	9.5	15.9	14.7	10.5	3.0	0.5	0.6	61.1	(1975)	(1992)		
Itki	19	a	16.2	24.1	41.8	24.2	50.9	222.9	373.8	357.3	279.9	96.6	4.4	6.5	1498.6	147	60	203.2	03 Jun 1956
		b	2.2	1.7	3.1	2.4	2.7	11.3	19.0	18.1	13.8	5.0	0.6	0.5	80.4	(1956)	(1966)		
Kankey	42	a	18.7	21.0	24.4	19.9	51.2	192.1	343.7	319.1	248.9	69.3	5.2	5.0	1318.5	136	77	332.6	05 Jul 1998
		b	2.0	1.8	2.4	1.8	3.8	10.1	16.2	17.7	12.4	3.8	0.5	0.5	73.0	(1995)	(1955)		
Khijari	13	a	17.9	18.9	19.9	25.2	54.4	183.4	367.0	344.8	277.6	79.2	7.0	10.9	1406.2	133	92	155.5	29 Jul 1965
		b	1.2	1.6	2.4	1.8	2.7	10.7	16.2	17.2	12.9	3.5	0.4	0.8	71.4	(1970)	(1989)		
Lapung	17	a	9.8	24.6	13.0	25.9	63.3	214.3	308.0	340.2	192.7	61.8	23.9	17.6	1295.1	150	69	190.2	06 Aug 1997
		b	1.0	1.6	0.8	1.8	5.1	9.4	13.8	15.4	10.5	3.0	1.0	0.8	64.2	(1994)	(1985)		
Mandar	35	a	14.4	18.8	21.3	16.8	42.6	236.1	352.4	322.8	214.7	49.3	11.7	11.4	1312.3	137	66	300.0	02 Jul 83
		b	0.9	1.5	1.8	1.2	3.0	9.3	15.5	14.5	9.7	2.6	0.6	0.7	61.3	(1977)	(1969)		
Mandar (Hydro)	42	a	21.6	25.6	18.3	19.2	38.0	209.6	377.7	354.2	218.3	75.1	12.1	8.9	1378.6	161	58	382.0	11 Jul 1990
		b	1.7	2.1	1.7	1.6	3.0	9.0	16.4	16.1	12.0	3.9	0.7	0.7	68.9	(1990)	(1979)		
Namkum	26	a	20.9	25.5	20.1	24.4	59.5	250.1	363.1	330.4	247.2	62.5	16.0	10.9	1430.6	163	62	221.5	28 Jun 1994
		b	1.7	2.0	2.1	2.0	4.3	11.3	16.7	17.2	12.7	3.0	1.1	0.9	75.0	(1994)	(1992)		
Ormangi/Ormang	26	a	12.8	19.9	15.0	18.5	43.3	219.2	333.4	283.4	224.8	86.4	17.4	7.6	1281.7	139	59	172.6	01 Oct 1959
		b	1.1	1.4	1.4	1.8	3.2	11.6	15.8	15.8	11.6	4.1	1.0	0.5	69.3	(1995)	(1988)		
Palandu	16	a	20.6	21.9	27.6	19.4	40.6	203.7	367.1	315.4	282.8	123.8	4.4	0.5	1427.8	139	82	237.7	11 Jun 1918
		b	1.8	2.1	2.5	1.7	3.1	10.8	18.4	16.5	13.5	5.9	0.7	0.1	77.1	(1959)	(1951)		
Ranchi (Obsy)	17	a	19.4	30.3	28.8	31.7	39.6	174.5	354.2	306.9	283.0	97.7	7.7	3.0	1376.8	149	75	231.1	09 Oct 1941
		b	1.9	2.1	2.4	2.1	3.1	10.1	17.5	16.2	12.2	4.9	0.7	0.3	73.5	(1961)	(1954)		
Ranchi (A) Obsy	45	a	21.7	26.0	24.8	27.6	58.6	229.6	336.3	333.5	263.5	81.4	10.9	10.0	1423.9	128	68	224.3	29 Jun 1994
		b	1.7	2.3	2.3	2.2	4.3	10.9	17.3	16.8	13.3	4.4	0.9	0.9	77.3	(1977)	(1992)		

**TABLE – 1 (contd...)**  
**NORMALS AND EXTREMES OF RAINFALL**  
**RANCHI**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Ranchi/Ratu	36	a	18.1	21.9	14.4	21.5	49.4	236.7	329.5	309.1	225.5	72.1	12.6	14.5	1325.3	144	50	207.2	03 Jul 1990
		b	1.4	1.8	1.5	1.8	3.6	10.6	16.4	15.9	11.5	3.7	0.6	1.0	69.8	(1995)	(1965)		
Silli	42	a	12.9	12.5	16.3	13.3	27.5	164.2	279.0	243.3	214.2	66.3	5.6	4.1	1059.2	174	46	210.6	22 Jun 1996
		b	1.4	1.2	1.6	1.4	2.4	9.2	15.3	14.0	11.4	3.7	0.3	0.4	62.3	(1959)	(1993)		
Sonahatu	24	a	9.1	13.9	18.8	19.3	31.2	191.9	231.9	262.1	224.5	59.9	6.3	3.9	1072.8	132	71	177.8	24 Sep 1931
		b	0.8	1.4	1.5	1.7	3.1	9.2	14.2	14.8	11.3	3.4	0.6	0.4	62.4	(1959)	(1966)		
Tamar	39	a	10.9	17.4	18.6	12.1	35.0	186.4	260.0	283.5	238.3	73.2	9.0	10.2	1154.6	142	54	330.2	15 Jul 1901
		b	1.1	1.3	1.7	1.5	2.9	9.6	14.4	14.9	12.1	4.2	0.8	0.6	65.1	(1952)	(1967)		
Ranchi (District)		a	15.6	20.7	19.7	20.5	42.9	206.2	334.3	325.2	242.8	73.5	10.5	8.3	1316.1	146	68		
		b	1.4	1.6	1.8	1.7	3.2	10.1	16.1	16.1	12.0	3.8	0.7	0.6	69.1	(1994)	(1992)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(RANCHI)**

Range in mm	No. of years	Range in mm	No. of years
801 - 900	1	1401 - 1500	7
901 - 1000	3	1501 - 1600	4
1001 - 1100	3	1601 - 1700	5
1101 - 1200	9	1701 - 1800	2
1201 - 1300	8	1801 - 1900	0
1301 - 1400	6	1901 - 2000	1

**(Data available for 49 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(RANCHI (A))**

MONTH	Mean Maximum Temperature	Mean Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	°C	°C	°C	Date	°C	Date	0830 IST	1730 IST
January	22.7	10.0	31.6	2009 Jan 25	3.2	2001 Jan 06	62	42
February	25.4	12.4	35.0	1967 Feb 22	3.5	2008 Feb 02	55	36
March	31.1	16.9	39.0	2004 Mar 24	8.6	2003 Mar 06	41	27
April	35.4	21.3	43.4	1989 Apr 29	9.7	1989 Apr 01	40	27
May	36.8	23.3	43.1	1962 May 30 1999 May 02	16.1	2003 May 01	50	36
June	33.3	23.5	43.3	1995 Jun 01	18.5	2004 Jun 07	71	62
July	29.2	22.5	38.0	1983 Jul 19	19.2	2006 Jul 22	87	82
August	28.5	22.2	34.6	1972 Aug 03	19.0	1972 Aug 30	88	83
September	28.8	21.6	34.5	2002 Sep 08	17.2	1994 Sep 29	83	78
October	28.3	18.6	33.2	1994 Oct 04	12.0	2009 Oct 27	70	61
November	25.7	14.1	32.0	2001 Nov 06	7.0	1970 Nov 30 1960 Nov 30	60	51
December	22.9	10.1	29.8	1990 Dec 07	0.6	1994 Dec 14	62	47
Annual	29.0	18.0	43.4	1989 Apr 29	0.6	1994 Dec 14	64	53

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(RANCHI (A))**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
7.2	8.3	9.1	9.5	10.0	10.8	10.6	10.7	9.9	7.6	7.3	7.1	9.0

**TABLE - 5**  
**Special Weather Phenomena**  
**(RANCHI (A))**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.8	2.7	3.6	5.0	9.0	12.1	11.4	11.7	9.0	3.0	0.2	0.2	68.7
Hail	0.0	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Dust storm	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Squall	0.0	0.3	0.4	1.1	1.6	1.0	0.2	0.0	0.0	0.0	0.0	0.0	4.6
Fog	4.2	1.9	1.4	0.3	0.4	0.1	0.1	0.1	0.5	1.9	1.7	2.8	15.4

## *SAHEBGANJ DISTRICT*



The climate of this district is characterised with a hot dry summer, a good rainy season and cool winter. The year may be divided in to four seasons. The winter season is from December to February, the summer season is from March to first week of June and south-west monsoon season is from June to September. The period from October to November constitute the transition period between the monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for seven raingauge stations for the period ranging from 11 to 34 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1484.7 mm. The rainfall in the southwest monsoon season constitutes about 84% of the annual normal rainfall. July is the rainiest month with an average rainfall of 372.8 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1951 to 2000, the highest annual rainfall was in 2000 when it amounted to 178% of the normal. In 1966, the annual rainfall in the district was the lowest and amounted to only 51% of the normal. In the same fifty year period there were 9 years in which the rainfall was less than 80% of the normal. Considering the district as a whole, there was one occasion each of four consecutive years and two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 1201 mm and 1800 mm in 28 years out of 44.

On an average there are 61 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 51 at Sahebganj to 68 at Patna.

The heaviest rainfall recorded in 24 hours at any station in the district was 601.4 mm at Taljhari on 25 September 1999.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the neighbouring observatory Dumka. The cold season starts from December and lasts till February, when both day and night temperatures decrease rapidly with the advance of the season. January is the coldest month when the mean maximum temperature is about 26°C and the mean minimum temperature is about 10°C. In winter months, during cold waves which affect the district in the wake of western disturbances passing across north India, minimum temperature may sometimes go down to about 4°C on individual days. From the month of March temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean daily maximum temperature at about 38°C and the mean minimum temperature at about 24°C. On individual days in the months of May and early part of June, the maximum temperature may be as high as 46°C. In April and May, day temperatures are almost equally high. During the latter part of summer until the onset of the monsoon by the first week of June, days are discomfortable with hot dusty winds. Day temperatures come down appreciably with the onset of the southwest monsoon in the second week of June. However, night temperatures in June are generally high as in May. The day temperature begins to decrease while drop in night temperature is appreciable with the withdrawal of monsoon by first week of October.

## **HUMIDITY**

In the southwest monsoon months, air is generally humid with the relative humidity well above 80%. Air is generally mild humid in post monsoon and winter seasons. During the rest of the year the relative humidity in the afternoon is generally lower than value in the morning. Summer is the driest part of the year with the relative humidity in the afternoon at about 40%.

## **CLOUDINESS**

During the monsoon months skies are heavily clouded to overcast. During the winter months sky is generally clear or lightly clouded. In April and May, cloudiness increases particularly in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year. During the southwest monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In post monsoon, winter and summer season, winds mainly blow from westerly direction. Towards the end of summer season, easterly wind appears and this wind strengthens and remains predominant during monsoon months.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the weather of the district and its neighbourhood, during their northwestward movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur in pre-monsoon months and southwest monsoon season. Its frequency is more in latter part of summer and early part of southwest monsoon season. Hailstorm and dust storm occurs occasionally in summer. Dust storms also occur occasionally in April and May. Fog occasionally occurs in the morning of winter months.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
SAHEBGANJ**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Barharwa	30	a	12.9	6.3	9.4	15.3	98.4	223.4	351.5	308.4	282.4	114.8	6.3	2.8	1431.9	141	46	350.0	07 Oct 2004
		b	0.8	0.6	0.7	1.3	3.8	9.4	15.5	14.1	10.9	4.5	0.4	0.2	62.2	(1952)	(1967)		
Barhat	11	a	5.6	2.5	7.6	8.1	50.1	249.0	428.9	352.3	381.5	50.0	2.3	11.2	1549.1	132	73	285.0	07 Oct 2004
		b	0.5	0.4	0.5	0.8	3.1	10.1	14.5	15.2	9.9	2.1	0.1	0.3	57.5	(1991)	(1994)		
Borio	33	a	14.6	3.5	7.2	16.3	81.9	253.7	441.6	281.2	277.4	98.5	8.3	3.7	1487.9	214	52	570.0	29 Jun 1997
		b	0.8	0.4	0.7	1.1	3.6	9.4	16.2	13.4	11.6	4.2	0.5	0.2	62.1	(1997)	(1951)		
Patna	11	a	8.5	9.7	13.4	26.3	92.7	231.4	349.1	306.8	430.8	73.5	14.4	11.2	1567.8	134	63	365.4	07 Oct 2004
		b	0.5	1.0	0.9	2.3	4.5	9.9	15.2	15.7	13.6	3.2	0.5	0.8	68.1	(2000)	(1996)		
Rajmahal	32	a	11.8	7.6	17.5	25.5	87.2	265.0	364.2	332.6	392.9	98.2	11.8	7.4	1621.7	229	36	429.0	28 Sep 1995
		b	1.0	0.8	0.8	1.0	4.2	10.5	13.7	12.5	11.0	3.8	0.6	0.5	60.4	(1999)	(1964)		
Sahebganj	33	a	13.9	3.7	8.4	14.6	60.8	188.4	297.8	229.3	256.8	90.4	4.4	4.0	1172.5	158	25	366.5	25 Sep 1999
		b	0.7	0.3	0.7	1.0	3.0	7.8	13.1	11.6	9.1	3.4	0.1	0.2	51.0	(1953)	(1964)		
Tajhari	34	a	10.9	9.2	17.9	39.3	88.7	225.4	376.3	319.9	358.6	97.4	7.9	8.7	1560.2	193	62	601.4	25 Sep 1999
		b	0.8	0.9	1.2	1.9	4.9	10.8	15.6	14.5	12.0	4.0	0.4	0.5	67.5	(1999)	(1979)		
Sahebganj (District)		a	11.2	6.1	11.6	20.8	80.0	233.8	372.8	304.4	340.1	89.0	7.9	7.0	1484.7	178	51		
		b	0.7	0.6	0.8	1.3	3.9	9.7	14.8	13.9	11.2	3.6	0.4	0.4	61.3	(2000)	(1966)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(SAHEBGANJ)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	1	1701 – 1800	1
801 – 900	2	1801 – 1900	2
901 – 1000	3	1901 – 2000	2
1001 – 1100	3	2001 – 2100	0
1101 – 1200	0	2101 – 2200	1
1201 – 1300	7	2201 – 2300	0
1301 – 1400	2	2301 – 2400	1
1401 – 1500	6	2401 – 2500	0
1501 – 1600	6	2501 – 2600	0
1601 – 1700	6	2601 – 2700	1

**(Data available for 44 years only)**

## *SARAIKELA DISTRICT*



The climate of this district is characterized by dry hot summer and mild humid post monsoon season and well distributed rainfall during the monsoon season. The year may be divided into four seasons. The cold season is from the end of November to February. The hot season is from March to first week of June and the southwest monsoon season is from June to September. October and November constitute transitional period between southwest monsoon and winter season.

### **RAINFALL**

Records of rainfall in the district are available for seven rain gauge stations for period ranging from 11 to 45 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average rainfall in the district as a whole is 1323.0 mm. During the southwest monsoon months June to September the district receives 83% of the annual rainfall. The period July and August constitute the rainiest part of the year with an average rainfall at about 318.5 mm. The variation in the rainfall from year to year is not much large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 150% of the normal occurred in 1956, while the lowest annual rainfall which was only 60% of the normal occurred in 2000. In the same fifty year period there were seven years in which the rainfall in the district was less than 80% of the normal. However, there is no occasion when such a low rainfall has occurred in consecutive years. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 29 years out of 41.

On an average there are 67 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 62 at Gamharia to 73 at Chandil (Hydro).

The heaviest rainfall recorded in 24 hours at any station in the district was 400.0 mm at Gamharia on 24 May 1975.

## **TEMPERATURE**

There is no meteorological observatory in the district. The climatological description of the district which follows is based on the data of neighbouring observatory in the district Jamshedpur, where similar climatological conditions prevail. Temperatures begin to decrease progressively from November. December and January are the coldest part of the year with the mean maximum temperature at about 26°C and the mean minimum temperature at about 11°C. In association with cold waves which affect the district in the winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to about 6°C on individual days. Temperatures begin to rise steadily after mid February till the first week of June. May and early part of June before the onset of southwest monsoon constitute the hottest part of the year when the mean maximum temperature is at about 39°C and the mean minimum temperature at about 26°C. On some days in May and early part of June, maximum temperature may reach about 45°C or above. The maximum temperature decreases and weather becomes appreciably cool with the advance of the southwest monsoon from second week of June and continues to be so throughout the season in the district. The temperature begins to decrease from November.

## **HUMIDITY**

Relative humidity is generally high at about 80% in the southwest monsoon months and about 70% in the post monsoon months. The summer months March to May are driest part of the year when relative humidity is about 50% to 60% in morning and 30% to 40% in the afternoon.

## **CLOUDINESS**

In the southwest monsoon months skies are generally heavily clouded to overcast. In October and latter part of summer there is moderate cloudiness, the

afternoons being more cloudy than mornings. In winter months and first part of summer, the skies are generally clear except on some days in the wake of western disturbances when skies are heavily clouded,

## **WINDS**

Winds are generally light with some increase in force in the later part of summer and southwest monsoon season. In post monsoon season winds prevail from northwesterly and westerly direction. In winter months winds are mainly calm or northwesterly. In summer and southwest monsoon months winds are predominantly southwesterly.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season affect the district and its neighbourhood during their northwesterly or westerly movements after crossing the coast. This causes gusty winds and widespread heavy rain.

Thunderstorms occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Thunderstorms are sometimes accompanied with hail storms and squalls. Occasional dust storms occur in summer months. Fog occasionally occurs in the morning hours of winter months.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**SARAIKELA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Chandil	44	a	14.4	17.1	21.2	23.0	49.4	242.5	309.1	309.2	238.8	72.5	11.7	6.6	1315.5	153	54	269.2	02 Sep 1978
		b	1.2	1.3	1.5	1.8	3.3	10.0	14.0	15.1	11.1	3.6	0.6	0.6	64.1	(1953)	(1967)		
Chandil (Hydro)	11	a	18.2	19.1	24.3	69.0	74.5	266.6	325.5	342.7	181.6	64.8	0.8	2.4	1389.5	122	83	196.0	23 Apr 1981
		b	1.9	1.5	1.7	2.9	5.6	11.7	17.2	17.0	10.3	2.7	0.3	0.5	73.3	(1984)	(1982)		
Gamharia	18	a	9.9	14.7	23.1	27.2	80.6	217.7	322.1	349.6	259.7	57.0	3.0	8.7	1373.3	134	69	400.0	24 May 1975
		b	0.7	0.9	1.3	1.8	3.1	10.1	14.0	14.2	11.0	3.8	0.4	0.3	61.6	(1975)	(1970)		
Kharsawan	40	a	13.7	25.4	24.1	23.5	44.4	237.2	306.1	328.7	261.7	67.9	10.0	3.7	1346.4	171	22	286.3	01 Sep 1957
		b	1.2	1.6	1.7	1.5	3.3	10.1	14.2	15.3	11.7	3.8	0.6	0.4	65.4	(1956)	(1965)		
Kharsawan/Kuchi	26	a	20.0	13.9	18.4	22.4	44.8	186.8	347.1	291.8	251.2	49.3	15.5	3.4	1264.6	217	55	153.0	03 Jul 1997
		b	1.7	1.2	1.5	1.7	3.7	10.5	15.5	15.2	12.7	3.3	0.9	0.4	68.3	(1975)	(2000)		
Nimdih	27	a	25.8	21.8	20.2	26.2	60.4	242.8	353.5	328.3	251.1	74.6	9.3	5.8	1419.8	172	53	215.9	01 Sep 1978
		b	1.7	1.6	1.7	1.9	4.0	10.3	14.6	14.7	10.7	3.5	0.7	0.5	65.9	(1999)	(2000)		
Saraikelela	45	a	13.1	24.8	20.9	25.8	55.0	178.6	263.2	281.0	223.0	52.4	10.2	4.9	1152.9	164	43	231.9	13 Sep 1953
		b	1.3	1.8	1.7	2.2	4.0	9.7	14.9	14.9	11.6	3.4	0.6	0.6	66.7	(1953)	(1979)		
Saraikelela (District)		a	16.4	19.5	21.7	31.0	58.4	224.6	318.1	318.8	238.2	62.6	8.6	5.1	1323.0	150	60		
		b	1.4	1.4	1.6	2.0	3.9	10.3	14.9	15.2	11.3	3.4	0.6	0.5	66.5	(1956)	(2000)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(SARAIKELA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	1	1401 – 1500	1
801 – 900	1	1501 – 1600	3
901 – 1000	1	1601 – 1700	3
1001 – 1100	7	1701 – 1800	3
1101 – 1200	5	1801 – 1900	1
1201 – 1300	6	1901 – 2000	2
1301 – 1400	7		

**(Data available for 41 years only)**

## *SIMDEGA DISTRICT*



The climate of this district is characterized by hot and dry summer and well distributed rainfall in the southwest monsoon season and mild humid in post monsoon season. The winter season commences from December and lasts till the end of February. The summer season follows thereafter and continues till about the first week of June. The southwest monsoon season is from second week of June to the end of September. October and November constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for seven raingauge stations for period ranging from 10 to 44 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average rainfall in the district as a whole is 1495.8 mm. During the southwest monsoon months June to September the district receives 87% of the annual normal rainfall. July is the rainiest month with an average rainfall of 431.2 mm. The variation in the rainfall from year to year is large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 191% of the normal occurred in 1994, while the lowest annual rainfall which was only 47% of the normal occurred in 1965. In this fifty year period there were nine years in which the rainfall in the district was less than 80% of the normal. There were two occasions when such a low rainfall occurred in two consecutive years. It is seen from Table 2 that the rainfall was between 1201 mm and 1800 mm in 24 years out of 40.

On an average there are 70 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 62 at Botba to 81 at Kolebira.

The heaviest rainfall recorded in 24 hours at any station in the district was 288.0 mm at Simdega on 26 July 1996.

## **TEMPERATURE**

As there is no meteorological observatory in the district, the following description of climate is based on records neighbouring observatory Chaibasa. The summer season commences by about the end of February when temperature begins to rise till the first week of June. May is the hottest month when the mean maximum temperature is at about 39°C and the mean minimum temperature at about 26°C. On individual days in the month of May and in June, before the onset of the southwest monsoon the maximum temperature may reach above 45°C on individual days. With the onset of the southwest monsoon by about the second week of June, maximum temperature decreases and weather becomes appreciably cool and continues to be so throughout the season. Temperatures decrease progressively from November. December and January are the coldest months of the year with the mean maximum temperature at about 26°C and the mean minimum temperature at about 11°C. In the wake of western disturbances passing across northern India in the cold season, the district is sometimes affected by cold waves and the minimum temperature may go down to about 6°C on individual days.

## **HUMIDITY**

The summer months March to May are driest part of the year when the relative humidity values in morning are about 50% to 60% and about 28% to 40% in the afternoon. The air is humid in southwest monsoon season, when the values of relative humidity are about 80%. In the rest of the year the air is generally dry with the values of relative humidity at about 50% to 70%.

## **CLOUDINESS**

In the winter and early part of summer skies are generally clear or lightly clouded. However, on some days in the winter in the wake of western disturbances skies are heavily clouded to overcast. The cloudiness increases from April and May

and in southwest monsoon months, skies are heavily clouded or overcast. cloudiness decreases from October.

## **WINDS**

Winds are generally light with some increase in force in the latter part of summer and southwest monsoon season. In summer and southwest monsoon season winds are predominantly southwesterly. In the rest of the year winds are calm.

## **SPECIAL WEATHER PHENOMENA**

Depressions from the Bay of Bengal during the southwest monsoon season cross the east coast of India and move in a northwesterly or westerly direction. These cause widespread rain and strong winds.

Thunderstorms occur throughout the year except in December. Its frequency is more in latter part of summer and southwest monsoon season.

**TABLE – 1  
NORMALS AND EXTREMES OF RAINFALL  
SIMDEGA**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **	Amount (mm)	Date	
Bano	31	a	10.5	7.8	9.5	6.6	30.3	171.6	330.5	311.8	301.5	69.9	3.8	4.9	1258.7	376	34	251.5	17 Jul 1947
		b	1.0	0.8	0.9	0.5	1.9	9.6	17.4	16.0	12.2	2.3	0.3	0.4	63.3	(1959)	(1958)		
Botba	10	a	33.1	4.5	6.7	14.3	29.9	352.1	407.3	298.7	292.1	22.1	20.0	21.3	1502.1	166	68	217.4	22 Jun 1996
		b	1.7	0.6	0.9	1.3	2.1	10.3	14.3	14.8	11.8	1.9	1.1	0.9	61.7	(1996)	(1995)		
Jaldego	15	a	19.9	6.7	12.7	9.1	40.8	267.8	522.5	344.0	324.9	130.2	5.8	10.3	1694.7	184	97	220.2	27 Sep 1989
		b	1.2	0.7	1.2	0.7	2.3	9.8	18.5	16.4	13.9	3.4	0.5	0.5	69.1	(1990)	(1999)		
Kolebira	26	a	25.1	19.5	21.5	23.0	51.4	237.4	434.2	305.2	243.9	59.9	12.3	16.6	1450.0	190	70	209.0	31 Jul 1986
		b	1.9	1.4	2.0	1.7	4.5	11.9	19.8	17.8	14.0	3.9	0.8	1.1	80.8	(1975)	(1979)		
Kurdege	41	a	13.5	15.4	9.7	22.2	28.1	226.5	432.1	348.3	283.1	50.3	12.2	1.7	1443.1	209	15	238.2	18 Sep 1994
		b	1.0	1.3	0.8	1.2	1.8	9.9	17.1	17.1	13.0	3.6	0.5	0.2	67.5	(1994)	(1979)		
Simdega	44	a	20.7	25.1	19.8	21.6	40.5	225.4	446.5	446.2	254.4	77.5	8.7	6.7	1593.1	170	57	288.0	26 Jul 1996
		b	1.6	2.0	1.7	1.7	2.9	10.6	19.8	18.7	13.0	4.1	0.7	0.5	77.3	(1988)	(1965)		
Thaitanagar	31	a	27.6	16.5	21.3	17.1	48.4	232.8	405.4	345.1	234.7	56.6	12.8	11.7	1430.0	167	72	190.0	18 Sep 1994
		b	1.9	1.4	1.8	1.8	3.5	11.2	18.3	17.8	12.1	3.2	0.8	0.7	74.5	(1994)	(1992)		
Simdega (District)		a	22.0	13.2	14.5	16.7	38.6	248.1	431.2	344.3	279.9	65.1	11.3	10.9	1495.8	191	47		
		b	1.4	1.1	1.3	1.3	2.7	10.4	17.7	16.9	12.8	3.2	0.7	0.6	70.1	(1994)	(1965)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951-2000)**  
**(SIMDEGA)**

<b>Range in mm</b>	<b>No. of years</b>	<b>Range in mm</b>	<b>No. of years</b>
701 – 800	2	1801 – 1900	1
801 – 900	0	1901 – 2000	2
901 – 1000	3	2001 – 2100	0
1001 – 1100	3	2101 – 2200	0
1101 – 1200	1	2201 – 2300	1
1201 – 1300	1	2301 – 2400	2
1301 – 1400	7	2401 – 2500	0
1401 – 1500	5	2501 – 2600	0
1501 – 1600	3	2601 – 2700	0
1601 – 1700	4	2701 – 2800	0
1701 – 1800	4	2801 – 2900	1

**(Data available for 40 years only)**

## *WEST SINGHBHUM DISTRICT*



The climate of this district is characterized by a hot summer, well distributed rainfall during the southwest monsoon season and mild humid post monsoon season. The year may be divided into four seasons. The cold season commences from December to February. The hot season from March to first week of June and the monsoon season is from June to September. October and November constitute the post monsoon season or transitional period between southwest monsoon and winter seasons.

### **RAINFALL**

Records of rainfall in the district are available for eleven raingauge stations for period ranging from 10 to 45 years. The details of the rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 1288.2 mm. During the southwest monsoon months June to September the district receives about 82% of the annual normal rainfall. August is the rainiest month with an average rainfall of 327.0 mm. The variation in the rainfall from year to year is large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 144% of the normal occurred in 1956, while the lowest annual rainfall which was 62% of the normal occurred in 2000. In the same fifty year period there were 8 years in which the annual rainfall in the district was less than 80% of the normal. However, none of them were consecutive years. It is seen from Table 2 that the rainfall was between 1001 mm and 1500 mm in 28 years out of 45.

On an average there are 65 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 57 at Manjhari to 71 at Majhgaon.

The heaviest rainfall recorded in 24 hours at any station in the district was 401.1 mm at Manjhari on 21 June 1977.

## **TEMPERATURE**

There is only one observatory in the district located at Chaibasa. The records of temperatures and other climatological parameters prevailing at this station may be taken to be broadly representative of the whole district. Temperatures begin to decrease progressively from November. December and January is the coldest part of the year with the mean maximum temperature at about 25.8°C and the mean minimum temperature at 11.5°C. In association with cold waves, which affect the district in winter months in the wake of western disturbances which move across north India, the minimum temperature may go down to about 4°C on individual days. Temperatures begin to rise steadily after mid February till first week of June. May and early part of June before the onset of southwest monsoon constitute the hottest part of the year. In May the mean maximum temperature is at 39.3°C and the mean minimum temperature is at 25.7°C. During this period, maximum temperature may reach about 45°C on some days. The maximum temperature decreases and weather becomes appreciably cool with the advance of the southwest monsoon by about the second week of June and continues to be so throughout the season. From November temperatures begin to decrease.

The highest maximum temperature and the lowest minimum temperature ever recorded at Chaibasa (observatory) were 46.7°C on 22 May 1948 and 4.4°C on 19 January 1934 respectively.

## **HUMIDITY**

The summer months March to May are driest part of the year when the relative humidity in morning is about 50% to 60% and about 30% to 40% in the afternoon. The air is humid in southwest monsoon season, when the relative humidity is about 80%. During the rest of the year the air is generally dry and mild humid with the relative humidity at about 50% to 70%.

## **CLOUDINESS**

In the winter and early part of summer skies are generally clear or lightly clouded. However, on some days in the winter in the wake of western disturbances skies are heavily clouded to overcast. The cloudiness increases from April to southwest monsoon months, skies are heavily clouded or overcast. Cloudiness decreases from October.

## **WINDS**

Winds are generally light with slight increase in force in the latter part of summer and southwest monsoon season. In summer and southwest monsoon season winds are predominantly southwesterly. In the rest of the year winds are calm.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon affect the weather of the district and its neighbourhood during their northwesterly or westerly movement after crossing the coast. This causes gusty winds and widespread heavy rain. Thunderstorms occur throughout the year except in December. Its frequency is more in latter part of summer and southwest monsoon season.

Tables 3, 4 and 5 give normals of temperature and relative humidity, mean wind speed and special weather phenomena respectively for Chaibasa observatory.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**WEST SINGBHUM**

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Chaibasa	45	a	13.9	19.6	22.7	29.2	58.3	169.8	252.4	295.2	228.2	82.3	15.2	2.2	1189.0	156	62	241.0	07 Oct 2004
		b	1.2	1.5	1.9	2.2	4.3	9.3	14.0	14.9	11.3	4.2	0.8	0.2	65.8	(1956)	(1954)		
Chakradhanpur	35	a	14.2	29.6	28.0	39.7	63.6	256.0	351.3	362.4	263.8	66.2	4.5	8.5	1487.8	172	58	208.0	22 Jun 1981
		b	1.2	1.5	1.7	2.2	3.9	10.5	15.2	15.7	11.8	3.6	0.3	0.5	68.1	(1984)	(1958)		
Goikera	41	a	13.3	19.7	13.6	14.1	35.1	203.4	313.2	338.6	213.4	53.9	4.9	4.1	1227.3	195	40	304.3	07 Aug 1920
		b	1.3	1.6	1.4	1.4	2.8	10.2	15.2	16.1	11.7	3.4	0.4	0.3	65.8	(1994)	(1967)		
Jagnathpur	33	a	10.6	25.4	32.5	19.3	72.9	185.3	300.1	336.4	222.7	66.5	10.9	5.7	1288.3	145	46	297.7	30 Jul 1927
		b	0.9	1.5	2.1	1.5	3.9	8.5	13.9	15.9	11.6	3.8	0.7	0.5	64.8	(1956)	(1979)		
Katbari	16	a	15.3	18.9	26.9	22.8	75.9	198.5	300.8	312.1	270.7	76.1	11.7	2.0	1331.7	141	76	265.7	29 Jul 1927
		b	1.2	1.7	1.8	1.9	4.1	9.9	14.9	14.3	11.8	4.6	0.9	0.1	67.2	(1952)	(1954)		
Kumardungi	24	a	19.1	24.3	20.5	37.8	97.3	228.9	316.8	298.1	183.9	65.2	15.1	11.5	1318.5	145	50	400.3	27 Jul 1979
		b	1.4	1.6	1.6	3.0	5.7	9.6	12.6	14.5	9.4	3.9	0.9	0.9	65.1	(1992)	(1987)		
Majhgaon	42	a	16.2	25.2	28.1	33.0	89.4	228.1	293.8	351.0	197.2	68.3	11.5	9.3	1351.1	158	71	356.6	30 Jul 1927
		b	1.4	1.7	2.0	2.8	5.6	10.9	14.7	15.8	10.6	4.5	0.7	0.7	71.4	(1956)	(1969)		
Manjhari	21	a	13.2	9.8	16.3	23.5	61.0	212.4	234.1	283.4	183.5	54.9	12.9	3.2	1108.2	195	64	401.1	21 Jun 1977
		b	1.2	0.9	1.1	1.7	4.5	8.6	12.2	13.5	9.6	3.0	0.9	0.2	57.4	(1977)	(1998)		
Manoharpur	35	a	11.1	12.5	18.5	15.5	39.3	190.8	364.3	384.1	197.5	39.4	10.0	3.3	1286.3	155	57	336.6	30 Jul 1927
		b	1.0	1.2	1.6	1.4	3.3	10.0	17.5	16.1	10.8	2.9	0.7	0.3	66.8	(1956)	(1979)		
Sonua	45	a	10.4	19.7	18.5	16.0	44.9	219.9	313.0	328.0	223.9	67.2	8.0	5.0	1274.5	144	49	215.9	27 Jul 1952
		b	1.0	1.4	1.5	1.5	3.2	10.2	15.7	16.5	12.0	3.9	0.7	0.4	68.0	(1977)	(1998)		
Toutnagar	10	a	27.8	3.8	13.8	34.4	70.4	235.6	292.6	307.5	180.5	87.9	33.8	19.1	1307.2	135	58	171.0	19 Oct 1999
		b	1.4	0.3	0.9	1.8	4.0	8.7	12.2	13.9	10.2	4.0	1.2	0.8	59.4	(1995)	(1992)		
West Singhbhum (District)		a	15.0	19.0	21.8	25.9	64.4	211.7	302.9	327.0	215.0	66.2	12.6	6.7	1288.2	144	62		
		b	1.2	1.4	1.6	1.9	4.1	9.7	14.4	15.2	11.0	3.8	0.7	0.4	65.4	(1956)	(2000)		

a: Normal rainfall in mm.

b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)

\* Based on all available data upto 2006.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**(Data 1951 - 2000)**  
**(WEST SINGHBHUM)**

Range in mm	No. of years	Range in mm	No. of years
701 – 800	1	1301 – 1400	4
801 – 900	2	1401 – 1500	2
901 – 1000	3	1501 – 1600	4
1001 – 1100	5	1601 – 1700	2
1101 – 1200	8	1701 – 1800	2
1201 – 1300	9	1801 – 1900	3

**(Data available for 45 years only)**

**TABLE - 3**  
**Normals of Temperature and Relative Humidity**  
**(CHAIBASA)**

MONTH	Mean Maximum Temperature °C	Mean Minimum Temperature °C	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
			°C	Date	°C	Date	0830 IST	1730 IST
January	25.8	11.5	33.3	1911 Jan 27	4.4	1934 Jan 19	68	50
February	28.9	14.4	37.3	1966 Feb 28 1967 Feb 22	6.2	1974 Feb 10	61	40
March	34.2	19.2	42.2	1955 Mar 31	11.6	1965 Mar 05	51	29
April	38.5	23.9	45.0	1941 Apr 29	14.9	1968 Apr 01	50	28
May	39.3	25.7	46.7	1948 May 22	18.3	1938 May 08	57	38
June	35.6	26.0	46.1	1958 Jun 06	17.6	1980 Jun 08	68	60
July	31.6	24.9	41.1	1926 Jul 01	21.1	1965 Jul 10	81	76
August	31.2	24.7	39.6	1988 Aug 30	21.0	1972 Aug 17	82	79
September	31.5	24.1	36.7	1911 Sep 30	20.0	1984 Sep 30	81	76
October	30.9	21.2	36.6	1957 Oct 11	13.9	1954 Oct 30	74	64
November	28.4	15.8	34.4	1979 Nov 22	6.9	1970 Nov 30	68	55
December	25.9	11.5	31.1	1960 Dec 31	5.0	1913 Dec 30	68	51
Annual	31.8	20.2	46.7	1948 May 22	4.4	1934 Jan 19	67	54

**TABLE - 4**  
**Mean Wind Speed in km/hr.**  
**(CHAIBASA)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.8	2.3	3.0	4.1	4.4	5.0	4.1	3.5	2.9	2.1	2.0	1.8	3.1

**TABLE - 5**  
**Special Weather Phenomena**  
**(CHAIBASA)**

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.7	0.8	2.0	2.1	3.5	3.2	2.5	3.1	1.2	0.2	0.0	19.5
Hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dust storm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0