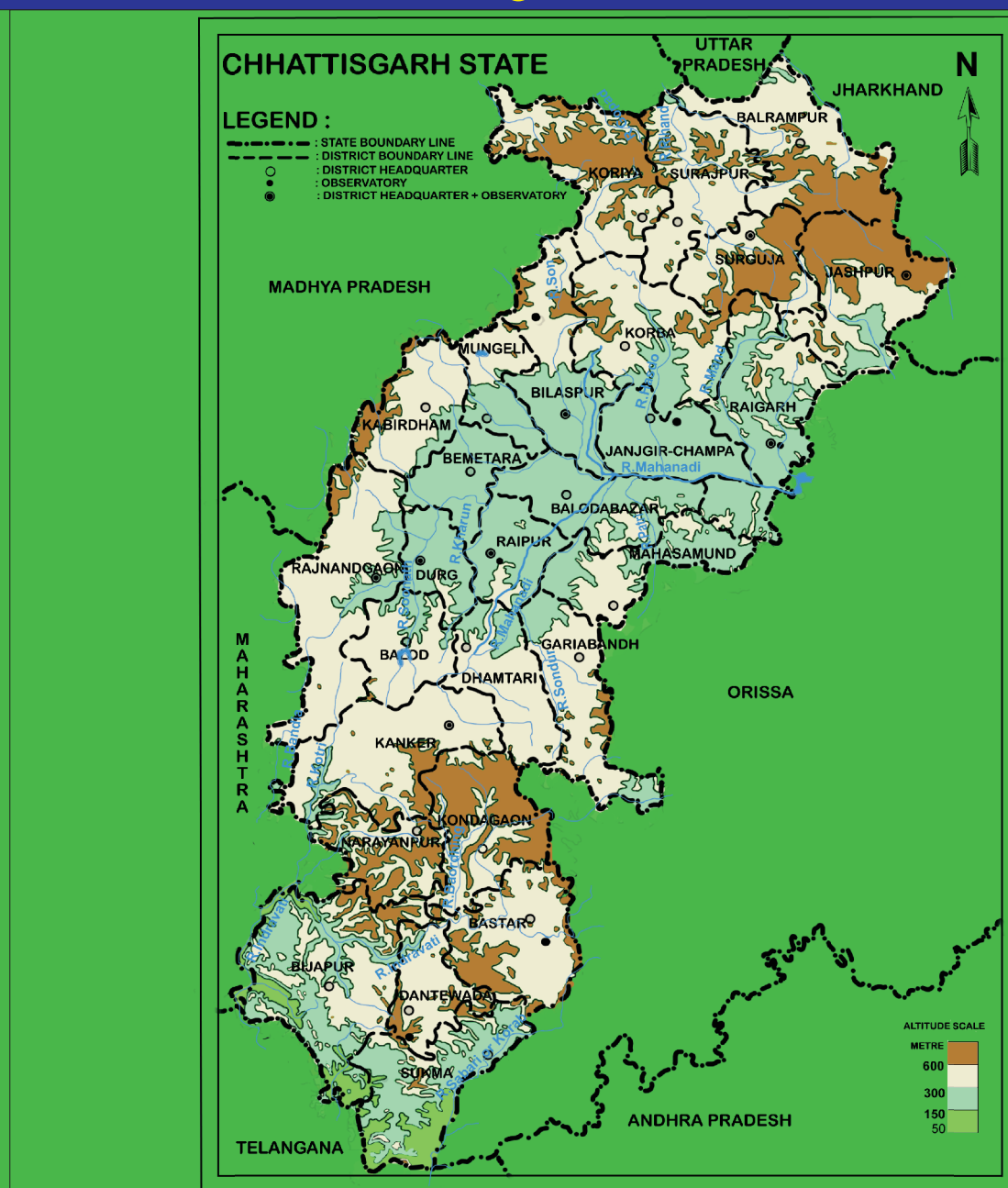




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MINISTRY OF EARTH SCIENCES  
भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

## छत्तीसगढ़ की जलवायु

## CLIMATE OF CHHATTISGARH



### CLIMATOLOGICAL SUMMARIES OF STATES SERIES - No. 22

ISSUED BY

OFFICE OF THE  
ADDITIONAL DIRECTOR GENERAL  
OF METEOROLOGY (RESEARCH)  
INDIA METEOROLOGICAL DEPARTMENT  
PUNE - 411 005



भारत सरकार  
GOVERNMENT OF INDIA  
भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

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India  
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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 execution of different projects. 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. "Climate of Chhattisgarh" is the twenty-second issue in the series of 'State Climatological Summaries'. The climate of this state is prepared for the first time.

The present publication contains district wise climate information on rainfall, temperatures, wind, humidity, clouds and other meteorological parameters for "Chhattisgarh" state. Information on climatic classification, coefficient of rainfall variation, droughts, excessive rainfall, cyclonic storms and depressions are also included in the publication. The state has some hilly terrain of low elevation. Hence, spatial temperatures for representative month of all seasons have been determined by applying lapse rates considering topographic features of the location. Climatic classification over the state is determined by Koppen's technique.

The contributions for preparation of climatological summary and related maps have been made by Shri G.S. Dhekne, Shri S.M. Deshpande, Smt. U.S. Satpute, Shri R.S. Wayal, Smt. P.R. Iyer and Smt. P.P. Bhagwat from "Climatological Publication Section" of the Office of the Additional Director General of Meteorology (Research), India Meteorological Department, Pune.

The publication has been prepared by Dr. T. P. Singh, Director and reviewed by Shri M. K. Gupta, DDGM(C). Shri B. Mukhopadhyay, LACD-ADGM(R) provided the overall guidance for this publication. I appreciate their sincere efforts.

I am hopeful that this publication will be a useful source of climatic information for societal development.

NEW DELHI  
MAY 2015

**DR. LAXMAN SINGH RATHORE**  
DIRECTOR GENERAL OF METEOROLOGY

**INDIA METEOROLOGICAL DEPARTMENT  
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| 17. | Abstract                          | The publication contains extensive information on the climate of Chhattisgarh state and its districts based on rainfall, temperature, winds, clouds and other weather parameters. The information on droughts and 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, Mean Maximum Temperature, Mean Minimum Temperature, Highest Maximum Temperature, Lowest Minimum Temperature, Rainfall Variability, Seasonal Rainfall, Annual Rainfall.                                      |

## **I N T R O D U C T I O N**

The climatology of Chhattisgarh state of India in terms of various meteorological parameters such as temperature, rainfall, rainfall variability, pressure and winds, relative humidity, clouds, weather hazards, etc. is described in state summary, followed by a detailed description of the climate of each district in the succeeding chapters. In this publication, the districts of Chhattisgarh state which were in existence as on 1<sup>st</sup> January 2014, have been considered and the climatology of these districts, arranged in alphabetical order is presented.

The normals for each month and annual rainfall are generally based on the data for the period 1961 to 2010. The monthly and annual normals of other meteorological parameters used for describing the climate are generally based on data for the period 1981 to 2010, however when data for the sufficient period is not available, normals for the previous period are utilized. The extreme values of temperature and rainfall presented in the publication are based on the updated data upto the year 2013. These data have been obtained from National Data Centre, Pune. The information on cyclones and depressions affected the state during the period 1891-2014 are included in the state summary.

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**CHHATTISGARH STATE**

**LEGEND :**

- : STATE BOUNDARY LINE
- - - : DISTRICT BOUNDARY LINE
- : DISTRICT HEADQUARTER
- : OBSERVATORY
- : DISTRICT HEADQUARTER + OBSERVATORY

**ALTITUDE SCALE**

METRE

- 600
- 300
- 150
- 50

**DISTRICTS:** BALRAMPUR, KORIYA, SURAJPUR, ABP, SURGUJA, JASHPUR, JSP, KORBA, BILASPUJ, RAIGARH, JANJIGIR-CHAMPA, RAIPUR, BEMETARA, BLS, DRG, DURG, RAJNANDGAON, RIN, BALOD, DHAMTARI, KNK, KANKER, KONDAGAON, KARAYANPUR, BASTAR, JGD, DANTEWADA, BLD, SUKMA, BIJAPUR.

**NEIGHBORING STATES:** UTTAR PRADESH, JHARKHAND, MADHYA PRADESH, ORISSA, MAHARASHTRA, ANDHRA PRADESH, TELANGANA.

**MAJOR RIVERS:** R. Son, R. Narmada, R. Mahanadi, R. Raute, R. Indravati, R. Seoni, R. Hasdeo, R. Kori, R. Balakrishna, R. Kaveri, R. Nandiyari, R. Kori, R. Balakrishna, R. Kaveri, R. Nandiyari, R. Kori, R. Balakrishna, R. Kaveri, R. Nandiyari.

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

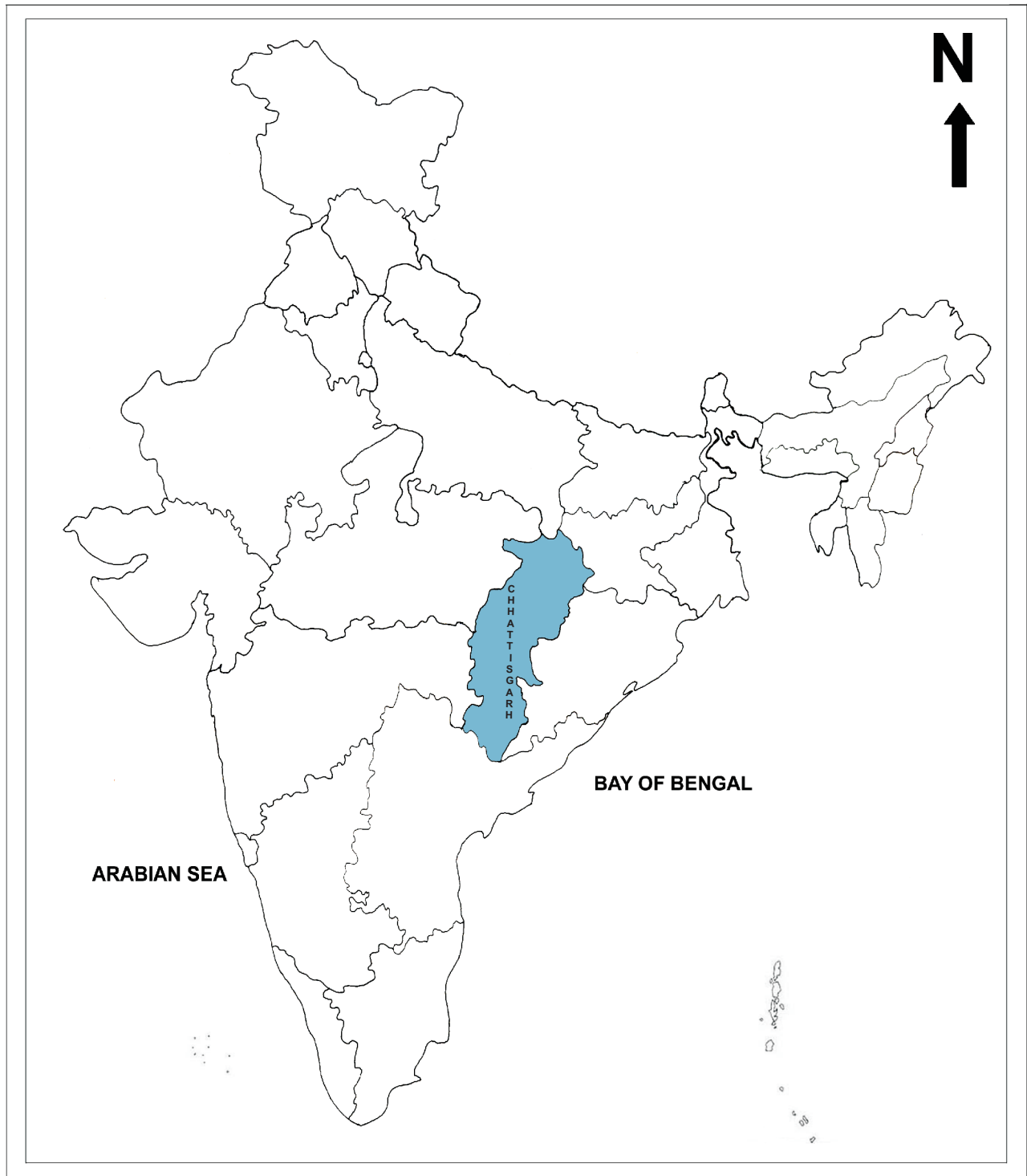


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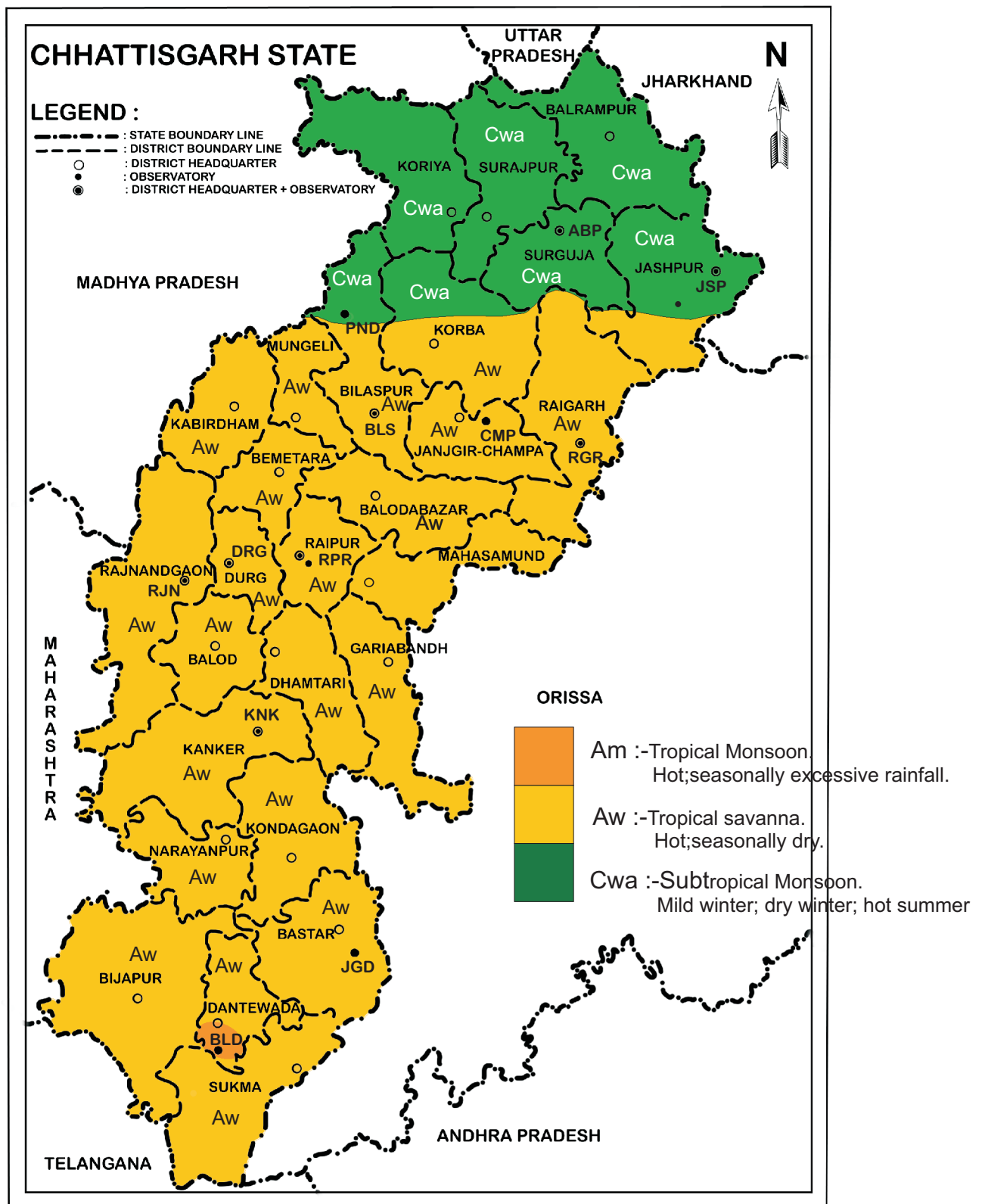


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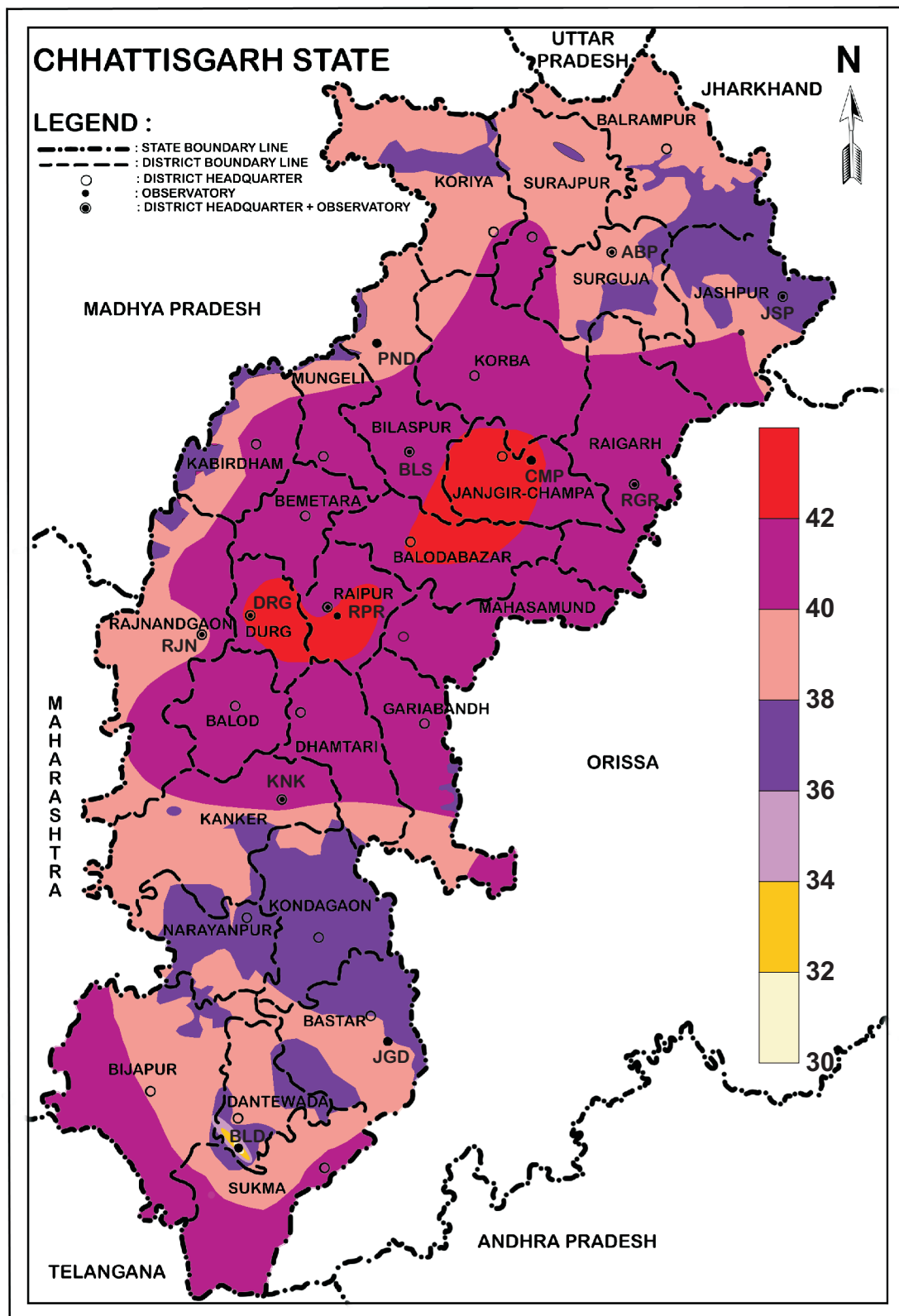


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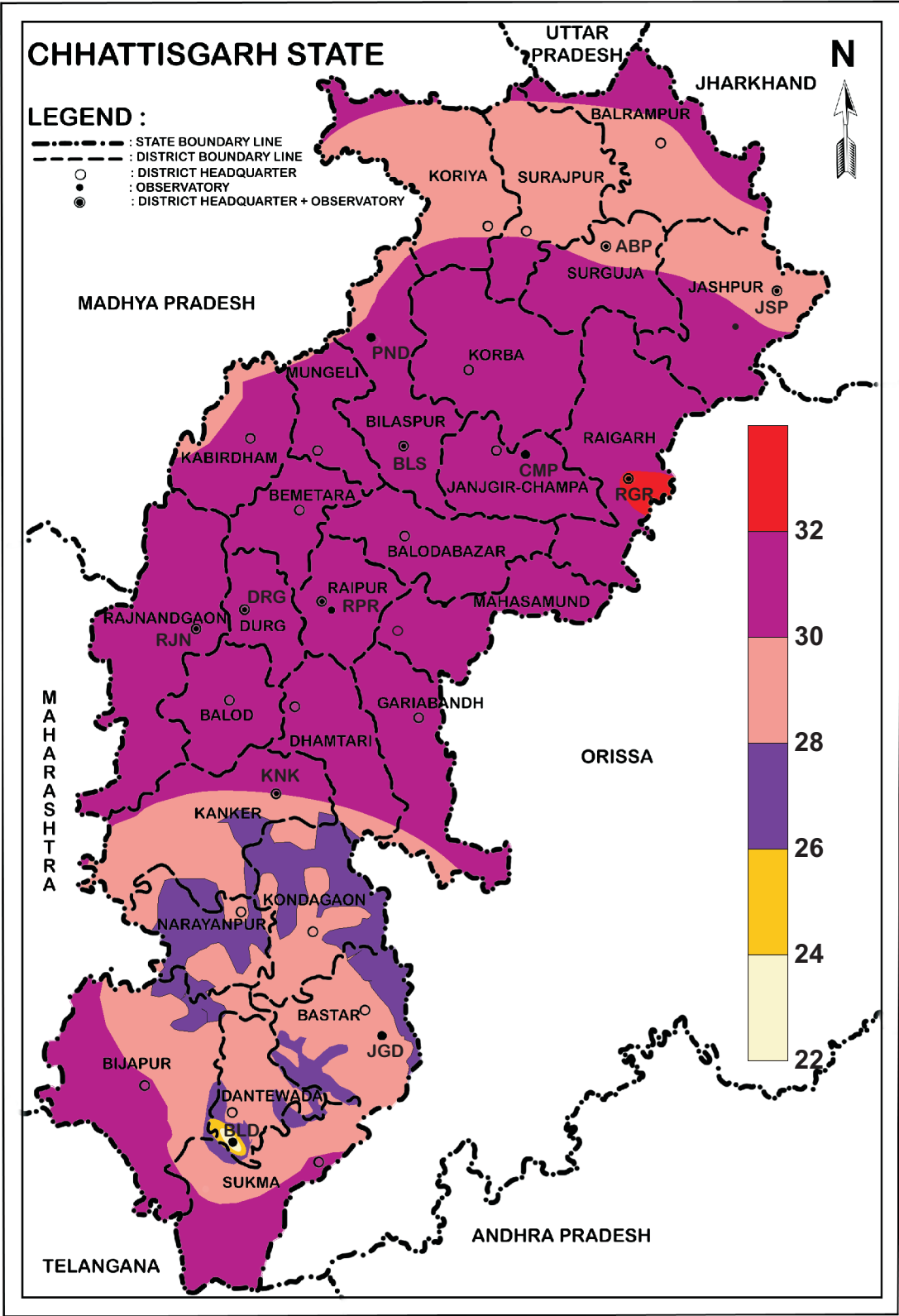


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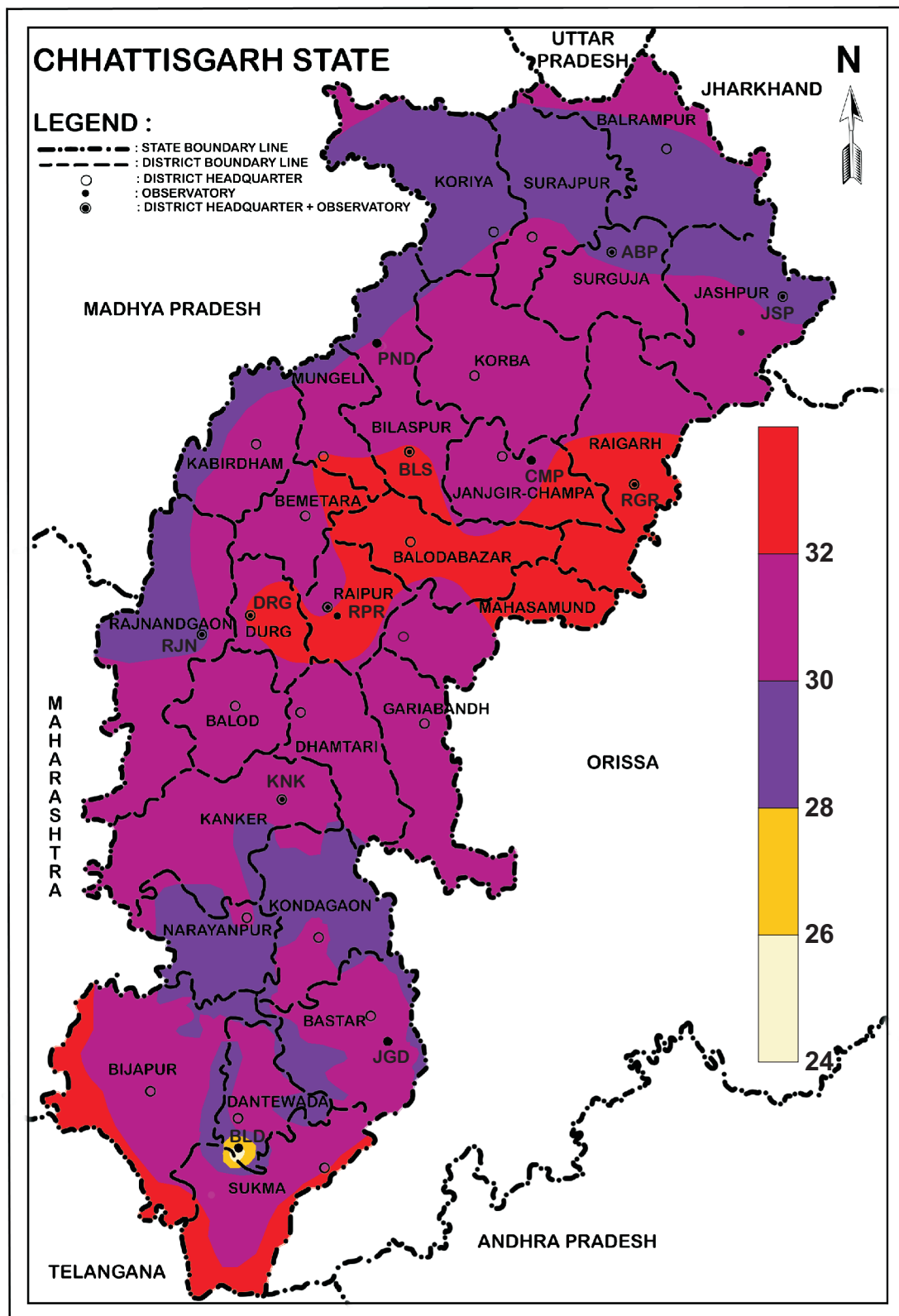




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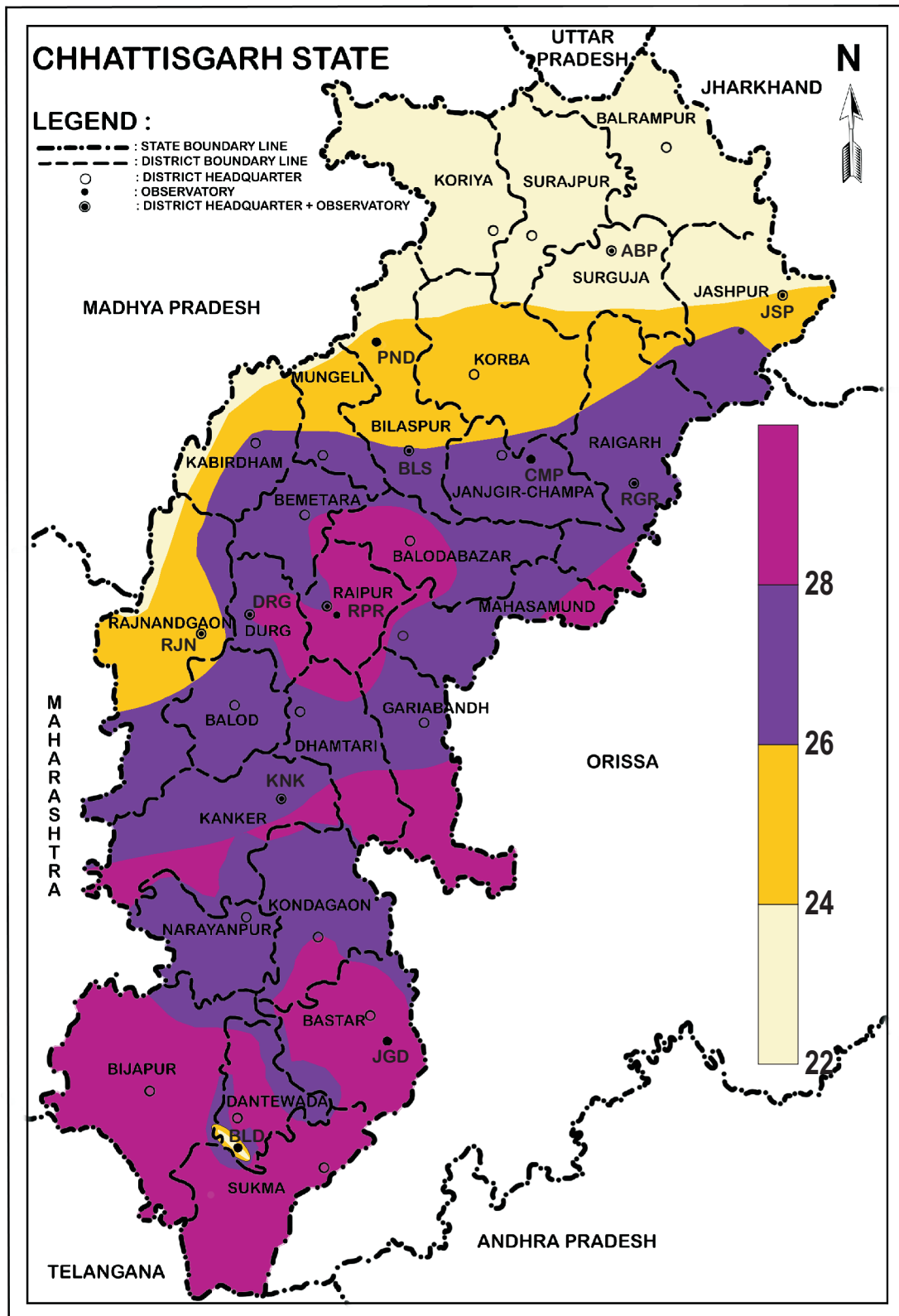




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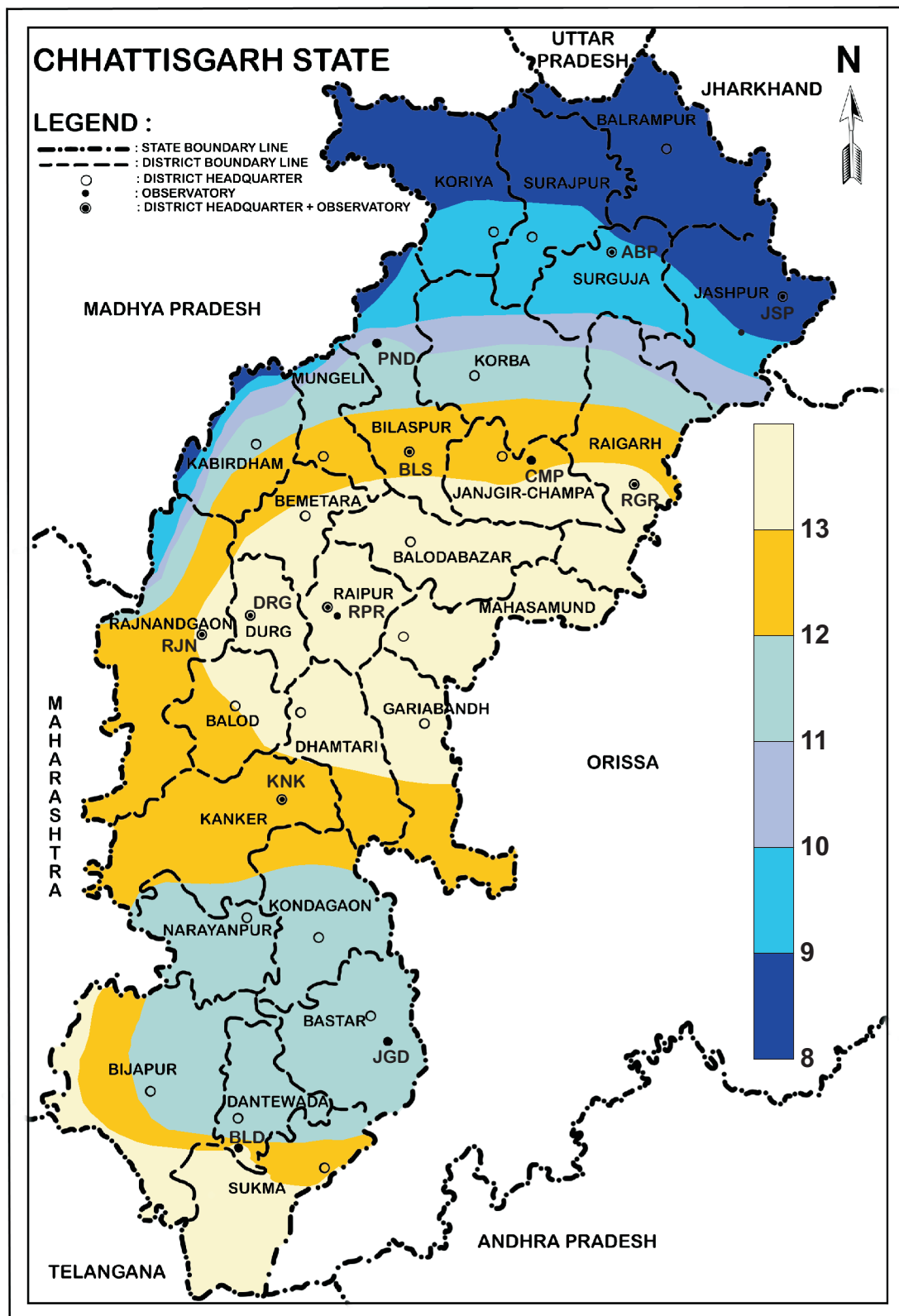


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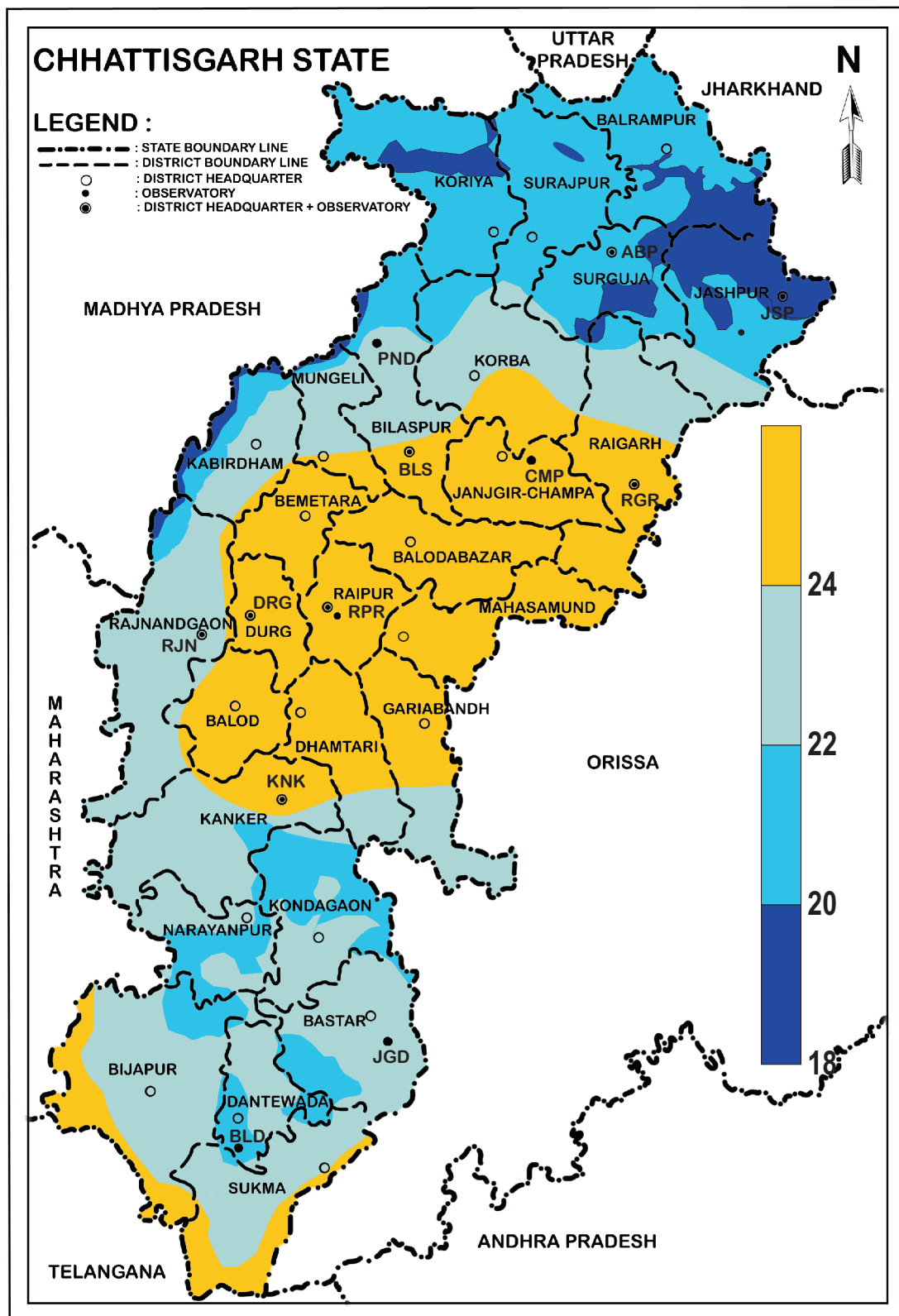


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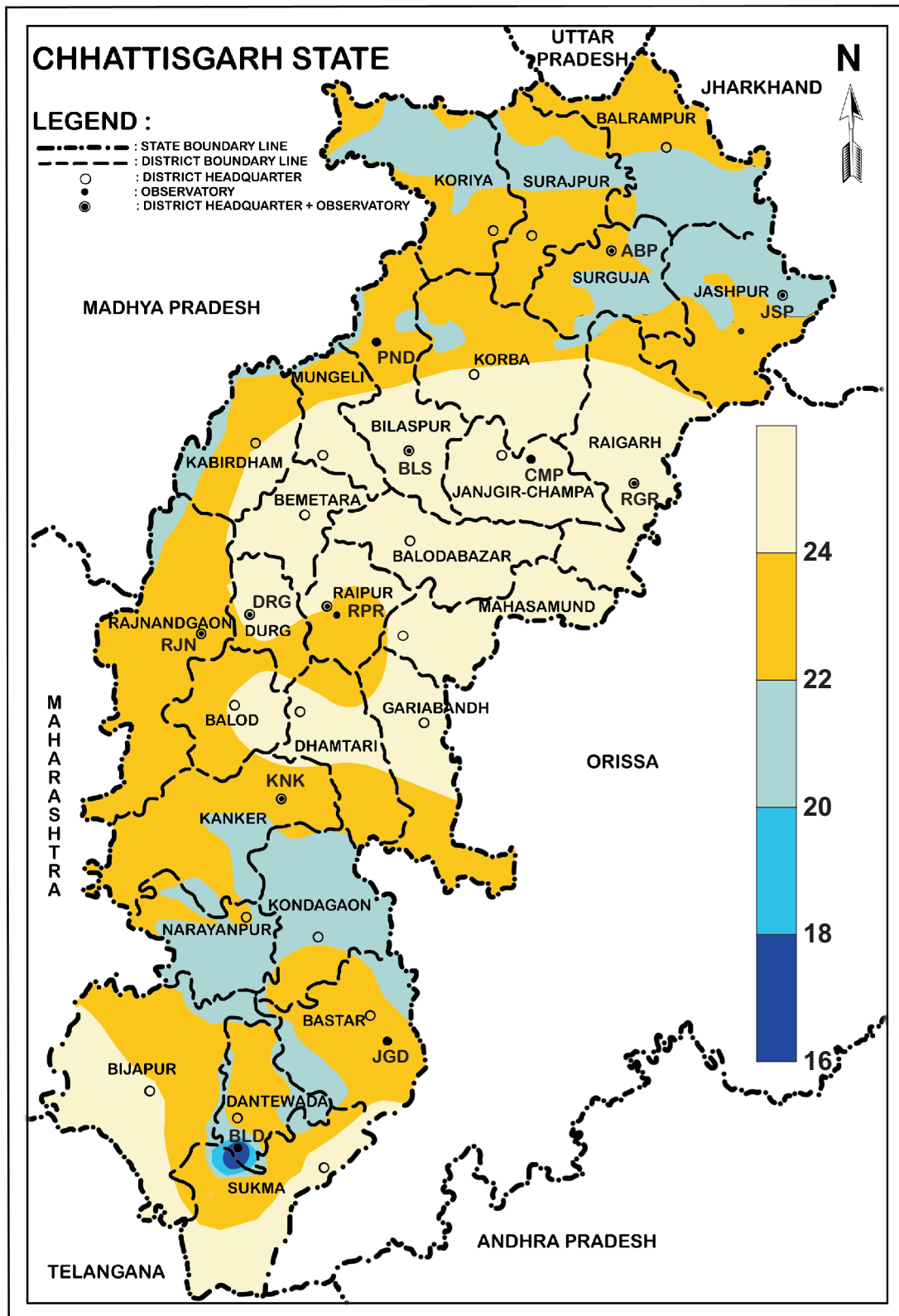


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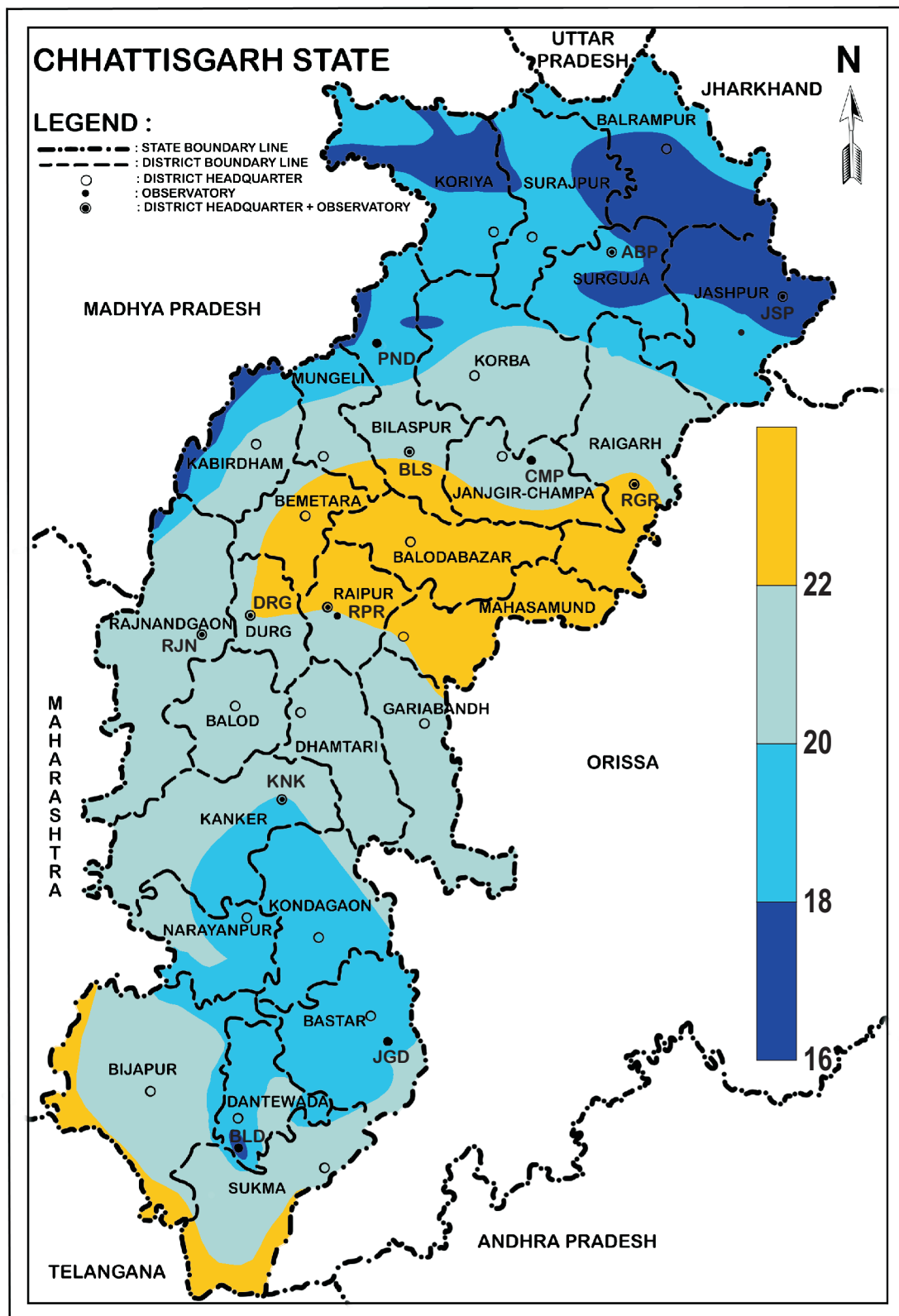


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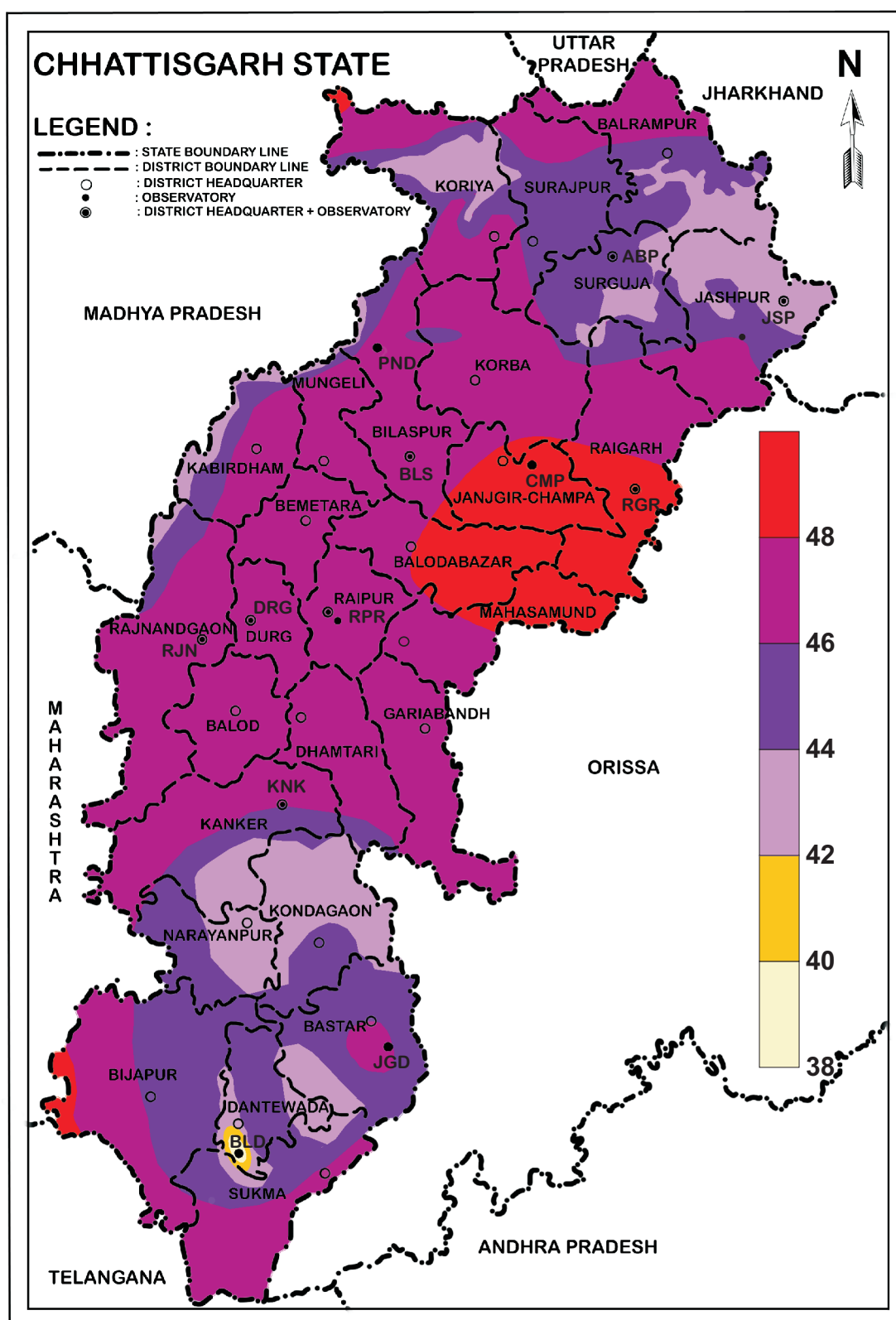


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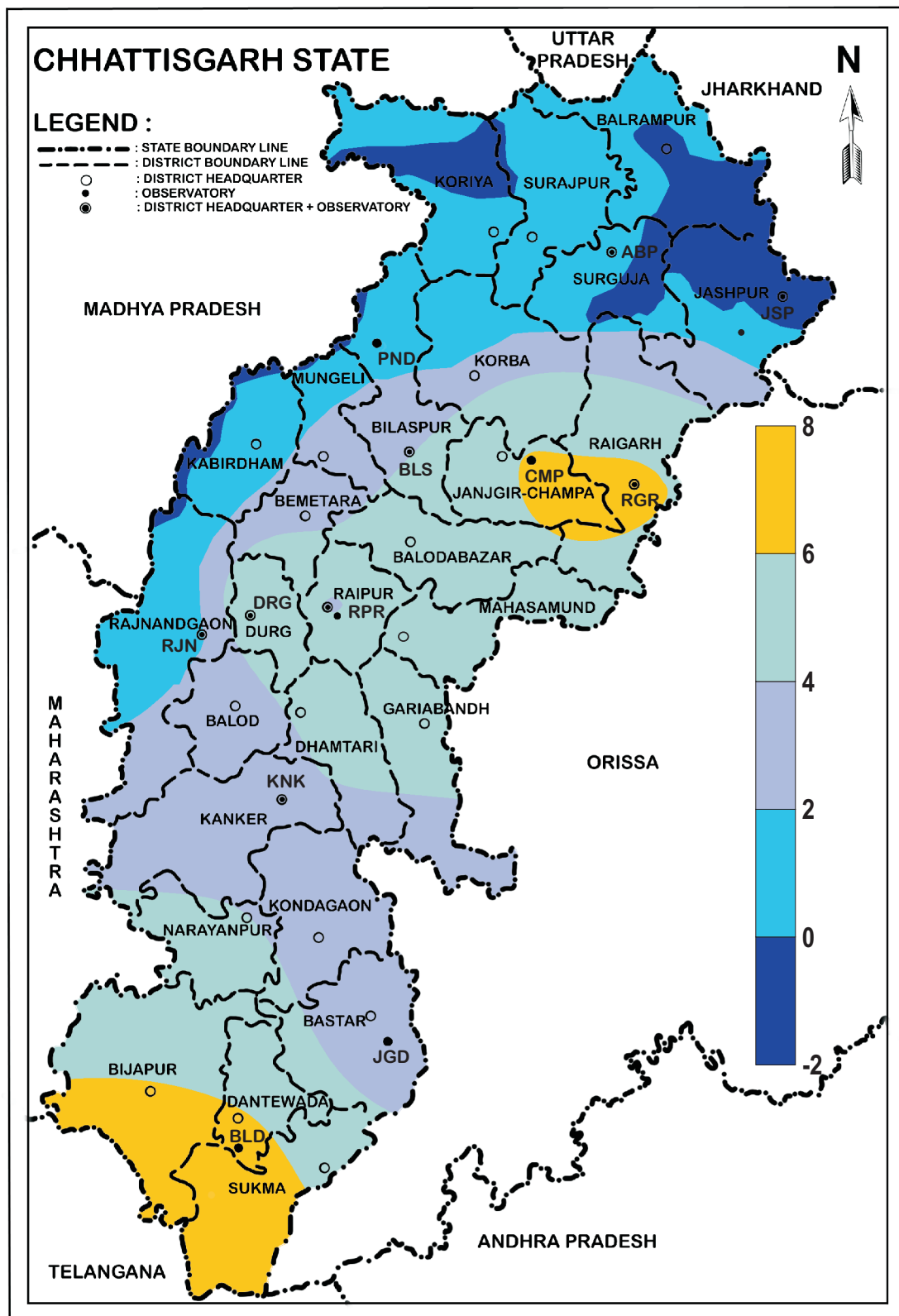


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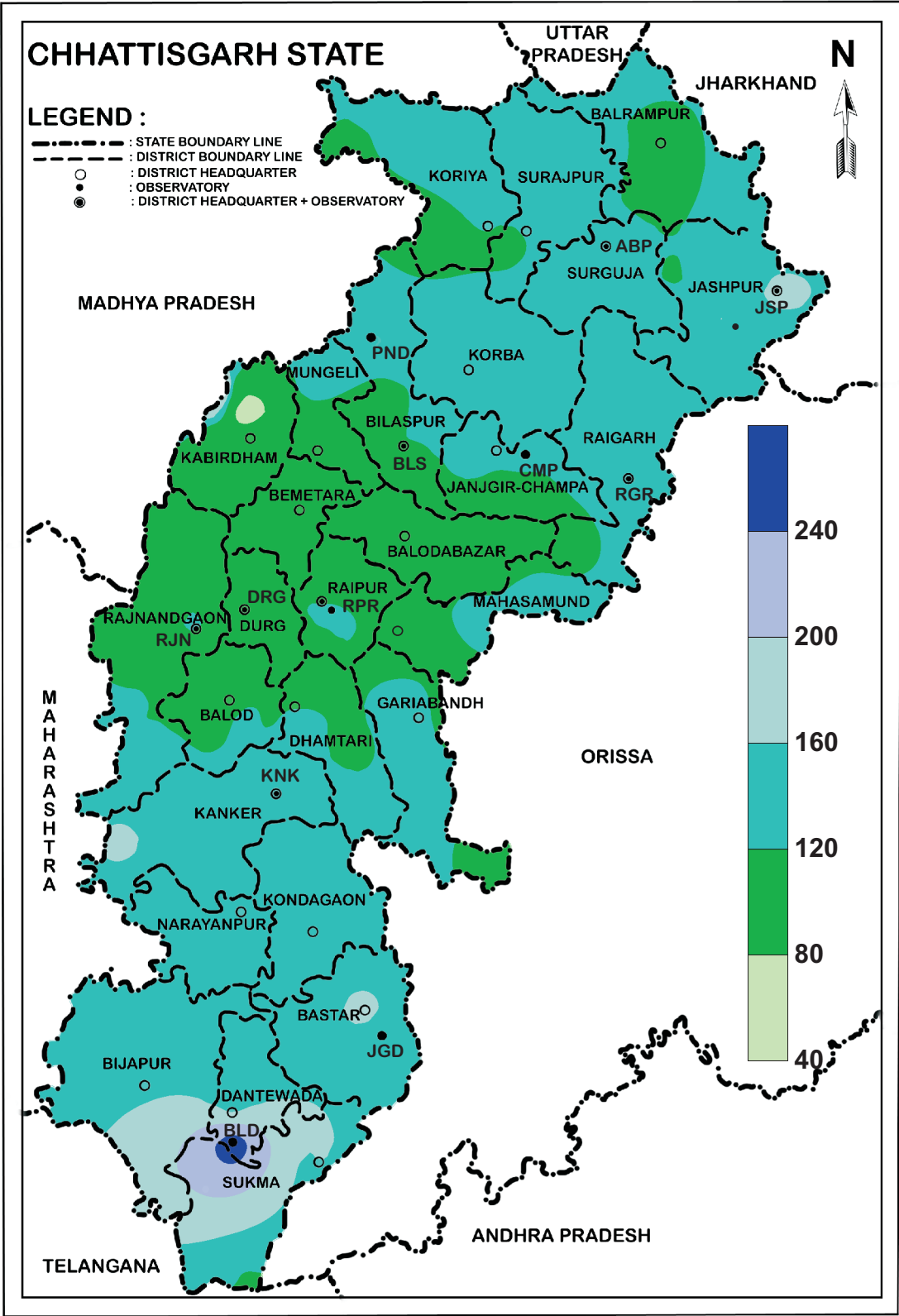




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( DEC-JAN-FEB )

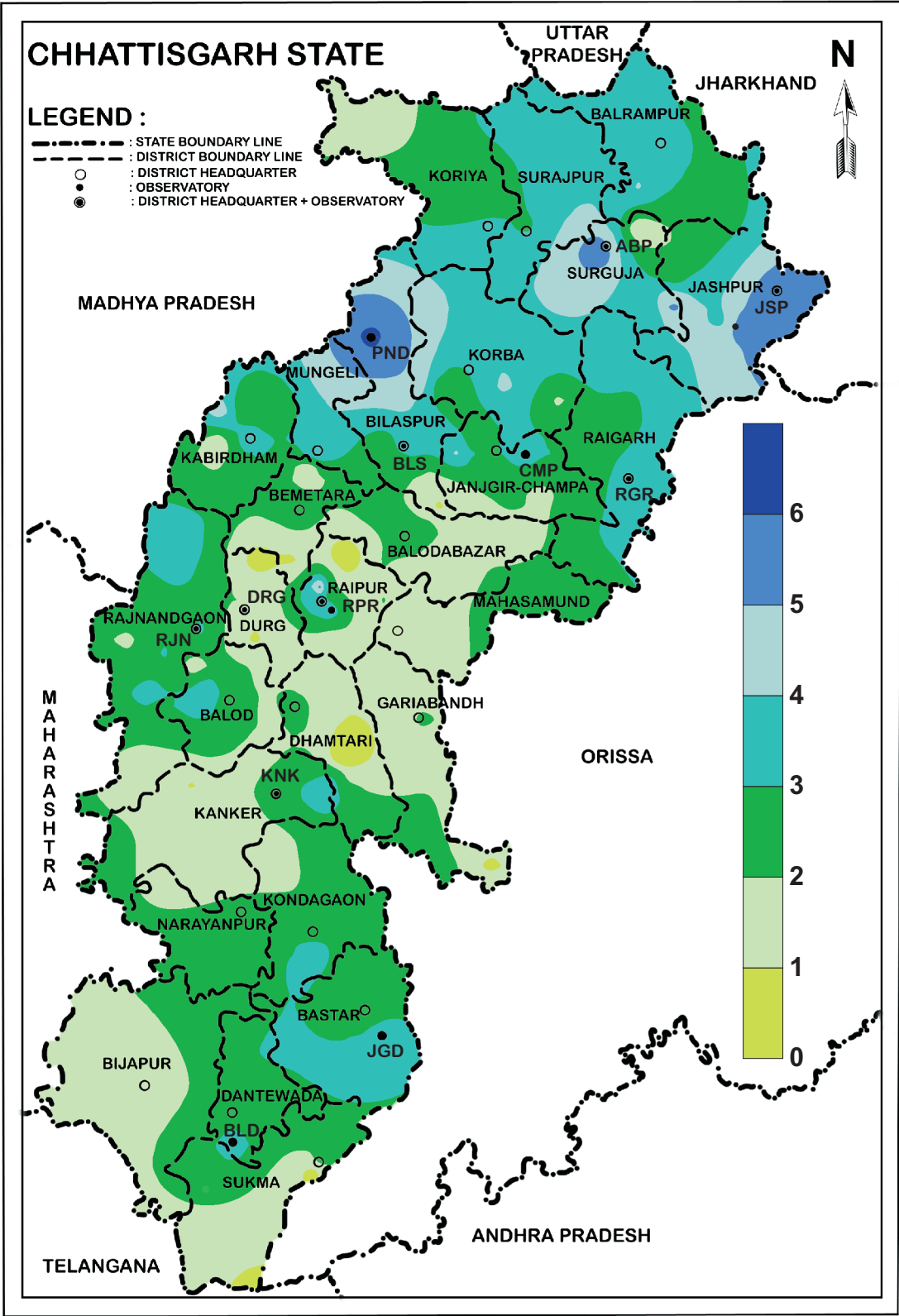


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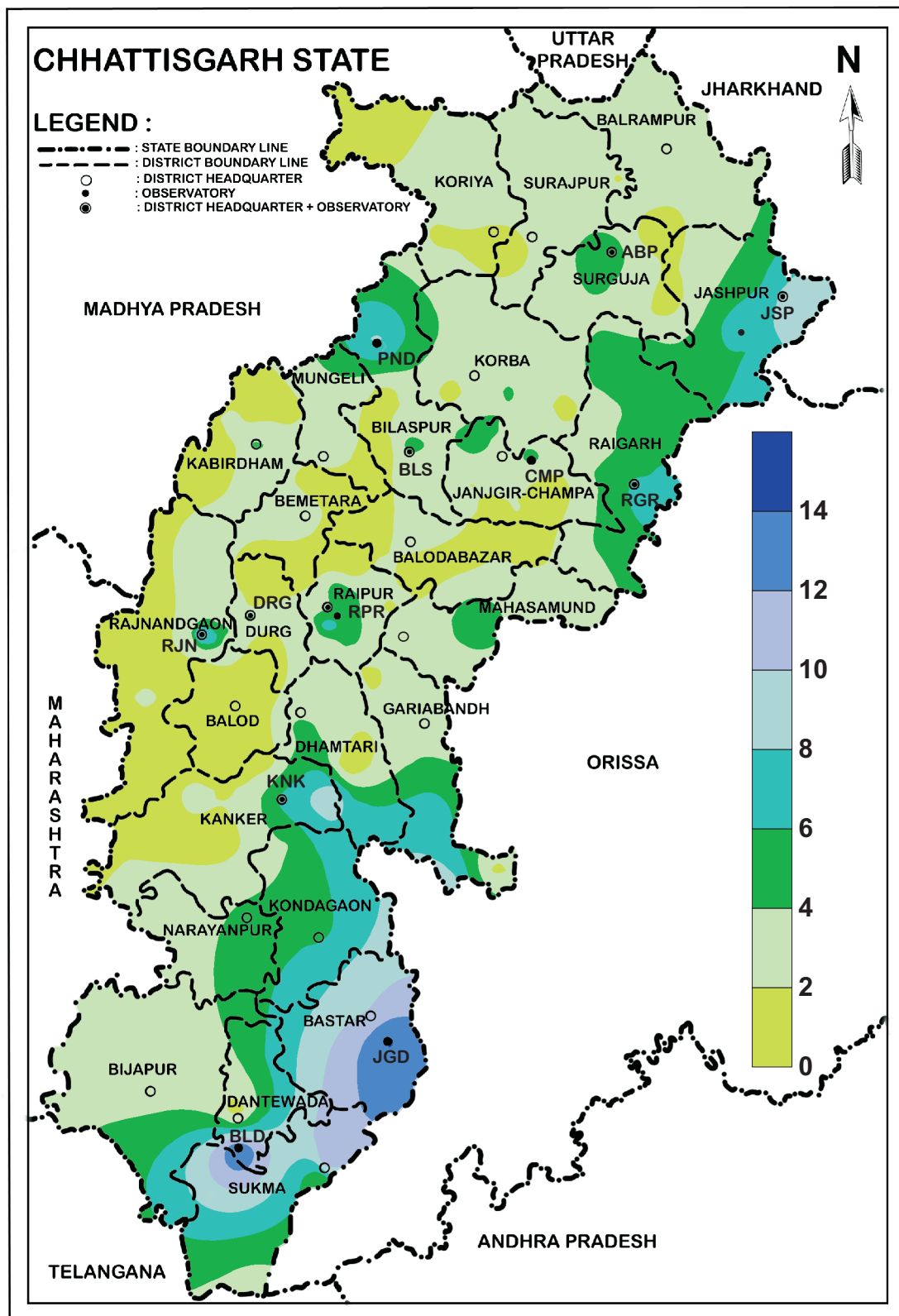


FIG.6(c): SEASONAL RAINFALL (cm) - SOUTHWEST MONSOON SEASON  
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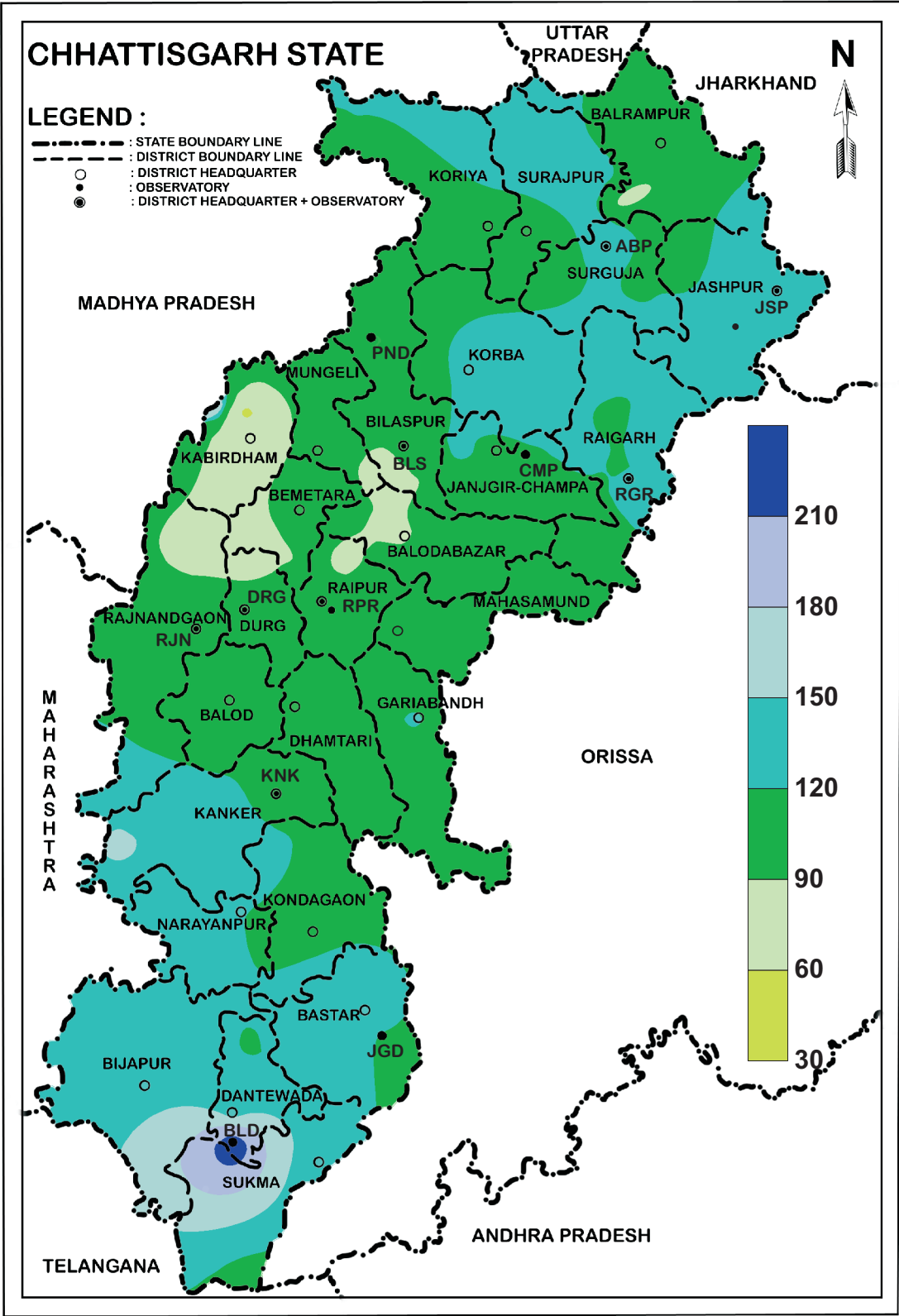
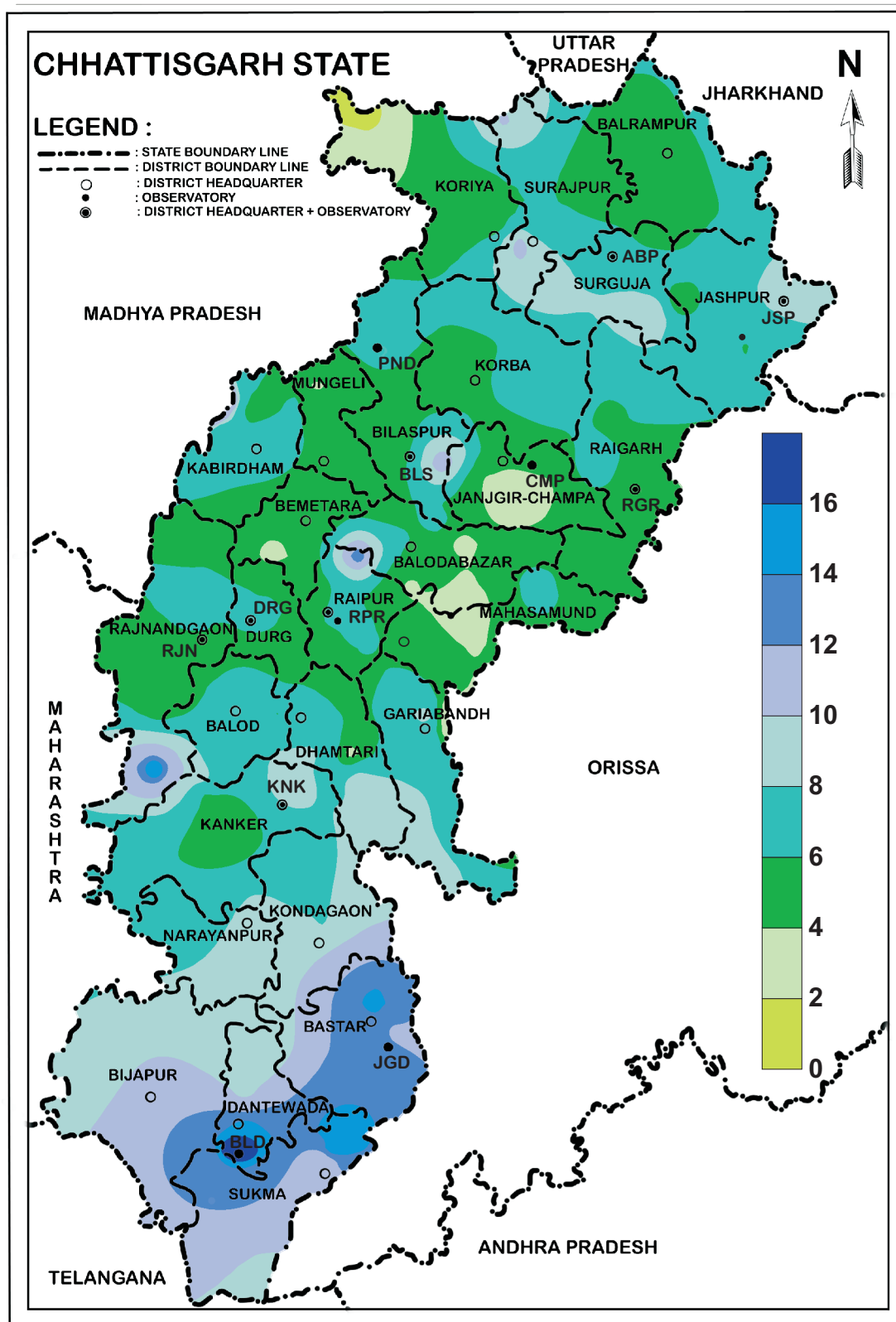


FIG.6(d): SEASONAL RAINFALL (cm) - POST MONSOON SEASON  
( OCTOBER-NOVEMBER )



**FIG.7: DISTRICT NORMALS OF SEASONAL AND ANNUAL RAINFALL (mm)  
CHHATTISGARH**

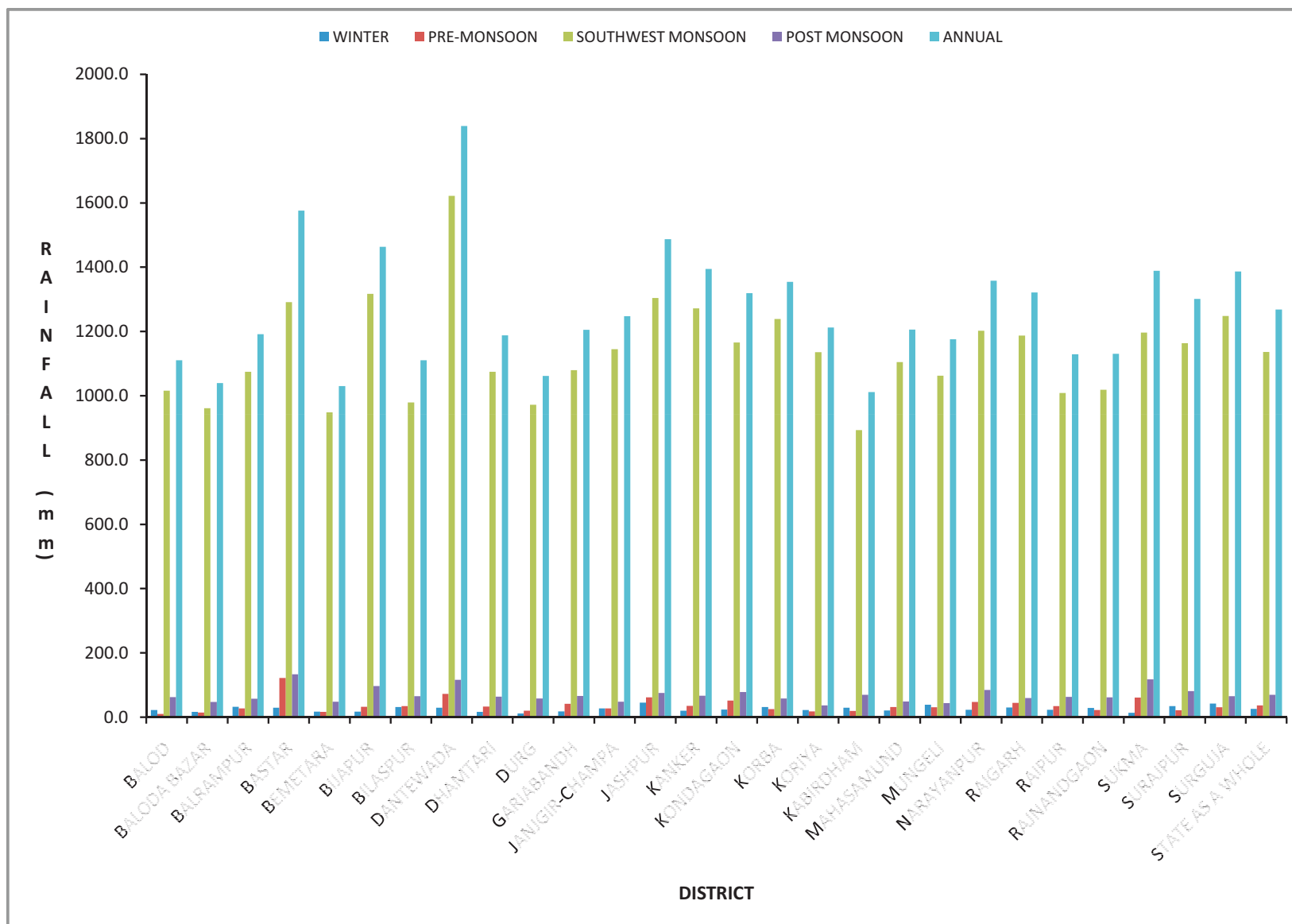


FIG.8: CATCHMENT AREAS WITH ANNUAL RAINFALL (mm)  
(316,317,319,320,321,414)

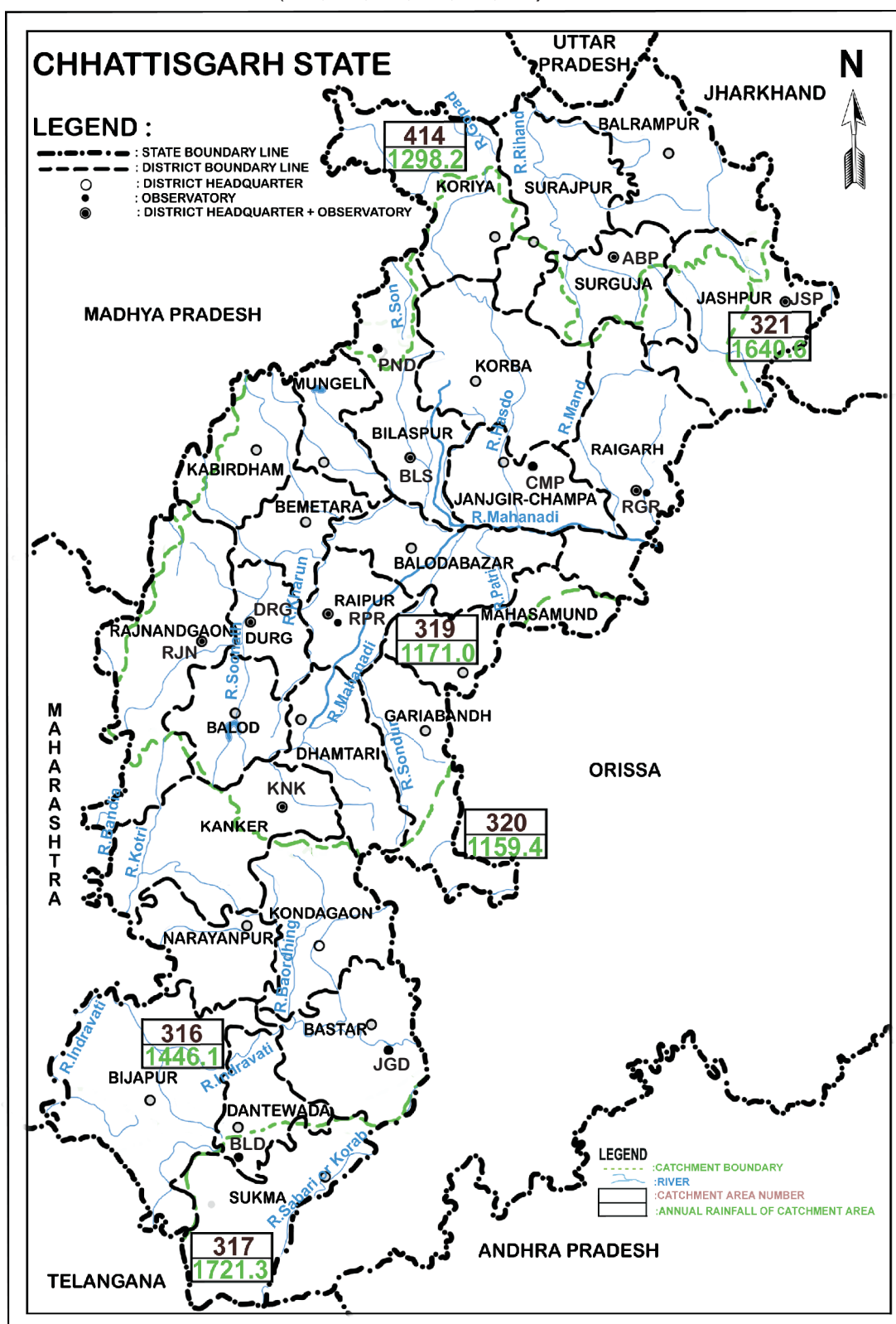


FIG.9: COEFFICIENT OF RAINFALL VARIATION - ANNUAL

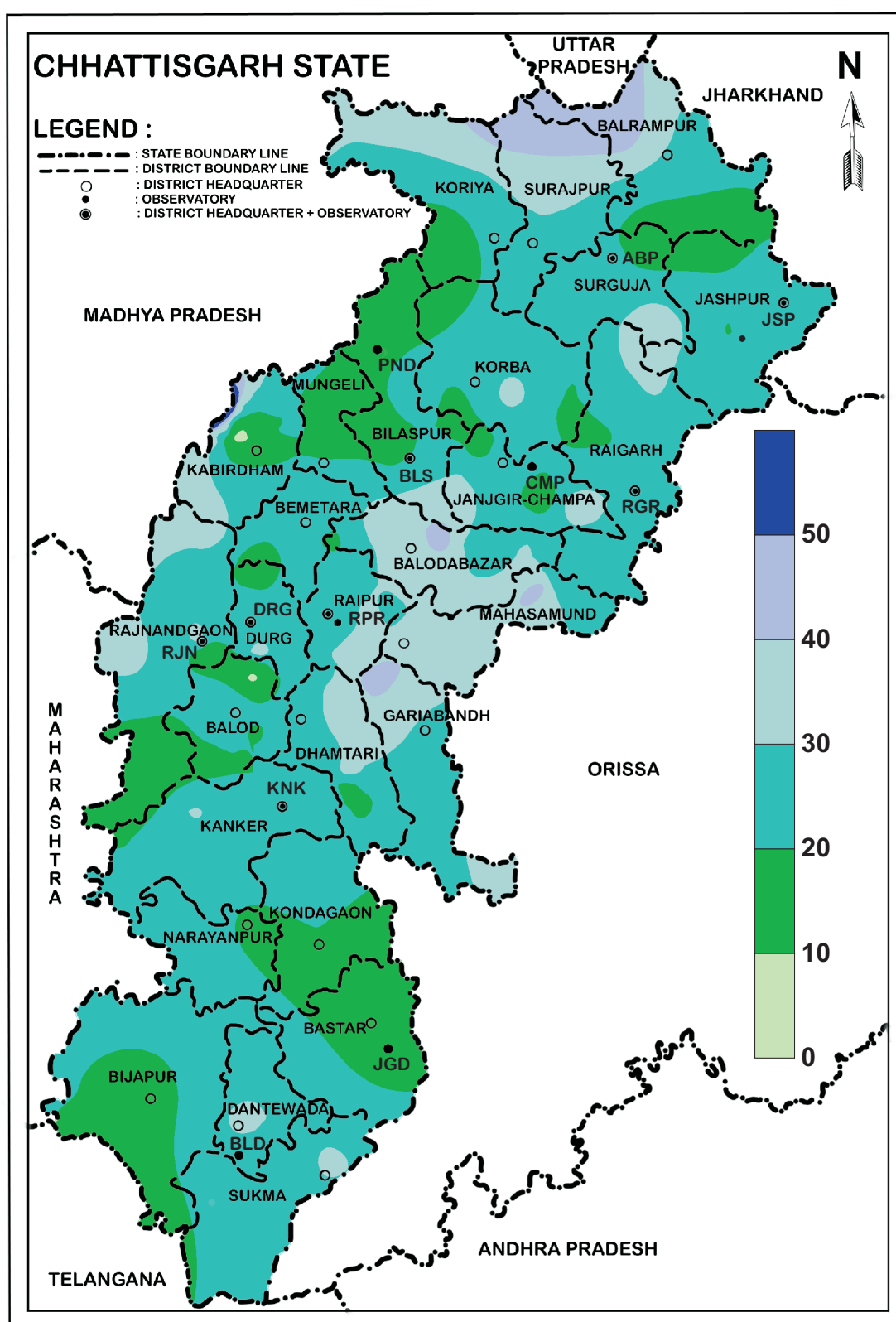




FIG.9(a): COEFFICIENT OF RAINFALL VARIATION PRE-MONSOON SEASON  
(MARCH-MAY)

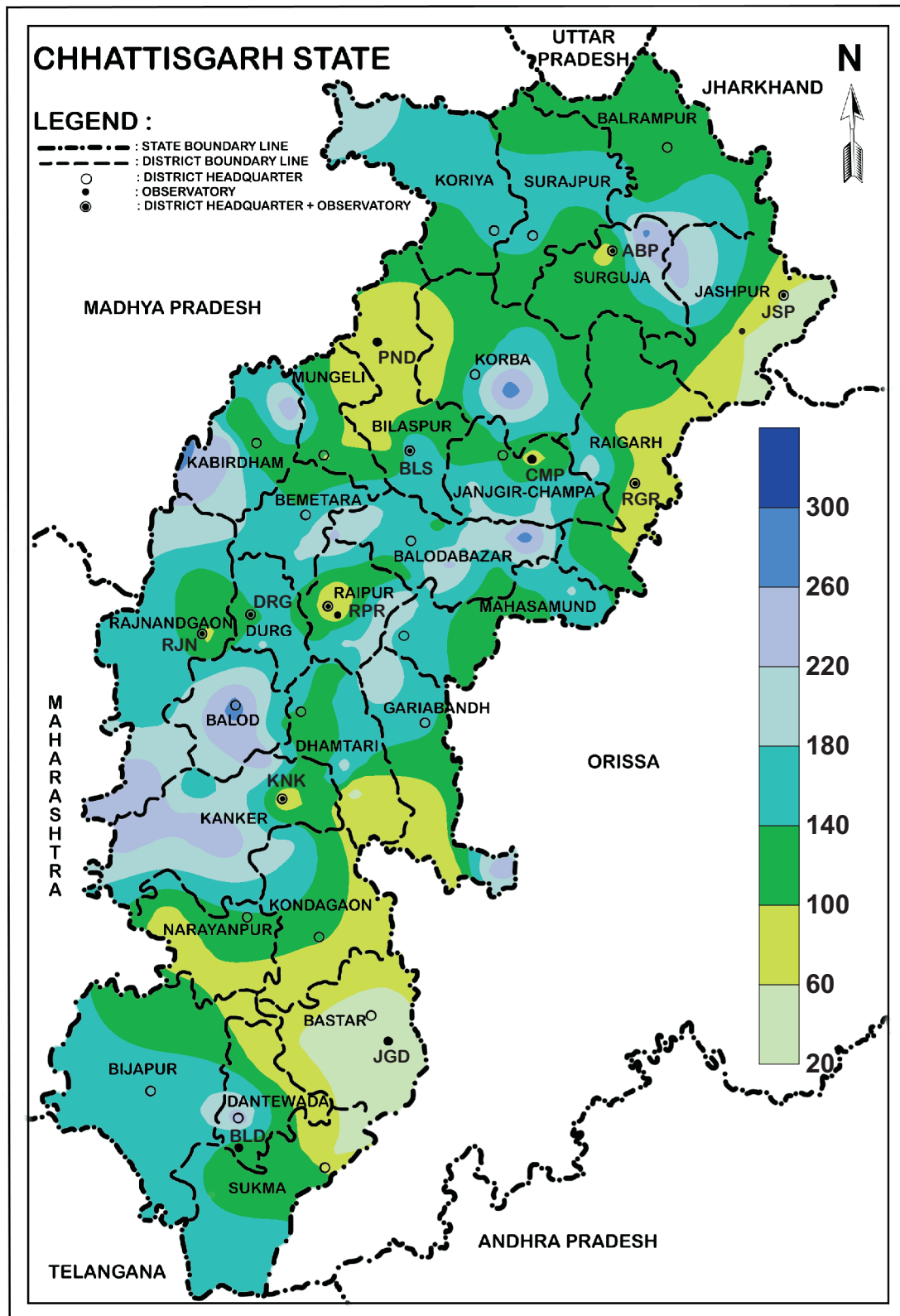
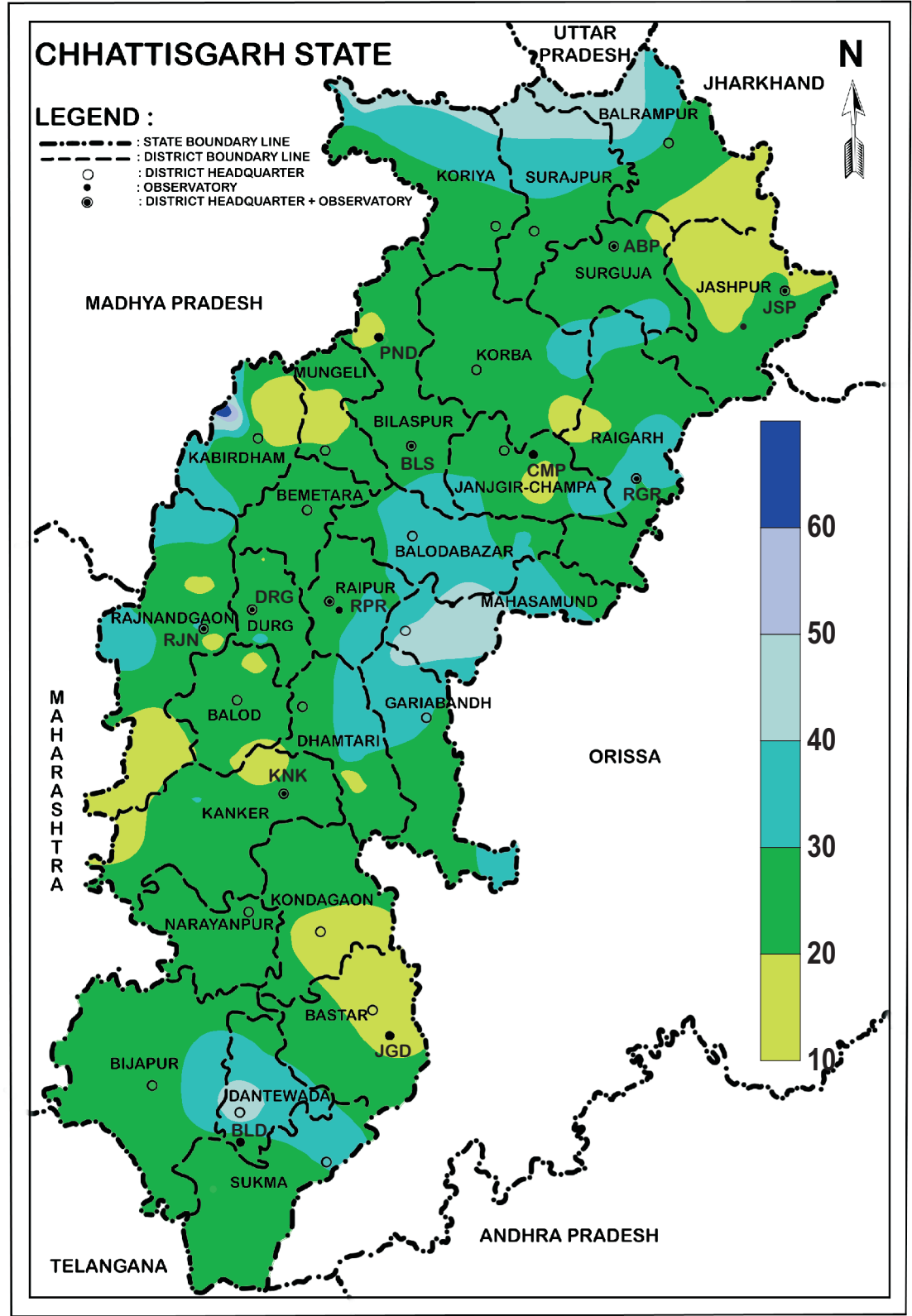


FIG.9(b): COEFFICIENT OF RAINFALL VARIATION - SOUTH WEST MONSOON SEASON  
(JUNE-SEPTEMBER)



**CHHATTISGARH STATE**

**LEGEND :**

- : STATE BOUNDARY LINE
- - - : DISTRICT BOUNDARY LINE
- : DISTRICT HEADQUARTER
- : OBSERVATORY
- ⊙ : DISTRICT HEADQUARTER + OBSERVATORY

**MAHYA PRADESH**

**UTTAR PRADESH**

**JHARKHAND**

**ORISSA**

**MAHARASHTRA**

**ANDHRA PRADESH**

**TELANGANA**

**Districts and Headquarters/Observatories:**

- BALRAMPUR
- KORIYA
- SURAJPUR
- ABP
- SURGUJA
- JASHPUR
- JSP
- PND
- KORBA
- BILASPUR
- BLS
- RAIGARH
- CMP
- JANJGIR-CHAMPA
- RGR
- MUNGELI
- KABIRDHAM
- BEMETARA
- BALODABAZAR
- MAHASAMUND
- DRG
- DURG
- RAJNANDGAON
- RJN
- RAIPUR
- RPR
- GARIABANDH
- BALOD
- DHANTARI
- KNK
- KANKER
- KONDAGAON
- NARAYANPUR
- BASTAR
- JGD
- BIJAPUR
- DANTEWADA
- BLD
- SUKMA

**Color Scale (Number of Districts):**

- 180
- 150
- 120
- 90
- 60
- 30

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

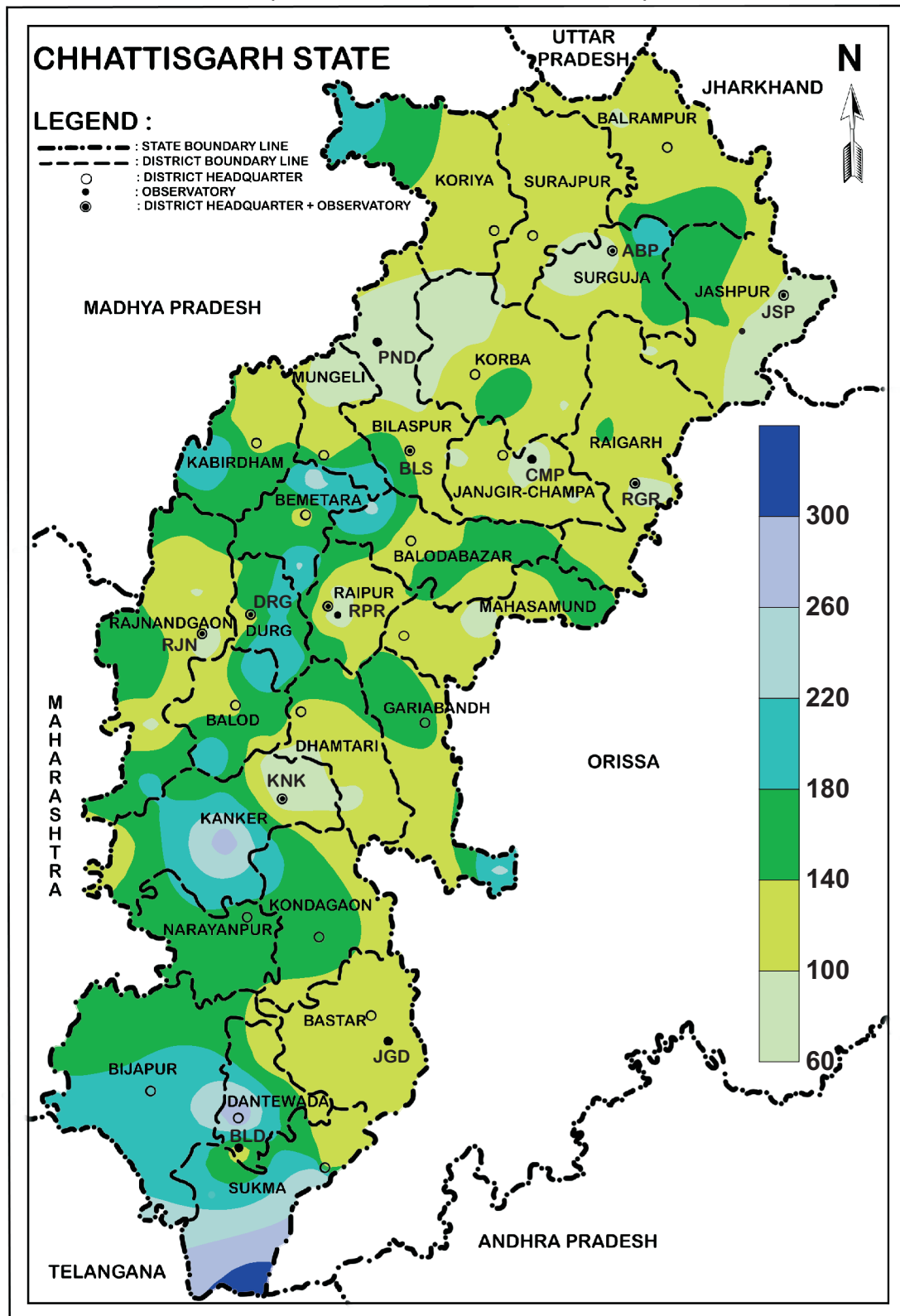
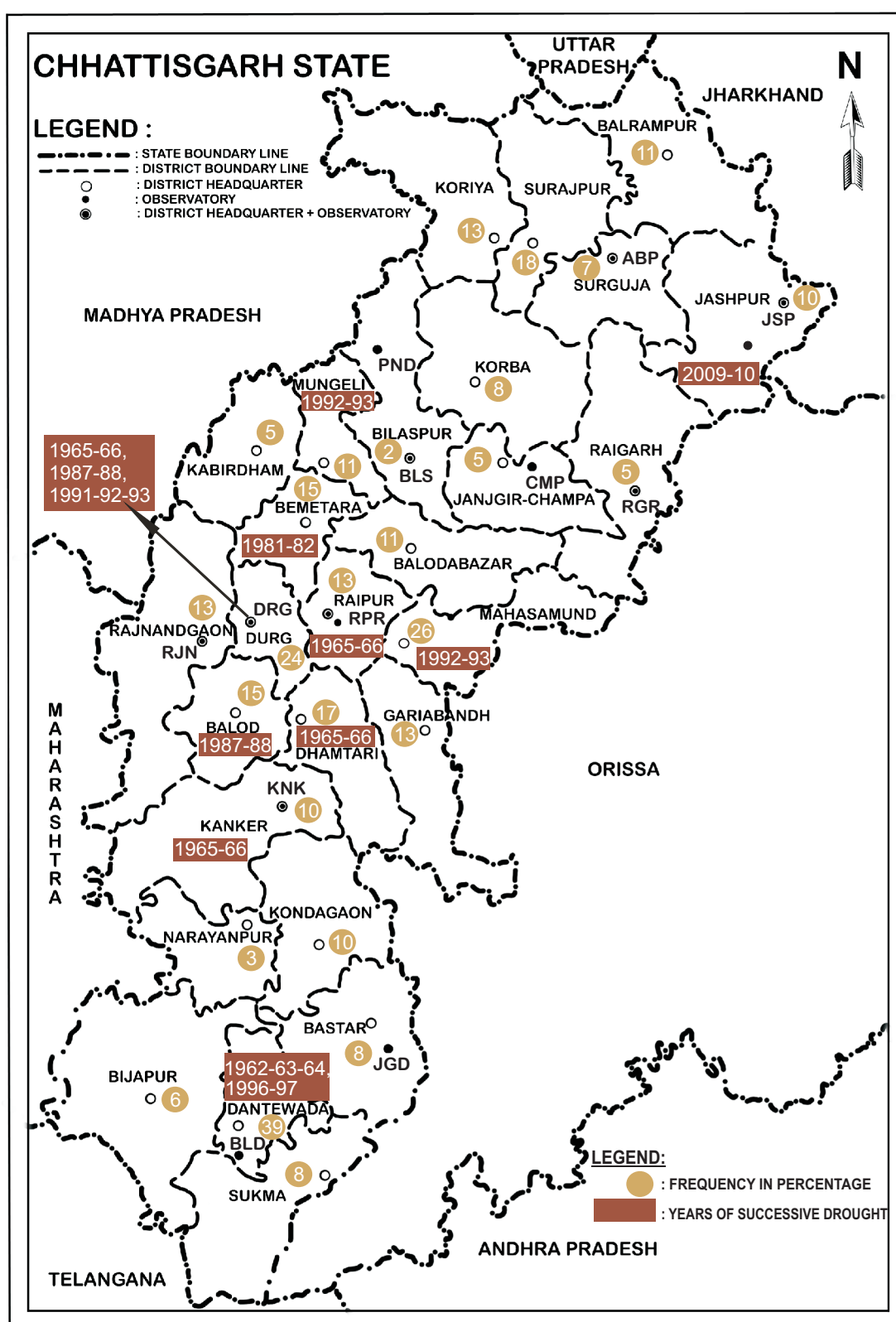


FIG.10: AREA AFFECTED BY DROUGHT (1961-2010)



[illegible]

# STATE CLIMATOLOGICAL SUMMARY

## CLIMATE OF CHHATTISGARH

### Introduction

Chhattisgarh is located between 17°46' N - 24°05' N latitude and 80°15' E- 84°20' E longitude in Central India with Uttar Pradesh to the north, Jharkhand to the north- east, Orissa to the east, Telangana to the south, Maharashtra to the south-west and Madhya Pradesh to the north and north-west form its boundaries. The State of Chhattisgarh has geographical area about 135,194 sq km. About 44% of its total area is covered by forests. Physiographically the state is divided in three parts viz. Northern Hill Ranges, Chhattisgarh Plain and Bastar Plateau.

**Chhattisgarh Plains:** This belt comprises of central area of the state. About 33% of its total geographical area of the plain is covered with forest.

**Bastar Plateau:** This belt comprises of almost southern part of the state covering Bastar, Bijapur, Dantewada, Kanker, Kondagaon, Narayanpur and Sukma districts. In this plateau, the land is undulating hills where peak height is about 1144 metre above mean sea level. The forest area in this plateau contributes 62% of the total geographical area.

**Northern Hills:** This belt comprises of almost northern portion of the state covering Balrampur, Jashpur, Koriya, Surajpur, Surguja and some part of Bilaspur, Korba, Mungeli and Raigarh districts. The forest area in this belt is about 47% of the total geographical area of this hilly region. The peak height in this region is about 1225 metre above mean sea level.

The Mahanadi is the principal river of the state. The other major rivers are Godavari, Indravati, Narmada, Sheonath, Hasdeo, Mand, Pairi, Rihand, Kharun, Son, Sabari, Sondur, Kotri and so on. They drain almost part of the state along with their many tributaries. These rivers glide through the uneven topography of the state giving rise to gorgeous waterfalls.



**Mahanadi River-** It rises from Shringi mount situated in Sihwa tehsil of Dhamtari district of Chhattisgarh. The total length of this river is 851 km. in which 286 km flows in Chhattisgarh state. Its main tributaries are Sheonath, Pairi, Jonk, Hasdeo, Mand etc.

**Sheonath River-** It originates near village Panabaras in the Rajnandgaon district. The river traverses a length of 380 Km. The main tributaries of Sheonath river are Tandula, Kharun, Arpa, Agar and Maniyari rivers.

**Indravati River-** It is 525 km long. It emerges from Dongar- Kala range in Orissa. The river flows 372 km in the state through Bastar district. The river has nearly 30 small tributaries.

**Hasdeo River-** It is a tributary of Mahanadi river. It originates from about 910 metre altitude near Sonhat in Koriya district. It joins Mahanadi river, near to Bilaigarh. The total length of this river is 333 km. Gej river is its main tributary.

**Rihand River-** It is a tributary of Son river. It rises from Mainpat plateau. It flows north through central part of Surguja district for 160 km.

The state has one meteorological sub-division- Chhattisgarh and it has following 27 districts.

| Sr. No. | District Name | Sr. No. | District Name |
|---------|---------------|---------|---------------|
| 1.      | Balod         | 15.     | Kondagaon     |
| 2.      | Baloda Bazar  | 16.     | Korba         |
| 3.      | Balrampur     | 17.     | Koriya        |
| 4.      | Bastar        | 18.     | Kabirdham     |
| 5.      | Bemetara      | 19.     | Mahasamund    |
| 6.      | Bijapur       | 20.     | Mungeli       |
| 7.      | Bilaspur      | 21.     | Narayanpur    |
| 8.      | Dantewada     | 22.     | Raigarh       |
| 9.      | Dhamtari      | 23.     | Raipur        |

|     |                |     |             |
|-----|----------------|-----|-------------|
| 10. | Durg           | 24. | Rajnandgaon |
| 11. | Gariabandh     | 25. | Sukma       |
| 12. | Janjgir-Champa | 26. | Surajpur    |
| 13. | Jashpur        | 27. | Surguja     |
| 14. | Kanker         |     |             |

## Climate

Chhattisgarh state experiences a tropical type of climate. The state is situated in the central part of India. The geographical factors like distance from the sea and altitude of the state have influenced the Chhattisgarh climate. The climate of Chhattisgarh is mainly tropical, humid and sub-humid. The climate is hot because of its position on the tropic of cancer. May is the hottest month while December and January are the coldest ones. The state is mostly dependent on the monsoons for rain. The climatic condition during summer is hot and gusts of dry wind blows over the state. During winter the temperature falls to some extent. The period from November to March is generally pleasant over the state except during a few spells when severe cold waves associated with western disturbances affect northern parts of the state in winter months. April and May months are hot, very dry and generally uncomfortable. Due to lower temperatures, some areas of plateau and Northern Hills regions are however comparatively less uncomfortable in summer. Weather tends to be oppressive during June due to high order of humidity and temperature. The next three months (July, August and September) are fairly comfortable due to reduced day temperatures, although the humidity continues to be high.

In general the year may be divided into four seasons. Winter season from December to February is followed by pre-monsoon or summer season from March to middle of June. Thereafter, southwest monsoon season starts and lasts till first week of October, followed by post monsoon season till November.

Areas in the state under each climate pattern based on Koppen's classification are shown in Fig. 2. This broad classification is based on annual and monthly means of precipitation in cm and temperature in  $^{\circ}\text{C}$ .

The climate of state varies from subtropical monsoon, mild and dry winter, hot summer (Cwa) over northern hilly areas and adjoining plains (Koriya, Surajpur, Balrampur, Surguja districts and northern parts of Bilaspur, Korba and Jashpur districts) to Tropical monsoon, hot and seasonally dry (Aw) over central and southern part of the state. Some part of Dantewada district only comes under the climate type-Tropical monsoon, hot and seasonally excessive rainfall (Am).

### **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 minimum in southwest monsoon season. The pressure gradient over the state generally remains weak except during late summer and monsoon season. During winter, the higher pressure is to the northwest. In March relatively higher pressure is to the east and in April, the pressure decreases from southwest to northeast over the state. Accordingly the winds which are light and mainly from north to northeast in January, turn gradually anticlockwise and are replaced, by light northwesterly to westerly winds by April. With the advance of the summer, the pressure gradient increases and correspondingly the winds also strengthen reaching their maximum strength in June. In June, the pressure decreases from south- southwest to north- northeast over the state and correspondingly the winds are mostly from south or southwest. With the progress of the monsoon, winds become more westerly. October is the month of transition, with the weakest pressure gradient. From October onwards the change –over of the pressure and wind pattern to the ‘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 temperatures at the observatory stations of the sub-division. The spatial distribution of mean maximum and mean minimum temperatures for the representative month of four seasons of

year is depicted in Fig. 2 (a,b,c,d ) and 3 (a.b.c.d). Fig. 4 and 5 give the extremes of maximum and minimum temperatures ever recorded on data up to 2013.

Pre-monsoon season is the hottest season while winter is the coldest season. Day temperatures are more or less uniform over the plains except during winter when temperatures increase south-wards. May is the hottest month with mean maximum temperature of  $39.4^{\circ}\text{C}$ . In the plains recording 1 to  $3^{\circ}\text{C}$  higher while over plateau regions and elevated places recording 2 to  $5^{\circ}\text{C}$  lower. In May, mean maximum temperature ranges from  $31.8^{\circ}\text{C}$  to  $42.6^{\circ}\text{C}$  over the state, the highest values are observed over central plain area (Fig 2(a)). The highest maximum temperature ever recorded at any individual station was  $48.4^{\circ}\text{C}$  at Champa observatory on 26<sup>th</sup> May 1984 which is  $5.8^{\circ}\text{C}$  higher than the normal for the warmest month. Bailadila observatory situated at altitude 1144 m. registered the highest maximum temperature of  $39.4^{\circ}\text{C}$  on 21 May 1992, which was  $7.6^{\circ}\text{C}$  higher than the normal for the warmest month. During July, an appreciable drop in mean maximum temperature is observed with the values ranging between  $22.8^{\circ}\text{C}$  and  $32.2^{\circ}\text{C}$  (fig 2(b)). The spatial distribution of day temperature in October is quiet similar to that of July (fig 2(c)). The values of mean maximum temperature in October range between  $25.1^{\circ}\text{C}$  and  $32.4^{\circ}\text{C}$ . From Fig. 2(d) it is observed that mean maximum temperature of January ranges between  $22.8^{\circ}\text{C}$  and  $28.7^{\circ}\text{C}$ .

December and January are the coldest months when mean minimum temperature for the state as a whole is  $11.7^{\circ}\text{C}$ , varying from  $7.7^{\circ}\text{C}$  in the northeast to about  $13.8^{\circ}\text{C}$  in the central plain area (fig 3(a)). During winter, much lower temperature may be experienced in the wake of western disturbances. On such occasion the lowest minimum temperature may fall down up to  $0^{\circ}\text{C}$  at few stations in the northern region. The lowest minimum temperature ever-recorded at any individual station was  $-1.3^{\circ}\text{C}$  at Jashpurnagar observatory on 7<sup>h</sup> December 1971, which was  $9^{\circ}\text{C}$  less than normal of the coldest month. The gradient of mean minimum temperature is observed to decrease sharply in the month of April. The value of minimum temperature ranges between  $19.3^{\circ}\text{C}$  and  $25.1^{\circ}\text{C}$  (fig 3(b)). The gradient of mean minimum temperature is further decrease during July and October (fig 3(c)) and (fig 3(d)), the minimum temperature values range from  $17.9^{\circ}\text{C}$  to  $25.1^{\circ}\text{C}$  and  $17.4^{\circ}\text{C}$  to  $22.2^{\circ}\text{C}$  respectively.

Both the maximum and minimum temperatures rise rapidly from February onwards till May. The increase in maximum temperature during the period from January to May ranges from about 9°C to 16°C at individual stations of the state. From June onwards both day and night temperature start to drop, the day temperature falls rapidly while night temperature falls slowly. From the beginning of June to the end of July the maximum temperatures falls about 4°C to 6°C, whereas minimum temperature falls by about 1°C to 2°C. In October, a slight rise in the maximum temperature is experienced due to increased insolation. The night temperature start to fall rapidly from September while the day temperature follows this trend after October, and both attain the lowest values in December or January. July and August have the smallest diurnal range of temperature about 5°C - 7°C. The diurnal range of temperature increases rapidly after withdrawal of southwest monsoon. During the period December to May diurnal range is of the order of 10°C to 17°C, being greatest in March and April.

## **Humidity**

Table III gives the mean relative humidity at 0830 and 1730 hours IST for observatory stations in the state. Summer is the driest part of the year when relative humidity in the afternoon is generally ranges between 26 % and 31% and morning relative humidity ranges between 44% and 49%. During southwest and post monsoon season relative humidity is generally high when morning humidity ranges between 68% and 87% and afternoon relative humidity ranges between 54% and 80%. During winter season relative humidity is moderate and it ranges between 61% and 69% in the morning and between 39% and 51% in the afternoon.

## **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 for observatory stations in the state.

The skies are generally heavily clouded or overcast during southwest monsoon season from June to September especially during July and August when about 6 okta or more sky covered with clouds and during June and September when about 4 to 5 okta sky covered with clouds. Skies are generally clear or lightly clouded during the period from November to April. During May and October skies are generally moderately clouded. Afternoons are however, comparatively more clouded than mornings.

## **Rainfall**

Table V gives district wise and state wise mean monthly and annual rainfall and number of rainy days (i.e. days with rainfall of 2.5 mm or more). Fig. 6 and 6(a) to 6(d) depict the spatial distribution of the annual and seasonal rainfall over the state.

The total annual precipitation for the state as a whole is about 126.8 cm and total annual number of rainy days are about 58 (Table V). The precipitation in the state occurs in the form of rain. The annual rainfall varies slightly from region to region. North eastern and southern parts of the state receive more rain than central part of the state with large variation due to topographic variation in the state. Dantewada district in the southern part of the state received the maximum amount of precipitation i.e. about 184 cm in a year, whereas Kabirdham district in the central part of the state received the minimum amount of precipitation i.e. about 101 cm in a year.

Fig. 6(a) and 6(b) show rainfall pattern during winter (December to February) and pre-monsoon season (March to May) respectively. During these seasons state receives little rain about 2 to 3 percent of annual rainfall. The rainfall over the state decreases from southeast and northeast region of the state towards the central region of the state during winter and pre-monsoon season. From Fig. 6(c), it is observed that during the southwest monsoon season, the rainfall increases towards the southwest region and north east region from central part of the state. Maximum rainfall is observed in windward side of southern and northeastern hilly parts of the state. State receives about 90% of annual rainfall during this season. The pattern of spatial distribution of the rainfall during southwest monsoon season viz. Fig.6(c))

generally resembles to that of the spatial distribution of the annual rainfall (Fig. 6). From Fig. 6(d) it is observed that during post monsoon season, rainfall is maximum in southeastern part of the state.

Southwest monsoon season is the main rainy season over the state. Of the total amount of rainfall, about 90% is received in the southwest monsoon season (June to September), 2% is received in the winter season (December to February), 3% in pre-monsoon season (March to May) and 5% in post monsoon season (October to November).

The percentage of the seasonal number of rainy days with respect to the annual number of rainy days shows that 86% during the southwest monsoon season, 4% during the pre-monsoon season, 3 % during the winter season and 7% in post monsoon season.

The state receives rainfall mainly due to low pressure areas and monsoon depressions originating in the Bay of Bengal during the southwest monsoon season. During the monsoon season most of the depressions originating in the Bay of Bengal cross inland and move westwards or west-north-westwards over the state, some of them breaking over the hilly districts. The rest of the rainfall occurs in winter and early summer in association with the passage of western disturbances across north India. July and August are the rainiest months and in these two months nearly 58% of the annual rainfall is received. After April, the rainfall gradually increases till June and thereafter sharply during July and August. It decreases rapidly after withdrawal of southwest monsoon in September. Precipitation during the pre-monsoon months is mostly associated with thunderstorms and constitutes about 3% of the annual rainfall.

The southwest monsoon sets in over the state by about the second week of June. The monsoon starts to withdraw from the state by about first week of October and completely withdraws by about second week of October.

The most common rain giving system over the state is cyclonic circulations and depressions originating in the Bay of Bengal also bring rain during southwest

monsoon season and occasionally flood comes in some areas of the state due to heavy rain. The state receives rain in winter due to western disturbances formed over the Mediterranean sea, Black sea and Caspian sea. Rainfall occurs in the pre-monsoon months due to thunderstorms and hailstorms developed with intense convective activity and cyclonic circulation with adequate moisture.

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 statewide rainfall.

Table VI gives the monthly and annual rainfall for various river catchments (No. 316, 317, 319, 320, 321 & 414) in the state. The annual rainfall of these river catchments is shown in Fig. 8. However, table VI shows the districts/parts of districts of Chhattisgarh state covered by these catchments. Catchment No. 316 formed by river Indravati which covers Bastar, Bijapur, Narayanpur and Kondagaon districts, and some area of Dantewada, Kanker and Rajnandgaon districts receives the annual rainfall of 1446.1 mm with 62 rainy days. Catchment No. 317 formed by river Godavari from its confluence with river Wainganga to its mouth which covers the district Sukma and some part of district Dantewada receives an annual rainfall of 1721.3 mm with 74 rainy days. Catchment No. 319 formed by river Mahanadi up to Hirakud dam site which covers the districts of Dhamtari, Durg, Janjgir-Champa, Korba, Raigarh, Raipur, Bemetara, Balod, Balodabazar and Mungeli and some areas of Bilaspur, Jashpur, Kanker, Koriya, Kabirdham, Mahasamund, Surguja, Gariabandh, Rajnandgaon, Surajpur districts receives an annual rainfall of 1171.0 mm with 54 rainy days. Catchment No. 320 formed by river Mahanadi from Hirakud dam site to its mouths which covers some area of Mahasamund and Gariabandh districts, receives an annual rainfall of 1159.4 mm with 56 rainy days. Catchment No. 321 formed by Brahmani and Baitarni rivers combined which covers some area of Jashpur district, receives an annual rainfall of 1640.6 mm with 83 rainy days. Catchment No. 414 formed by river Son which covers the Balrampur district and some area of Bilaspur, Jashpur, Koriya, Surguja, Jashpur and Surajpur districts, receives an annual rainfall of 1298.2 mm with 59 rainy days



## Rainfall Variability

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

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

It is observed from Fig. 9 that values of CV of annual rainfall range between 3.2% and 54.3% over the entire state of Chhattisgarh. The extreme north region and central part of the state exhibit highest variability with values of CV ranging between 30% and 50%. Other part of the state exhibits lower values of CV.

The spatial distribution of CV of seasonal rainfall over Chhattisgarh 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 winter season (December to February) respectively.

During the pre-monsoon season it is observed that values of CV range between 44% and 305% (Fig. 9(a)). Highest CV values are observed in Surguja, Kabirdham, Korba, Janjgir- Champa, Balodabazar and Balod districts ranging between 220% and 305%. Other part of the state exhibits variability between 20% and 220%.

During southwest monsoon season it is observed that values of rainfall variability CV ranges between 11% and 63% (Fig. 9(b)). Most part of the state is having CV values up to 40%. Some part in Dantewada, Gariabandh, Koriya, Surajpur, Balrampur and Balodabazar districts depicts CV values ranging between 40% and 50% and small portion in western part of Kabirdham district shows the highest values of CV of above 50%.

During post monsoon season the values of CV range between 51% and 201% (Fig. 9(c)). The gradient of CV is quite steep. CV values increases from south to northwards in the state and the highest value of CV is observed in Surajpur district.

During winter season the values of CV range between 73% and 326% (Fig. 9(d)). CV increases towards the south and highest values of CV are observed in southern most Sukma district with values of CV ranging between 220% and 326%. Dantewada and Kanker districts in southern part show CV ranging between 260% and 300%.

As 90 % of annual rainfall occurs during southwest monsoon season, the variability in this season over Chhattisgarh is relatively low and similar to that of annual rainfall while as the variability of rainfall during pre-monsoon and winter seasons are very high with CV values exceeding 200% over some parts of the state. In general the contribution of rainfall during southwest monsoon season to the annual rainfall is a maximum over the state.

### **Droughts:**

Meteorological 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 more than 20% of the years examined, such areas are classified as “drought areas” and areas having drought condition for more than 40% of the years under consideration represent “chronically drought affected areas”. Dantewada, Durg and Mahasamund districts in the state experienced 12, 10 and 7 years of drought out of 31, 41 and 27 respectively years of consideration during the period 1961-2010, satisfying the criteria for “drought areas”.

Following districts of the state were affected by drought during some year or the other during the period 1961-2010. The details of year wise occurrence of drought over each district during the 50 year period of 1961-2010 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.

Balod (6), Baloda Bazar( 4), Balrampur (3), Bastar (3), Bemetara (6), Bijapur (2), Bilaspur (1), Dantewada (12), Dhamtari (6), Durg (10), Gariabandh (5), Janjgir-Champa (2), Jashpur (4), Kanker(4), Kondagaon (4), Korba (3), Koriya (4),Kabirdham (2), Mahasamund (7), Mungeli(4), Narayanpur (1), Raigarh (2), Raipur (6), Rajnandgaon (5), Sukma (3), Surajpur (6), Surguja (3).

Occurrence of drought conditions in successive years is not frequent in the state. However, individual district have had successive years of drought. Severity 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 district wise years of drought and successive drought during the period under consideration 50 year period 1961-2010.

**Table ( i )**

| <b>Sr. No.</b> | <b>Names of district affected</b> | <b>Years of drought</b>   | <b>Years of successive drought</b>        |
|----------------|-----------------------------------|---|---|
| 1              | Balod                             | 1965, 1972, 1974, 1987, 1988, 2006.                                     | 1987 - 1988.                              |
| 2              | Baloda Bazar                      | 1965, 1979, 1988, 1998.   |   |
| 3              | Balrampur                         | 1974, 1979, 1992.   |   |
| 4              | Bastar                            | 1965, 1987, 1997.   |   |
| 5              | Bemetara                          | 1965, 1974, 1981, 1982, 1987, 1996.                                     | 1981 - 1982.                              |
| 6              | Bijapur                           | 1979 , 1998.  |   |
| 7              | Bilaspur                          | 1979  |   |
| 8              | Dantewada                         | 1962, 1963, 1964, 1974, 1979, 1984, 1987, 1992, 1996, 1997, 2002, 2005. | 1962 - 1963 - 1964, 1996 - 1997.          |
| 9              | Dhamtari                          | 1965, 1966, 1974, 1979, 1983, 1986.                                     | 1965 - 1966.                              |
| 10             | Durg                              | 1965, 1966, 1974, 1982, 1987, 1988, 1991, 1992, 1993, 2006.             | 1965 - 1966, 1987-1988, 1991-1992 - 1993. |
| 11             | Gariabandh                        | 1965, 1974, 1979, 1998, 2004.   |   |
| 12             | Janjgir-Champa                    | 1969, 1991.   |   |
| 13             | Jashpur                           | 1976, 2006, 2009, 2010.   | 2009 - 2010.                              |
| 14             | Kanker                            | 1965, 1966, 1974, 2000.   | 1965 - 1966.                              |
| 15             | Kondagaon                         | 1974, 1998, 2000, 2002.   |   |
| 16             | Korba                             | 1965, 1979, 1984.   |   |

**Table ( i )**

| <b>Sr. No.</b> | <b>Names of district affected</b> | <b>Years of drought</b>                   | <b>Years of successive drought</b> |
|----------------|-----------------------------------|---|------------------------------------|
| 17             | Koriya                            | 1962, 1965, 1976, 1979.                   |                                    |
| 18             | Kabirdham                         | 1991, 2004.                               |                                    |
| 19             | Mahasamund                        | 1965, 1974, 1977, 1979, 1984, 1992, 1993. | 1992 - 1993.                       |
| 20             | Mungeli                           | 1982, 1992, 1993, 1996.                   | 1992 - 1993.                       |
| 21             | Narayanpur                        | 1965                                      |                                    |
| 22             | Raigarh                           | 1965, 2009.                               |                                    |
| 23             | Raipur                            | 1965, 1966, 1974, 1979, 1988, 2004.       | 1965 – 1966.                       |
| 24             | Rajnandgaon                       | 1974, 1987, 1992, 1996, 2009.             |                                    |
| 25             | Sukma                             | 1968, 1973, 1984.                         |                                    |
| 26             | Surajpur                          | 1962, 1965, 1976, 1979, 1982, 1988.       |                                    |
| 27             | Surguja                           | 1974, 2004, 2010.                         |                                    |

Fig. 10 shows the percentage frequency of drought and years of successive drought in the districts during the period 1961-2010. 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>S.No.</b> | <b>Names of district affected</b> | <b>Years of severe drought</b> |
|--------------|-----------------------------------|--------------------------------|
| 1            | Balod                             | 1988 (49%)                     |
| 2            | Dantewada                         | 1963 (30%), 1987, 1997, 2002.  |
| 4            | Mahasamund                        | 1993 (48%)                     |
| 3            | Surajpur                          | 1979 (43%)                     |

It is observed that the lowest annual rainfall was in Dantewada district (30% of the normal rainfall) in year 1963.

It is observed that in year 1965 fifteen districts, in year 1974 thirteen districts and in year 1979 twelve districts out of 27 districts experienced drought.

There were no drought conditions in the state in the following 15 years: 1961, 1967, 1970, 1971, 1975, 1978, 1980, 1985, 1989, 1990, 1994, 1999, 2001, 2007 and 2008.

### **Excessive Rainfall:**

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

Fig. 11 shows the percentage frequency of excessive rainfall years and successive years of excessive rainfall during the period 1961-2010. The following table (iii) gives the district wise excessive rainfall years and the highest annual rainfall (expressed as percentage of normal) with the years of occurrence.

**Table (iii)**

| <b>District</b> | <b>Years of excessive rainfall</b>                                | <b>Highest amount of Rainfall in cm</b> | <b>Rainfall in% of normal</b> | <b>Year</b> | <b>Annual Rainfall in cms.</b> |
|-----------------|---|---|-------------------------------|-------------|--------------------------------|
| Balod           | 1961, 1973, 1975, 1978, 1994, 1997, 2001.                         | 191.0                                   | 172                           | 1961        | 111.1                          |
| Baloda Bazar    | 1961, 1964, 1967, 1970, 1973, 1994, 2006.                         | 189.1                                   | 182                           | 1961        | 103.9                          |
| Balrampur       | 1961, 1963, 1975, 1984, 1994, 2003.                               | 190.6                                   | 160                           | 2003        | 119.2                          |
| Bastar          | 1975, 2010.   | 208.0                                   | 132                           | 1975        | 157.6                          |
| Bemetara        | 1961, 1964, 1967, 1970, <b>1992, 1993, 1994</b> , 1998, 2005.     | 181.3                                   | 176                           | 1961        | 103.0                          |
| Bijapur         | 1963, 1988.   | 226.2                                   | 155                           | 1988        | 146.3                          |
| Bilaspur        | 1961, 1964, 1967, 1968, 1971, 1973, 1975, 1980, 1984, 1990, 1994. | 196.6                                   | 177                           | 1961        | 111.1                          |
| Dantewada       | 1986, 1990, 1993, 1994.   | 401.0                                   | 218                           | 1990        | 183.9                          |
| Dhamtari        | 1961, 1964, 1967, 1994, 2003.                                     | 192.4                                   | 162                           | 1994        | 118.8                          |
|                 |   |   |                               |             |                                |
| Durg            | 1961, 1970, 1971, 1973, 1980, 1997, 1999, 2003, 2010.             | 188.9                                   | 178                           | 2003        | 106.2                          |
| Gariabandh      | 1961, 1964, 1967, 1970, 1980, 1994.                               | 179.6                                   | 149                           | 1994        | 120.5                          |
| Janjgir-Champa  | 1961, 1973, 1983, 1994, 2003.                                     | 218.3                                   | 175                           | 1994        | 124.8                          |

**Table (iii)**

| <b>District</b> | <b>Years of excessive rainfall</b>                                      | <b>Highest amount of Rainfall in cm</b> | <b>Rainfall in% of normal</b> | <b>Year</b> | <b>Annual Rainfall in cms.</b> |
|-----------------|---|---|-------------------------------|-------------|--------------------------------|
| Jashpur         | 1961, 1971, 1973, 1977, 1983, 1996, 1998, 2001, 2003.                   | 239.4                                   | 161                           | 1971        | 148.7                          |
| Kanker          | 1986, 1994, 2001, 2003, 2006,   | 269.1                                   | 193                           | 1986        | 139.5                          |
| Kondagaon       | 1975, 1986, 1994, 2001.   | 209.8                                   | 159                           | 2001        | 132.0                          |
| Korba           | 1961, 1967, 1980, 1988, 1994, 1998, 2003.                               | 319.6                                   | 236                           | 1988        | 135.4                          |
| Koriya          | 1964, 1967, 1975, 1984, 1994, 1998, 2003.                               | 178.2                                   | 147                           | 2003        | 121.2                          |
| Kabirdham       | 1961, 1973, 1974, 1983, 1988, 1990, 1994, 1995, 1996, 1997, 1998, 1999. | 298.3                                   | 295                           | 1998        | 101.1                          |
| Mahasamund      | 1961, 1964, 1994, 2003.   | 223.1                                   | 185                           | 1961        | 120.6                          |
| Mungeli         | 1961  | 183.5                                   | 156                           | 1961        | 117.6                          |
| Narayanpur      | 1983, 1986, 1990, 1994.   | 217.2                                   | 160                           | 1990        | 135.8                          |
| Raigarh         | 1961, 1970, 1973, 1994.   | 245.7                                   | 186                           | 1961        | 132.1                          |
| Raipur          | 1961, 1964, 1970, 1971, 1973, 1980, 1989, 1990, 1994, 2003, 2005, 2007. | 181.8                                   | 161                           | 1970        | 112.9                          |
| Rajnandgaon     | 1961, 1964, 1967, 1973, 1994, 2005.                                     | 235.2                                   | 208                           | 1967        | 113.1                          |
| Sukma           | 2003, 2006, 2007.   | 237.5                                   | 171                           | 2006        | 138.9                          |
| Surajpur        | 1961, 1973, 1980, 1994, 1999, 2001, 2003.                               | 210.8                                   | 162                           | 1973        | 130.1                          |
| Surguja         | 1961, 1971, 1975, 1977, 1980, 1991, 1994.                               | 276.0                                   | 199                           | 1961        | 138.7                          |

From the above table, it is seen that during the period under consideration, there were 36 years in which some districts or the other in the state recorded excessive rainfall. In the year 1998, Kabirdham district received highest excessive rainfall, i.e. 295% of the annual normal rainfall. In the year 1994, maximum number of districts (i.e. 21 out of 27) of the state experienced excessive rainfall. Kabirdham and Raipur districts experienced maximum number of excessive rainfall years (12) while Mungeli district experienced minimum number of excessive rainfall ( 1 ) year . The successive years of excessive rainfall against each district are listed below:

### Successive years of Excessive Rainfall (Districtwise)

| Sr. No. | District       | Years of successive excessive rainfall                |
|---------|----------------|---|
| 1       | Balod          |   |
| 2       | Baloda bazar   |   |
| 3       | Balrampur      |   |
| 4       | Bastar         |   |
| 5       | Bemetara       | 1992 - 1993 - 1994.                                   |
| 6       | Bijapur        |   |
| 7       | Bilaspur       | 1967 - 1968.  |
| 8       | Dantewada      | 1993 - 1994.  |
| 9       | Dhamtari       |   |
| 10      | Durg           | 1970 - 1971.  |
| 11      | Gariabandh     |   |
| 12      | Janjgir-champa |   |
| 13      | Jashpur        |   |
| 14      | Kanker         |   |
| 15      | Kondagaon      |   |
| 16      | Korba          |   |
| 17      | Koriya         |   |
| 18      | Kabirdham      | 1973 - 1974, 1994 - 1995 - 1996 - 1997 - 1998 - 1999. |
| 19      | Mahasamund     |   |
| 20      | Mungeli        |   |
| 21      | Narayanpur     |   |
| 22      | Raigarh        |   |
| 23      | Raipur         | 1970 - 1971, 1989 - 1990.                             |
| 24      | Rajnandgaon    |   |
| 25      | Sukma          | 2006 - 2007.  |
| 26      | Surajpur       |   |
| 27      | Surguja        |   |

The heaviest one day rainfall on record at any station in the state was 917.2 mm on 08 September 2003 at Wadrafnagar in Balrampur district.

## **Cyclonic storms and depressions**

Table VII depicts the number of storms/depressions which affected the state during the period 1891- 2014. The cyclonic storms and depressions which affect the 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. The Chhattisgarh state is about 300 km away from the east coast of India. 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 movement, the disturbances sometimes turn or recurve towards north or northeast under the influence of deep westerly system moving across Pakistan and Northwest India. The point of recurvature progressively shifts westward till September. The disturbances in May recurve while still out in Bay of Bengal. As such exceptionally a few of them cross the coast and travel in land, weaken far away from the state and therefore cannot affect it.

In the months January to April, the state has not been affected by the storms and depressions for a single occasion, but during the month of December it was affected once since 1891. The number of storms /depressions that affected the state in October and November was 21 and 6 respectively while the maximum number being 27 in the month of July. The maximum numbers of storms/monsoon depressions originating from the Bay of Bengal affect the state during July, August and October. The monsoon depressions during June to September generally form over the head Bay of Bengal and travelling west or northwestwards, they move across Orissa, Chhattisgarh, Madhya Pradesh. With further advance of the year, the Bay storms / depressions progressively take southerly course. Therefore the track of the Bay of Bengal cyclones is still more southerly in October and November.

During the period 1891- 2014, 100 storms/depressions affected the Chhattisgarh state.



## **Other Weather Phenomena**

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

Convective activity is responsible for the occurrence of thunderstorms, hailstorms and dust storms in Chhattisgarh state. With the advance of the summer, thunderstorm activity becomes pronounced due to heating of the land. When the moisture in the atmosphere is insufficient, dry thunderstorms or duststorms occur. The maximum number of thunderstorms occurs with approach of the monsoon current, so its frequency reaches maximum in May or June or July in the state. While dust storms are mainly confined to the summer months of March to June. Pre-monsoon and monsoon thunderstorms are sometimes severe and accompanied by squalls or hail. The average number of days of thunderstorms during the monsoon season is ranging between 1 and 14 in the state and the maximum being in June. Thunderstorm activity is the least in the state during November and December.

### **(b) Fog**

Hill Fog is frequent over hilly terrain during the rainy months of June to September, when air is almost saturated and is easily cooled below the dew point while rising over high elevations. During July to September, hill fog occurs for some days in each month. Favourable conditions for formation of fog such as light to calm wind, sufficient humidity, clear skies, low temperatures etc., do exist after the withdrawal of the monsoon till March. But due to lack of sufficient moisture, fog occurs only occasionally in winter and post monsoon seasons, maximum frequency of fog occurrence being during the months of December and January.

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

| STATION   |   | JAN      | FEB        | MAR       | APR      | MAY         | JUNE   | JULY   | AUG    | SEP       | OCT    | NOV    | DEC    | ANNUAL |
|-----------|---|----------|------------|-----------|----------|-------------|--------|--------|--------|-----------|--------|--------|--------|--------|
| Ambikapur | a | 2.6      | 3.2        | 3.9       | 4.4      | 4.3         | 5      | 4.1    | 3.5    | 3.4       | 2.9    | 2.6    | 3.6    | 3.6    |
|           | m | C        | C/N        | C/N/S     | C/N/S    | C/SW/W      | C/W/SW | C/W/SW | C/W/SW | C/N/S     | C/N    | C/N    | C      |        |
|           | e | C/N      | N/C        | N/C       | C/N      | N           | N/C/W  | C/W/SW | C/W/N  | C/N       | C/N    | C/N    | C/N    |        |
| Bailadila | a | 9.2      | 11.6       | 13.0      | 15.3     | 16.8        | 21.5   | 23.5   | 25.3   | 16.7      | 11.8   | 12.2   | 9.0    | 15.6   |
|           | m | E/NE     | E/NE       | SW/S      | SW       | SW/W        | W/NW   | W      | W      | NW/W      | E/NE   | E/NE   | NE/E   |        |
|           | e | NE/E     | W/NE/SW/NW | W/SW/NW/S | W/SW     |             |        | W/NW   | W/NW   | W         | E/NE   | NE/N   | NE     |        |
| Bilaspur  | a | 0.6      | 1.6        | 2.5       | 4.6      | 4.9         | 4.8    | 3.1    | 2.3    | 1.5       | 0.6    | 0.6    | 0.3    | 2.3    |
|           | m | C/SW/W   | C/SW       | C         | C/E      | C           | C      | C      | C      | C         | C      | C      | C      |        |
|           | e | W/C      | SW/C       | C/SW      | C/E/N/NW | C           | C      | C      | C      | C         | C      | C      | C      |        |
| Champa    | a | 4.3      | 5.2        | 5.7       | 5.6      | 6.3         | 7.7    | 7.3    | 7      | 5         | 3.6    | 4.1    | 4.3    | 5.5    |
|           | m | N        | N          | N/C       | C/N      | C/E/<br>N/W | W      | W/SW   | W/SW   | C/W/<br>N | C/N    | N      | N      |        |
|           | e | C/N      | N/W/C      | W/C       | W        | NW/NW       | W/SW   | W/SW   | W/SW   | C/W       | C/N    | N/C    | C/N    |        |
| Durg      | a | 2.4      | 3.3        | 3.4       | 4.7      | 5.3         | 6.7    | 6.8    | 5.6    | 3.9       | 3      | 2.7    | 2      | 4.2    |
|           | m | N/NE     | N/NE       | N/NE/SW   | SW       | SW          | SW     | SW     | SW     | SW        | NE/N   | N/NE   | N/NE   |        |
|           | e | C/N/NE   | N/NE/C     | C/SW      | SW/C     | SW/W        | SW     | SW     | SW     | SW        | N/NE/C | NE/C/N | C/N/NE |        |
| Jagdalpur | a | 2.0      | 2.6        | 3.0       | 3.8      | 4.2         | 4.2    | 3.6    | 3.5    | 2.7       | 2.7    | 2.7    | 2.0    | 3.1    |
|           | m | C/NE/E/N | C/NE/S/SW  | C/SW/S/NE | SW/C/S   | SW          | SW     | SW     | C/W/SW | C/SW/W    | C/NE   | C/NE   | C/NE/N |        |
|           | e | C/S/NE/N | C/SW/NW/S  | C/SW/NW/S | SW/C/W/S | SW/S/W/NW   | SW/W   | SW/W   | C/W/SW | C/W/NW/SW | C/NE   | C/NE   | C      |        |

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

| STATION           |          | JAN        | FEB        | MAR        | APR        | MAY        | JUN        | JUL        | AUG        | SEP        | OCT        | NOV        | DEC        | ANNUAL     |
|-------------------|----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Jashpurnagar      | a        | 2.5        | 2.7        | 3.3        | 4.2        | 4.1        | 4.1        | 3.6        | 3.8        | 2.4        | 2.2        | 2.3        | 2.0        | 3.1        |
|                   | m        | NE         | NE         | NE         | NE         | NE/SW      | SW         | SW         | NE/SW      | NE         | NE         | NE         | NE         |            |
|                   | e        | SW         | SW         | SW/NW      | SW         | SW         | SW         | SW         | SW         | SW         | NE/SW      | SW/NE      | NE/SW      |            |
| Kanker            | a        | 2.7        | 4          | 5.4        | 7.3        | 8.3        | 10.3       | 9.7        | 8.8        | 6.1        | 3.4        | 2.5        | 2.1        | 5.9        |
|                   | m        | C          | C          | C/SW       | C/SW       | SW/C       | SW         | SW         | SW         | C/SW       | C          | C          | C          |            |
|                   | e        | C          | C          | C/SW       | C/SW/NW    | SW/W/C     | SW         | SW         | SW         | SW/C       | C/SW       | C/NE       | C/NE       |            |
| Pendra Road       | a        | 2.3        | 2.9        | 3.7        | 4.4        | 4.6        | 4.7        | 3.7        | 3.4        | 2.8        | 1.9        | 1.8        | 1.8        | 3.2        |
|                   | m        | C/N        | C/N        | C/N        | C/N/S      | C/S/N      | C/NW/N     | C/NW/W/SW  | C/N/NW/W   | C/N/NW     | C/N        | C/N        | C/N        |            |
|                   | e        | C/N        | N/C        | N          | N          | N          | C/N/SW/NW  | C/SW/W/S   | C/W/NW/N   | C/N        | C/N        | C/N        | C/N        |            |
| Raigarh           | a        | 2.5        | 4.2        | 3.3        | 3.7        | 4.4        | 5.2        | 4.3        | 4.6        | 3.2        | 2.9        | 3.1        | 2.5        | 3.7        |
|                   | m        | NE         | NE         | NE         | NE/SE      | SE/SW/NE   | SW         | SW         | SW         | SW         | NE         | NE         | NE         |            |
|                   | e        | NW         | NW         | NW         | SW/NW      | NW/SW      | SW         | SW         | SW         | SW         | SW/SE/NE   | NE/NW      | NW/NE      |            |
| Raipur            | a        | 3.6        | 4.4        | 4.4        | 6.0        | 7.7        | 10.0       | 9.5        | 8.6        | 6.4        | 3.9        | 3.4        | 2.8        | 5.9        |
|                   | m        | C/NE       | NE/C       | C/NE/SW    | SW/W       | W/SW       | SW/W       | SW         | SW         | W/C/SW     | C/NE       | NE/C       | C/NE       |            |
|                   | e        | C/NE       | C/W/NE     | W/SW/C     | W/SW       | W          | SW/W       | SW/W       | SW/W       | SW/C       | C/NE       | C/NE       | C/NE       |            |
| Rajnandgaon       | a        |            |            |            |            |            |            |            |            |            |            |            |            |            |
|                   | m        | C/NE       | NE/C       | C/NE/N     | C/NE       | NE/C       | C/SW/NE    | C/SW       | C/SW/NE    | NE/SW      | NE         | NE         | C/NE       |            |
|                   | e        | C/NE       | C/NE       | C/NE       | C/NE       | C/NE       | C/NE/SW    | C/SW/NE    | C/SW/NE    | NE/SW      | C/NE       | NE/C       | C/NE       |            |
| <b>State Mean</b> | <b>a</b> | <b>3.4</b> | <b>4.4</b> | <b>4.9</b> | <b>5.9</b> | <b>6.6</b> | <b>7.9</b> | <b>7.6</b> | <b>7.4</b> | <b>5.3</b> | <b>3.8</b> | <b>3.7</b> | <b>3.2</b> | <b>5.4</b> |

a: Mean Wind Speed in Km. per hour. m: Predominant Wind Direction in the Morning. e: : Predominant Wind Direction in the Evening.  
C: Calm.

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

**CHHATTISGARH**

| OBSERVATORY  | TEMP | JAN  | FEB  | MAR  | APR  | MAY  | JUN  | JUL  | AUG  | SEP  | OCT  | NOV  | DEC  | ANNUAL |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| Ambikapur    | Max  | 23.2 | 26.7 | 32.2 | 37.3 | 39.4 | 35.5 | 29.8 | 29.4 | 29.8 | 29.3 | 26.2 | 23.5 | 30.2   |
|              | Min  | 9.1  | 11.8 | 16.1 | 21.2 | 24.8 | 24.8 | 23.2 | 23.0 | 22.2 | 18.1 | 12.9 | 9.0  | 18.0   |
| Bailadila    | Max  | 22.8 | 24.8 | 28.7 | 31.2 | 31.8 | 27.1 | 22.8 | 22.3 | 24.0 | 25.1 | 24.0 | 22.8 | 25.6   |
|              | Min  | 13.5 | 15.5 | 18.9 | 20.5 | 21.3 | 19.4 | 17.9 | 17.6 | 18.0 | 17.4 | 15.1 | 13.2 | 17.4   |
| Champa       | Max  | 27.3 | 30.5 | 35.6 | 40.3 | 42.6 | 38.1 | 31.5 | 30.7 | 31.7 | 31.9 | 29.9 | 27.3 | 33.1   |
|              | Min  | 12.9 | 15.5 | 19.4 | 24.1 | 27.3 | 26.6 | 24.5 | 24.3 | 24.2 | 21.2 | 16.5 | 12.9 | 20.8   |
| Durg         | Max  | 28.1 | 30.4 | 35.7 | 40.2 | 42.4 | 37.4 | 31.0 | 30.5 | 31.6 | 32.3 | 30.2 | 27.6 | 33.1   |
|              | Min  | 13.8 | 16.4 | 20.7 | 25.1 | 28.3 | 26.5 | 24.2 | 24.4 | 24.3 | 22.0 | 17.3 | 13.7 | 21.4   |
| Ginabahar    | Max  | 26.2 | 28.9 | 34.1 | 38.5 | 40.1 | 35.8 | 30.4 | 29.9 | 30.8 | 31.2 | 29.2 | 26.4 | 31.8   |
|              | Min  | 9.0  | 11.9 | 16.2 | 21.1 | 24.0 | 24.0 | 22.8 | 22.9 | 22.1 | 18.5 | 13.3 | 9.3  | 17.9   |
| Jagdalpur    | Max  | 28.7 | 31.5 | 35.2 | 37.6 | 38.0 | 33.3 | 29.1 | 28.5 | 30.2 | 30.6 | 29.3 | 28.2 | 31.7   |
|              | Min  | 11.7 | 14.5 | 18.6 | 22.2 | 24.1 | 23.8 | 22.7 | 22.5 | 22.3 | 19.8 | 15.2 | 11.2 | 19.0   |
| Jashpurnagar | Max  | 24.2 | 26.6 | 31.4 | 35.2 | 36.6 | 33.0 | 29.2 | 28.6 | 28.9 | 29.2 | 27.1 | 25.1 | 29.6   |
|              | Min  | 8.1  | 10.7 | 14.9 | 19.3 | 22.3 | 22.5 | 21.9 | 21.6 | 20.5 | 16.9 | 11.8 | 7.7  | 16.5   |
| Kanker       | Max  | 27.9 | 30.9 | 34.9 | 38.3 | 40.3 | 35.4 | 30.0 | 29.3 | 30.4 | 30.8 | 29.3 | 27.2 | 32.1   |
|              | Min  | 12.6 | 15.7 | 19.8 | 24.4 | 26.9 | 25.8 | 23.7 | 23.3 | 23.0 | 19.9 | 15.5 | 12.1 | 20.2   |
| Pendra Road  | Max  | 24.5 | 27.5 | 32.4 | 37.3 | 39.3 | 35.5 | 30.0 | 29.3 | 29.9 | 30.0 | 27.7 | 25.4 | 30.7   |
|              | Min  | 11.1 | 13.6 | 17.9 | 22.6 | 25.4 | 24.8 | 23.2 | 22.9 | 22.1 | 18.7 | 14.4 | 11.2 | 19.0   |
| Raigarh      | Max  | 27.9 | 30.8 | 35.5 | 39.8 | 41.4 | 37.4 | 32.2 | 31.2 | 32.2 | 32.4 | 30.3 | 28.2 | 33.3   |
|              | Min  | 13.3 | 16.2 | 20.5 | 24.8 | 27.5 | 26.8 | 25.1 | 25.0 | 24.6 | 22.2 | 17.5 | 13.1 | 21.4   |
| Raipur       | Max  | 27.8 | 31.0 | 35.2 | 39.9 | 41.7 | 37.4 | 31.4 | 30.3 | 31.6 | 31.8 | 30.1 | 28.3 | 33.0   |
|              | Min  | 13.6 | 16.5 | 20.6 | 24.8 | 27.6 | 26.7 | 24.6 | 24.4 | 24.3 | 22.0 | 17.3 | 13.3 | 21.3   |
| Rajnandgaon  | Max  | 24.0 | 28.4 | 32.9 | 37.0 | 39.5 | 34.8 | 30.4 | 28.6 | 29.2 | 29.6 | 26.4 | 24.2 | 30.4   |
|              | Min  | 13.3 | 15.2 | 18.7 | 23.1 | 25.3 | 24.1 | 23.2 | 23.3 | 23.2 | 21.3 | 17.0 | 13.5 | 20.1   |
| State Mean   | Max  | 26.1 | 29.0 | 33.7 | 37.7 | 39.4 | 35.1 | 29.8 | 29.1 | 30.0 | 30.4 | 28.3 | 26.2 | 31.2   |
|              | Min  | 11.8 | 14.5 | 18.5 | 22.8 | 25.4 | 24.7 | 23.1 | 22.9 | 22.6 | 19.8 | 15.3 | 11.7 | 19.4   |

**TABLE – III**  
**MEAN RELATIVE HUMIDITY ( % )**  
**CHHATTISGARH**

| OBSERVATORY       |          | JAN       | FEB       | MAR       | APR       | MAY       | JUN       | JUL       | AUG       | SEP       | OCT       | NOV       | DEC       | ANNUAL    |
|-------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Ambikapur         | M        | 77        | 67        | 51        | 39        | 43        | 66        | 86        | 88        | 86        | 79        | 77        | 77        | 70        |
|                   | E        | 50        | 40        | 29        | 23        | 28        | 55        | 81        | 83        | 79        | 64        | 57        | 54        | 53        |
| Bailadila         | M        | 59        | 57        | 46        | 51        | 60        | 82        | 95        | 96        | 89        | 72        | 65        | 58        | 70        |
|                   | E        | 45        | 39        | 36        | 39        | -         | -         | 90        | 94        | 89        | 78        | 65        | 50        | 52        |
| Champa            | M        | 69        | 59        | 45        | 40        | 40        | 66        | 87        | 88        | 85        | 79        | 72        | 70        | 67        |
|                   | E        | 41        | 32        | 23        | 20        | 21        | 49        | 76        | 78        | 74        | 59        | 46        | 45        | 47        |
| Durg              | M        | 70        | 62        | 51        | 46        | 44        | 68        | 85        | 85        | 82        | 76        | 68        | 70        | 67        |
|                   | E        | 50        | 46        | 35        | 26        | 25        | 60        | 76        | 80        | 73        | 63        | 51        | 52        | 53        |
| Ginabahal         | M        | 68        | 61        | 44        | 38        | 44        | 67        | 86        | 86        | 81        | 71        | 65        | 68        | 65        |
|                   | E        | 43        | 38        | 29        | 26        | 32        | 59        | 79        | 80        | 76        | 58        | 52        | 48        | 52        |
| Jagdalpur         | M        | 76        | 67        | 59        | 56        | 59        | 75        | 87        | 89        | 85        | 80        | 78        | 78        | 74        |
|                   | E        | 47        | 38        | 33        | 35        | 43        | 66        | 81        | 83        | 79        | 70        | 62        | 55        | 58        |
| Jashpurmagar      | M        | 65        | 58        | 49        | 47        | 53        | 72        | 85        | 87        | 84        | 73        | 66        | 63        | 67        |
|                   | E        | 55        | 47        | 34        | 32        | 40        | 65        | 82        | 82        | 81        | 69        | 60        | 55        | 58        |
| Kanker            | M        | 64        | 59        | 48        | 45        | 45        | 67        | 80        | 83        | 80        | 73        | 68        | 67        | 65        |
|                   | E        | 41        | 37        | 33        | 31        | 33        | 57        | 76        | 78        |           | 61        | 51        | 43        | 51        |
| Pendra Road       | M        | 68        | 58        | 45        | 34        | 40        | 63        | 84        | 87        | 83        | 70        | 65        | 66        | 64        |
|                   | E        | 49        | 40        | 31        | 24        | 29        | 55        | 79        | 81        | 76        | 62        | 54        | 50        | 53        |
| Raigarh           | M        | 69        | 64        | 51        | 42        | 47        | 65        | 83        | 85        | 82        | 73        | 68        | 70        | 67        |
|                   | E        | 49        | 40        | 31        | 26        | 30        | 53        | 74        | 79        | 75        | 62        | 53        | 51        | 52        |
| Raipur            | M        | 68        | 62        | 49        | 42        | 44        | 64        | 85        | 87        | 82        | 77        | 72        | 68        | 67        |
|                   | E        | 44        | 35        | 29        | 23        | 27        | 51        | 76        | 79        | 74        | 64        | 54        | 47        | 50        |
| Rajnandgaon       | M        | 69        | 61        | 51        | 44        | 47        | 65        | 84        | 88        | 86        | 78        | 70        | 69        | 68        |
|                   | E        | 52        | 39        | 34        | 23        | 30        | 52        | 74        | 80        | 77        | 67        | 54        | 58        | 53        |
| <b>State Mean</b> | <b>M</b> | <b>69</b> | <b>61</b> | <b>49</b> | <b>44</b> | <b>47</b> | <b>68</b> | <b>86</b> | <b>87</b> | <b>84</b> | <b>75</b> | <b>69</b> | <b>69</b> | <b>67</b> |
|                   | <b>E</b> | <b>47</b> | <b>39</b> | <b>31</b> | <b>27</b> | <b>31</b> | <b>57</b> | <b>79</b> | <b>81</b> | <b>77</b> | <b>65</b> | <b>55</b> | <b>51</b> | <b>53</b> |

M: MORNING      E: EVENING

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

| OBSERVATORY       |          | JAN        | FEB        | MAR        | APR        | MAY        | JUN        | JUL        | AUG        | SEP        | OCT        | NOV        | DEC        | ANNUAL     |
|-------------------|----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Ambikapur         | a        | 19         | 18         | 19         | 17         | 16         | 4          | 0          | 0          | 4          | 15         | 20         | 22         | 154        |
|                   | b        | 2          | 2          | 2          | 1          | 1          | 7          | 14         | 14         | 8          | 3          | 1          | 1          | 56         |
|                   | c        | 1.6        | 1.5        | 1.5        | 1.5        | 1.8        | 4.4        | 6.2        | 6.3        | 4.6        | 2.1        | 1.3        | 1.0        | 2.8        |
| Bailadila         | a        | 23         | 21         | 22         | 18         | 11         | 4          | 1          | 4          | 7          | 13         | 15         | 19         | 194        |
|                   | b        | 0          | 0          | 0          | 0          | 1          | 4          | 20         | 4          | 1          | 1          | 1          | 0          | 18         |
|                   | c        | 0.9        | 1          | 0.9        | 1.5        | 2.3        | 4.2        | 6          | 4.5        | 3.2        | 2.1        | 1.8        | 1.4        | 2.2        |
| Champa            | a        | 18         | 15         | 17         | 15         | 12         | 2          | 0          | 0          | 2          | 12         | 16         | 16         | 125        |
|                   | b        | 2          | 2          | 1          | 1          | 1          | 9          | 19         | 20         | 9          | 2          | 1          | 1          | 68         |
|                   | c        | 1.8        | 1.7        | 1.8        | 2.1        | 2.3        | 5.7        | 7          | 7.1        | 5.5        | 2.7        | 2          | 2          | 3.5        |
| Durg              | a        | 23         | 22         | 26         | 24         | 22         | 7          | 2          | 3          | 11         | 21         | 24         | 26         | 211        |
|                   | b        | 2          | 1          | 1          | 1          | 1          | 12         | 21         | 17         | 8          | 3          | 2          | 1          | 70         |
|                   | c        | 1.2        | 1.2        | 0.9        | 0.9        | 1.2        | 4.8        | 7          | 6.1        | 3.8        | 2          | 1          | 0.8        | 2.5        |
| Ginabahar         | a        | 23         | 20         | 23         | 24         | 21         | 8          | 1          | 1          | 5          | 18         | 23         | 24         | 191        |
|                   | b        | 4          | 4          | 3          | 2          | 4          | 13         | 22         | 17         | 14         | 6          | 3          | 3          | 95         |
|                   | c        | 1.6        | 1.6        | 1.5        | 1.2        | 1.7        | 4.8        | 7          | 6.2        | 5.3        | 2.3        | 1.3        | 1.2        | 3.0        |
| Jagdalpur         | a        | 20         | 20         | 20         | 16         | 9          | 1          | 0          | 0          | 1          | 9          | 14         | 18         | 128        |
|                   | b        | 2          | 1          | 1          | 1          | 2          | 10         | 16         | 18         | 8          | 3          | 2          | 1          | 64         |
|                   | c        | 1.4        | 1.2        | 1.4        | 1.7        | 2.9        | 5.8        | 6.7        | 7.0        | 5.6        | 3.4        | 2.3        | 1.6        | 3.4        |
| Jashpurnagar      | a        | 22         | 21         | 23         | 22         | 20         | 6          | 1          | 0          | 3          | 15         | 23         | 26         | 180        |
|                   | b        | 1          | 1          | 1          | 0          | 0          | 3          | 6          | 5          | 3          | 1          | 1          | 1          | 23         |
|                   | c        | 1.2        | 1.1        | 0.9        | 0.9        | 1.5        | 4.0        | 5.8        | 5.8        | 4.6        | 2.2        | 1.0        | 0.6        | 2.5        |
| Kanker            | a        | 22         | 21         | 21         | 18         | 17         | 3          | 0          | 0          | 2          | 12         | 19         | 22         | 157        |
|                   | b        | 2          | 1          | 1          | 1          | 2          | 11         | 18         | 18         | 9          | 4          | 2          | 2          | 71         |
|                   | c        | 1.3        | 1.2        | 1.4        | 1.7        | 2          | 5.5        | 7          | 6.8        | 5.2        | 2.9        | 1.8        | 1.6        | 3.2        |
| Pendra road       | a        | 18         | 18         | 18         | 17         | 14         | 4          | 0          | 0          | 3          | 15         | 19         | 20         | 146        |
|                   | b        | 2          | 1          | 1          | 1          | 1          | 6          | 13         | 13         | 7          | 2          | 1          | 1          | 47         |
|                   | c        | 1.7        | 1.5        | 1.5        | 1.5        | 1.9        | 4.8        | 6.4        | 6.5        | 5.0        | 2.3        | 1.4        | 1.3        | 3.0        |
| Raigarh           | a        | 21         | 21         | 22         | 20         | 18         | 5          | 2          | 1          | 7          | 17         | 22         | 23         | 180        |
|                   | b        | 2          | 1          | 2          | 2          | 3          | 9          | 15         | 16         | 9          | 3          | 2          | 1          | 63         |
|                   | c        | 1.3        | 0.8        | 1.0        | 1.1        | 1.7        | 4.4        | 5.7        | 6.0        | 4.3        | 1.8        | 0.9        | 0.7        | 2.5        |
| Raipur            | a        | 18         | 17         | 18         | 14         | 10         | 1          | 0          | 0          | 2          | 10         | 15         | 22         | 128        |
|                   | b        | 1          | 1          | 0          | 1          | 1          | 5          | 12         | 13         | 4          | 2          | 1          | 0          | 41         |
|                   | c        | 1.6        | 1.5        | 1.5        | 1.6        | 2.5        | 5.3        | 6.4        | 6.7        | 5          | 2.8        | 1.6        | 1          | 3.1        |
| Rajnandgaon       | a        | 22         | 22         | 23         | 21         | 22         | 13         | 12         | 10         | 16         | 21         | 20         | 24         | 226        |
|                   | b        | 0          | 0          | 0          | 0          | 0          | 1          | 1          | 2          | 1          | 0          | 0          | 0          | 5          |
|                   | c        | 0.3        | 0.1        | 0.1        | 0.1        | 0.2        | 1.0        | 0.9        | 1.5        | 1.2        | 0.5        | 0.2        | 0.1        | 0.5        |
| <b>State Mean</b> | <b>a</b> | <b>21</b>  | <b>20</b>  | <b>21</b>  | <b>19</b>  | <b>16</b>  | <b>5</b>   | <b>2</b>   | <b>2</b>   | <b>5</b>   | <b>15</b>  | <b>19</b>  | <b>22</b>  | <b>165</b> |
|                   | <b>b</b> | <b>2</b>   | <b>1</b>   | <b>1</b>   | <b>1</b>   | <b>1</b>   | <b>7</b>   | <b>15</b>  | <b>13</b>  | <b>7</b>   | <b>3</b>   | <b>1</b>   | <b>1</b>   | <b>53</b>  |
|                   | <b>c</b> | <b>1.3</b> | <b>1.2</b> | <b>1.2</b> | <b>1.3</b> | <b>1.8</b> | <b>4.6</b> | <b>6.0</b> | <b>5.9</b> | <b>4.4</b> | <b>2.3</b> | <b>1.4</b> | <b>1.1</b> | <b>2.7</b> |

a: Days with clear sky.

b: Days with sky overcast.

c: Mean Cloud Amount.

\*\* = Unit, equal to one eighth of sky used in specifying cloud amount.

For example: 1 Okta means 1/8<sup>th</sup> of the sky covered.

TABLE IV ( A)

MEAN CLOUD AMOUNT \*\* (OKTA OF THE SKY) AND MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AT 1730 HRS. IST

| OBSERVATORY  |   | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|--------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Ambikapur    | a | 16  | 14  | 13  | 10  | 6   | 1   | 0   | 0   | 1   | 9   | 14  | 18  | 100    |
|              | b | 2   | 1   | 2   | 2   | 3   | 10  | 15  | 14  | 9   | 3   | 2   | 1   | 63     |
|              | c | 1.9 | 1.8 | 2.3 | 2.7 | 3.5 | 5.7 | 6.6 | 6.8 | 5.6 | 3.1 | 1.9 | 1.5 | 3.6    |
| Bailadila    | a | 16  | 16  | 11  | 9   | -   | -   | 0   | 2   | 7   | 1   | 6   | 10  | 78     |
|              | b | 0   | 0   | 0   | 0   | -   | -   | 0   | 0   | 1   | 2   | 0   | 0   | 3      |
|              | c | 1.4 | 1.1 | 1.9 | 1.9 | -   | -   | 4.2 | 2.3 | 3.8 | 3.6 | 1.0 | 2.3 | 2.3    |
| Champa       | a | 14  | 10  | 10  | 6   | 5   | 0   | 0   | 0   | 0   | 7   | 12  | 14  | 78     |
|              | b | 2   | 2   | 2   | 2   | 3   | 14  | 19  | 20  | 12  | 3   | 2   | 2   | 83     |
|              | c | 2.1 | 2.2 | 2.4 | 3.3 | 3.7 | 6.5 | 7   | 7.2 | 6.3 | 3.4 | 2.4 | 2.3 | 4.1    |
| Durg         | a | 26  | 23  | 27  | 21  | 21  | 6   | 2   | 3   | 7   | 20  | 25  | 28  | 209    |
|              | b | 1   | 1   | 1   | 1   | 2   | 13  | 21  | 19  | 12  | 3   | 1   | 0   | 75     |
|              | c | 0.7 | 0.9 | 0.6 | 1.5 | 1.8 | 5.2 | 6   | 5.8 | 4.7 | 2.1 | 0.7 | 0.5 | 2.6    |
| Ginabahal    | a | 22  | 19  | 19  | 19  | 13  | 4   | 2   | 2   | 4   | 16  | 22  | 23  | 165    |
|              | b | 5   | 5   | 6   | 5   | 9   | 19  | 22  | 15  | 16  | 10  | 4   | 5   | 121    |
|              | c | 1.9 | 1.9 | 2.5 | 2.2 | 3.7 | 6.1 | 7   | 6   | 5.7 | 3.1 | 1.6 | 1.6 | 3.6    |
| Jagdalpur    | a | 13  | 11  | 8   | 3   | 2   | 0   | 0   | 0   | 0   | 3   | 8   | 13  | 61     |
|              | b | 1   | 0   | 1   | 2   | 5   | 12  | 18  | 18  | 12  | 6   | 2   | 1   | 78     |
|              | c | 2.2 | 2.2 | 2.8 | 4.1 | 4.9 | 6.6 | 7   | 7.3 | 6.8 | 4.9 | 3.2 | 2.2 | 4.5    |
| Jashpurnagar | a | 21  | 18  | 21  | 17  | 14  | 4   | 1   | 0   | 2   | 13  | 21  | 24  | 154    |
|              | b | 1   | 1   | 1   | 1   | 1   | 5   | 7   | 7   | 4   | 1   | 1   | 1   | 29     |
|              | c | 1.2 | 1.1 | 1   | 1.4 | 2.2 | 4.4 | 5.5 | 5.7 | 4.5 | 2.2 | 1.1 | 0.6 | 2.6    |
| Kanker       | a | 21  | 17  | 17  | 10  | 11  | 2   | 0   | 0   | 1   | 11  | 17  | 18  | 125    |
|              | b | 1   | 1   | 1   | 2   | 3   | 10  | 18  | 17  | 13  | 4   | 2   | 2   | 74     |
|              | c | 1.4 | 1.5 | 1.8 | 3   | 2.9 | 5.9 | 7   | 7.1 | 6.1 | 3.5 | 2.2 | 2   | 3.7    |
| Pendra Road  | a | 15  | 12  | 11  | 8   | 4   | 1   | 0   | 0   | 1   | 8   | 13  | 16  | 89     |
|              | b | 2   | 0   | 1   | 1   | 1   | 8   | 13  | 12  | 7   | 2   | 1   | 1   | 48     |
|              | c | 2.2 | 2.1 | 2.6 | 3   | 3.6 | 5.8 | 6.6 | 6.8 | 5.7 | 3.1 | 2   | 1.8 | 3.8    |
| Raigarh      | a | 17  | 17  | 20  | 15  | 12  | 3   | 2   | 1   | 3   | 12  | 16  | 19  | 138    |
|              | b | 2   | 1   | 1   | 2   | 4   | 10  | 17  | 15  | 11  | 5   | 2   | 1   | 71     |
|              | c | 1.5 | 1.1 | 1.1 | 1.5 | 2.8 | 4.8 | 6.4 | 5.4 | 4.7 | 2.8 | 1.6 | 1.2 | 2.9    |
| Raipur       | a | 16  | 17  | 14  | 8   | 3   | 0   | 0   | 0   | 0   | 5   | 9   | 17  | 88     |
|              | b | 1   | 0   | 0   | 0   | 1   | 4   | 10  | 10  | 4   | 1   | 1   | 0   | 32     |
|              | c | 1.6 | 1.2 | 1.8 | 2.6 | 3.6 | 5.7 | 6.7 | 6.8 | 5.7 | 3.6 | 2.2 | 1.4 | 3.6    |
| Rajnandgaon  | a | 21  | 19  | 20  | 18  | 20  | 11  | 13  | 9   | 11  | 17  | 19  | 22  | 199    |
|              | b | 0   | 0   | 0   | 0   | 0   | 0   | 1   | 2   | 0   | 0   | 0   | 0   | 3      |
|              | c | 0.3 | 0.1 | 0.1 | 0.2 | 0.4 | 1   | 1.1 | 1.5 | 1.1 | 0.4 | 0.2 | 0.2 | 0.5    |
| State Mean   | a | 18  | 16  | 16  | 12  | 10  | 3   | 2   | 1   | 3   | 10  | 15  | 18  | 124    |
|              | b | 1   | 1   | 1   | 1   | 3   | 9   | 13  | 12  | 8   | 3   | 1   | 1   | 54     |
|              | c | 1.5 | 1.4 | 1.7 | 2.3 | 3.0 | 5.2 | 5.9 | 5.7 | 5.1 | 2.7 | 1.7 | 1.5 | 3.1    |

a : Days with clear sky.

b : Days with sky overcast.

c : Mean Cloud amount.

\*\* = Unit, equal to 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 ( in mm) AND NUMBER OF RAINY DAYS**  
**CHHATTISGARH**

| DISTRICT       |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT   | NOV  | DEC  | ANNUAL |
|----------------|---|------|------|------|------|------|-------|-------|-------|-------|-------|------|------|--------|
| Balod          | a | 12.8 | 7.0  | 3.9  | 1.5  | 4.6  | 178.8 | 340.1 | 321.7 | 175.0 | 52.3  | 10.3 | 2.5  | 1110.5 |
|                | b | 0.7  | 0.4  | 0.2  | 0.1  | 0.2  | 6.8   | 14.2  | 13.2  | 7.9   | 2.5   | 0.3  | 0.2  | 46.7   |
| Baloda Bazar   | a | 5.6  | 6.6  | 6.3  | 2.7  | 5.2  | 152.3 | 328.4 | 304.5 | 175.8 | 41.4  | 5.7  | 4.6  | 1039.1 |
|                | b | 0.4  | 0.5  | 0.5  | 0.2  | 0.5  | 7.3   | 14.8  | 13.5  | 8.3   | 2.3   | 0.3  | 0.3  | 48.9   |
| Balrampur      | a | 9.8  | 18.0 | 12.1 | 9.3  | 5.6  | 167.7 | 342.0 | 313.1 | 252.1 | 49.8  | 7.3  | 4.7  | 1191.5 |
|                | b | 0.6  | 1.1  | 1.0  | 0.7  | 0.5  | 8.0   | 15.5  | 14.8  | 9.9   | 2.9   | 0.4  | 0.4  | 55.8   |
| Bastar         | a | 14.8 | 7.3  | 14.8 | 37.2 | 69.9 | 209.5 | 400.6 | 440.1 | 240.8 | 107.2 | 26.5 | 7.0  | 1575.7 |
|                | b | 1.1  | 0.6  | 1.3  | 2.7  | 4.8  | 9.8   | 18.1  | 18.3  | 12.6  | 5.4   | 1.5  | 0.5  | 76.7   |
| Bemetara       | a | 7.1  | 4.0  | 5.0  | 3.3  | 8.5  | 161.6 | 339.5 | 286.0 | 160.9 | 44.7  | 3.7  | 5.8  | 1030.1 |
|                | b | 0.4  | 0.4  | 0.4  | 0.3  | 0.5  | 7.1   | 14.3  | 12.6  | 7.8   | 2.1   | 0.2  | 0.3  | 46.4   |
| Bijapur        | a | 9.2  | 3.8  | 6.6  | 16.1 | 9.4  | 196.6 | 443.0 | 462.3 | 215.4 | 86.0  | 11.0 | 3.9  | 1463.3 |
|                | b | 0.4  | 0.2  | 0.3  | 0.7  | 0.6  | 8.1   | 16.5  | 17.5  | 10.3  | 4.1   | 0.6  | 0.2  | 59.5   |
| Bilaspur       | a | 16.7 | 10.3 | 16.1 | 8.9  | 9.5  | 169.2 | 328.4 | 297.2 | 184.7 | 51.1  | 14.1 | 4.3  | 1110.5 |
|                | b | 1.1  | 0.9  | 1.2  | 0.7  | 0.8  | 7.6   | 15.4  | 14.1  | 9.2   | 2.7   | 0.8  | 0.3  | 54.8   |
| Dantewada      | a | 13.9 | 8.0  | 8.7  | 20.8 | 43.1 | 237.0 | 560.5 | 568.2 | 255.9 | 97.4  | 18.6 | 7.2  | 1839.3 |
|                | b | 0.9  | 0.6  | 0.6  | 1.6  | 2.5  | 9.5   | 19.3  | 20.5  | 12.7  | 5.5   | 1.4  | 0.7  | 75.8   |
| Dhamtari       | a | 5.3  | 7.2  | 6.9  | 10.2 | 15.6 | 178.5 | 335.2 | 345.6 | 215.5 | 55.9  | 7.8  | 3.9  | 1187.6 |
|                | b | 0.4  | 0.5  | 0.5  | 0.7  | 1.1  | 7.9   | 14.1  | 13.8  | 9.5   | 2.9   | 0.5  | 0.3  | 52.2   |
| Durg           | a | 5.7  | 3.7  | 8.1  | 5.1  | 6.9  | 186.3 | 306.8 | 303.7 | 174.9 | 50.1  | 7.8  | 2.4  | 1061.5 |
|                | b | 0.4  | 0.4  | 0.5  | 0.4  | 0.6  | 8.3   | 13.6  | 13.6  | 8.1   | 2.7   | 0.3  | 0.2  | 49.1   |
| Gariabandh     | a | 5.8  | 7.8  | 9.4  | 13.3 | 18.8 | 196.3 | 344.6 | 339.3 | 199.2 | 56.7  | 9.5  | 4.4  | 1205.1 |
|                | b | 0.4  | 0.6  | 0.8  | 1.1  | 1.3  | 8.4   | 14.8  | 14.3  | 9.2   | 3.2   | 0.5  | 0.3  | 54.9   |
| Janjgir-Champa | a | 10.4 | 8.6  | 9.1  | 7.0  | 11.1 | 170.3 | 394.4 | 384.0 | 196.5 | 41.0  | 7.2  | 8.1  | 1247.7 |
|                | b | 0.7  | 0.7  | 0.7  | 0.5  | 0.8  | 7.1   | 16.1  | 14.9  | 8.9   | 2.4   | 0.5  | 0.6  | 53.9   |
| Jashpur        | a | 18.6 | 16.1 | 14.1 | 15.8 | 31.9 | 255.9 | 427.0 | 369.9 | 251.5 | 62.4  | 12.9 | 10.8 | 1486.9 |
|                | b | 1.2  | 1.4  | 1.2  | 1.2  | 2.4  | 11.3  | 19.2  | 18.3  | 12.6  | 3.6   | 0.8  | 0.7  | 73.9   |
| Kanker         | a | 8.9  | 6.4  | 9.1  | 14.6 | 11.6 | 208.0 | 418.7 | 436.4 | 209.0 | 58.3  | 8.6  | 4.9  | 1394.5 |
|                | b | 0.5  | 0.4  | 0.6  | 0.9  | 0.8  | 8.0   | 15.2  | 15.6  | 9.0   | 3.0   | 0.6  | 0.3  | 54.9   |
| Kondagaon      | a | 14.1 | 4.3  | 7.2  | 20.6 | 24.1 | 201.6 | 369.7 | 380.1 | 214.1 | 67.6  | 10.6 | 5.5  | 1319.5 |
|                | b | 0.5  | 0.3  | 0.6  | 1.5  | 1.5  | 9.2   | 16.1  | 16.4  | 10.6  | 3.9   | 0.6  | 0.4  | 61.6   |
| Korba          | a | 13.6 | 12.0 | 7.8  | 10.7 | 6.5  | 179.0 | 429.7 | 405.9 | 224.5 | 50.1  | 8.1  | 6.2  | 1354.1 |
|                | b | 0.7  | 1.0  | 0.7  | 0.5  | 0.5  | 7.9   | 17.0  | 15.7  | 10.3  | 2.6   | 0.4  | 0.3  | 57.6   |
| Koriya         | a | 9.1  | 9.4  | 9.5  | 3.6  | 4.9  | 173.7 | 377.0 | 352.8 | 231.9 | 30.2  | 6.5  | 3.4  | 1212.0 |
|                | b | 0.7  | 0.6  | 0.8  | 0.4  | 0.4  | 7.5   | 16.2  | 15.2  | 10.3  | 2.2   | 0.4  | 0.2  | 54.9   |
| Kabirdham      | a | 12.8 | 10.9 | 8.3  | 6.0  | 5.3  | 139.6 | 331.9 | 252.9 | 168.5 | 54.7  | 14.7 | 5.6  | 1011.2 |
|                | b | 0.8  | 0.9  | 0.7  | 0.4  | 0.5  | 6.6   | 14.3  | 13.2  | 8.1   | 2.9   | 0.8  | 0.3  | 49.5   |
| Mahasamund     | a | 5.1  | 8.7  | 10.1 | 6.0  | 15.6 | 186.9 | 369.5 | 337.5 | 210.6 | 44.9  | 4.0  | 6.8  | 1205.7 |
|                | b | 0.3  | 0.7  | 0.6  | 0.7  | 1.4  | 8.1   | 15.0  | 14.4  | 9.4   | 2.6   | 0.4  | 0.4  | 54.0   |
| Mungeli        | a | 9.7  | 16.5 | 15.1 | 7.6  | 8.4  | 149.1 | 355.5 | 337.0 | 220.7 | 39.2  | 4.9  | 12.4 | 1176.1 |



**TABLE- V**  
**MEAN RAINFALL ( in mm) AND NUMBER OF RAINY DAYS**  
**CHHATTISGARH**

| DISTRICT          |          | JAN         | FEB        | MAR        | APR         | MAY         | JUN          | JUL          | AUG          | SEP          | OCT         | NOV         | DEC        | ANNUAL        |
|-------------------|----------|-------------|------------|------------|-------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|------------|---------------|
|                   | b        | 0.6         | 0.9        | 1.2        | 0.7         | 0.8         | 7.9          | 17.0         | 16.0         | 10.5         | 2.2         | 0.3         | 0.6        | 58.7          |
| Narayanpur        | a        | 8.1         | 9.0        | 10.4       | 17.5        | 19.4        | 186.2        | 398.4        | 410.6        | 207.1        | 74.1        | 10.9        | 6.1        | 1357.8        |
|                   | b        | 0.3         | 0.6        | 0.5        | 1.2         | 1.1         | 9.2          | 17.0         | 18.2         | 11.2         | 4.2         | 0.7         | 0.4        | 64.6          |
| Raigarh           | a        | 11.6        | 10.8       | 11.6       | 11.7        | 21.3        | 205.0        | 390.8        | 363.7        | 227.5        | 50.8        | 8.7         | 7.7        | 1321.2        |
|                   | b        | 0.8         | 0.9        | 1.0        | 1.0         | 1.6         | 9.2          | 17.0         | 16.2         | 11.0         | 2.9         | 0.6         | 0.5        | 62.7          |
| Raipur            | a        | 7.1         | 8.2        | 10.4       | 7.2         | 16.9        | 190.7        | 320.3        | 303.5        | 193.9        | 54.6        | 8.8         | 7.7        | 1129.3        |
|                   | b        | 0.6         | 0.8        | 0.8        | 0.7         | 1.2         | 8.4          | 14.5         | 13.8         | 9.1          | 2.9         | 0.5         | 0.5        | 53.8          |
| Rajnandgaon       | a        | 12.7        | 8.0        | 8.4        | 4.0         | 9.6         | 177.1        | 330.0        | 333.9        | 177.5        | 51.2        | 10.7        | 7.7        | 1130.8        |
|                   | b        | 0.7         | 0.6        | 0.6        | 0.4         | 0.7         | 7.1          | 14.3         | 14.1         | 8.5          | 2.5         | 0.5         | 0.4        | 50.4          |
| Sukma             | a        | 5.1         | 2.8        | 6.1        | 20.8        | 34.2        | 184.5        | 379.9        | 385.2        | 246.7        | 97.2        | 20.5        | 5.6        | 1388.6        |
|                   | b        | 0.3         | 0.2        | 0.3        | 1.4         | 2.2         | 8.4          | 17.3         | 17.7         | 11.7         | 5.3         | 0.9         | 0.3        | 66.0          |
| Surajpur          | a        | 9.1         | 15.6       | 11.3       | 6.0         | 4.4         | 206.4        | 416.1        | 342.8        | 198.6        | 72.1        | 9.2         | 9.4        | 1301.0        |
|                   | b        | 0.7         | 0.9        | 0.6        | 0.2         | 0.3         | 8.3          | 15.7         | 14.5         | 9.2          | 3.1         | 0.6         | 0.6        | 54.7          |
| Surguja           | a        | 24.2        | 10.1       | 12.7       | 7.2         | 11.0        | 243.9        | 403.7        | 365.6        | 235.2        | 56.4        | 9.1         | 7.8        | 1386.9        |
|                   | b        | 1.2         | 0.9        | 1.2        | 0.7         | 1.0         | 9.9          | 17.5         | 16.9         | 11.1         | 3.5         | 0.5         | 0.6        | 65.0          |
| <b>State Mean</b> | <b>a</b> | <b>10.6</b> | <b>8.9</b> | <b>9.6</b> | <b>10.9</b> | <b>16.0</b> | <b>188.6</b> | <b>377.1</b> | <b>360.9</b> | <b>209.8</b> | <b>59.2</b> | <b>10.3</b> | <b>6.2</b> | <b>1268.1</b> |
|                   | <b>b</b> | <b>0.6</b>  | <b>0.7</b> | <b>0.7</b> | <b>0.8</b>  | <b>1.1</b>  | <b>8.3</b>   | <b>15.9</b>  | <b>15.5</b>  | <b>9.9</b>   | <b>3.2</b>  | <b>0.6</b>  | <b>0.4</b> | <b>57.7</b>   |

a :- Normal Rainfall ( mm )

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

TABLE-VI  
MEAN RAINFALL(mm) OVER DIFFERENT RIVER CATCHMENTS OF CHHATTISGARH STATE

| Sr.No | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT   | NOV  | DEC  | ANNUAL |
|-------|--|------|------|------|------|-------|-------|-------|-------|-------|------|------|--------|
| 1     | River Indravati. (Catchment.No.316 )   |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Districts/Parts of districts within this catchment:-</u><br>BASTAR, BIJAPUR, NARAYANPUR, KONDAGAON. / DANTEWADA, KANKER.  |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 11.2   | 5.2  | 7.4  | 16.7 | 23.4 | 203.4 | 427.1 | 449.2 | 211.1 | 75.4  | 11.3 | 4.7  | 1446.1 |
| b     | 0.6  | 0.4  | 0.5  | 1.2  | 1.6  | 8.5   | 16.7  | 17.4  | 10.3  | 3.9   | 0.7  | 0.4  | 62.2   |
| 2     | River Godavari from its confluence with river Wainganga to its mouth. (Catchment.No. 317 )   |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Districts/Parts of districts within this catchment:-</u><br>SUKMA / DANTEWADA.  |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 7.0  | 5.5  | 9.8  | 25.4 | 47.5 | 228.2 | 490.6 | 501.0 | 270.8 | 104.5 | 24.7 | 6.4  | 1721.3 |
| b     | 0.5  | 0.4  | 0.7  | 1.7  | 2.6  | 9.3   | 18.7  | 19.4  | 13.0  | 5.8   | 1.3  | 0.4  | 73.7   |
| 3     | River Mahanadi upto Hirakud dam site. (Catchment.No. 319 )   |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Districts/Parts of districts within this catchment:-</u><br>DHAMTARI, DURG, JANJGIR-CHAMPA, KORBA, RAIGARH, RAIPUR, BEMETARA, BALOD, BALODABAZAR, MUNGELI / BILASPUR, JASHPUR, KANKER, KORIYA, KABIRDHAM, MAHASAMUND, SURGUJA, GARIABANDH, RAJNANDGAON, SURAJPUR. |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 9.9  | 8.7  | 9.2  | 7.3  | 11.4 | 181.5 | 351.6 | 329.7 | 195.5 | 50.8  | 9.1  | 6.2  | 1171.0 |
| b     | 0.6  | 0.7  | 0.7  | 0.6  | 0.9  | 7.9   | 15.2  | 14.4  | 9.2   | 2.7   | 0.5  | 0.4  | 53.7   |
| 4     | River Mahanadi from Hirakud dam site to its mouths. (Catchment.No.320 )  |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Parts of districts within this catchment:-</u><br>MAHASAMUND, GARIABANDH.   |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 6.0  | 8.9  | 7.5  | 10.7 | 20.6 | 170.1 | 332.2 | 322.4 | 213.1 | 54.9  | 7.3  | 5.8  | 1159.4 |
| b     | 0.4  | 0.7  | 0.7  | 1.1  | 1.7  | 8.2   | 15.2  | 14.4  | 9.3   | 3.2   | 0.4  | 0.4  | 55.6   |
| 5     | River Brahmani and Baitarni combined. (Catchment.No.321 )  |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Parts of districts within this catchment:-</u><br>JASHPUR   |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 24.6   | 22.3 | 24.3 | 24.9 | 44.6 | 254.6 | 475.6 | 392.7 | 273.0 | 76.5  | 14.4 | 13.1 | 1640.6 |
| b     | 1.9  | 1.9  | 2.3  | 2.0  | 3.6  | 11.3  | 20.9  | 19.4  | 13.1  | 4.5   | 0.9  | 0.9  | 82.7   |
| 6     | River Son.No.414 )   |      |      |      |      |       |       |       |       |       |      |      |        |
|       | <u>Districts/Parts of districts within this catchment:-</u><br>BALRAMPUR / BILASPUR, KORIYA, SURGUJA, SURAJPUR.  |      |      |      |      |       |       |       |       |       |      |      |        |
| a     | 15.7   | 13.5 | 12.4 | 8.5  | 9.0  | 202.4 | 387.3 | 351.9 | 235.4 | 48.2  | 7.7  | 6.4  | 1298.2 |
| b     | 0.9  | 1.0  | 1.0  | 0.6  | 0.8  | 8.5   | 16.5  | 15.8  | 10.4  | 2.8   | 0.5  | 0.5  | 59.2   |

a: Normal Rainfall in mm.  
b: Average number of rainy days.

**TABLE – VII**  
**STORMS AND DEPRESSIONS AFFECTING CHHATTISGARH STATE**  
**DURING 1891 – 2014**

| <b>MONTHS</b> | <b>NO. OF STORMS/<br/>DEPRESSIONS</b> |
|---------------|---------------------------------------|
| JANUARY       | NIL                                   |
| FEBRUARY      | NIL                                   |
| MARCH         | NIL                                   |
| APRIL         | NIL                                   |
| MAY           | 4                                     |
| JUNE          | 14                                    |
| JULY          | 27                                    |
| AUGUST        | 19                                    |
| SEPTEMBER     | 8                                     |
| OCTOBER       | 21                                    |
| NOVEMBER      | 6                                     |
| DECEMBER      | 1                                     |
| <b>TOTAL</b>  | <b>100</b>                            |

# DISTRICT CLIMATOLOGICAL SUMMARIES

## **BALOD DISTRICT**

The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to September. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for seven raingauge stations for the period ranging from 10 to 31 years. The details of 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 1110.5 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 91% of annual rainfall. July and August are the rainiest months with an average value of 330.9 mm. The annual rainfall in the district varies over a small range. In the fifty years period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 172% of the normal. In the year 1988, the annual rainfall in the district was the lowest in this period and amounted to only 49 % of the normal. In this fifty years period the rainfall was less than 80% of the normal in 7 years. Considering the district as a whole, there was one occasion of two consecutive years of such low rainfall. It is seen from Table 2 that the annual rainfall was between 801 mm and 1400 mm in 29 years out of 41.

On an average there are 47 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 42 at Sanjari to 52 at Adamabad.

The heaviest rainfall in 24 hours recorded at any station in the district was 436.9 mm at Adamabad on 13 September 1959.

## **TEMPERATURE**

There is no meteorological observatory in the district, so the description which follows is based on the meteorological data and climatological conditions prevailing at the neighbouring observatories Kanker and Durg. Temperatures begin to rise rapidly from March to the first week of June. May is the hottest month with the mean maximum temperature of about 41°C and mean minimum temperature of about 27°C. On some days in May and early part of June, the maximum temperature may reach about 45°C. Thundershowers sometimes occur during afternoons bring some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather sometimes becomes pleasant, the day temperatures go down appreciably but the drop in the night temperatures is slight. After the withdrawal of monsoon by about first week of October, the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature about 28°C and mean minimum temperature about 13°C. During winter cold waves sometimes affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to about 6°C on individual days.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoon than in the morning, except in the southwest monsoon months when there is little difference. In the southwest monsoon months the air is generally humid with value of relative humidity of the order of 60% to 85%. Humidity decreases in post monsoon and winter seasons and air is generally mild humid. Summer season is the driest part of the year with value of relative humidity in the afternoon being about 35% and morning humidity is about 50%.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and in the latter part of summer season skies are generally moderately clouded. In winter season skies are generally clear or lightly clouded. In April, May and in October, 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 season. In association with thunderstorms during March to May and during the monsoon season when depressions affect the weather of the district, the district may experiences gusty winds. In pre-monsoon and southwest monsoon seasons winds mainly blow from southwest and west direction and sometimes calm winds are also observed. From October to February winds mostly blow from north and northeast direction, sometimes calm winds are also observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms are common during the summer and southwest monsoon season, being most frequent during April to June. They also sometimes occur during February and October months. Thunderstorms during summer season are occasionally accompanied with hail. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of the winter months.

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

| STATION          | No. of Years of Data |        | JAN         | FEB         | MAR         | APR        | MAY        | JUN          | JUL           | AUG           | SEP          | OCT         | NOV         | DEC        | ANNUAL         | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |               | HEAVIEST RAINFALL IN 24 HOURS* |             |
|------------------|----------------------|--------|-------------|-------------|-------------|------------|------------|--------------|---------------|---------------|--------------|-------------|-------------|------------|----------------|--|---------------|--------------------------------|-------------|
|                  |                      |        |             |             |             |            |            |              |               |               |              |             |             |            |                | HIGHEST                                  | LOWEST        | AMOUNT (mm)                    | DATE        |
| Adamabad         | 31                   |        | 2.7<br>0.2  | 6.8<br>0.4  | 7.4<br>0.6  | 3.0<br>0.3 | 8.1<br>0.4 | 182.6<br>8.0 | 315.5<br>15.1 | 326.4<br>14.4 | 189.1<br>9.3 | 53.8<br>3.2 | 4.0<br>0.2  | 2.8<br>0.2 | 1102.2<br>52.3 | 174<br>(1961)                            | 50<br>(1988)  | 436.9                          | 13 Sep 1959 |
| Balod            | 24                   | a<br>b | 10.6<br>0.6 | 7.1<br>0.3  | 3.4<br>0.2  | 2.8<br>0.1 | 6.8<br>0.4 | 148.8<br>6.7 | 308.5<br>14.1 | 321.3<br>13.0 | 177.1<br>8.2 | 53.3<br>2.3 | 25.9<br>1.0 | 3.9<br>0.4 | 1069.5<br>47.3 | 153<br>(1973)                            | 43<br>(1974)  | 240.6                          | 16 Aug 1978 |
| Dondi            | 18                   | a<br>b | 19.4<br>1.1 | 0.6<br>0.1  | 0.0<br>0.0  | 0.0<br>0.0 | 0.0<br>0.0 | 183.4<br>6.5 | 377.0<br>14.9 | 330.6<br>11.8 | 177.5<br>7.1 | 52.3<br>2.3 | 10.3<br>0.1 | 3.0<br>0.2 | 1154.1<br>44.1 | 139<br>(2001)                            | 82<br>(1993)  | 241.3                          | 06 Aug 2010 |
| Dondi Lohara     | 22                   | a<br>b | 15.6<br>0.8 | 23.4<br>1.0 | 2.8<br>0.1  | 1.0<br>0.0 | 8.6<br>0.5 | 179.1<br>6.5 | 329.3<br>13.6 | 289.7<br>12.7 | 135.6<br>6.8 | 50.7<br>2.3 | 16.9<br>0.4 | 3.3<br>0.3 | 1056.0<br>45.0 | 174<br>(1994)                            | 57<br>(2006)  | 195.0                          | 18 Jul 2000 |
| Gudardehi        | 10                   | a<br>b | 15.3<br>0.5 | 4.1<br>0.3  | 11.3<br>0.4 | 0.0<br>0.0 | 0.0<br>0.0 | 206.4<br>7.5 | 293.2<br>13.9 | 311.7<br>13.7 | 153.2<br>7.9 | 45.1<br>2.5 | 7.2<br>0.2  | 0.0<br>0.0 | 1047.5<br>46.9 | 134<br>(2003)                            | 108<br>(2010) | 171.0                          | 06 Aug 2010 |
| Gurua            | 22                   | a<br>b | 13.6<br>0.6 | 7.2<br>0.4  | 2.2<br>0.2  | 4.0<br>0.2 | 9.0<br>0.3 | 178.2<br>6.4 | 415.6<br>14.4 | 380.5<br>14.1 | 217.9<br>8.7 | 68.8<br>3.0 | 7.5<br>0.3  | 4.4<br>0.4 | 1308.9<br>49.0 | 148<br>(1994)                            | 79<br>(1992)  | 405.0                          | 11 Jul 1994 |
| Sanjari          | 11                   | a<br>b | 12.1<br>0.8 | 0.0<br>0.0  | 0.0<br>0.0  | 0.0<br>0.0 | 0.0<br>0.0 | 172.9<br>6.0 | 341.6<br>13.3 | 291.9<br>12.6 | 174.3<br>7.0 | 41.9<br>2.2 | 0.0<br>0.0  | 0.0<br>0.0 | 1034.7<br>41.9 | 104<br>(2005)                            | 78<br>(2004)  | 240.0                          | 19 Aug 1939 |
| Balod (District) |                      | a<br>b | 12.8<br>0.7 | 7.0<br>0.4  | 3.9<br>0.2  | 1.5<br>0.1 | 4.6<br>0.2 | 178.8<br>6.8 | 340.1<br>14.2 | 321.7<br>13.2 | 175.0<br>7.9 | 52.3<br>2.5 | 10.3<br>0.3 | 2.5<br>0.2 | 1110.5<br>46.7 | 172<br>(1961)                            | 49<br>(1988)  |                                |             |

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.

\*\* Years of occurrence given in brackets.



**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BALOD**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 501 – 600   | 2            | 1301-1400   | 4            |
| 601 – 700   | 2            | 1401-1500   | 3            |
| 701 – 800   | 1            | 1501-1600   | 1            |
| 801 – 900   | 2            | 1601-1700   | 1            |
| 901 – 1000  | 8            | 1701-1800   | 1            |
| 1001 -1100  | 4            | 1801-1900   | 0            |
| 1101-1200   | 4            | 1901-2000   | 1            |
| 1201-1300   | 7            |             |              |

**(Data available for 41 years)**

## **BALODABAZAR DISTRICT**

The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to September. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for twelve raingauge stations for the period ranging from 11 to 49 years. The details of 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 1039.1 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 92% of annual normal rainfall, July being the month with the highest rainfall with an average value of 328.4 mm. The annual rainfall in the district varies over a small range. In this period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 182% of the normal. In the year 1979, the annual rainfall in the district was the lowest in this period and amounted to only 61% of the normal. In this period the rainfall was less than 80% of the normal in 8 years and none of them were consecutive. It is seen from Table 2 that the annual rainfall was between 801 mm and 1300 mm in 24 years out of 38.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 46 at Bhatapara to 54 at Balodu.

The heaviest rainfall in 24 hours recorded at any station in the district was 353.8 mm at Sandi on 13 July 1958.

## **TEMPERATURE**

There is no meteorological observatory in the district. Hence, the climatological description of the district which follows is based on the meteorological data of neighbouring observatory Raipur. From about the beginning of March, temperatures begin to rise steadily till first week of June. May is the hottest month of the year with the mean maximum temperature at about 42°C and mean minimum temperature at about 28°C. May and the early part of June i.e. prior to the onset of the southwest monsoon is rather hot and the day temperature sometimes reaches upto 45°C on individual days and also the dust raising winds add to the discomfort. The arrival of the monsoon air over the district by about the second week of June brings relief, and thereafter, weather sometimes becomes cool and pleasant. Towards the end of monsoon season in September the day temperatures increase slightly and the rise is maintained in October after the withdrawal of the monsoon. But the night temperatures begin to drop from September onwards. From November both day and night temperatures begin to drop rapidly, and December and January are usually the coldest months with the mean maximum temperature at about 28°C and the mean minimum at about 13°C. Cold waves sometimes affect the district in association with the passage of western disturbances across northern India in the cold season. Under such conditions, the minimum temperatures may go down to 7°C on individual days.

## **HUMIDITY**

In the southwest monsoon season the air is generally humid with values of relative humidity about 75% to 90% during July to September. After the monsoon season humidity decreases and the air is generally dry in the afternoons of winter and summer season. The driest part of the year is summer season when the value of relative humidity in the afternoon is at about 25% whereas it is about 45% in the morning.

## **CLOUDINESS**

During the southwest monsoon months skies are generally heavily clouded to overcast. In the latter half of the summer and post monsoon months the cloudiness is moderate, the afternoons are more cloudy than the mornings. 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.

## **WINDS**

Winds are generally light to moderate with some increase in force in the latter part of summer and southwest monsoon season. In the post monsoon and winter months, winds are mostly calm and northeasterlies are observed in the same season. In the month of March, winds are variable in direction. By April southwesterlies and westerlies winds blow and they become predominant during the period from May to September.

## **SPECIAL WEATHER PHENOMENA**

During the monsoon season, depressions originating in the Bay of Bengal cross the east coast of India and move in some westerly direction. In their passage across the central parts of the country, these storms affect the district and its neighbourhood and cause widespread heavy rain and strong winds. An occasional storm from the Bay of Bengal in October also affects the district. Thunderstorms occur throughout the year and their frequency being highest in the late summer and southwest monsoon months and least in the period from October to February. Thunderstorms during the period February to June are sometimes accompanied by squall, less frequently with hail and dust storm. Fog occurs occasionally in winter.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**BALODA BAZAR**

| STATION         | No.<br>of<br>Years<br>of<br>Data |   | JAN  | FEB  | MAR | APR | MAY | JUN   | JUL   | AUG   | SEP   | OCT  | NOV | DEC | ANNUAL | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |        | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|-----------------|----------------------------------|---|------|------|-----|-----|-----|-------|-------|-------|-------|------|-----|-----|--------|--|--------|-----------------------------------|-------------|
|                 |                                  |   |      |      |     |     |     |       |       |       |       |      |     |     |        | HIGHEST  | LOWEST | AMOUNT<br>(mm)                    | DATE        |
| Arjuni          | 37                               | a | 4.9  | 7.6  | 7.9 | 2.0 | 4.2 | 153.3 | 337.9 | 290.8 | 187.2 | 48.7 | 4.1 | 4.8 | 1053.4 | 179  | 59     | 226.1                             | 24 Sep 1973 |
|                 |                                  | b | 0.4  | 0.6  | 0.5 | 0.2 | 0.4 | 6.7   | 14.8  | 13.6  | 8.2   | 2.5  | 0.2 | 0.3 | 48.4   | (1961)   | (1965) |                                   |             |
| Baloda<br>Bazar | 46                               | a | 7.2  | 10.6 | 9.0 | 7.8 | 9.3 | 144.4 | 293.5 | 263.6 | 145.1 | 51.2 | 7.5 | 6.9 | 956.1  | 175  | 53     | 232.2                             | 02 Aug 1908 |
|                 |                                  | b | 0.7  | 0.9  | 0.9 | 0.7 | 0.8 | 7.8   | 14.4  | 13.6  | 8.1   | 2.7  | 0.4 | 0.4 | 51.4   | (1973)   | (1998) |                                   |             |
| Balodu          | 11                               | a | 1.5  | 13.4 | 2.2 | 0.8 | 2.2 | 140.8 | 377.5 | 344.0 | 247.1 | 46.4 | 3.8 | 0.3 | 1180.0 | 159  | 59     | 196.0                             | 10 Sep 1992 |
|                 |                                  | b | 0.1  | 0.8  | 0.3 | 0.1 | 0.1 | 7.4   | 17.4  | 15.5  | 9.4   | 2.6  | 0.1 | 0.0 | 53.8   | (1961)   | (1979) |                                   |             |
| Bhatapara       | 20                               | a | 18.8 | 2.5  | 9.7 | 2.5 | 0.1 | 138.6 | 339.9 | 271.9 | 158.8 | 35.3 | 3.1 | 3.6 | 984.8  | 182  | 55     | 239.0                             | 28 Jun 2008 |
|                 |                                  | b | 1.1  | 0.1  | 0.3 | 0.1 | 0.0 | 6.4   | 15.1  | 12.6  | 7.7   | 1.9  | 0.2 | 0.2 | 45.7   | (1994)   | (2004) |                                   |             |
| Bhilaigarh      | 20                               | a | 3.2  | 3.2  | 1.2 | 2.5 | 0.0 | 157.3 | 326.6 | 341.7 | 169.1 | 32.8 | 6.5 | 3.0 | 1047.1 | 156  | 59     | 323.0                             | 13 Aug 2006 |
|                 |                                  | b | 0.2  | 0.2  | 0.1 | 0.2 | 0.0 | 7.1   | 14.2  | 14.1  | 8.3   | 2.2  | 0.5 | 0.3 | 47.4   | (2006)   | (2010) |                                   |             |
| Kasdol          | 22                               | a | 5.3  | 0.9  | 2.2 | 1.2 | 3.7 | 130.5 | 323.4 | 300.4 | 131.5 | 34.4 | 9.8 | 5.9 | 949.2  | 146  | 79     | 250.0                             | 13 Aug 2006 |
|                 |                                  | b | 0.5  | 0.1  | 0.3 | 0.1 | 0.4 | 7.8   | 14.0  | 13.4  | 7.5   | 2.1  | 0.4 | 0.5 | 47.1   | (2003)   | (2004) |                                   |             |

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

| STATION                | No. of Years of Data |   | JAN | FEB  | MAR  | APR | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|------------------------|----------------------|---|-----|------|------|-----|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|--------------------------------|-------------|
|                        |                      |   |     |      |      |     |      |       |       |       |       |      |      |     |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Khairdatan             | 23                   | a | 0.7 | 5.1  | 2.3  | 2.3 | 3.0  | 143.2 | 316.5 | 280.5 | 167.7 | 26.3 | 0.5  | 3.3 | 951.4  | 197                                      | 54     | 281.9                          | 04 Jul 1915 |
|                        |                      | b | 0.1 | 0.5  | 0.3  | 0.3 | 0.3  | 6.8   | 15.4  | 12.9  | 8.7   | 2.0  | 0.1  | 0.2 | 47.6   | (1961)                                   | (1965) |                                |             |
| Kondapar               | 25                   | a | 2.5 | 17.7 | 10.1 | 6.4 | 11.1 | 203.7 | 333.3 | 368.3 | 184.5 | 52.1 | 12.5 | 3.6 | 1205.8 | 167                                      | 5      | 304.0                          | 24 Jun 1986 |
|                        |                      | b | 0.1 | 0.8  | 0.6  | 0.4 | 1.1  | 7.9   | 13.3  | 12.6  | 8.4   | 2.7  | 0.6  | 0.2 | 48.7   | (1961)                                   | (1979) |                                |             |
| Lahood                 | 31                   | a | 2.3 | 4.7  | 9.2  | 2.7 | 6.7  | 152.1 | 304.6 | 311.2 | 164.8 | 37.9 | 3.3  | 7.0 | 1006.5 | 191                                      | 54     | 300.0                          | 07 Aug 1990 |
|                        |                      | b | 0.2 | 0.5  | 0.8  | 0.2 | 0.7  | 7.0   | 14.7  | 13.3  | 8.1   | 2.6  | 0.3  | 0.3 | 48.7   | (1961)                                   | (1979) |                                |             |
| Pallari                | 49                   | a | 5.4 | 3.1  | 7.0  | 1.8 | 3.6  | 167.0 | 340.5 | 296.9 | 171.0 | 37.3 | 2.9  | 6.3 | 1042.8 | 234                                      | 69     | 341.1                          | 13 Jul 1958 |
|                        |                      | b | 0.4 | 0.2  | 0.4  | 0.2 | 0.4  | 7.6   | 15.5  | 14.1  | 8.7   | 2.2  | 0.3  | 0.3 | 50.3   | (1970)                                   | (1974) |                                |             |
| Sandi                  | 39                   | a | 5.8 | 8.2  | 10.7 | 1.8 | 14.0 | 138.5 | 298.1 | 298.9 | 203.1 | 47.4 | 6.3  | 6.0 | 1038.8 | 191                                      | 50     | 353.8                          | 13 Jul 1958 |
|                        |                      | b | 0.4 | 0.8  | 0.7  | 0.3 | 1.0  | 7.6   | 14.9  | 13.8  | 8.7   | 2.1  | 0.3  | 0.4 | 51.0   | (1961)                                   | (1965) |                                |             |
| Simga                  | 27                   | a | 9.1 | 1.8  | 3.5  | 0.5 | 4.1  | 158.7 | 348.5 | 285.3 | 179.4 | 47.3 | 8.6  | 4.7 | 1051.5 | 140                                      | 80     | 332.0                          | 13 Aug 2006 |
|                        |                      | b | 0.6 | 0.2  | 0.4  | 0.0 | 0.4  | 7.6   | 14.2  | 12.5  | 8.2   | 2.2  | 0.5  | 0.4 | 47.2   | (2007)                                   | (2010) |                                |             |
| BalodaBazar (District) |                      | a | 5.6 | 6.6  | 6.3  | 2.7 | 5.2  | 152.3 | 328.4 | 304.5 | 175.8 | 41.4 | 5.7  | 4.6 | 1039.1 | 182                                      | 61     |                                |             |
|                        |                      | b | 0.4 | 0.5  | 0.5  | 0.2 | 0.5  | 7.3   | 14.8  | 13.5  | 8.3   | 2.3  | 0.3  | 0.3 | 48.9   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BALODA BAZAR**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 – 700   | 2            | 1301-1400   | 2            |
| 701 – 800   | 5            | 1401–1500   | 2            |
| 801 – 900   | 6            | 1501-1600   | 1            |
| 901 – 1000  | 5            | 1601-1700   | 0            |
| 1001 -1100  | 7            | 1701-1800   | 1            |
| 1101-1200   | 3            | 1801-1900   | 1            |
| 1201-1300   | 3            |             |              |

(Data available for 38 years)

## **BALRAMPUR DISTRICT**

Balrampur district has hilly terrain and plain areas of low elevation. The peak height in the district is about 1225 metre above mean sea level. The climate of this district is characterised with a hot dry in summer and good rainfall during the monsoon season. The year may be divided in to four seasons. The winter season is from December to February, followed by summer season till the second week of June. South-west monsoon season is from mid-June to September. The period of October to November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for four raingauge stations for period ranging from 10 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 1191.5 mm. During the southwest monsoon season, (June to September) the district receives about 90% of the annual normal rainfall. July is the rainiest month with an average value of 342.0 mm. The variation in the rainfall from year to year is not much large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 160% of the annual normal occurred in year 2003, while the lowest annual rainfall which was 64% of the normal occurred in 1979. In this period under consideration there were four 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 901 mm and 1500 mm in 19 years out of 28 years for which continuous data is available.

On an average there are 56 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 48 at Rajpur to 63 at Kusami.

The heaviest rainfall in 24 hours recorded at any station in the district was 917.2 mm at Wadraf Nagar on 08 September 2003.



## **TEMPERATURE**

There is no meteorological observatory in the district so the description that follows is based on the records of the meteorological data of Ambikapur observatory in the neighbouring Surguja district. After February there is continuous increase in temperature. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 24°C. On individual days in May and early part of June, the maximum temperature may be as high as 44°C. Afternoon thundershowers sometimes occur and bring some relief though only temporarily. During the latter part of summer until the onset of the monsoon by about the second week of June, days are discomfortable with hot dusty winds. With the onset of the southwest monsoon in the second week of June, day temperatures come down appreciably. However, night temperatures in June are generally as high as in May. The day temperatures in October are about the same as in the monsoon season, but the night becomes cooler. With the withdrawal of monsoon by first week of October, the day temperature begins to decrease while drop in night temperature is appreciable. After October both day and night temperatures decrease rapidly. December and January are the coldest months with the mean maximum temperature about 23°C and mean minimum about 9°C. In winter months, cold waves sometimes affect the district in the wake of western disturbances passing across north India, causing minimum temperature to sometimes go down to about 1°C on individual day. These temperatures may be 1-2°C high in plain of low elevation and 2-4°C low in high altitudinal areas.

## **HUMIDITY**

In the south west monsoon months, particularly in July, August and September air is mostly humid with its value of relative humidity ranges between 80% and 88%. Air is generally mild humid in post monsoon and winter seasons. The relative humidity in the afternoon is generally lower than the morning. Summer is the driest part of the year with the value of relative humidity in the afternoon at about 25%.

## **CLOUDINESS**

During southwest monsoon season skies are heavily clouded to overcast. In the latter half of summer and post monsoon months cloudiness is moderate. During the winter months sky is generally clear or lightly clouded. In May and October months cloudiness is more particularly in the afternoons.

## **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 the southwest monsoon season winds mostly blow from west and southwest directions. Sometimes northerly winds are also observed in the district. From September northerly winds start to appear in the district and northerly winds become predominant in post monsoon, winter and summer seasons. From March southerly winds appear in the district and become predominant in the southwest 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 westward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in latter part of summer and in southwest monsoon season. Hailstorms and dust storms occur occasionally in summer season. Fog occasionally occurs in the post monsoon and winter seasons. Fog is also observed in the hilly terrain during monsoon season.

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

| STATION                 | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV         | DEC        | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|-------------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|-------------|-------------|------------|----------------|--|--------------|-----------------------------------|-------------|
|                         |                                  |        |             |             |             |             |             |              |               |               |               |             |             |            |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Kusami                  | 27                               | a<br>b | 9.4<br>0.4  | 9.8<br>0.7  | 6.7<br>0.5  | 20.0<br>1.0 | 3.2<br>0.3  | 221.8<br>9.3 | 409.6<br>18.4 | 366.6<br>17.7 | 244.6<br>10.8 | 52.6<br>2.9 | 8.8<br>0.5  | 5.6<br>0.5 | 1358.7<br>63.0 | 128<br>(1961)                                  | 60<br>(1979) | 228.6                             | 23 Jul 1991 |
| Rajpur                  | 10                               | a<br>b | 7.7<br>0.6  | 28.3<br>1.6 | 10.4<br>1.2 | 1.9<br>0.3  | 10.8<br>0.8 | 119.3<br>5.7 | 346.6<br>14.1 | 229.5<br>11.8 | 171.6<br>8.3  | 56.4<br>3.1 | 0.3<br>0.0  | 4.7<br>0.3 | 987.5<br>47.8  | 146<br>(2008)                                  | 82<br>(2005) | 136.2                             | 08 Sep 2003 |
| Ramanujganj             | 46                               | a<br>b | 10.9<br>0.8 | 11.6<br>0.9 | 9.4<br>0.9  | 5.6<br>0.6  | 8.4<br>0.8  | 164.4<br>8.7 | 331.5<br>15.9 | 363.4<br>16.0 | 229.2<br>10.6 | 56.3<br>3.2 | 8.7<br>0.6  | 5.9<br>0.4 | 1205.3<br>59.4 | 145<br>(1961)                                  | 58<br>(1979) | 320.0                             | 11 Sep 1987 |
| Wardahnagar             | 10                               | a<br>b | 11.4<br>0.8 | 22.3<br>1.3 | 21.9<br>1.5 | 9.8<br>0.9  | 0.0<br>0.0  | 165.4<br>8.1 | 280.2<br>13.4 | 292.8<br>13.6 | 363.0<br>10.0 | 34.0<br>2.3 | 11.3<br>0.5 | 2.5<br>0.4 | 1214.6<br>52.8 | 212<br>(2003)                                  | 80<br>(2004) | 917.2                             | 08 Sep 2003 |
| Balrampur<br>(District) |                                  | a<br>b | 9.8<br>0.6  | 18.0<br>1.1 | 12.1<br>1.0 | 9.3<br>0.7  | 5.6<br>0.5  | 167.7<br>8.0 | 342.0<br>15.5 | 313.1<br>14.8 | 252.1<br>9.9  | 49.8<br>2.9 | 7.3<br>0.4  | 4.7<br>0.4 | 1191.5<br>55.8 | 160<br>(2003)                                  | 64<br>(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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BALRAMPUR**  
**(Data 1961-2010)**

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

**(Data available for 28 years)**

## **BASTAR DISTRICT**

Physiographically the district is predominantly a part of Bastar plateau. The maximum altitude in Bastar district is 956 metre above mean sea level. Average elevation of this district is about 600 m.

The climate of this district is characterized by a hot summer and good rainfall during the monsoon season. The year may be divided into four seasons. Summer (pre-monsoon) season from March to the first week of June is followed by southwest monsoon season which extends upto about the first week of October. October and November months constitute the post monsoon season. Winter season which follows thereafter lasts till the end of February.

### **RAINFALL**

Records of rainfall in the district are available for two rain gauge stations for period of 10 and 48 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 1575.7 mm. During southwest monsoon season (June to September) the district receives rainfall of about 82% of annual rainfall. August is the rainiest month with average rainfall of about 440.1 mm. The variation in the rainfall from year to year is not large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 132% of the annual normal occurred in year 1975, while the lowest annual rainfall which was 68% of the normal occurred in 1987. In the fifty year period there were only six 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 1201 mm and 1900 mm in 34 years out of 39.

On an average there are 77 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number is 74 at Kumarpara and 79 at Jagdalpur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 259.7 mm at Jagdalpur observatory on 17 June 1974.

## **TEMPERATURE**

Jagdalpur is a meteorological observatory in the district situated at an elevation of 554 metre above mean sea level. The temperature and other meteorological data for this station may be taken as representative of the climatic conditions in the district as a whole. After February, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature at 38.0°C and mean minimum temperature at 24.1°C. On some days in May and early part of June, the maximum temperature sometimes reaches at about 44°C. Thundershowers sometimes occur in afternoons and bring some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather becomes slightly cool, the day temperatures go down appreciably but the drop in the night temperatures is slight. After withdrawal of monsoon about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December is the coldest month of the year with the mean maximum temperature at 28.2°C and the mean minimum temperature at 11.2°C. Cold waves sometimes affect the district in winter months in the wake of western disturbances which move across northern part of India, the minimum temperature may go down to 4°C on individual days. These temperatures may be lowered by 1- 3°C at hilly areas.

The highest maximum temperature ever recorded at Jagdalpur was 46.1°C on 22<sup>nd</sup> May 1912 and the lowest minimum temperature ever recorded was 3.0°C on 07 January 1986.

## **HUMIDITY**

During the southwest monsoon season and post monsoon season relative humidity is generally high and is between 65% and 90%. The humidity is more in mornings than in evenings. The humidity decreases rapidly in the afternoons during winter and summer season. The summer season is the driest part of the year with value of relative humidity especially in the afternoon is of the order of 33% to 43%.

## **CLOUDINESS**

In the southwest monsoon season skies are heavily clouded to overcast. From October, cloudiness decreases. 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 and post monsoon seasons winds mainly blow from northeast and north direction. Sometimes southerlies and southwesterlies winds are also observed in February. During summer season winds mostly blow from southwest direction. Some southerlies, northeasterlies and northwesterlies are also observed during this period. Winds generally blow from southwest or west direction. Some northwesterlies are also observed during September.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post monsoon season affect the weather of the district and its neighbourhood during their westward or northwestward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in later part of summer and southwest monsoon season. Thunderstorms during the summer season are sometimes accompanied by hail and dust storm. Thunderstorms are sometimes accompanied by squalls except during November and December months. Frequency of squall is more during latter part of pre-monsoon and early part of monsoon season. Fog occurs in winter and post monsoon seasons and sometimes also observed during monsoon season in hilly area.

Tables 3, 4, 5 and 6 give normals of temperature and relative humidity, cloudiness, mean wind speed and wind direction and special weather phenomena respectively for Jagdalpur observatory.



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

| STATION              | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN           | JUL           | AUG           | SEP           | OCT          | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|----------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|---------------|--------------|-------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                      |                                  |        |             |             |             |             |             |               |               |               |               |              |             |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Jagdapur<br>(Obsy)   | 48                               | a<br>b | 10.7<br>0.7 | 10.8<br>0.9 | 17.6<br>1.6 | 52.2<br>3.8 | 72.1<br>5.3 | 241.9<br>10.9 | 354.9<br>17.5 | 359.3<br>18.4 | 216.3<br>12.5 | 90.4<br>5.2  | 26.6<br>1.6 | 13.5<br>0.7 | 1466.3<br>79.1 | 142<br>(1975)                                  | 73<br>(1987) | 259.7                             | 17 Jun 1974 |
| Kumarpara            | 10                               | a<br>b | 18.8<br>1.6 | 3.7<br>0.2  | 12.0<br>1.0 | 22.1<br>1.6 | 67.6<br>4.3 | 177.1<br>8.7  | 446.3<br>18.7 | 521.0<br>18.3 | 265.3<br>12.7 | 124.0<br>5.5 | 26.4<br>1.3 | 0.5<br>0.2  | 1684.8<br>74.1 | 132<br>(2001)                                  | 89<br>(2005) | 149.8                             | 04 JUL 2006 |
| Bastar<br>(District) |                                  | a<br>b | 14.8<br>1.1 | 7.3<br>0.6  | 14.8<br>1.3 | 37.2<br>2.7 | 69.9<br>4.8 | 209.5<br>9.8  | 400.6<br>18.1 | 440.1<br>18.3 | 240.8<br>12.6 | 107.2<br>5.4 | 26.5<br>1.5 | 7.0<br>0.5  | 1575.7<br>76.7 | 132<br>(1975)                                  | 68<br>(1987) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BASTAR**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 1001 -1100  | 1            | 1601-1700   | 4            |
| 1101-1200   | 2            | 1701-1800   | 3            |
| 1201-1300   | 5            | 1801-1900   | 0            |
| 1301-1400   | 3            | 1901-2000   | 0            |
| 1401-1500   | 12           | 2001- 2100  | 2            |
| 1500-1600   | 7            |             |              |

(Data available for 39 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest<br>Maximum<br>ever recorded |                          | Lowest<br>Minimum<br>ever recorded |                          | Relative<br>Humidity<br>(%) |             |
|-----------|--------------------------------|--------------------------------|-------------------------------------|--------------------------|------------------------------------|--------------------------|-----------------------------|-------------|
|           | °C                             | °C                             | °C                                  | Date                     | °C                                 | Date                     | 0830<br>IST                 | 1730<br>IST |
| January   | 28.7                           | 11.7                           | 34.8                                | 27-01-2009               | 3.0                                | 07-01-1986               | 76                          | 47          |
| February  | 31.5                           | 14.5                           | 18.7                                | 20-02-2006               | 5.8                                | 05-02-1988               | 67                          | 38          |
| March     | 35.2                           | 18.6                           | 40.3                                | 30-03-1996               | 8.5                                | 01-03-1984               | 59                          | 33          |
| April     | 37.5                           | 22.2                           | 42.5                                | 15-04-1999               | 15.0                               | 07-04-1989               | 56                          | 36          |
| May       | 38.0                           | 24.1                           | 46.1                                | 22-05-1912               | 17.2                               | 04-05-1981               | 59                          | 43          |
| June      | 33.3                           | 23.7                           | 45.5                                | 05-06-2003               | 14.5                               | 10-06-1986               | 76                          | 66          |
| July      | 29.1                           | 22.7                           | 38.1                                | 05-07-2009               | 18.5                               | 03-07-1985               | 87                          | 81          |
| August    | 28.5                           | 22.4                           | 33.1                                | 23-08-1998<br>24-08-2010 | 19.5                               | 30-08-1985               | 89                          | 83          |
| September | 30.2                           | 22.2                           | 35.1                                | 20-09-2005               | 17.6                               | 30-09-1984               | 85                          | 79          |
| October   | 30.5                           | 19.8                           | 36.1                                | 18-10-1984               | 11.2                               | 30-10-1985               | 81                          | 70          |
| November  | 29.3                           | 15.2                           | 34.1                                | 15-11-2009               | 6.1                                | 26-11-1981<br>30-11-1985 | 78                          | 62          |
| December  | 28.2                           | 11.2                           | 32.1                                | 13-12-2008               | 4.6                                | 24-12-1984               | 74                          | 58          |
| Annual    | 31.7                           | 19.0                           | 46.1                                | 22-05-1912               | 3.0                                | 07-01-1986               | 74                          | 58          |

**TABLE-4**  
**Mean Cloud Amount <sup>\*\*</sup>(Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(JAGDALPUR)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 20  | 20  | 20  | 16  | 9   | 1   | 0   | 0   | 1   | 9   | 14  | 18  | 128    |
| b                     | 2   | 1   | 1   | 1   | 2   | 10  | 16  | 18  | 8   | 3   | 2   | 1   | 64     |
| c                     | 1.4 | 1.2 | 1.4 | 1.7 | 2.9 | 5.8 | 6.7 | 7.0 | 5.6 | 3.4 | 2.3 | 1.6 | 3.4    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 13  | 11  | 8   | 3   | 2   | 0   | 0   | 0   | 0   | 3   | 8   | 13  | 61     |
| b                     | 1   | 0   | 1   | 2   | 5   | 12  | 18  | 18  | 12  | 6   | 2   | 1   | 78     |
| c                     | 2.2 | 2.2 | 2.8 | 4.1 | 4.9 | 6.6 | 7.0 | 7.3 | 6.8 | 4.9 | 3.2 | 2.2 | 5.0    |

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount in Okta.

<sup>\*\*</sup> 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(JAGDALPUR)**

|                      | Jan          | Feb           | Mar           | Apr          | May           | Jun  | Jul  | Aug        | Sep           | Oct  | Nov  | Dec        | Annual |
|----------------------|--------------|---------------|---------------|--------------|---------------|------|------|------------|---------------|------|------|------------|--------|
| Wind speed in km/hr  | 2.0          | 2.6           | 3.0           | 3.8          | 4.2           | 4.2  | 3.6  | 3.5        | 2.7           | 2.7  | 2.7  | 2.0        | 3.1    |
| Direction in morning | C/NE/<br>E/N | C/NE/S<br>/SW | C/SW/<br>S/NE | SW/C/<br>S   | SW            | SW   | SW   | C/W/S<br>W | C/SW/<br>W    | C/NE | C/NE | C/NE/<br>N |        |
| Direction in evening | C/S/N<br>E/N | C/SW/<br>NW/S | C/SW/<br>NW/S | SW/C/<br>W/S | SW/S/<br>W/NW | SW/W | SW/W | C/W/S<br>W | C/W/N<br>W/SW | C/NE | C/NE | C          |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(JAGDALPUR)**

| Mean No. of Days With | Jan | Feb | Mar | Apr  | May  | Jun  | Jul | Aug  | Sep  | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|------|------|------|-----|------|------|-----|-----|-----|--------|
| Thunder               | 0.3 | 0.9 | 4.2 | 12.5 | 13.1 | 14.4 | 8.0 | 10.0 | 12.8 | 5.8 | 1.1 | 0.2 | 83.3   |
| Hail                  | 0.0 | 0.0 | 0.2 | 0.6  | 0.5  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 1.3    |
| Dust storm            | 0.0 | 0.0 | 0.0 | 0.0  | 0.2  | 0.0  | 0.0 | 0.0  | 0.0  | 0.0 | 0.0 | 0.0 | 0.2    |
| Fog                   | 1.7 | 0.6 | 0.3 | 0.1  | 0.0  | 0.0  | 0.1 | 0.3  | 1.4  | 2.3 | 3.6 | 4.4 | 14.8   |
| Squall                | 0.1 | 0.1 | 0.6 | 2.5  | 2.8  | 1.8  | 0.3 | 0.4  | 0.4  | 0.1 | 0.0 | 0.0 | 9.1    |

## **BEMETARA DISTRICT**

The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer (pre-monsoon) season follows thereafter and continues till about the second week of June. The southwest monsoon season is from the middle of June to September. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for three raingauge stations for the period ranging from 22 to 49 years. The details of 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 1030.1 mm. The rainfall in the southwest monsoon season (June-September) constitutes about 92% of the annual normal rainfall, July being the month with the highest rainfall with an average rainfall of 339.5 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 176% of the normal. In year 1974, the annual rainfall in the district was the lowest in this period and amounted to only 59% of the normal. In this period the rainfall was less than 80% of the normal occurred in 7 years. During this period 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 801 mm and 1300 mm in 26 years out of 39.

On an average there are 46 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 43 at Navgarh to 51 at Bemetara.

The heaviest rainfall in 24 hours recorded at any station in the district was 300.5 mm at Kharra on 12 September 1942.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at Raipur and Pendra Road observatories respectively in the neighbouring Raipur and Bilaspur districts. After February, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 40°C and mean minimum temperature about 26°C. On some days in April, May and early part of June, the maximum temperature may reach about 45°C. Thundershowers sometimes occur in afternoons which bring welcome relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather cools down slightly, the day temperatures go down appreciably but the drop in the night temperatures is slight. After the withdrawal of monsoon by about first week of October, the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature at about 27°C and the mean minimum temperature at about 12°C. During winter season cold waves sometimes affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to about 6°C on some individual days.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoon than in the morning. In the southwest monsoon months the air is mostly humid with value of relative humidity of the order of 55% to 90%. Humidity decreases from October. During post monsoon and winter seasons air is generally mild humid. Summer season is the driest part of the year with value of relative humidity in the afternoon being about 25% and morning humidity is about 50%.

## **CLOUDINESS**

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

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in later 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 pre-monsoon and southwest monsoon season winds mainly blow from southwest and west direction and sometimes calm and northerly winds are also observed. From October to February winds mostly blow from north and northeast direction, sometimes calm winds are also observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year and they are frequent during the southwest monsoon season. Thunderstorms occur during the pre-monsoon and early southwest monsoon season are occasionally accompanied with hail and squall. Dust storms occur occasionally during the summer season. Fog occasionally occurs in the mornings of the winter and post monsoon seasons.

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

| STATION                | No.<br>of<br>Years<br>of<br>Data |   | JAN  | FEB  | MAR  | APR | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV | DEC  | ANNUAL | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |        | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|------------------------|----------------------------------|---|------|------|------|-----|------|-------|-------|-------|-------|------|-----|------|--------|--|--------|-----------------------------------|-------------|
|                        |                                  |   |      |      |      |     |      |       |       |       |       |      |     |      |        | HIGHEST  | LOWEST | AMOUNT<br>(mm)                    | DATE        |
| Bemetara               | 49                               | a | 13.2 | 8.1  | 10.9 | 6.7 | 17.7 | 178.3 | 340.1 | 310.0 | 179.1 | 43.3 | 6.3 | 10.6 | 1124.3 | 178  | 45     | 216.9                             | 10 Jul 1925 |
|                        |                                  | b | 0.8  | 0.8  | 0.8  | 0.5 | 0.9  | 8.0   | 14.6  | 13.1  | 8.3   | 2.1  | 0.4 | 0.5  | 50.8   | (1999)   | (1974) |                                   |             |
| Kharra                 | 32                               | a | 1.1  | 13.9 | 4.2  | 1.0 | 4.9  | 159.4 | 308.0 | 279.6 | 158.4 | 39.8 | 3.2 | 3.3  | 966.8  | 177  | 62     | 300.5                             | 12 Sep 1942 |
|                        |                                  | b | 0.2  | 0.3  | 0.4  | 0.1 | 0.5  | 6.8   | 13.9  | 13.5  | 7.8   | 2.1  | 0.0 | 0.2  | 45.8   | (1961)   | (1987) |                                   |             |
| Navgarh                | 22                               | a | 7.1  | 0.1  | 0.0  | 2.3 | 2.9  | 147.0 | 370.5 | 268.3 | 145.2 | 51.0 | 1.6 | 3.4  | 999.4  | 138  | 63     | 180.0                             | 19 Jul 1992 |
|                        |                                  | b | 0.3  | 0.1  | 0.0  | 0.2 | 0.2  | 6.6   | 14.3  | 11.3  | 7.2   | 2.1  | 0.1 | 0.3  | 42.7   | (1993)   | (1996) |                                   |             |
| Bemetara<br>(District) |                                  | a | 7.1  | 4.0  | 5.0  | 3.3 | 8.5  | 161.6 | 339.5 | 286.0 | 160.9 | 44.7 | 3.7 | 5.8  | 1030.1 | 176  | 59     |                                   |             |
|                        |                                  | b | 0.4  | 0.4  | 0.4  | 0.3 | 0.5  | 7.1   | 14.3  | 12.6  | 7.8   | 2.1  | 0.3 | 0.3  | 46.4   | (1961)   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BEMETARA**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 - 700   | 2            | 1301-1400   | 1            |
| 701 – 800   | 5            | 1401–1500   | 4            |
| 801 – 900   | 4            | 1500-1600   | 0            |
| 901 – 1000  | 8            | 1601-1700   | 0            |
| 1001 -1100  | 5            | 1701-1800   | 0            |
| 1101-1200   | 4            | 1801-1900   | 1            |
| 1201-1300   | 5            |             |              |

**(Data available for 39 years)**



## **BIJAPUR DISTRICT**

Bijapur is the southernmost district of Chhattisgarh state. The district has almost plain areas of low elevation and some area of hills.

The climate of this district is characterized by dry hot in summer and good rainfall during the southwest monsoon season. The year may be divided into four seasons. Summer (pre-monsoon) season from March to the second week of June is followed by southwest monsoon season which extends upto about first week of October. The period of October and November is of post monsoon season. Winter season is from December to February.

### **RAINFALL**

Records of rainfall in the district are available for two rain gauge stations for the period ranging from 44 to 45 years. The details of 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 1463.3 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 90% of annual normal rainfall, July and August being the months with the highest rainfall with an average value of about 453 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1998, when it amounted to 155% of the normal. In the year 1988, the annual rainfall in the district was lowest in the fifty year period and amounted to only 59% of the normal. In the fifty year period the rainfall was less than 80% of the normal in 3 years and none of them were consecutive years. It is seen from Table 2 that the annual rainfall was between 1101 mm and 1800 mm in 27 years out of 32.

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 is 58 at Bhopalpatnam and 61 at Bijapur.

The heaviest rainfall in 24 hours recorded at any station in the district was 362.0 mm at Bijapur on 26 July 1988.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description that follows is based on the records of Jagdalpur observatory in the neighbouring Bastar district. The temperature and other meteorological data for this station may be taken as representative of the climatic conditions in the district as a whole. After February, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 38°C and the mean minimum temperature about 24°C. In May and early part of June, the maximum temperature sometimes reaches about 43°C. Thundershowers sometimes occur in afternoons bring some relief from the heat. With the onset of southwest monsoon over the district by about the second week of June, the weather becomes slightly cool the day temperatures go down appreciably by the drop in the night temperatures increase slightly. After October both the temperatures steadily decrease. December and January are generally the coldest months of the year with the mean maximum temperature about 28°C and the mean minimum temperature about 11°C. Cold waves sometimes 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. These temperatures may be lowered by 1-2°C at hilly areas and 1-3°C high in plain area of low elevation.

## **HUMIDITY**

During the southwest monsoon season and post monsoon seasons, relative humidity is generally high and it ranges between 65% and 90%. The relative humidity is more in the mornings than in the evenings. The humidity decreases rapidly during winter and summer season. The summer season is the driest part of the year with value of relative humidity especially in the afternoon of the order of 30% to 45%.

## **CLOUDINESS**

In southwest monsoon season skies are heavily clouded to overcast. From October, cloudiness decreases. 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 moderate in latter part of summer and southwest monsoon season and light in the rest of the year. In winter and post monsoon seasons winds mainly blow from northeast and north direction. Some southerlies and southwesterlies winds are also observed in February. During summer season winds mostly blow from southwest direction. Sometimes southerlies, northeasterlies and northwesterlies are also observed during this period. Winds generally blow from southwest or west direction during the southwest monsoon season. Sometimes northwesterlies are also observed during September.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post monsoon season affect the weather of the district and its neighbourhood during their westward or northwestward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in southwest monsoon season. Thunderstorms during the summer season are sometimes accompanied by hail and dust storm. Fog occurs in winter and post monsoon seasons and sometimes it is also observed during the monsoon season at hilly area.

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

| STATION            | No. of Years of Data |        | JAN        | FEB        | MAR        | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV         | DEC        | ANNUAL         | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |              | HEAVIEST RAINFALL IN 24 HOURS* |             |
|--------------------|----------------------|--------|------------|------------|------------|-------------|-------------|--------------|---------------|---------------|---------------|-------------|-------------|------------|----------------|--|--------------|--------------------------------|-------------|
|                    |                      |        |            |            |            |             |             |              |               |               |               |             |             |            |                | HIGHEST                                  | LOWEST       | AMOUNT (mm)                    | DATE        |
| Bhopalpatnam       | 45                   | a<br>b | 9.3<br>0.4 | 5.6<br>0.3 | 8.2<br>0.4 | 18.3<br>0-9 | 7.9<br>0.4  | 188.7<br>7.9 | 431.1<br>16.4 | 445.7<br>16.8 | 212.2<br>10.1 | 78.8<br>3.8 | 7.6<br>0.4  | 4/7<br>0.2 | 1418.1<br>58.0 | 151<br>(1963)                            | 61<br>(1998) | 275.0                          | 28 Jun 1975 |
| Bijapur            | 44                   | a<br>b | 9.1<br>0.3 | 2.0<br>0.1 | 4.9<br>0.2 | 13.9<br>0.5 | 10.8<br>0.7 | 204.5<br>8.3 | 455.0<br>16.7 | 478.9<br>18.2 | 218.5<br>10.5 | 93.1<br>4.3 | 14.4<br>0.8 | 3.1<br>1.1 | 1508.2<br>60.7 | 150<br>(1988)                            | 69<br>(1979) | 362.0                          | 26 Jul 1988 |
| Bijapur (District) |                      | a<br>b | 9.2<br>0.4 | 3.8<br>0.2 | 6.6<br>0.3 | 16.1<br>0.7 | 9.4<br>0.6  | 196.6<br>8.1 | 443.0<br>16.5 | 462.3<br>17.5 | 215.4<br>10.3 | 86.0<br>4.1 | 11.0<br>0.6 | 3.9<br>0.2 | 1463.3<br>59.5 | 155<br>(1988)                            | 59<br>(1998) |                                |             |

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.  
\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BIJAPUR**  
**(Data 1962-2010)**

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

**(Data available for 32 years)**

## **BILASPUR DISTRICT**

The southern part of the district is a plain land with gentle slopes. The northern part of the district is mostly hilly with highly undulating topography. The topography varies between 250 m above mean sea level in southern plains and 1120 m amsl in the northern hills. The climate of this district is characterized by hot dry summer season and well distributed rainfall in southwest monsoon season.

The year may be divided in to four seasons. Winter season is from December to February, the summer (pre-monsoon) season from March to middle of June and southwest monsoon season is from the middle of June to first week of October. The period of October and November constitutes post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for seven raingauge stations for the period ranging from 10 to 49 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 1110.5 mm. The variation in rainfall from year to year is not large. 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 328.4 mm. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 177% of the normal. In the year 1979, the annual rainfall in the district was the lowest during this period and amounted to only 60% of the normal. In this fifty year period the rainfall was less than 80% of the normal in 2 years but they were not consecutive. It is seen from Table 2 that the annual rainfall was between 901 mm and 1400 mm in 35 years out of 47.

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 46 at Bilha and Masturi to 74 at Pendra Road observatory.

The heaviest rainfall in 24 hours at any station in the district was 277.0 mm at Bilaspur on 29 June 2005.

## **TEMPERATURE**

There are two meteorological observatories in the district one at Bilaspur and other at Pendra Road situated at the elevation of 625 metre above mean sea level. The records of Bilaspur observatory is not available for sufficient period so the description that follows, is based on the records of the Pendra Road observatory. This observatory is situated near the northwestern border of the district which is at a higher elevation. From the beginning of March, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature at 39.3°C and mean minimum temperature at 25.4°C. In the latter part of the summer season i.e. May and early part of June, the maximum temperature sometimes reaches about 44°C to 45°C on individual days. During the latter part of summer until the onset of the monsoon by second week of June, days are uncomfortable with hot dusty winds. However, the afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the advance of the southwest monsoon into the district towards the middle of June, the day temperatures fall rapidly while drop in night temperature is comparatively small. With the withdrawal of the monsoon by about first week of October, there is rapid drop in the night temperatures while both the temperatures begin to decrease rapidly after October. January is the coldest month of the year when mean maximum temperature is at about 24.5°C and mean minimum temperature at about 11.1°C. In winter months, cold waves sometimes affect the district in the wake of western disturbances passing across north India, the minimum temperatures may sometimes go down to about 3°C on individual days.

The temperatures may be lowered by 2 -3°C in high altitudinal areas and they may be 1 -2°C high in plain area of low elevation with reference to Pendra Road Observatory.

The highest maximum temperature ever recorded at Pendra Road was 46.7°C on 13 May 2004 and the lowest minimum was 1.6°C in February 1929.

## **HUMIDITY**

In the south west monsoon months, air is generally humid, and relative humidity ranges between 63% and 87% in the mornings and it ranges between 55% and 81% in the afternoon. Air is generally mildly humid in post monsoon and winter seasons. The humidity is generally less in the afternoons than in the mornings. Summer is the driest part of the year when the value of relative humidity is about 25% to 30% in the afternoon.

## **CLOUDINESS**

During southwest monsoon season skies are heavily clouded to overcast. In the latter part of summer and post monsoon season there is moderate cloudiness. During the winter months, skies are generally clear or lightly clouded. Generally cloudiness is more in the afternoon than in the mornings.

## **WINDS**

Winds are generally light to moderate with a little strengthening in the latter part of summer and early part of monsoon season. In the southwest monsoon season winds are mostly northerly to northwesterly and sometimes westerly to southwesterly winds are also observed in the district. In the rest of the year winds generally blow from north direction and calm winds are also sometimes observed. During the monsoon season, when depressions affect the weather of the district, the district may experience occasionally gusty winds.



## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season cross the east coast and moving in some west direction pass through or in the neighbourhood of the district causing widespread and locally heavy rain and gusty winds. Occasionally post monsoon storms from the Bay of Bengal affect the weather of the district. Thunderstorm occurs in the district throughout the year. Its frequency is more in the latter part of summer season and in the southwest monsoon season. Fog occurs occasionally in the mornings of post monsoon and winter seasons and during monsoon season particularly in hilly areas.

Table 3, 4, 5 and 6 give the normals of temperature and humidity, cloudiness, wind speed and direction, and special weather phenomena respectively for Pendra Road observatory.

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

| STATION                | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT          | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |               | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|------------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|--------------|-------------|-------------|----------------|--|---------------|-----------------------------------|-------------|
|                        |                                  |        |             |             |             |             |             |              |               |               |               |              |             |             |                | HIGHEST  | LOWEST        | AMOUNT<br>(mm)                    | DATE        |
| Bilaspur               | 49                               | a<br>b | 16.1<br>1.1 | 15.0<br>1.3 | 22.2<br>1.5 | 10.1<br>0.8 | 16.2<br>1.4 | 168.7<br>7.5 | 361.1<br>16.6 | 330.5<br>14.8 | 188.0<br>9.3  | 45.9<br>2.3  | 13.6<br>0.6 | 8.5<br>0.5  | 1195.9<br>57.7 | 194<br>(1961)                                  | 39<br>(1979)  | 277.0                             | 29 Jun 2005 |
| Bilha                  | 10                               | a<br>b | 13.2<br>0.8 | 9.6<br>0.8  | 12.2<br>0.8 | 3.5<br>0.5  | 4.6<br>0.4  | 119.1<br>6.2 | 301.8<br>14.0 | 280.6<br>13.4 | 145.8<br>6.1  | 35.7<br>2.4  | 12.5<br>0.8 | 0.0<br>0.0  | 938.6<br>46.2  | 132<br>(2007)                                  | 98<br>(2005)  | 132.3                             | 13 Aug 2006 |
| Kota                   | 21                               | a<br>b | 32.1<br>1.7 | 6.1<br>0.5  | 2.1<br>0.4  | 3.9<br>0.4  | 3.5<br>0.2  | 165.4<br>7.8 | 358.8<br>16.8 | 319.2<br>14.9 | 206.1<br>10.4 | 45.1<br>2.4  | 9.9<br>0.6  | 8.0<br>0.7  | 1160.2<br>56.8 | 163<br>(1994)                                  | 74<br>(1992)  | 197.0                             | 21 Jul 1994 |
| Marwahi                | 10                               | a<br>b | 3.8<br>0.4  | 3.2<br>0.3  | 30.6<br>2.2 | 4.7<br>0.4  | 5.9<br>0.7  | 160.4<br>6.8 | 319.0<br>13.3 | 260.2<br>11.4 | 209.8<br>11.0 | 29.5<br>2.0  | 26.0<br>1.1 | 0.0<br>0.0  | 1053.1<br>49.6 | 137<br>(2003)                                  | 98<br>(2005)  | 151.0                             | 26 Jul 2010 |
| Masturi                | 10                               | a<br>b | 11.9<br>0.9 | 9.6<br>0.4  | 9.3<br>0.8  | 10.2<br>0.3 | 1.4<br>0.1  | 163.5<br>5.9 | 340.6<br>13.9 | 271.1<br>13.1 | 151.3<br>6.6  | 111.5<br>3.6 | 7.7<br>0.6  | 0.1<br>0.0  | 1088.2<br>46.2 | 149<br>(2001)                                  | 101<br>(2005) | 220.5                             | 29 Jun 2005 |
| PendraRoad<br>(Obsy)   | 48                               | a<br>b | 26.1<br>2.1 | 24.3<br>2.2 | 28.8<br>2.2 | 24.6<br>1.9 | 32.0<br>2.7 | 195.5<br>9.9 | 350.3<br>18.5 | 350.7<br>17.1 | 225.8<br>11.8 | 61.2<br>3.8  | 15.4<br>1.1 | 13.0<br>0.9 | 1347.7<br>74.2 | 146<br>(1961)                                  | 63<br>(2009)  | 262.1                             | 18 Aug 1953 |
| Takhatpur              | 17                               | a<br>b | 13.7<br>0.6 | 4.5<br>0.5  | 7.5<br>0.8  | 5.5<br>0.4  | 3.1<br>0.4  | 211.7<br>9.2 | 267.0<br>14.6 | 268.0<br>13.9 | 165.9<br>8.9  | 29.1<br>2.1  | 13.3<br>0.7 | 0.5<br>0.1  | 989.8<br>52.2  | 143<br>(2003)                                  | 89<br>(1995)  | 160.5                             | 30 Jun 2007 |
| Bilaspur<br>(District) |                                  | a<br>b | 16.7<br>1.1 | 10.3<br>0.9 | 16.1<br>1.2 | 8.9<br>0.7  | 9.5<br>0.8  | 169.2<br>7.6 | 328.4<br>15.4 | 297.2<br>14.1 | 184.7<br>9.2  | 51.1<br>2.7  | 14.1<br>0.8 | 4.3<br>0.3  | 1110.5<br>54.8 | 177<br>(1961)                                  | 60<br>(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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**BILASPUR**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601- 700    | 1            | 1301-1400   | 12           |
| 701- 800    | 0            | 1401-1500   | 2            |
| 801- 900    | 2            | 1501-1600   | 3            |
| 901- 1000   | 2            | 1601-1700   | 2            |
| 1001-1100   | 4            | 1701-1800   | 1            |
| 1101-1200   | 12           | 1801-1900   | 0            |
| 1201-1300   | 5            | 1901-2000   | 1            |

**(Data available for 47 years)**

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest Maximum<br>ever recorded |                          | Lowest Minimum<br>ever recorded |                                    | Relative<br>Humidity (%) |             |
|-----------|--------------------------------|--------------------------------|----------------------------------|--------------------------|---------------------------------|------------------------------------|--------------------------|-------------|
|           | °C                             | °C                             | °C                               | Date                     | °C                              | Date                               | 0830<br>IST              | 1730<br>IST |
| January   | 24.5                           | 11.1                           | 33.0                             | 27-01-2009               | 2.6                             | 05-01-2011                         | 68                       | 49          |
| February  | 27.5                           | 13.6                           | 36.0                             | 27-02-2006               | 1.6                             | -02-1929                           | 58                       | 40          |
| March     | 32.4                           | 17.9                           | 40.0                             | 26-03-2010               | 8.7                             | 10-03-1979                         | 45                       | 31          |
| April     | 37.3                           | 22.6                           | 43.2                             | 29-04-1999<br>19-04-2010 | 12.4                            | 02-04-1961                         | 34                       | 24          |
| May       | 39.3                           | 25.4                           | 46.7                             | 13-05-2004               | 15.5                            | 04-05-1987                         | 40                       | 29          |
| June      | 35.5                           | 24.8                           | 44.6                             | 05-06-2003               | 16.6                            | -06-1915                           | 63                       | 55          |
| July      | 30.0                           | 23.2                           | 39.0                             | 04-07-2010               | 18.1                            | 13-7-2010<br>23-07-2011            | 84                       | 79          |
| August    | 29.3                           | 22.9                           | 35.2                             | 03-08-1972               | 18.1                            | 08-08-2010                         | 87                       | 81          |
| September | 29.9                           | 22.1                           | 34.6                             | 03-09-1996               | 15.5                            | 30-09-2010                         | 83                       | 76          |
| October   | 30.0                           | 18.7                           | 36.7                             | 18-10-2008               | 11.5                            | 29-10-2009                         | 70                       | 62          |
| November  | 27.7                           | 14.4                           | 33.5                             | 04-11-2001               | 6.1                             | -11-1912<br>-11-1926               | 65                       | 54          |
| December  | 25.4                           | 11.2                           | 30.6                             | 21-12-2002<br>21-12-2008 | 3.8                             | -12-1929<br>-12-1936<br>08-12-2008 | 66                       | 50          |
| Annual    | 30.7                           | 19.0                           | 46.7                             | 13-05-2004               | 1.6                             | -02-1929                           | 64                       | 53          |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(PENDRA ROAD)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 18  | 18  | 18  | 17  | 14  | 4   | 0   | 0   | 3   | 15  | 19  | 20  | 146    |
| b                     | 2   | 1   | 1   | 1   | 1   | 6   | 13  | 13  | 7   | 2   | 1   | 1   | 47     |
| c                     | 1.7 | 1.5 | 1.5 | 1.5 | 1.9 | 4.8 | 6.4 | 6.5 | 5.0 | 2.3 | 1.4 | 1.3 | 3.0    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 15  | 12  | 11  | 8   | 4   | 1   | 0   | 0   | 1   | 8   | 13  | 16  | 89     |
| b                     | 2   | 0   | 1   | 1   | 1   | 8   | 13  | 12  | 7   | 2   | 1   | 1   | 48     |
| c                     | 2.2 | 2.1 | 2.6 | 3.0 | 3.6 | 5.8 | 6.6 | 6.8 | 5.7 | 3.1 | 2.0 | 1.8 | 3.8    |
|                       |     |     |     |     |     |     |     |     |     |     |     |     |        |

a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(PENDRA ROAD)**

|                      | Jan | Feb | Mar | Apr   | May   | Jun         | Jul         | Aug        | Sep     | Oct | Nov | Dec | Annual |
|----------------------|-----|-----|-----|-------|-------|-------------|-------------|------------|---------|-----|-----|-----|--------|
| Wind speed in km/hr  | 2.3 | 2.9 | 3.7 | 4.4   | 4.6   | 4.7         | 3.7         | 3.4        | 2.8     | 1.9 | 1.8 | 1.8 | 3.2    |
| Direction in morning | C/N | C/N | C/N | C/N/S | C/S/N | C/NWN       | C/NW /W /SW | C/N /NW /W | C/N /NW | C/N | C/N | C/N |        |
| Direction in evening | C/N | N/C | N   | N     | N     | C/N /SW /NW | C/SW /W /S  | C/W /NW /N | C/N     | C/N | C/N | C/N |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(PENDRA ROAD)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.9 | 1.8 | 2.2 | 3.1 | 4.1 | 7.4 | 6.8 | 5.0 | 4.4 | 1.8 | 0.4 | 0.2 | 38.1   |
| Hail                  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |
| Dust storm            | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1    |
| Fog                   | 0.7 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.3 | 1.7    |
| Squall                | 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    |

## **DANTEWADA DISTRICT**

Dantewada district lies at the Bastar plateau having an undulating topography with hills and valleys. The plateau and ridges in the area are lying at 600 metre above mean sea level. The highest elevation in hilly area is 1144 m amsl and the lowest elevation is 50 m. Dantewada town is the district headquarters.

The climate of this district is characterized by mild hot at hilly terrain and hot in low elevation during summer season and good rainfall in the monsoon season. The year may be divided into four seasons. Summer season from March to the first week of June is followed by southwest monsoon season which extends up to about first week of October. October and November months constitute the post monsoon season. Winter season follows thereafter and lasts till the end of February.

### **RAINFALL**

Records of rainfall in the district are available for three rain gauge stations for the period ranging from 23 to 40 years. The details of 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 1839.6 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 88% of the annual normal rainfall, July and August being the months with the highest rainfall with an average value of about 565.0 mm. The annual rainfall at place to place in the district varies over a large range and variation in the rainfall from year to year is also large. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1990 when it amounted to 218 % of the normal. In the year 1963, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 30% of the normal. In this fifty year period the rainfall was less than 80% of the normal in 15 years. Considering the district as a whole, there were two occasions of three consecutive years

and two consecutive years each of such low rainfall. It is seen from Table 2 that the annual rainfall was between 1401 mm and 2300 mm in 14 years out of 31.

On an average there are 76 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 Dantewada to 97 at Bailadila observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 355.0 mm at Dantewada on 31 August 1976.

## **TEMPERATURE**

There is a meteorological observatory in the district at Bailadila situated at an elevation of 1144 m. So the description that follows is based on the records of this observatory. After February, temperature begins to rise rapidly. May is the hottest month with the mean maximum temperature at 31.8°C and mean minimum temperature at 21.3°C. In latter part of the summer season i.e. April to June, the maximum temperature sometimes reaches about 37°C on individual days. With the advance of the southwest monsoon into the district towards the middle of June, the day and night temperatures drop rapidly. With the withdrawal of the monsoon by about first week of October, the day temperatures increase slightly but night temperatures slightly drop. After October both the temperatures steadily decrease. December and January are generally the coldest months with average maximum temperature at 22°C and mean minimum temperature at 13.3°C. During winter months, cold waves affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to about 8°C. The temperatures may be 4°C to 6°C higher in the low elevated areas.

The highest maximum temperature ever recorded in the district was 39.4°C on 21 May 1992 and the lowest minimum temperature ever recorded was 6.7°C on 29 January 1977.

## **HUMIDITY**

The relative humidity is generally high during the monsoon months and it ranges between 80% and 96%. From October humidity start to decrease and post monsoon season is of mild humid. Winter and pre-monsoon season are generally dry. The driest part of the year is the summer season, when humidity is at about 35% to 40% in the afternoon and at about 52% in the morning.

## **CLOUDINESS**

During the monsoon season the sky is generally moderately to heavily clouded. Cloudiness decreases from November and clear or lightly clouded skies are common during the winter and early summer season. Cloudiness is generally more in the afternoon except during the monsoon season. Cloudiness is moderate in post monsoon and in latter part of pre-monsoon season.

## **WINDS**

Winds are generally strong throughout the year with more strengthen in the late summer and monsoon season. During the post monsoon and winter season winds generally blow from east and northeast direction. During pre-monsoon and southwest monsoon season winds generally blow from southwest, south and west directions. Some northwesterlies are also observed during the southwest monsoon and pre-monsoon seasons.

## **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. Thunderstorms sometimes occur in pre-monsoon and

southwest monsoon season. Fog is generally observed at hills throughout the year. During pre-monsoon and monsoon seasons its frequency is maximum.

Tables 3, 4, 5 and 6 give normals of temperature and relative humidity, cloudiness, wind speed and direction and special weather phenomena respectively for Bailadila observatory.



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

| STATION                 | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN           | JUL           | AUG           | SEP           | OCT          | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|-------------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|---------------|--------------|-------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                         |                                  |        |             |             |             |             |             |               |               |               |               |              |             |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Bailadila<br>(Obsy)     | 23                               | a<br>b | 12.9<br>0.8 | 13.6<br>1.0 | 20.9<br>1.6 | 39.2<br>2.7 | 87.2<br>3.9 | 359.0<br>12.0 | 822.7<br>22.8 | 848.2<br>24.6 | 343.2<br>17.0 | 126.3<br>7.5 | 37.1<br>2.3 | 8.9<br>0.6  | 2719.2<br>96.8 | 147<br>(1990)                                  | 76<br>(1985) | 292.4                             | 18 Jun 1999 |
| Dantewada               | 40                               | a<br>b | 14.3<br>0.4 | 5.9<br>0.2  | 0.6<br>0.0  | 5.1<br>0.2  | 3.6<br>0.2  | 183.5<br>7.5  | 459.8<br>17.1 | 437.3<br>17.2 | 214.6<br>10.2 | 94.2<br>4.5  | 4.2<br>0.3  | 1.3<br>0.1  | 1424.4<br>57.9 | 287<br>(1976)                                  | 38<br>(1963) | 355.0                             | 31 Aug 1976 |
| Gidem<br>(Hydro)        | 24                               | a<br>b | 14.4<br>1.4 | 4.5<br>0.7  | 4.7<br>0.2  | 18.2<br>1.9 | 38.4<br>3.3 | 168.4<br>8.9  | 399.9<br>18.0 | 419.1<br>19.7 | 209.8<br>11.0 | 71.8<br>4.5  | 14.4<br>1.5 | 11.5<br>1.4 | 1375.1<br>72.5 | 158<br>(2006)                                  | 54<br>(1997) | 163.6                             | 11 Jul 1998 |
| Dantewada<br>(District) |                                  | a<br>b | 13.9<br>0.9 | 8.0<br>0.6  | 8.7<br>0.6  | 20.8<br>1.6 | 43.1<br>2.5 | 237.0<br>9.5  | 560.8<br>19.3 | 568.2<br>20.5 | 255.9<br>12.7 | 97.4<br>5.5  | 18.6<br>1.4 | 7.2<br>0.7  | 1839.6<br>75.8 | 218<br>(1990)                                  | 30<br>(1963) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**DANTEWADA**  
**(Data 1962-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 501 – 600   | 1            | 2301 - 2400 | 0            |
| 601 - 700   | 0            | 2401 - 2500 | 1            |
| 701 - 800   | 2            | 2501 - 2600 | 1            |
| 801 – 900   | 1            | 2601 - 2700 | 0            |
| 901 - 1000  | 1            | 2701 - 2800 | 0            |
| 1001 – 1100 | 2            | 2801 - 2900 | 0            |
| 1101 - 1200 | 1            | 2901 - 3000 | 0            |
| 1201 - 1300 | 1            | 3001 - 3100 | 0            |
| 1301 – 1400 | 4            | 3101 – 3200 | 0            |
| 1401 – 1500 | 2            | 3201 - 3300 | 0            |
| 1501 – 1600 | 2            | 3301 - 3400 | 0            |
| 1601 – 1700 | 4            | 3401 - 3500 | 0            |
| 1701 – 1800 | 1            | 3501 - 3600 | 0            |
| 1801 – 1900 | 0            | 3601 - 3700 | 0            |
| 1901 - 2000 | 2            | 3701 - 3800 | 0            |
| 2001 – 2100 | 2            | 3801 - 3900 | 0            |
| 2101 - 2200 | 0            | 3901 - 4000 | 1            |
| 2201 - 2300 | 1            | 4001 - 4100 | 1            |

**(Data available for 31 years)**

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

| 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   | 22.8                     | 13.5                     | 27.6                          | 31-01-1990 | 6.7                          | 29-01-1977 | 59                    | 45       |
| February  | 24.8                     | 15.5                     | 30.6                          | 28-02-1989 | 9.8                          | 04-02-1977 | 57                    | 39       |
| March     | 28.7                     | 18.9                     | 34.0                          | 30-03-1999 | 10.2                         | 04-03-1996 | 46                    | 36       |
| April     | 31.2                     | 20.5                     | 37.4                          | 15-04-1999 | 12.0                         | 13-04-2001 | 51                    | 39       |
| May       | 31.8                     | 21.3                     | 39.4                          | 21-05-1992 | 11.4                         | 06-05-2000 | 60                    | --       |
| June      | 27.1                     | 19.4                     | 38.0                          | 01-06-1998 | 11.8                         | 14-06-1994 | 82                    | --       |
| July      | 22.8                     | 17.9                     | 29.9                          | 01-07-1982 | --                           | -----      | 95                    | 90       |
| August    | 22.3                     | 17.6                     | 28.1                          | 28-08-1985 | --                           | -----      | 96                    | 94       |
| September | 24.0                     | 18.0                     | 29.4                          | 27-09-1992 | 13.4                         | 11-09-1986 | 89                    | 89       |
| October   | 25.1                     | 17.4                     | 29.4                          | 25-10-2000 | 11.1                         | 31-10-1987 | 72                    | 78       |
| November  | 24.0                     | 15.1                     | 29.6                          | 01-11-1993 | 9.4                          | 25-11-1987 | 65                    | 65       |
| December  | 22.8                     | 13.2                     | 28.5                          | 06-12-1998 | 8.4                          | 12-12-1999 | 58                    | 50       |
| Annual    | 25.6                     | 17.4                     | 39.4                          | 21-05-1992 | 6.7                          | 29-01-1977 | 70                    | 52       |

**TABLE – 4**  
**Mean Cloud Amount \*\*(Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(BAILADILA)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 23  | 21  | 22  | 18  | 11  | 4   | 1   | 4   | 7   | 13  | 15  | 19  | 194    |
| b                     | 0   | 0   | 0   | 0   | 1   | 4   | 20  | 4   | 1   | 1   | 1   | 0   | 18     |
| c                     | 0.9 | 1.0 | 0.9 | 1.5 | 2.3 | 4.2 | 6.0 | 4.5 | 3.2 | 2.1 | 1.8 | 1.4 | 2.2    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 16  | 16  | 11  | 9   | -   | -   | 0   | 2   | 7   | 1   | 6   | 10  | 78     |
| b                     | 0   | 0   | 0   | 0   | -   | -   | 0   | 0   | 1   | 2   | 0   | 0   | 3      |
| c                     | 1.4 | 1.1 | 1.9 | 1.9 | -   | -   | 4.2 | 2.3 | 3.8 | 3.6 | 1.0 | 2.3 | 2.3    |

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount in Okta.

\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(BAILADILA)**

|                      | Jan  | Feb         | Mar         | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  | Annual |
|----------------------|------|-------------|-------------|------|------|------|------|------|------|------|------|------|--------|
| Wind speed in km/hr  | 9.2  | 11.6        | 13.0        | 15.3 | 16.8 | 21.5 | 23.5 | 25.3 | 16.7 | 11.8 | 12.2 | 9.0  | 15.6   |
| Direction in morning | E/NE | E/NE        | SW/S        | SW   | SW/W | W/NW | W    | W    | NW/W | E/NE | E/NE | NE/E |        |
| Direction in evening | NE/E | W/NE/<br>SW | W/SW/<br>NW | W/SW | --   | --   | W/NW | W/NW | W    | E/NE | NE/N | NE   |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(BAILADILA)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |
| 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 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0    |
| Fog                   | 0.2 | 0.4 | 0.3 | 1.9 | 1.5 | 0.0 | 1.7 | 1.8 | 2.1 | 0.4 | 0.0 | 0.0 | 10.3   |
| Squall                | 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    |

## **DHAMTARI DISTRICT**

The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to first week of October. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for six 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 Table 1 and 2. The average annual rainfall in the district is 1187.6 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 91% of the annual normal rainfall. July and August are the rainiest months with an average rainfall of 335.0 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010 the highest annual rainfall was in year 1994 when it amounted to 162% of the normal. In the year 1965, the annual rainfall in the district was the lowest in this period and amounted to only 55% of the normal. In this period the rainfall was less than 80% of the normal in 9 years. Considering the district as a whole, there were two occasions of two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 901 mm and 1500 mm in 25 years out of 36.

On an average there are 52 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 42 at Gattasilli to 57 at Maramsilli.

The heaviest rainfall in 24 hours recorded at any station in the district was 381.0 mm at Kurud on 04 August 1910.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at the neighbouring observatory - Kanker. After February, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 40°C and mean minimum temperature about 27°C. In May and early part of June, the maximum temperature may sometimes reach about 44°C. Thundershowers sometimes occur during afternoons bringing some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather slightly cools down, the day temperatures go down appreciably but the drop in the night temperatures is slight. After the withdrawal of monsoon by about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature about 28°C and the mean minimum temperature about 12°C. Cold waves sometimes affect the district in winter months in the wake of western disturbances which move across north India, when the minimum temperature may go down to about 4°C or below on individual days.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoon than in the morning, except in the southwest monsoon months when there is little difference. In the southwest monsoon season air is generally humid with value of relative humidity of the order of 55% to 85%. Humidity decreases in post monsoon and winter seasons and air is generally mild humid. Summer season is the driest part of the year with value of relative humidity in the afternoon being about 30% and the humidity is about 45% in the mornings.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and latter part of summer months the cloudiness is moderate, the afternoons being much cloudy than the mornings. In the rest of the year skies are generally clear or lightly clouded.

## **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 experiences gusty winds. In pre monsoon and southwest monsoon season and in October winds mainly blow from southwest direction and sometimes calm winds are also observed. During November and December winds mostly blow from northeast direction, sometimes calm winds are also observed. In January and February generally calm winds are observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms sometimes occur during the summer and southwest monsoon seasons, being more frequent during April to June. They sometimes occur during February and October months. Thunderstorms occur during pre-monsoon months are occasionally accompanied with hail. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of the winter months.

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

| STATION             | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|---------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|--------------------------------|-------------|
|                     |                      |   |      |      |      |      |      |       |       |       |       |      |      |     |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Dhamtari            | 43                   | a | 11.3 | 8.0  | 6.0  | 8.6  | 13.5 | 171.0 | 319.8 | 320.0 | 203.2 | 58.9 | 11.1 | 6.9 | 1138.3 | 165                                      | 61     | 313.2                          | 05 Sep 1952 |
|                     |                      | b | 0.9  | 0.6  | 0.5  | 0.7  | 0.9  | 8.3   | 14.1  | 13.8  | 8.8   | 3.0  | 0.6  | 0.5 | 52.7   | (1994)                                   | (2004) |                                |             |
| Gattasilli          | 18                   | a | 0.0  | 0.6  | 0.0  | 3.0  | 0.0  | 135.8 | 289.4 | 334.6 | 230.2 | 26.2 | 0.0  | 0.0 | 1019.8 | 145                                      | 28     | 230.0                          | 11 Sep 1976 |
|                     |                      | b | 0.0  | 0.1  | 0.0  | 0.2  | 0.0  | 6.2   | 12.9  | 12.2  | 8.9   | 1.6  | 0.0  | 0.0 | 42.1   | (1967)                                   | (1965) |                                |             |
| Kurud               | 31                   | a | 0.5  | 7.2  | 8.7  | 6.5  | 18.5 | 182.9 | 363.9 | 307.2 | 187.2 | 37.4 | 4.8  | 1.5 | 1126.3 | 174                                      | 44     | 381.0                          | 04 Aug 1910 |
|                     |                      | b | 0.1  | 0.5  | 0.7  | 0.5  | 1.4  | 7.5   | 14.0  | 13.2  | 8.5   | 2.4  | 0.4  | 0.2 | 49.4   | (1994)                                   | (1974) |                                |             |
| Maramsilli          | 29                   | a | 2.6  | 12.0 | 6.6  | 22.2 | 19.4 | 204.8 | 332.2 | 358.5 | 230.8 | 73.8 | 6.5  | 2.2 | 1271.6 | 135                                      | 66     | 279.6                          | 02 Aug 1967 |
|                     |                      | b | 0.3  | 1.1  | 0.4  | 1.2  | 1.3  | 9.3   | 15.1  | 14.6  | 9.5   | 3.5  | 0.5  | 0.2 | 57.0   | (1964)                                   | (1972) |                                |             |
| Rudri               | 32                   | a | 5.3  | 14.7 | 14.3 | 12.4 | 19.5 | 208.2 | 359.5 | 371.8 | 227.6 | 60.9 | 9.5  | 3.9 | 1307.6 | 148                                      | 59     | 345.9                          | 05 Sep 1952 |
|                     |                      | b | 0.4  | 0.8  | 0.7  | 0.8  | 1.2  | 8.9   | 14.4  | 14.7  | 10.0  | 3.1  | 0.5  | 0.3 | 55.8   | (1994)                                   | (1966) |                                |             |
| Virgudi             | 10                   | a | 11.9 | 0.8  | 6.0  | 8.2  | 22.4 | 168.5 | 346.6 | 381.3 | 213.9 | 78.3 | 14.7 | 9.1 | 1261.7 | 144                                      | 105    | 196.7                          | 03 Jul 2006 |
|                     |                      | b | 0.9  | 0.1  | 0.7  | 1.0  | 1.9  | 7.0   | 13.9  | 14.3  | 11.0  | 3.7  | 1.0  | 0.7 | 56.2   | (2003)                                   | (2004) |                                |             |
| Dhamtari (District) |                      | a | 5.3  | 7.2  | 6.9  | 10.2 | 15.6 | 178.5 | 335.2 | 345.6 | 215.5 | 55.9 | 7.8  | 3.9 | 1187.6 | 162                                      | 55     |                                |             |
|                     |                      | b | 0.4  | 0.5  | 0.5  | 0.7  | 1.1  | 7.9   | 14.1  | 13.8  | 9.5   | 2.9  | 0.5  | 0.3 | 52.2   | (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.

\*\* Years of occurrence given in brackets.



**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**DHAMTARI**  
**(Data 1961-2010)**

| <b>Range in mm</b> | <b>No. of years</b> | <b>Range in mm</b> | <b>No. of years</b> |
|--------------------|---------------------|--------------------|---------------------|
| 601 – 700          | 2                   | 1301-1400          | 2                   |
| 701 – 800          | 1                   | 1401–1500          | 1                   |
| 801 – 900          | 4                   | 1501-1600          | 2                   |
| 901 – 1000         | 5                   | 1601-1700          | 1                   |
| 1001 -1100         | 5                   | 1701-1800          | 0                   |
| 1101-1200          | 7                   | 1801-1900          | 0                   |
| 1201-1300          | 5                   | 1901-2000          | 1                   |

**(Data available for 36 years)**

## **DURG DISTRICT**

The climate of this district is characterized by dry hot in summer and well distributed rainfall during the monsoon season. The year may be divided into four seasons. Winter season starts by December and lasts till the end of February. The period from March to about the middle of June is of summer season, the southwest monsoon season which follows lasts till the first week of October. Thereafter upto November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for seven raingauge 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 Table 1 and 2. The average annual rainfall in the district is 1061.5 mm. During the monsoon season (June to September) the district receives rain about 92% of the annual rainfall. July and August are the rainiest months with average rainfall of 305.3 mm. The annual rainfall from year to year in the district has moderate variation. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 178% of the annual normal occurred in year 2003, while the lowest annual rainfall which was 53% of the normal occurred in year 1974. In the fifty year period there were 11 years in which the annual rainfall in the district was less than 80% of the normal and during this period there were two occasions of two consecutive years and one occasion of three consecutive years. It is seen from Table 2 that the rainfall was between 801 mm and 1300 mm in 22 years out of 41.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 45 at Dhamdha to 53 at Bhilai.

The heaviest rainfall in 24 hours recorded at any station in the district was 337.0 mm at Durg on 15 June 2004.

## **TEMPERATURE**

There is one meteorological observatory in the district located at Durg at an elevation of 293 metre above mean sea level. The description that follows is based on the records of this observatory. From about the beginning of March, temperatures begin to rise rapidly till May which is the hottest month. The mean maximum temperature in May is of 42.4°C and mean minimum of 28.3°C. The heat in summer is quite intense and the hot dust raising winds add to the discomfort. The day temperature during the period April to the early part of June goes up to about 45°C on individual days. With the onset of the monsoon by about mid-June, there is appreciable drop in temperatures and sometimes weather becomes pleasant. After the withdrawal of the monsoon, early in October, the day temperatures remain same as in September but the nights become progressively cooler. After October, both the day and night temperatures decrease rapidly till December and January which are the coldest months with average maximum temperature at 27.9°C and mean minimum temperature at 13.7°C. During the winter season, the cold waves with the passage of western disturbances across North India sometimes affect the district and on such occasions, the minimum temperature drops down to about 7°C.

The highest maximum temperature ever recorded at Durg was 47.4°C on 31 May 1988 and the lowest minimum temperature ever recorded was 6.0°C on 14 January 2012.

## **HUMIDITY**

The value of relative humidity is generally high during the monsoon months and it ranges at about 60% to 85%. The values of relative humidity start to decrease in October. It is comparatively less during rest of the year.

The driest part of the year is the summer season, when the average humidity is about 30% in the afternoons and about 47% in the mornings.

## **CLOUDINESS**

During the monsoon sky is heavily clouded or overcast. In the latter part of summer season and early part of post monsoon season, skies are moderately clouded. During the rest of the year skies are mostly clear or lightly clouded.

## **WINDS**

Winds are generally light to moderate throughout the year with some strengthening in force during latter summer and southwest monsoon season. During the period of pre-monsoon and southwest monsoon months, winds generally blow from southwest direction. During post monsoon and winter seasons winds generally blow from north and northeast direction. In the month of March, winds generally blow from north and northeast direction and southwest wind also appears in the district.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon seasons move in a westerly direction towards the district or its neighbourhood causing widespread heavy rain and gusty winds. Thunderstorms occur frequently during the period February to October. Fog occasionally occurs during winter season.

Tables 3, 4, 5 and 6 give normals of temperature and relative humidity, mean wind speed and wind direction and special weather phenomena respectively for Durg observatory.

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

| STATION         | No. of Years of Data |   | JAN  | FEB | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|-----------------|----------------------|---|------|-----|------|------|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|--------------------------------|-------------|
|                 |                      |   |      |     |      |      |      |       |       |       |       |      |      |     |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Bhatagaon       | 38                   | a | 5.4  | 3.2 | 8.0  | 3.1  | 8.8  | 201.8 | 315.5 | 317.7 | 191.3 | 40.6 | 7.4  | 1.7 | 1104.5 | 160                                      | 61     | 287.5                          | 15 Jun 2004 |
|                 |                      | b | 0.4  | 0.3 | 0.4  | 0.4  | 0.8  | 8.1   | 14.1  | 14.1  | 8.4   | 2.7  | 0.3  | 0.2 | 50.2   | (1961)                                   | (1974) |                                |             |
| Bhilai          | 33                   | a | 9.1  | 3.3 | 10.0 | 6.0  | 7.7  | 200.1 | 294.2 | 334.5 | 203.5 | 56.3 | 4.2  | 3.9 | 1132.8 | 158                                      | 46     | 288.3                          | 19 Aug 1939 |
|                 |                      | b | 0.5  | 0.3 | 0.4  | 0.5  | 0.7  | 8.9   | 13.9  | 14.7  | 9.4   | 3.1  | 0.2  | 0.3 | 52.9   | (1970)                                   | (1988) |                                |             |
| Dhamdha         | 12                   | a | 0.0  | 5.7 | 9.8  | 0.0  | 4.1  | 143.6 | 280.3 | 254.6 | 126.8 | 30.7 | 5.9  | 0.0 | 861.5  | 141                                      | 80     | 127.0                          | 30 Jun 2007 |
|                 |                      | b | 0.0  | 0.5 | 0.5  | 0.0  | 0.8  | 8.8   | 12.9  | 12.7  | 6.8   | 1.7  | 0.3  | 0.0 | 45.0   | (2007)                                   | (1991) |                                |             |
| Durg            | 49                   | a | 11.8 | 3.9 | 5.9  | 4.4  | 7.3  | 197.0 | 305.3 | 305.6 | 175.7 | 53.0 | 9.6  | 5.1 | 1084.6 | 190                                      | 52     | 337.0                          | 15 Jun 2004 |
|                 |                      | b | 0.7  | 0.3 | 0.6  | 0.4  | 0.7  | 8.1   | 13.3  | 13.6  | 8.2   | 3.2  | 0.3  | 0.5 | 49.9   | (2003)                                   | (1974) |                                |             |
| Durg (Obsy)     | 22                   | a | 3.7  | 4.3 | 17.5 | 14.9 | 15.0 | 199.7 | 353.4 | 282.6 | 181.1 | 62.9 | 17.3 | 3.7 | 1156.1 | 131                                      | 64     | 260.4                          | 13 Aug 2006 |
|                 |                      | b | 0.3  | 0.6 | 1.1  | 0.8  | 0.9  | 8.2   | 14.8  | 12.1  | 7.3   | 3.0  | 0.7  | 0.3 | 50.1   | (1973)                                   | (1976) |                                |             |
| Khapari         | 31                   | a | 4.1  | 3.4 | 0.9  | 3.4  | 1.7  | 194.8 | 329.7 | 336.6 | 186.1 | 57.1 | 2.8  | 0.8 | 1121.4 | 221                                      | 54     | 305.6                          | 19 Aug 1970 |
|                 |                      | b | 0.3  | 0.4 | 0.1  | 0.4  | 0.1  | 7.9   | 13.1  | 14.0  | 8.3   | 2.7  | 0.2  | 0.1 | 47.6   | (1973)                                   | (1974) |                                |             |
| Selod           | 35                   | a | 5.5  | 2.2 | 4.6  | 4.0  | 3.8  | 167.3 | 269.3 | 294.0 | 159.8 | 50.4 | 7.1  | 1.6 | 969.6  | 176                                      | 43     | 260.0                          | 08 Jul 1973 |
|                 |                      | b | 0.3  | 0.2 | 0.2  | 0.4  | 0.2  | 7.9   | 13.1  | 13.7  | 8.2   | 2.4  | 0.4  | 0.2 | 47.2   | (1973)                                   | (1974) |                                |             |
| Durg (District) |                      | a | 5.7  | 3.7 | 8.1  | 5.1  | 6.9  | 186.3 | 306.8 | 303.7 | 174.9 | 50.1 | 7.8  | 2.4 | 1061.5 | 178                                      | 53     |                                |             |
|                 |                      | b | 0.4  | 0.4 | 0.5  | 0.4  | 0.6  | 8.3   | 13.6  | 13.6  | 8.1   | 2.7  | 0.3  | 0.2 | 49.1   | (2003)                                   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**DURG**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 501 – 600   | 3            | 1201 – 1300 | 3            |
| 601 – 700   | 2            | 1301 - 1400 | 1            |
| 701 – 800   | 5            | 1401 -1500  | 1            |
| 801 – 900   | 3            | 1501 - 1600 | 4            |
| 901 – 1000  | 3            | 1601 - 1700 | 1            |
| 1001 – 1100 | 5            | 1701 - 1800 | 1            |
| 1101 – 1200 | 8            | 1801 - 1900 | 1            |

(Data available for 41 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest<br>Maximum<br>ever recorded |            | Lowest<br>Minimum<br>ever recorded |            | Relative<br>Humidity<br>(%) |             |
|-----------|--------------------------------|--------------------------------|-------------------------------------|------------|------------------------------------|------------|-----------------------------|-------------|
|           | °C                             | °C                             | °C                                  | Date       | °C                                 | Date       | 0830<br>IST                 | 1730<br>IST |
| January   | 28.1                           | 13.8                           | 36.3                                | 02-01-1980 | 6.0                                | 14-01-2012 | 70                          | 50          |
| February  | 30.4                           | 16.4                           | 39.3                                | 22-02-1974 | 8.5                                | 12-02-2012 | 62                          | 46          |
| March     | 35.7                           | 20.7                           | 42.4                                | 30-03-1985 | 12.0                               | 02-03-1971 | 51                          | 35          |
| April     | 40.2                           | 25.1                           | 45.3                                | 28-04-1973 | 16.6                               | 08-04-2011 | 46                          | 26          |
| May       | 42.4                           | 28.3                           | 47.4                                | 31-05-1988 | 19.7                               | 02-05-2005 | 44                          | 25          |
| June      | 37.4                           | 26.5                           | 46.2                                | 02-06-2012 | 20.0                               | 03-06-1988 | 68                          | 60          |
| July      | 31.0                           | 24.2                           | 40.4                                | 01-07-1987 | 19.7                               | 31-07-2012 | 85                          | 76          |
| August    | 30.5                           | 24.4                           | 35.4                                | 04-08-1987 | 19.4                               | 04-08-2012 | 85                          | 80          |
| September | 31.6                           | 24.3                           | 37.4                                | 13-09-2012 | 20.0                               | 30-09-2011 | 82                          | 73          |
| October   | 32.3                           | 22.0                           | 38.0                                | 02-10-1984 | 12.8                               | 27-10-2009 | 76                          | 63          |
| November  | 30.2                           | 17.3                           | 38.3                                | 03-11-1975 | 9.0                                | 30-11-1975 | 68                          | 51          |
| December  | 27.6                           | 13.7                           | 34.4                                | 14-12-1984 | 6.9                                | 22-12-2011 | 70                          | 52          |
| Annual    | 33.1                           | 21.4                           | 47.4                                | 31-05-1988 | 6.0                                | 14-01-2012 | 67                          | 53          |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(DURG)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 23  | 22  | 26  | 24  | 22  | 7   | 2   | 3   | 11  | 21  | 24  | 26  | 211    |
| b                     | 2   | 1   | 1   | 1   | 1   | 12  | 21  | 17  | 8   | 3   | 2   | 1   | 70     |
| C                     | 1.2 | 1.2 | 0.9 | 0.9 | 1.2 | 4.8 | 7.0 | 6.1 | 3.8 | 2.0 | 1.0 | 0.8 | 2.5    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 26  | 23  | 27  | 21  | 21  | 6   | 2   | 3   | 7   | 20  | 25  | 28  | 209    |
| b                     | 1   | 1   | 1   | 1   | 2   | 13  | 21  | 19  | 12  | 3   | 1   | 0   | 75     |
| c                     | 0.7 | 0.9 | 0.6 | 1.5 | 1.8 | 5.2 | 6   | 5.8 | 4.7 | 2.1 | 0.7 | 0.5 | 2.6    |

- a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(DURG)**

|                      | Jan    | Feb        | Mar         | Apr  | May  | Jun | Jul | Aug | Sep | Oct        | Nov    | Dec        | Annual |
|----------------------|--------|------------|-------------|------|------|-----|-----|-----|-----|------------|--------|------------|--------|
| Wind speed in km/hr  | 2.4    | 3.3        | 3.4         | 4.7  | 5.3  | 6.7 | 6.8 | 5.6 | 3.9 | 3.0        | 2.7    | 2.0        | 4.2    |
| Direction in morning | N/NE   | N/NE       | N/NE/<br>SW | SW   | SW   | SW  | SW  | SW  | SW  | NE/N       | N/NE   | N/NE       |        |
| Direction in evening | C/N/NE | N/NE/<br>C | C/SW        | SW/C | SW/W | SW  | SW  | SW  | SW  | N/NE/<br>C | NE/C/N | C/N/<br>NE |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(DURG)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.0 | 0.2 | 0.4 | 1.0 | 0.5 | 1.2 | 1.7 | 0.8 | 0.1 | 0.1 | 0.0 | 0.0 | 6.0    |
| 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    |
| Fog                   | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2    |
| Squall                | 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    |

## **GARIABANDH DISTRICT**

Gariabandh district has almost plain area of low elevation and some hilly area of upto 925 metre above mean sea level in eastern part. The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to the first week of October. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for six raingauge stations for the period ranging from 28 to 40 years. The details of 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 1205.1 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 90% of the annual normal rainfall. July and August are the rainiest months with an average value of 342 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1994 when it amounted to 149% of the normal. In the year 1965, the annual rainfall in the district was the lowest in this period and amounted to only 56% of the normal. In this period the rainfall was less than 80% of the normal in 5 years and none of them were consecutive. It is seen from Table 2 that annual rainfall was between 901 mm and 1500 mm in 28 years out of 39.

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 48 at Deobhog to 62 at Urmal Hydro.



The heaviest rainfall in 24 hours recorded at any station in the district was 308.2 mm at Deobhog on 01 September 1995.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at Kanker and Raipur observatories respectively in the neighbouring Kanker and Raipur districts. After February, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 41°C and mean minimum temperature about 27°C. In May and early part of June, the maximum temperature may reach at about 44°C on individual days. Sometimes thundershowers occur in afternoons and bring some relief from the heat. With the onset of southwest monsoon season over the district by about the second week of June weather slightly cools down, the day temperatures go down appreciably but the drop in the night temperatures is slight. After withdrawal of monsoon about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature about 28°C and mean minimum temperature about 12°C. Cold waves affect the district in winter months in the wake of western disturbances which move across north India, when the minimum temperature may go down to about 7°C on some individual days. The temperatures may be lowered by 2°C to 3°C in high elevated areas.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoon than in the morning, except in the southwest monsoon months when there is little difference. In the southwest monsoon months the air is generally humid with value of relative humidity of the order of 55% to 90%. Humidity decreases from October. In post monsoon and winter seasons air is generally mild humid. Summer season is the driest part of the year with value of relative

humidity in the afternoon being about 30% and morning humidity is about 45%.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and latter part of summer season skies are generally moderately clouded. In winter season skies are generally clear or lightly clouded. In April, May and in October, cloudiness increases particularly in the afternoons.

## **WINDS**

Winds are generally light to moderate throughout the year with some increase in force in later 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 sometimes experiences gusty winds. In pre-monsoon and southwest monsoon seasons winds mainly blow from southwest and west direction and sometimes calm winds are also observed. From October to February winds mostly blow from north and northeast direction, sometimes calm winds are also observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms sometimes occur during the summer and southwest monsoon seasons, being more frequent during April to June. They sometimes occur during February and October months. Thunderstorms which occur during February to May are occasionally accompanied with hail and squalls. Dust storms occur occasionally during summer. Fog occasionally occurs in the morning of the winter months.

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

| STATION               | No. of Years of Data |   | JAN | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|-----------------------|----------------------|---|-----|------|------|------|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|--------------------------------|-------------|
|                       |                      |   |     |      |      |      |      |       |       |       |       |      |      |     |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Bhalukona             | 38                   | a | 4.7 | 9.3  | 11.1 | 2.4  | 8.8  | 160.0 | 330.4 | 287.0 | 201.9 | 30.6 | 6.4  | 5.7 | 1058.3 | 165                                      | 63     | 191.8                          | 13 Jul 1958 |
|                       |                      | b | 0.3 | 0.7  | 1.1  | 0.4  | 0.7  | 7.3   | 15.7  | 14.3  | 9.6   | 2.3  | 0.2  | 0.4 | 53.0   | (1961)                                   | (1965) |                                |             |
| Deobhog               | 35                   | a | 3.8 | 3.7  | 0.3  | 4.6  | 11.4 | 163.8 | 305.3 | 295.8 | 208.7 | 52.0 | 4.2  | 1.2 | 1053.8 | 170                                      | 26     | 308.2                          | 01 Sep 1995 |
|                       |                      | b | 0.1 | 0.2  | 0.1  | 0.5  | 0.7  | 7.5   | 13.9  | 13.2  | 8.6   | 3.0  | 0.2  | 0.1 | 48.1   | (1994)                                   | (1983) |                                |             |
| Gariabandh            | 40                   | a | 5.5 | 10.3 | 5.2  | 9.4  | 22.5 | 239.9 | 371.9 | 406.2 | 221.2 | 74.9 | 11.8 | 5.0 | 1383.8 | 173                                      | 44     | 301.5                          | 03 Aug 1942 |
|                       |                      | b | 0.4 | 0.6  | 0.6  | 1.0  | 1.2  | 8.9   | 14.8  | 14.9  | 9.5   | 3.5  | 0.6  | 0.4 | 56.4   | (2008)                                   | (1965) |                                |             |
| Mainpur Hydro         | 28                   | a | 7.7 | 7.7  | 23.0 | 24.6 | 22.4 | 238.2 | 386.7 | 356.1 | 197.3 | 65.0 | 13.2 | 5.2 | 1347.1 | 133                                      | 47     | 296.0                          | 28 Jul 1991 |
|                       |                      | b | 0.7 | 0.8  | 1.4  | 1.6  | 1.4  | 9.1   | 15.2  | 14.9  | 9.6   | 4.0  | 0.7  | 0.2 | 59.6   | (1970)                                   | (1974) |                                |             |
| Rajim                 | 30                   | a | 4.9 | 3.5  | 1.7  | 8.0  | 5.9  | 186.9 | 368.0 | 353.6 | 167.7 | 53.5 | 4.6  | 5.0 | 1163.3 | 231                                      | 63     | 254.5                          | 24 Nov 1958 |
|                       |                      | b | 0.2 | 0.4  | 0.1  | 0.5  | 0.5  | 8.3   | 14.7  | 13.9  | 8.3   | 2.7  | 0.3  | 0.4 | 50.3   | (1964)                                   | (1968) |                                |             |
| Urmal Hydro           | 38                   | a | 8.5 | 12.5 | 15.2 | 31.1 | 41.7 | 189.0 | 305.5 | 337.2 | 198.2 | 64.1 | 16.9 | 4.3 | 1224.2 | 144                                      | 50     | 211.8                          | 22 Aug 1990 |
|                       |                      | b | 0.7 | 1.1  | 1.3  | 2.8  | 3.1  | 9.1   | 14.8  | 14.8  | 9.5   | 3.8  | 1.0  | 0.3 | 62.3   | (1970)                                   | (1974) |                                |             |
| Gariabandh (District) |                      | a | 5.8 | 7.8  | 9.4  | 13.3 | 18.8 | 196.3 | 344.6 | 339.3 | 199.2 | 56.7 | 9.5  | 4.4 | 1205.1 | 149                                      | 56     |                                |             |
|                       |                      | b | 0.4 | 0.6  | 0.8  | 1.1  | 1.3  | 8.4   | 14.8  | 14.3  | 9.2   | 3.2  | 0.5  | 0.3 | 54.9   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**GARIABANDH**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 – 700   | 2            | 1201-1300   | 9            |
| 701 – 800   | 1            | 1301-1400   | 4            |
| 801 – 900   | 2            | 1401–1500   | 2            |
| 901 – 1000  | 2            | 1501-1600   | 2            |
| 1001 -1100  | 4            | 1601-1700   | 3            |
| 1101-1200   | 7            | 1701-1800   | 1            |

(Data available for 39 years)

## **JANJGIR-CHAMPA DISTRICT**

The climate of this district is characterized by dry hot in summer and well distributed rainfall in the monsoon season. The year may be divided into four seasons. Summer (pre-monsoon) season is from March to mid-June. The period from mid-June to September is of southwest monsoon season. October and November months constitute the post-monsoon season. Winter season is from December to February.

### **RAINFALL**

Records of rainfall in the district are available for nine raingauge stations for period ranging from 10 to 48 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 1247.7 mm. During the southwest monsoon season (June to September) the district receives 92% of the annual normal rainfall. July and August are the rainiest months with average rainfall of 389.2 mm. The variation in the rainfall from year to year is not much large. In the fifty year period from 1961 to 2010, the highest annual rainfall amounting to 175 % of the normal occurred in year 1994, while the lowest annual rainfall which was only 66 % of the normal occurred in 1969. In the same fifty year period there were seven years in which the rainfall in the district was less than 80% of the normal and there was one occasion of three consecutive years of such a low rainfall. It is seen from Table 2 that the rainfall was between 901 mm and 1500 mm in 34 years out of 43.

On an average there are 54 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 Pawgarh to 63 at Champa observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 385.4 mm at Janjgir on 16 June 1994.

## **TEMPERATURE**

There is one meteorological observatory in the district at Champa. So the description which follows is based on the data of this observatory. Temperatures begin to increase from March till May which is the hottest month with the mean maximum temperature at 42.6°C and mean minimum temperature at 27.3°C. On some days in April, May and early part of June the maximum temperature may sometimes rise up to about 46°C. May and the early part of June prior to the onset of the southwest monsoon is rather hot and the dust raising scorching winds add to the discomfort. The arrival of the monsoon over the district by about the second week of June brings relief, and thereafter, throughout the southwest monsoon season, the weather remains pleasant. With the advance of the southwest monsoon into the district the weather become slightly cool. In August and early September due to breaks in the monsoon which are common, the day temperatures increase slightly and this increase continues in October. The temperatures begin to decrease rapidly after October. December and January are generally the coldest months with the mean maximum temperature at 27.3°C and mean minimum temperature at 12.9 °C. 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 7°C on individual days.

The highest maximum temperature ever recorded at Champa was 48.4°C on 26 May 1984 and the lowest minimum was 6.2 °C on 22 January 1963.

## **HUMIDITY**

In the southwest monsoon season air is generally humid with value of relative humidity generally above 75% in the period from July to September. The humidity decreases in the post monsoon season. The summer months are the driest part of the year with value of relative humidity especially in the afternoon is less than 25%.

## **CLOUDINESS**

During the southwest monsoon months skies are heavily clouded to overcast. From October the cloudiness decreases and it is moderate in the post-monsoon season. 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 later part of summer especially in the afternoon.

## **WINDS**

Winds are generally light to moderate throughout the year with some strengthening in force during the latter part of summer and southwest monsoon season. Winds generally blow from north direction during the period from October to April. Some westerly components are also seen during this period. In May northerly, north-westerly and westerly components are observed in the district. In the southwest monsoon season winds generally blow from west and southwest direction.

## **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 and cause gusty winds and widespread heavy rain. Thunderstorms occur throughout the year. Its frequency is more in the southwest monsoon season. Dust storms also occur less frequently during the period March to June.

Tables 3, 4, 5 and 6 give the temperature and humidity, cloudiness, mean wind speed and wind direction and special weather phenomena respectively for Champa observatory.

**TABLE – 1**  
**NORMALS AND EXTREMES OF RAINFALL**  
**JANJGIR CHAMPA**

| STATION                  | No. of Years of Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |               | HEAVIEST RAINFALL IN 24 HOURS* |             |
|--------------------------|----------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|-------------|-------------|-------------|----------------|--|---------------|--------------------------------|-------------|
|                          |                      |        |             |             |             |             |             |              |               |               |               |             |             |             |                | HIGHEST                                  | LOWEST        | AMOUNT (mm)                    | DATE        |
| Akaltara                 | 10                   | a<br>b | 22.0<br>0.7 | 12.5<br>0.6 | 8.7<br>0.7  | 4.8<br>0.3  | 23.7<br>1.4 | 188.1<br>7.1 | 472.6<br>16.2 | 367.9<br>15.6 | 248.7<br>8.9  | 74.4<br>3.1 | 5.9<br>0.4  | 10.4<br>0.5 | 1439.7<br>55.5 | 162<br>(2003)                            | 72<br>(2006)  | 169.0                          | 08 Aug 2004 |
| Baloda                   | 10                   | a<br>b | 9.8<br>0.7  | 4.0<br>0.5  | 10.0<br>0.6 | 8.5<br>0.4  | 34.5<br>1.5 | 148.9<br>6.6 | 466.1<br>17.8 | 446.9<br>13.7 | 144.2<br>8.0  | 41.2<br>2.3 | 14.7<br>0.6 | 8.8<br>0.4  | 1337.6<br>53.1 | 140<br>(2001)                            | 108<br>(2003) | 134.5                          | 15 Jun 2004 |
| Champa (Obsy)            | 31                   | a<br>b | 10.4<br>1.0 | 18.0<br>1.6 | 20.3<br>2.0 | 9.9<br>1.0  | 15.8<br>1.6 | 187.5<br>8.6 | 378.5<br>17.1 | 396.2<br>16.0 | 211.6<br>10.8 | 45.2<br>2.8 | 5.8<br>0.5  | 7.1<br>0.4  | 1306.3<br>63.4 | 163<br>(1961)                            | 66<br>(1979)  | 260.4                          | 11 Aug 1963 |
| Jaijaipur                | 10                   | a<br>b | 3.7<br>0.6  | 5.4<br>0.4  | 1.1<br>0.2  | 6.6<br>0.3  | 1.2<br>0.1  | 181.3<br>7.3 | 363.9<br>16.1 | 301.0<br>12.9 | 204.6<br>8.1  | 31.0<br>2.3 | 7.7<br>0.4  | 8.7<br>0.9  | 1116.2<br>49.6 | 127<br>(2003)                            | 90<br>(2009)  | 180.0                          | 08 Aug 2004 |
| Janjgir                  | 48                   | a<br>b | 10.5<br>0.8 | 10.7<br>0.8 | 11.1<br>0.7 | 5.7<br>0.4  | 7.7<br>0.8  | 157.0<br>7.1 | 385.6<br>16.2 | 383.2<br>15.4 | 206.1<br>9.6  | 40.2<br>2.2 | 7.4<br>0.6  | 7.7<br>0.5  | 1232.9<br>55.1 | 171<br>(2003)                            | 66<br>(1969)  | 385.4                          | 16 Jun 1994 |
| Malkharonda              | 10                   | a<br>b | 7.7<br>0.8  | 4.6<br>0.3  | 2.6<br>0.3  | 4.9<br>0.3  | 0.0<br>0.0  | 151.2<br>5.8 | 351.2<br>15.5 | 423.9<br>15.9 | 178.1<br>7.6  | 40.3<br>3.0 | 0.9<br>0.3  | 8.1<br>0.6  | 1173.5<br>50.4 | 129<br>(2003)                            | 110<br>(2005) | 175.3                          | 07 Sep 2003 |
| Pawgarh                  | 21                   | a<br>b | 10.9<br>0.7 | 5.6<br>0.4  | 6.0<br>0.4  | 11.5<br>0.7 | 2.0<br>0.2  | 177.6<br>6.3 | 390.9<br>14.4 | 369.2<br>14.7 | 185.4<br>8.5  | 32.8<br>1.7 | 9.4<br>0.6  | 5.8<br>0.7  | 1207.1<br>49.3 | 198<br>(1994)                            | 81<br>(1998)  | 237.8                          | 13 Aug 2006 |
| Sakti                    | 47                   | a<br>b | 10.8<br>0.8 | 11.8<br>0.9 | 8.3<br>0.6  | 7.0<br>0.6  | 11.2<br>0.9 | 181.9<br>7.6 | 391.1<br>16.0 | 400.2<br>15.8 | 237.7<br>10.7 | 41.5<br>2.6 | 7.5<br>0.5  | 7.0<br>0.5  | 1316.0<br>57.5 | 154<br>(1973)                            | 62<br>(1976)  | 260.0                          | 15 Jun 1994 |
| Seorinarayan             | 17                   | a<br>b | 8.1<br>0.6  | 4.5<br>0.5  | 13.5<br>1.1 | 3.8<br>0.3  | 4.1<br>0.5  | 158.8<br>7.9 | 350.1<br>15.5 | 367.5<br>14.1 | 152.1<br>7.7  | 22.4<br>1.7 | 5.1<br>0.3  | 9.4<br>0.9  | 1099.4<br>51.1 | 155<br>(2003)                            | 53<br>(1969)  | 271.6                          | 25 Jul 2010 |
| Janjgirchampa (District) |                      | a<br>b | 10.4<br>0.7 | 8.6<br>0.7  | 9.1<br>0.7  | 7.0<br>0.5  | 11.1<br>0.8 | 170.3<br>7.1 | 394.4<br>16.1 | 384.0<br>14.9 | 196.5<br>8.9  | 41.0<br>2.4 | 7.2<br>0.5  | 8.1<br>0.6  | 1247.7<br>53.9 | 175<br>(1994)                            | 66<br>(1969)  |                                |             |

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.

\*\* Years of occurrence given in brackets.



**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**JANGIR-CHAMPA**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 801 – 900   | 1            | 1501 - 1600 | 3            |
| 901 - 1000  | 6            | 1601 - 1700 | 1            |
| 1001 – 1100 | 7            | 1701 - 1800 | 2            |
| 1101 - 1200 | 7            | 1801 - 1900 | 0            |
| 1201 - 1300 | 4            | 1901 - 2000 | 0            |
| 1301 – 1400 | 7            | 2001 - 2100 | 1            |
| 1401 – 1500 | 3            | 2101 - 2200 | 1            |

(Data available for 43 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest<br>Maximum<br>ever recorded |                          | Lowest<br>Minimum<br>ever recorded |            | Relative<br>Humidity<br>(%) |             |
|-----------|--------------------------------|--------------------------------|-------------------------------------|--------------------------|------------------------------------|------------|-----------------------------|-------------|
|           | °C                             | °C                             | °C                                  | Date                     | °C                                 | Date       | 0830<br>IST                 | 1730<br>IST |
| January   | 27.3                           | 12.9                           | 32.6                                | 28-01-1980               | 6.2                                | 22-01-1963 | 69                          | 41          |
| February  | 30.5                           | 15.5                           | 38.3                                | 25-02-2006               | 7.6                                | 02-02-2008 | 59                          | 32          |
| March     | 35.6                           | 19.4                           | 42.4                                | 29-03-1972               | 11.5                               | 04-03-1965 | 45                          | 23          |
| April     | 40.3                           | 24.1                           | 46.9                                | 28-04-1980               | 15.8                               | 05-04-2008 | 40                          | 20          |
| May       | 42.6                           | 27.3                           | 48.4                                | 26-05-1984               | 19.9                               | 01-05-1963 | 40                          | 21          |
| June      | 38.1                           | 26.6                           | 47.2                                | 03-06-1953<br>03-06-1978 | 18.6                               | 20-06-2011 | 66                          | 49          |
| July      | 31.5                           | 24.5                           | 41.6                                | 06-07-1982               | 19.4                               | 23-07-2011 | 87                          | 76          |
| August    | 30.7                           | 24.3                           | 37.4                                | 01-08-1972               | 21.2                               | 12-08-2005 | 88                          | 78          |
| September | 31.7                           | 24.2                           | 36.0                                | 11-09-1968               | 19.6                               | 29-09-1972 | 85                          | 74          |
| October   | 31.9                           | 21.2                           | 36.2                                | 12-10-1957               | 15.1                               | 29-10-1983 | 79                          | 59          |
| November  | 29.9                           | 16.5                           | 35.1                                | 22-11-1979               | 9.6                                | 30-11-1960 | 72                          | 46          |
| December  | 27.3                           | 12.9                           | 37.6                                | 18-12-2008               | 6.6                                | 17-12-2010 | 70                          | 45          |
| Annual    | 33.1                           | 20.8                           | 48.4                                | 26-05-1984               | 6.2                                | 22-01-1963 | 67                          | 47          |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(CHAMPA)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 18  | 15  | 17  | 15  | 12  | 2   | 0   | 0   | 2   | 12  | 16  | 16  | 125    |
| b                     | 2   | 2   | 1   | 1   | 1   | 9   | 19  | 20  | 9   | 2   | 1   | 1   | 68     |
| c                     | 1.8 | 1.7 | 1.8 | 2.1 | 2.3 | 5.7 | 7.1 | 7.1 | 5.5 | 2.7 | 2.0 | 2.0 | 3.5    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 14  | 10  | 10  | 6   | 5   | 0   | 0   | 0   | 0   | 7   | 12  | 14  | 78     |
| b                     | 2   | 2   | 2   | 2   | 3   | 14  | 19  | 20  | 12  | 3   | 2   | 2   | 83     |
| c                     | 2.1 | 2.2 | 2.4 | 3.3 | 3.7 | 6.5 | 7.3 | 7.2 | 6.3 | 3.4 | 2.4 | 2.3 | 4.1    |

a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(CHAMPA)**

|                      | Jan | Feb   | Mar | Apr | May        | Jun  | Jul  | Aug  | Sep   | Oct | Nov | Dec | Annual |
|----------------------|-----|-------|-----|-----|------------|------|------|------|-------|-----|-----|-----|--------|
| Wind speed in km/hr  | 4.3 | 5.2   | 5.7 | 5.6 | 6.3        | 7.7  | 7.3  | 7.0  | 5.0   | 3.6 | 4.1 | 4.3 | 5.5    |
| Direction in morning | N   | N     | N/C | C/N | C/E/<br>NW | W    | W/SW | W/SW | C/W/N | C/N | N   | N   |        |
| Direction in evening | C/N | N/W/C | W/C | W   | NW/N/<br>W | W/SW | W/SW | W/SW | C/W   | C/N | N/C | C/N |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(CHAMPA)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.6 | 1.5 | 3.2 | 3.3 | 3.9 | 9.6 | 8.4 | 8.6 | 6.7 | 1.5 | 0.2 | 0.2 | 47.7   |
| Hail                  | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |
| Dust storm            | 0.0 | 0.0 | 0.2 | 0.2 | 0.1 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8    |
| 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    |
| Squall                | 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    |

## **JASHPUR DISTRICT**

The district is divided into two parts, the northern hilly belt having an altitude upto 970 metre above mean sea level and the remaining southern part is almost plain of low elevation.

The climate of this district is characterised by dry hot in summer and well distributed rainfall in the monsoon season. The year may be divided into four seasons. Winter season is from December to February and is followed by summer (pre-monsoon) season till the middle of June. The period from mid-June to September constitutes the southwest monsoon season. The period of October and November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for seven rain gauge stations for the period ranging from 20 to 43 years. The details of 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 1486.9 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 88% of the annual normal rainfall. July is the rainiest month with average rainfall of 427.0 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1971 when it amounted to 161% of the normal. In the year 2006, the annual rainfall in the district was the lowest amounting to only 66% of the normal. In this period the rainfall was less than 80% of the normal in 5 years and 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 1800 mm in 25 years out of 39.

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 62 at Bagichha to 83 at Jashpurnagar observatory.

The heaviest rainfall in 24 hours at any station in the district was 365.0 mm at Jashpurnagar observatory on 30 June 2001.

## **TEMPERATURE**

There are two meteorological observatories in the district one at Jashpurnagar at an altitude of 779 metre above mean sea level and other at Ginabahar. So the description that follows is based on the records of these observatories. From the beginning of March temperatures begin to rise rapidly till May which is the hottest month with the mean maximum temperature at about 40°C and mean minimum temperature at about 24°C in plain of low elevation. The temperatures are lowered by 1-2°C at high altitudinal area. In the latter part of the summer season i.e. May and early part of June the maximum temperature sometimes reaches about 44°C on individual days in plain area of low elevation. During the latter part of summer until the onset of the monsoon by about the second week of June, days are uncomfortable with hot dusty winds. With the advance of the southwest monsoon into the district day temperatures drop appreciably while night temperatures remain as high as in May. After withdrawal of southwest monsoon the day temperatures increase slightly and the rise is maintained in October. But the night temperatures begin to drop appreciably from October. From the beginning of November the day temperatures also begin to drop rapidly and generally December and January are the coldest months with the mean maximum temperature at about 24°C and mean minimum is at about 8°C at hilly areas. These temperatures may be high by 2-3°C in areas of low elevation. Cold waves sometimes affect the district in association with the passage of western disturbances across north India, and on such occasions minimum temperatures drop down to about freezing point during winter months.

The highest maximum temperature ever recorded in the district was 46.1°C on 31 May 1988 at Ginabahar and the lowest minimum temperature ever recorded was -1.3°C on 7 December 1971 at Jashpurnagar.

## **HUMIDITY**

Air is generally humid in the southwest monsoon months with value of relative humidity ranges between 76% and 87%. Humidity decreases in the post monsoon season. In the winter season it is fairly dry over the district. The driest part of the year is the summer season with the humidity in the afternoon at about 35%.

## **CLOUDINESS**

During the southwest monsoon months skies are heavily clouded to overcast. In the latter half of summer season and post monsoon season, sky is moderately clouded. During the rest of the year, skies are generally clear or lightly clouded.

## **WINDS**

Winds are generally light to moderate in the district with some slight strengthening in force during the monsoon season. Generally in the mornings northeasterly winds are observed throughout the year in the district, except during June & July months when southwesterlies are predominant and during May and August some southwesterlies are also seen along with northeasterlies. In the afternoon southwesterlies prevail throughout the year. Northeasterlies component is also seen along with southwesterlies. During the monsoon season when depressions affect the weather of the district, the district may experience gusty winds occasionally.

## **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 and cause gusty winds and widespread heavy rain. An occasional storm from the Bay of

Bengal in October may also affect the district. Thunderstorms generally occur throughout the year. Its frequency is more in latter part of summer and monsoon season. Hailstorm and dust storm rarely occur. Fog occasionally occurs in the mornings of winter and pre-monsoon months.

Tables 3, 4, 5 give the normals of temperature and humidity, cloudiness, wind speed and direction respectively for Jashpurnagar observatory and tables 3(a), 4(a) and 5(a) give normals of temperature and humidity, cloudiness and special weather phenomena respectively for Ginabahar observatory.

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

| STATION                    | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN           | JUL           | AUG           | SEP           | OCT         | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|----------------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|---------------|-------------|-------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                            |                                  |        |             |             |             |             |             |               |               |               |               |             |             |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Bagichha                   | 21                               | a<br>b | 11.1<br>0.6 | 3.5<br>0.3  | 3.1<br>0.3  | 6.1<br>0.4  | 9.4<br>0.6  | 194.9<br>9.7  | 359.5<br>16.9 | 270.7<br>16.5 | 202.1<br>11.6 | 41.9<br>2.9 | 19.8<br>0.9 | 13.3<br>1.1 | 1135.4<br>61.8 | 139<br>(2001)                                  | 62<br>(2009) | 160.0                             | 26 Sep 1993 |
| Ginabaha<br>(Hydro)        | 36                               | a<br>b | 18.1<br>1.3 | 23.3<br>1.9 | 16.4<br>1.7 | 20.6<br>1.7 | 38.6<br>3.2 | 264.3<br>11.3 | 417.1<br>18.1 | 402.9<br>18.0 | 239.6<br>11.7 | 59.4<br>3.5 | 8.5<br>0.6  | 12.8<br>0.7 | 1521.6<br>73.7 | 178<br>(1971)                                  | 71<br>(1976) | 228.6                             | 24 Jun 1953 |
| Jashpurnagar               | 40                               | a<br>b | 25.8<br>1.7 | 20.6<br>1.6 | 13.2<br>1.1 | 19.6<br>1.5 | 35.1<br>3.0 | 271.4<br>11.5 | 474.1<br>20.7 | 403.9<br>19.7 | 257.7<br>13.4 | 72.4<br>4.0 | 14.0<br>1.0 | 10.4<br>0.6 | 1618.2<br>79.8 | 157<br>(1971)                                  | 60<br>(2006) | 290.4                             | 16 Jul 2003 |
| Jashpurnagar<br>(Obsy)     | 43                               | a<br>b | 24.6<br>1.9 | 22.3<br>1.9 | 24.3<br>2.3 | 24.9<br>2.0 | 44.6<br>3.6 | 254.6<br>11.3 | 475.6<br>20.9 | 392.7<br>19.4 | 273.0<br>13.1 | 76.5<br>4.5 | 14.4<br>0.9 | 13.1<br>0.9 | 1640.6<br>82.7 | 157<br>(1971)                                  | 54<br>(2006) | 365.0                             | 30 Jun 2001 |
| Kunkari                    | 20                               | a<br>b | 18.7<br>0.7 | 6.8<br>0.7  | 15.8<br>0.9 | 6.4<br>0.7  | 45.3<br>2.0 | 303.1<br>13.1 | 445.1<br>19.2 | 360.1<br>17.4 | 325.3<br>15.5 | 59.4<br>3.8 | 20.8<br>1.4 | 11.8<br>0.8 | 1618.6<br>76.2 | 126<br>(1998)                                  | 73<br>(2010) | 172.0                             | 10 Sep 1998 |
| Pathalgaon<br>(Hydro)      | 23                               | a<br>b | 8.6<br>0.8  | 19.4<br>1.7 | 8.5<br>0.9  | 16.5<br>0.9 | 24.6<br>2.0 | 243.0<br>11.8 | 396.2<br>20.1 | 403.2<br>19.6 | 235.0<br>12.6 | 78.1<br>3.5 | 2.5<br>0.2  | 5.5<br>0.3  | 1441.1<br>74.4 | 172<br>(1961)                                  | 57<br>(1976) | 168.4                             | 01 Oct 1961 |
| Tapkara<br>(Hydro)         | 29                               | a<br>b | 23.6<br>1.6 | 17.1<br>1.4 | 17.2<br>1.5 | 16.2<br>1.3 | 25.9<br>2.2 | 260.1<br>10.4 | 421.5<br>18.3 | 355.7<br>17.2 | 227.6<br>10.4 | 48.8<br>3.3 | 10.2<br>0.8 | 9.0<br>0.5  | 1432.9<br>68.9 | 146<br>(1961)                                  | 68<br>(1962) | 195.2                             | 08 Jul 1994 |
| Jashpurnagar<br>(District) |                                  | a<br>b | 18.6<br>1.2 | 16.1<br>1.4 | 14.1<br>1.2 | 15.8<br>1.2 | 31.9<br>2.4 | 255.9<br>11.3 | 427.0<br>19.2 | 369.9<br>18.3 | 251.5<br>12.6 | 62.4<br>3.6 | 12.9<br>0.8 | 10.8<br>0.7 | 1486.9<br>73.9 | 161<br>(1971)                                  | 66<br>(2006) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**JASHPURNAGAR**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 901 - 1000  | 1            | 1701 – 1800 | 1            |
| 1001 – 1100 | 3            | 1801 - 1900 | 4            |
| 1101 - 1200 | 4            | 1901 - 2000 | 3            |
| 1201 - 1300 | 1            | 2001 - 2100 | 0            |
| 1301 – 1400 | 5            | 2101 - 2200 | 0            |
| 1401 – 1500 | 3            | 2201 - 2300 | 1            |
| 1501 – 1600 | 3            | 2301 - 2400 | 2            |
| 1601 – 1700 | 8            |             |              |

(Data available for 39 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest<br>Maximum<br>ever recorded |                          | Lowest Minimum<br>ever recorded |            | Relative<br>Humidity (%) |             |
|-----------|--------------------------------|--------------------------------|-------------------------------------|--------------------------|---------------------------------|------------|--------------------------|-------------|
|           | °C                             | °C                             | °C                                  | Date                     | °C                              | Date       | 0830<br>IST              | 1730<br>IST |
| January   | 24.2                           | 8.1                            | 35.6                                | 01-01-2008               | 1.0                             | 07-01-1986 | 65                       | 55          |
| February  | 26.6                           | 10.7                           | 37.6                                | 19-02-1999               | 1.5                             | 10-02-1974 | 58                       | 47          |
| March     | 31.4                           | 14.9                           | 38.6                                | 27-03-2004               | 5.0                             | 01-03-1988 | 49                       | 34          |
| April     | 35.2                           | 19.3                           | 41.2                                | 30-04-1999               | 11.0                            | 01-04-1968 | 47                       | 32          |
| May       | 36.6                           | 22.3                           | 42.5                                | 26-05-1984               | 14.1                            | 06-05-2004 | 53                       | 40          |
| June      | 33.0                           | 22.5                           | 42.5                                | 02-06-1995               | 3.2                             | 01-06-1999 | 72                       | 65          |
| July      | 29.2                           | 21.9                           | 38.6                                | 12-07-2008               | 18.5                            | 28-07-1986 | 85                       | 82          |
| August    | 28.6                           | 21.6                           | 35.2                                | 13-08-2008               | 16.5                            | 25-08-1985 | 87                       | 82          |
| September | 28.9                           | 20.5                           | 34.0                                | 21-09-1976               | 13.7                            | 30-09-2008 | 84                       | 81          |
| October   | 29.2                           | 16.9                           | 33.0                                | 01-10-1976               | 9.5                             | 30-10-1993 | 73                       | 69          |
| November  | 27.1                           | 11.8                           | 31.6                                | 07-11-2001               | 3.7                             | 30-11-1970 | 66                       | 60          |
| December  | 25.1                           | 7.7                            | 34.4                                | 25-12-2004               | -1.3                            | 07-12-1971 | 63                       | 55          |
| Annual    | 29.6                           | 16.5                           | 42.5                                | 26-05-1984<br>02-06-1995 | -1.3                            | 07-12-1971 | 67                       | 58          |



**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(JASHPURNAGAR)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 22  | 21  | 23  | 22  | 20  | 6   | 1   | 0   | 3   | 15  | 23  | 26  | 182    |
| b                     | 1   | 1   | 1   | 0   | 0   | 3   | 6   | 5   | 3   | 1   | 1   | 1   | 23     |
| c                     | 1.2 | 1.1 | 0.9 | 0.9 | 1.5 | 4.0 | 5.8 | 5.8 | 4.6 | 2.2 | 1.0 | 0.6 | 2.5    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 21  | 18  | 21  | 17  | 14  | 4   | 1   | 0   | 2   | 13  | 21  | 24  | 156    |
| b                     | 1   | 1   | 1   | 1   | 1   | 5   | 7   | 7   | 4   | 1   | 1   | 1   | 31     |
| c                     | 1.2 | 1.1 | 1.0 | 1.4 | 2.2 | 4.4 | 5.5 | 5.7 | 4.5 | 2.2 | 1.1 | 0.6 | 2.6    |

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount in Okta.

\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(JASHPURNAGAR)**

|                      | Jan | Feb | Mar   | Apr | May   | Jun | Jul | Aug   | Sep | Oct   | Nov   | Dec   | Annual |
|----------------------|-----|-----|-------|-----|-------|-----|-----|-------|-----|-------|-------|-------|--------|
| Wind speed in km/hr  | 2.5 | 2.7 | 3.3   | 4.2 | 4.1   | 4.1 | 3.6 | 3.8   | 2.4 | 2.2   | 2.3   | 2.0   | 3.1    |
| Direction in morning | NE  | NE  | NE    | NE  | NE/SW | SW  | SW  | NE/SW | NE  | NE    | NE    | NE    |        |
| Direction in evening | SW  | SW  | SW/NW | SW  | SW    | SW  | SW  | SW    | SW  | NE/SW | SW/NE | NE/SW |        |

TABLE- 3(a)

**NORMALS OF TEMPERATURES AND RELATIVE HUMIDITY  
(GINABAHAR)**

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest Maximum<br>ever recorded |            | Lowest Minimum<br>ever recorded |            | Relative<br>Humidity (%) |             |
|-----------|--------------------------------|--------------------------------|----------------------------------|------------|---------------------------------|------------|--------------------------|-------------|
|           | °C                             | °C                             | °C                               | Date       | °C                              | Date       | 0830<br>IST              | 1730<br>IST |
| January   | 26.2                           | 9                              | 33.1                             | 31-01-1990 | 2.2                             | 17-01-1962 | 68                       | 43          |
| February  | 28.9                           | 11.9                           | 36.9                             | 23-02-1991 | 2.1                             | 17-02-1977 | 61                       | 38          |
| March     | 34.1                           | 16.2                           | 43.1                             | 31-03-1994 | 5.5                             | 11-03-1979 | 44                       | 29          |
| April     | 38.5                           | 21.1                           | 45.1                             | 30-04-1994 | 12.7                            | 02-04-1968 | 38                       | 26          |
| May       | 40.1                           | 24                             | 46.1                             | 31-05-1988 | 16.9                            | 17-05-1971 | 44                       | 32          |
| June      | 35.8                           | 24                             | 45.1                             | 01-06-1996 | 15.3                            | 07-06-1996 | 67                       | 59          |
| July      | 30.4                           | 22.8                           | 40.1                             | 06-07-1982 | 15.9                            | 04-07-1994 | 86                       | 79          |
| August    | 29.9                           | 22.9                           | 36.7                             | 22-08-1973 | 15.9                            | 20-08-1996 | 86                       | 80          |
| September | 30.8                           | 22.1                           | 36.1                             | 15-09-1996 | 13.9                            | 28-09-1994 | 81                       | 76          |
| October   | 31.2                           | 18.5                           | 35.8                             | 14-10-1963 | 8.8                             | 24-10-1995 | 71                       | 58          |
| November  | 29.2                           | 13.3                           | 34.1                             | 04-11-1981 | 3.3                             | 27-11-1995 | 65                       | 52          |
| December  | 26.4                           | 9.3                            | 33.1                             | 17-12-1985 | 1.1                             | 15-12-1976 | 68                       | 48          |
| Annual    | 31.8                           | 17.9                           | 46.1                             | 31-05-1988 | 1.1                             | 15-12-1976 | 65                       | 52          |

TABLE – 4 (a)

**MEAN CLOUD AMOUNT \*\* (OKTA OF THE SKY) AND MEAN NUMBER  
OF DAYS CLEAR AND OVERCAST SKIES.  
(GINABAHAR)**

|                | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| 0830 HOURS IST |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a              | 23  | 20  | 23  | 24  | 21  | 8   | 1   | 1   | 5   | 18  | 23  | 24  | 191    |
| b              | 4   | 4   | 3   | 2   | 4   | 13  | 22  | 17  | 14  | 6   | 3   | 3   | 95     |
| c              | 1.6 | 1.6 | 1.5 | 1.2 | 1.7 | 4.8 | 7   | 6.2 | 5.3 | 2.3 | 1.3 | 1.2 | 3      |
| 1730 HOURS IST |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a              | 22  | 19  | 19  | 19  | 13  | 4   | 2   | 2   | 4   | 16  | 22  | 23  | 165    |
| b              | 5   | 5   | 6   | 5   | 9   | 19  | 22  | 15  | 16  | 10  | 4   | 5   | 121    |
| c              | 1.9 | 1.9 | 2.5 | 2.2 | 3.7 | 6.1 | 7   | 6   | 5.7 | 3.1 | 1.6 | 1.6 | 3.6    |

**TABLE- 5 (a)**  
**SPECIAL WEATHER PHENOMENA**  
**(GINABAHAR)**

| NO. OF DAYS<br>WITH | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| HAIL                | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0.1 | 0   | 0   | 0.1    |
| THUNDER             | 0.1 | 0.8 | 1.3 | 2.4 | 3   | 4.9 | 2   | 2.4 | 1.9 | 1.7 | 0   | 0.1 | 20.6   |
| FOG                 | 0.1 | 0.1 | 0.4 | 0.1 | 0.3 | 0   | 0   | 0   | 0   | 0   | 0.1 | 0   | 1.1    |
| DUST                | 0   | 0   | 0   | 0   | 0.1 | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0.1    |
| SQUALL              | 0   | 0   | 0   | 0   | 0   | 0.1 | 0   | 0   | 0   | 0   | 0   | 0   | 0.1    |

## **KABIRDHAM DISTRICT**

The northern and western parts of Kabirdham district are surrounded by Maikal mountain ranges of Satpura. Here the highest peak is Kesmarda which is 925 metre above mean sea level. The central-east and southern part of the district is plain of low elevation.

The climate of this district is characterized by a dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer (pre-monsoon) season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to the end of September. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for six rain gauge stations for the period ranging from 10 to 44 years. The details of 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 1011.2 mm. The rainfall in the southwest monsoon season constitutes about 88% of the annual normal rainfall, July being the month with the highest rainfall of 331.9 mm. The annual rainfall in the district varies over large range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1998 when it amounted to 295 % of the normal. In the year 2004, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 72% of the normal. In this fifty year period the rainfall was less than 80% of the normal in 4 years and none of them were consecutive. It is seen from Table 2 that the annual rainfall was between 801 mm and 1300 mm in 26 years out of 38.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 36 at Bodla to 68 at Chilpi Hydro.

The heaviest rainfall in 24 hours recorded at any station in the district was 272.0 mm at Sahaspur on 27 July 2006.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at Raipur and Pendra Road observatories respectively in the neighbouring Raipur and Bilaspur districts. After February, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 40°C and mean minimum temperature about 26°C. On some days in May and early part of June, the maximum temperature may reach about 45°C. Thundershowers sometimes occur in afternoons which bring welcome relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather becomes slightly cool and pleasant, the day temperatures go down appreciably but the drop in the night temperature is slight. After the withdrawal of monsoon about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. January is the coldest month of the year with the mean maximum temperature about 26°C and mean minimum temperature about 12°C. During winter season cold waves sometimes affect the district in the wake of western disturbances which move across north India, the minimum temperature may go down to about 4°C to 5 °C on some individual days.

These temperatures may be lowered by 2°C to 3°C in the high altitudinal areas.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoons than in the mornings, except in the southwest monsoon months when there is little difference. In the southwest monsoon months the air is mostly humid with value of relative humidity of the order of 55% to 90%. Humidity decreases from October. During post monsoon and winter seasons air is generally mild humid. Summer season is the driest part of the year with value of relative humidity in the afternoon being about 25% and morning humidity is about 45%.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and winter season skies are generally clear or lightly clouded. In April, May and in October, cloudiness is more 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 pre-monsoon and the monsoon seasons when depressions affect the weather of the district, the district may experiences gusty winds. In pre-monsoon and southwest monsoon season winds mainly blow from southwest and west direction and sometimes calm and northeasterly winds are also observed. From October to February winds mostly blow from north and northeast direction, sometimes calm winds are also observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year and they are frequent during the southwest monsoon season. Thunderstorms occur during the pre-monsoon and early southwest monsoon season are occasionally accompanied with hail and squall. Dust storms occur occasionally during the summer season. Thunderstorms during pre-monsoon period occasionally accompanied with squalls. Fog occasionally occurs in the mornings of the winter, post monsoon season and some monsoon months in hilly terrain.

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

| STATION              | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|----------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|------|--------|--|--------|--------------------------------|-------------|
|                      |                      |   |      |      |      |      |      |       |       |       |       |      |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Bodla                | 10                   | a | 8.7  | 8.5  | 5.2  | 0.1  | 1.0  | 63.2  | 190.0 | 125.7 | 118.0 | 36.7 | 6.3  | 0.7  | 564.1  | 135                                      | 80     | 81.0                           | 14 Sep 2005 |
|                      |                      | b | 0.9  | 0.8  | 0.5  | 0.0  | 0.1  | 3.7   | 11.1  | 9.7   | 6.5   | 2.4  | 0.4  | 0.1  | 36.2   | (2005)                                   | (2004) |                                |             |
| Borlan               | 11                   | a | 11.1 | 0.0  | 0.0  | 2.0  | 0.0  | 159.1 | 293.2 | 213.9 | 142.1 | 55.3 | 12.7 | 0.4  | 889.8  | 139                                      | 74     | 168.6                          | 13 Aug 2006 |
|                      |                      | b | 0.5  | 0.0  | 0.0  | 0.2  | 0.0  | 5.5   | 11.7  | 11.5  | 6.7   | 2.7  | 0.6  | 0.1  | 39.5   | (1968)                                   | (2004) |                                |             |
| Chilpi (Hydro)       | 13                   | a | 9.3  | 19.6 | 6.7  | 3.8  | 9.0  | 170.9 | 611.6 | 462.4 | 283.4 | 80.5 | 22.2 | 18.1 | 1697.5 | 273                                      | 51     | 210.8                          | 13 Sep 1998 |
|                      |                      | b | 1.3  | 1.8  | 1.1  | 0.5  | 1.2  | 7.8   | 19.4  | 18.2  | 10.8  | 4.1  | 1.2  | 0.8  | 68.2   | (1998)                                   | (1991) |                                |             |
| Kowardha             | 44                   | a | 14.5 | 14.6 | 19.7 | 7.1  | 18.5 | 131.6 | 271.8 | 282.3 | 173.6 | 61.7 | 16.9 | 8.8  | 1021.1 | 155                                      | 78     | 222.3                          | 13 Jul 1958 |
|                      |                      | b | 1.0  | 1.3  | 1.5  | 0.8  | 1.6  | 7.9   | 15.0  | 13.7  | 9.0   | 3.6  | 0.9  | 0.6  | 56.9   | (1961)                                   | (1982) |                                |             |
| Pandaria             | 22                   | a | 12.7 | 3.2  | 5.5  | 3.9  | 1.5  | 154.6 | 295.3 | 246.2 | 162.9 | 47.4 | 17.1 | 4.9  | 955.2  | 140                                      | 56     | 152.0                          | 07 Oct 1994 |
|                      |                      | b | 0.7  | 0.5  | 0.3  | 0.1  | 0.1  | 7.3   | 14.6  | 14.1  | 9.1   | 2.3  | 0.8  | 0.4  | 50.3   | (1998)                                   | (1991) |                                |             |
| Sahaspur             | 10                   | a | 20.3 | 19.2 | 12.9 | 19.0 | 1.5  | 158.0 | 329.4 | 187.0 | 130.7 | 46.3 | 12.9 | 0.9  | 938.1  | 267                                      | 99     | 272.0                          | 27 Jul 2006 |
|                      |                      | b | 0.7  | 1.0  | 1.0  | 0.6  | 0.3  | 7.5   | 13.8  | 12.1  | 6.8   | 2.5  | 0.6  | 0.1  | 47.0   | (2001)                                   | (2005) |                                |             |
| Kabirdham (District) |                      | a | 12.8 | 10.9 | 8.3  | 6.0  | 5.3  | 139.6 | 331.9 | 252.9 | 168.5 | 54.7 | 14.7 | 5.6  | 1011.2 | 295                                      | 72     |                                |             |
|                      |                      | b | 0.8  | 0.9  | 0.7  | 0.4  | 0.5  | 6.6   | 14.3  | 13.2  | 8.1   | 2.9  | 0.8  | 0.3  | 49.5   | (1998)                                   | (2004) |                                |             |

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.

\*\* Years of occurrence given in brackets.



**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**KABIRDHAM**  
**(Data 1961-2010)**

| Range in mm | No. of Years | Range in mm | No.of Years |
|-------------|--------------|-------------|-------------|
| 701-800     | 4            | 1901-2000   | 0           |
| 801-900     | 6            | 2001-2100   | 0           |
| 901-1000    | 7            | 2101-2200   | 0           |
| 1001-1100   | 4            | 2201-2300   | 0           |
| 1101-1200   | 4            | 2301-2400   | 0           |
| 1201-1300   | 5            | 2401-2500   | 0           |
| 1301-1400   | 1            | 2501-2600   | 0           |
| 1401-1500   | 2            | 2601-2700   | 0           |
| 1501-1600   | 2            | 2701-2800   | 1           |
| 1601-1700   | 0            | 2801-2900   | 0           |
| 1701-1800   | 1            | 2901-3000   | 1           |
| 1801-1900   | 0            |             |             |

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

## **KANKER DISTRICT**

The district has almost area of low elevation and some hilly area. The climate of this district is characterized by dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer (pre-monsoon) season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to September. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for eight 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 1394.5 mm. During the monsoon season (June to September) the district receives rainfall of about 91% of the annual rainfall. July and August are the rainiest months with an average rainfall of 427.5 mm. The variation in the rainfall from year to year is not large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 193% of the annual normal occurred in year 1986, while the lowest annual rainfall which was 52% of the normal occurred in year 1965. In the fifty year period there were seven 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 occurred in two consecutive years. It is seen from Table 2 that the rainfall was between 1101 mm and 1700 mm in 27 years out of 40.

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 49 at Narharpur to 63 at Khijrawan Hydro. The heaviest rainfall in 24 hours recorded at any station in the district was 497.8 mm at Charama on 9 July 2001.

## **TEMPERATURE**

There is one observatory in the district located at Kanker having an altitude of 402 metre. The meteorological data and climatological conditions prevailing at this station can be taken as representative of the whole district. After February, temperatures begin to rise rapidly till about second week of June. May is the hottest month with the mean maximum temperature at 40.3°C and mean minimum temperature at 26.9°C. In April, May and early part of June, the maximum temperature reaches at about 44°C on individual days. Thundershowers sometimes occur during afternoons and bring some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather cools down, the day temperatures go down appreciably but the drop in the night temperatures is slight. After withdrawal of monsoon about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with average of maximum temperature at 27.5°C and average of minimum temperature at 12°C. Cold waves sometimes affect the district in winter months in the wake of western disturbances which move across northern part of India, the minimum temperature may go down to about 4°C or below on individual days. The temperatures may be lowered by 1°C to 2°C in high altitudinal areas.

The highest maximum temperature ever recorded at Kanker was 46.1°C on 10 June 1931 and the lowest minimum temperature ever recorded was 2.7°C on 15 December 1981.

## **HUMIDITY**

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

value of relative humidity of the order of 55% to 85%. The humidity decreases from October. In post monsoon and winter seasons air is generally mild humid. Summer season is the driest part of the year with value of relative humidity in the afternoons being about 32% and the humidity is about 45% in the mornings.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and latter part of summer season the cloudiness is moderate, the afternoons being much cloudy than the mornings. In the rest of the year skies are generally clear or lightly clouded.

## **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 sometimes experiences gusty winds. In pre monsoon and southwest monsoon season and in October month winds mainly blow from southwest direction and sometimes calm winds are also observed. During November and December winds mostly blow from northeast direction and sometimes calm winds are also observed. In January and February generally calm winds are observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms sometimes occur during the summer and southwest monsoon seasons, being more frequent during April to June. They sometimes

occur during February and October months. Thunderstorms which occur during pre-monsoon months, are occasionally accompanied with hail. Dust storms occasionally occur during summer. Fog occasionally occurs in the mornings of the winter months.

Tables 3, 4, 5 and 6 give the normals of temperature and relative humidity, cloudiness, mean wind speed and wind direction and special weather phenomena respectively for Kanker observatory.

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

| STATION                | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|------------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|------|--------|--|--------|--------------------------------|-------------|
|                        |                      |   |      |      |      |      |      |       |       |       |       |      |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Antagarh               | 38                   | a | 3.0  | 2.2  | 1.8  | 5.3  | 3.7  | 193.2 | 479.6 | 528.7 | 205.3 | 37.9 | 3.2  | 3.8  | 1467.7 | 155                                      | 63     | 342.3                          | 09 Aug 1981 |
|                        |                      | b | 0.2  | 0.2  | 0.1  | 0.5  | 0.2  | 7.5   | 15.9  | 16.2  | 8.2   | 2.2  | 0.2  | 0.1  | 51.5   | (1994)                                   | (1965) |                                |             |
| Bhanupratappur         | 45                   | a | 7.6  | 8.9  | 5.7  | 8.4  | 9.9  | 206.8 | 462.8 | 494.3 | 217.4 | 55.5 | 5.8  | 3.6  | 1486.7 | 189                                      | 49     | 291.2                          | 04 Aug 1981 |
|                        |                      | b | 0.4  | 0.4  | 0.4  | 0.6  | 0.5  | 8.1   | 16.7  | 17.3  | 10.3  | 3.0  | 0.4  | 0.3  | 58.4   | (2006)                                   | (1974) |                                |             |
| Bhanupratappur (Hydro) | 13                   | a | 2.8  | 4.0  | 11.6 | 7.8  | 10.4 | 204.9 | 497.4 | 494.9 | 148.9 | 77.1 | 6.9  | 0.1  | 1466.8 | 149                                      | 69     | 285.4                          | 13 Jun 2001 |
|                        |                      | b | 0.3  | 0.4  | 0.7  | 0.4  | 0.9  | 8.3   | 16.0  | 18.2  | 7.9   | 3.6  | 0.4  | 0.0  | 57.1   | (2001)                                   | (2000) |                                |             |
| Charama                | 10                   | a | 7.1  | 0.0  | 0.8  | 4.5  | 2.7  | 179.5 | 433.6 | 345.8 | 218.6 | 68.5 | 10.5 | 8.6  | 1280.2 | 134                                      | 85     | 497.8                          | 09 Jul 2001 |
|                        |                      | b | 0.6  | 0.0  | 0.1  | 0.2  | 0.1  | 7.3   | 14.4  | 14.6  | 10.0  | 3.2  | 0.9  | 0.4  | 51.8   | (2001)                                   | (2004) |                                |             |
| Kanker (Obsy)          | 35                   | a | 8.0  | 14.8 | 16.0 | 24.5 | 26.0 | 183.1 | 312.6 | 330.5 | 214.2 | 82.0 | 10.4 | 4.6  | 1226.7 | 141                                      | 55     | 304.8                          | 05 Aug 1911 |
|                        |                      | b | 0.6  | 1.2  | 1.3  | 2.6  | 2.0  | 8.8   | 14.0  | 13.4  | 9.1   | 4.5  | 0.8  | 0.5  | 58.8   | (2001)                                   | (1965) |                                |             |
| Khijrawan (Hydro)      | 29                   | a | 12.0 | 17.8 | 16.9 | 53.0 | 27.7 | 202.6 | 291.3 | 332.3 | 217.8 | 54.2 | 15.2 | 6.4  | 1247.2 | 159                                      | 43     | 292.0                          | 04 Apr 1997 |
|                        |                      | b | 1.0  | 1.2  | 1.3  | 2.1  | 2.5  | 9.4   | 15.2  | 15.4  | 10.4  | 3.5  | 0.9  | 0.5  | 63.4   | (1994)                                   | (1965) |                                |             |
| Narharpur              | 10                   | a | 14.0 | 0.0  | 14.6 | 9.7  | 1.5  | 206.9 | 385.5 | 406.3 | 252.3 | 35.0 | 11.1 | 10.8 | 1347.7 | 138                                      | 78     | 200.1                          | 07 Aug 2007 |
|                        |                      | b | 0.6  | 0.0  | 0.5  | 0.4  | 0.1  | 7.9   | 13.5  | 14.4  | 8.2   | 2.0  | 0.7  | 0.6  | 48.9   | (2003)                                   | (2004) |                                |             |
| Pankhajur              | 10                   | a | 16.4 | 3.4  | 5.0  | 3.4  | 10.8 | 287.2 | 486.6 | 558.5 | 197.3 | 56.4 | 5.8  | 1.6  | 1632.4 | 150                                      | 80     | 413.0                          | 14 Jun 2001 |
|                        |                      | b | 0.6  | 0.1  | 0.4  | 0.1  | 0.4  | 6.5   | 16.1  | 15.6  | 8.2   | 2.4  | 0.4  | 0.3  | 51.1   | (2003)                                   | (2004) |                                |             |
| Kanker (District)      |                      | a | 8.9  | 6.4  | 9.1  | 14.6 | 11.6 | 208.0 | 418.7 | 436.4 | 209.0 | 58.3 | 8.6  | 4.9  | 1394.5 | 193                                      | 52     |                                |             |
|                        |                      | b | 0.5  | 0.4  | 0.6  | 0.9  | 0.8  | 8.0   | 15.2  | 15.6  | 9.0   | 3.0  | 0.6  | 0.3  | 54.9   | (1986)                                   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**KANKER**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 701 – 800   | 2            | 1701 - 1800 | 2            |
| 801 – 900   | 0            | 1801 - 1900 | 1            |
| 901 - 1000  | 1            | 1901 - 2000 | 1            |
| 1001 – 1100 | 3            | 2001 - 2100 | 0            |
| 1101 - 1200 | 5            | 2101 - 2200 | 2            |
| 1201 - 1300 | 6            | 2201 - 2300 | 0            |
| 1301 – 1400 | 3            | 2301 - 2400 | 0            |
| 1401 – 1500 | 6            | 2401 - 2500 | 0            |
| 1501 – 1600 | 2            | 2501 - 2600 | 0            |
| 1601 – 1700 | 5            | 2601 - 2700 | 1            |

(Data available for 40 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest<br>Maximum<br>ever recorded |                          | Lowest<br>Minimum<br>ever recorded |                          | Relative<br>Humidity<br>(%) |             |
|-----------|--------------------------------|--------------------------------|-------------------------------------|--------------------------|------------------------------------|--------------------------|-----------------------------|-------------|
|           | °C                             | °C                             | °C                                  | Date                     | °C                                 | Date                     | 0830<br>IST                 | 1730<br>IST |
| January   | 27.9                           | 12.6                           | 33.0                                | 15-01-1973               | 3.9                                | 8-01-1946                | 64                          | 41          |
| February  | 30.9                           | 15.7                           | 36.5                                | 28-02-1966               | 3.9                                | 27-02-1934               | 59                          | 37          |
| March     | 34.9                           | 19.8                           | 40.0                                | 29-03-1966               | 10.0                               | 30-03-1975               | 48                          | 33          |
| April     | 38.3                           | 24.4                           | 43.6                                | 30-04-1973               | 15.0                               | 13-04-1979<br>14-04-1979 | 45                          | 31          |
| May       | 40.3                           | 26.9                           | 45.4                                | 10-05-1973               | 14.6                               | 03-05-1981               | 45                          | 33          |
| June      | 35.4                           | 25.8                           | 46.1                                | 10-06-1931               | 15.4                               | 30-06-1975               | 67                          | 57          |
| July      | 30.0                           | 23.7                           | 36.1                                | 07-07-1966               | 15.0                               | 24-07-1975               | 80                          | 76          |
| August    | 29.3                           | 23.3                           | 34.4                                | 02-08-1972               | 14.4                               | 17-08-1975               | 83                          | 78          |
| September | 30.4                           | 23.0                           | 34.0                                | 12-09-1968<br>29-09-1980 | 15.0                               | 10-09-1975               | 80                          | -           |
| October   | 30.8                           | 19.9                           | 35.4                                | 05-10-1966               | 11.7                               | 30-10-1954               | 73                          | 61          |
| November  | 29.3                           | 15.5                           | 34.0                                | 22-11-1929               | 3.7                                | 20-11-1981               | 68                          | 51          |
| December  | 27.2                           | 12.1                           | 32.7                                | 07-12-1976               | 2.7                                | 15-12-1981               | 67                          | 43          |
| Annual    | 32.1                           | 20.2                           | 46.1                                | 10-06-1931               | 2.7                                | 15-12-1981               | 65                          | 51          |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(KANKER)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 22  | 21  | 21  | 18  | 17  | 3   | 0   | 0   | 2   | 12  | 19  | 22  | 157    |
| b                     | 2   | 1   | 1   | 1   | 2   | 11  | 18  | 18  | 9   | 4   | 2   | 2   | 71     |
| c                     | 1.3 | 1.2 | 1.4 | 1.7 | 2.0 | 5.5 | 7.0 | 6.8 | 5.2 | 2.9 | 1.8 | 1.6 | 3.2    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 21  | 17  | 17  | 10  | 11  | 2   | 0   | 0   | 1   | 11  | 17  | 18  | 125    |
| b                     | 1   | 1   | 1   | 2   | 3   | 10  | 18  | 17  | 13  | 4   | 2   | 2   | 74     |
| c                     | 1.4 | 1.5 | 1.8 | 3.0 | 2.9 | 5.9 | 7.2 | 7.1 | 6.1 | 3.5 | 2.2 | 2.0 | 3.7    |

a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(KANKER)**

|                      | Jan | Feb | Mar  | Apr      | May     | Jun  | Jul | Aug | Sep  | Oct  | Nov  | Dec  | Annual |
|----------------------|-----|-----|------|----------|---------|------|-----|-----|------|------|------|------|--------|
| Wind speed in km/hr  | 2.7 | 4.0 | 5.4  | 7.3      | 8.3     | 10.3 | 9.7 | 8.8 | 6.1  | 3.4  | 2.5  | 2.1  | 5.9    |
| Direction in morning | C   | C   | C/SW | C/SW     | SW/C    | SW   | SW  | SW  | C/SW | C    | C    | C    |        |
| Direction in evening | C   | C   | C/SW | C/SW/ NW | SW/W/ C | SW   | SW  | SW  | SW/C | C/SW | C/NE | C/NE |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(KANKER)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.2 | 0.5 | 2.5 | 4.6 | 4.1 | 6.1 | 3.1 | 3.1 | 3.0 | 1.4 | 0.0 | 0.0 | 28.6   |
| Hail                  | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 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 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4    |
| Fog                   | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1    |
| Squall                | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |



## **KONDAGAON DISTRICT**

Physiographically the district is predominantly a part of Bastar plateau. The district has hilly terrain and some area of low elevation. It has an average elevation of 593 metre above mean sea level. The peak height in the district is about 802 metre.

The climate of this district is characterized by hot in summer and good rainfall during the monsoon season. The year may be divided into four seasons. Summer season from March to about the middle of June is followed by southwest monsoon season which extends upto about first week of October. October and November months constitute the post monsoon season. Winter season which follows thereafter, lasts till the end of February.

### **RAINFALL**

Records of rainfall in the district are available for three rain gauge stations for the period ranging from 29 to 46 years. The details of 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 1319.5 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 88% of the annual normal rainfall. July and August are the rainiest months with an average value of 375.0 mm. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 2001 when it amounted to 159% of the normal. In the year 1998, the annual rainfall in the district was the lowest in this period and amounted to only 66% of the normal. In this period the rainfall was less than 80% of the normal in 8 years and 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 1600 mm in 26 years out of 40.

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 55 at Keskai to 66 at Kondagaon Hydro.

The heaviest rainfall in 24 hours recorded at any station in the district was 264.3 mm at Keskal on 04 July 2006.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at Kanker and Jagdalpur observatories respectively in the neighbouring Kanker and Bastar districts respectively. After February, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 25°C. In May and early part of June, the maximum temperature may reach about 44°C. Thundershowers sometimes occur in afternoons and bring some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather cools down, the day temperatures go down appreciably but the drop in the night temperatures is slight. After withdrawal of monsoon by first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature about 28°C and mean minimum temperature about 12°C. In winter season cold waves sometimes affect the district in the wake of western disturbances which move across northern part of India, the minimum temperature may go down to about 4°C on some individual days. The temperatures may be lowered by 1° -2°C in high altitudinal areas.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoon than in the morning, except in the southwest monsoon months when there is little difference. In the southwest monsoon months the air is generally humid with value of relative humidity of the order of 55% to 90%. Humidity decreases in post monsoon and winter seasons and air is generally mild humid. Summer

season is the driest part of the year with value of relative humidity in the afternoon being about 35% and morning humidity is about 45%.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. In post monsoon and winter season skies are generally clear or lightly clouded. In April, May and in October, 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 pre-monsoon and southwest monsoon season when depressions affect the weather of the district, the district may experience gusty winds. In pre-monsoon and southwest monsoon season winds mainly blow from southwest and west direction and sometimes calm winds are also observed. From October to February winds mostly blow from north and northeast direction, sometimes calm winds are also observed.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms are common during the summer and southwest monsoon season, being most frequent during April to June. Sometimes they also occur during February and October months. Thunderstorms occur during February to May, are occasionally accompanied with hail. Dust storms occur occasionally during summer. Thunderstorms during pre-monsoon period occasionally accompanied with squalls. Fog occasionally occurs in the mornings of the winter months and the monsoon season, particularly in hilly areas.

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

| STATION                 | No.<br>of<br>Years<br>of<br>Data |   | JAN  | FEB | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |        | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|-------------------------|----------------------------------|---|------|-----|------|------|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|-----------------------------------|-------------|
|                         |                                  |   |      |     |      |      |      |       |       |       |       |      |      |     |        | HIGHEST  | LOWEST | AMOUNT<br>(mm)                    | DATE        |
| Keskal                  | 46                               | a | 9.6  | 2.4 | 10.3 | 11.4 | 19.2 | 202.8 | 378.4 | 425.8 | 209.7 | 64.7 | 6.7  | 6.0 | 1347.0 | 164  | 67     | 264.3                             | 04 Jul 2006 |
|                         |                                  | b | 0.5  | 0.2 | 0.6  | 0.6  | 0.9  | 8.3   | 15.1  | 15.0  | 9.6   | 3.5  | 0.3  | 0.3 | 54.9   | (1975)   | (1996) |                                   |             |
| Kondagaon               | 46                               | a | 9.4  | 5.2 | 8.5  | 20.3 | 22.1 | 192.9 | 359.0 | 354.3 | 223.0 | 67.9 | 10.4 | 5.6 | 1278.6 | 143  | 63     | 260.4                             | 04 Jul 2006 |
|                         |                                  | b | 0.4  | 0.3 | 0.7  | 1.6  | 1.5  | 9.4   | 16.5  | 17.6  | 11.5  | 4.0  | 0.5  | 0.4 | 64.4   | (1994)   | (1974) |                                   |             |
| Kondagaon<br>(Hydro)    | 29                               | a | 23.3 | 5.3 | 2.9  | 30.2 | 31.0 | 209.2 | 371.7 | 360.2 | 209.6 | 70.1 | 14.7 | 4.8 | 1333.0 | 135  | 71     | 260.4                             | 04 Jul 2006 |
|                         |                                  | b | 0.7  | 0.5 | 0.4  | 2.2  | 2.2  | 10.0  | 16.7  | 16.7  | 10.8  | 4.2  | 1.0  | 0.5 | 65.9   | (2006)   | (2002) |                                   |             |
| Kondagaon<br>(District) |                                  | a | 14.1 | 4.3 | 7.2  | 20.6 | 24.1 | 201.6 | 369.7 | 380.1 | 214.1 | 67.6 | 10.6 | 5.5 | 1319.5 | 159  | 66     |                                   |             |
|                         |                                  | b | 0.5  | 0.3 | 0.6  | 1.5  | 1.5  | 9.2   | 16.1  | 16.4  | 10.6  | 3.9  | 0.6  | 0.4 | 61.6   | (2001)   | (1998) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**KONDAGAON**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 801 – 900   | 2            | 1501-1600   | 2            |
| 901 – 1000  | 4            | 1601-1700   | 5            |
| 1001 -1100  | 8            | 1701-1800   | 1            |
| 1101-1200   | 1            | 1801-1900   | 1            |
| 1201-1300   | 7            | 1901 2000   | 0            |
| 1301-1400   | 4            | 2001-2100   | 1            |
| 1401–1500   | 4            |             |              |

(Data available for 40 years)

## **KORBA DISTRICT**

The climate of this district is characterized by hot dry in summer and good rainfall during the monsoon season. The year may be divided in to four seasons. The winter season is from December to February, and is followed by the summer till the middle of June. Southwest monsoon season is from middle of June to September. The period of October to November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for five rainguage stations for period ranging from 10 to 48 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 1354.1mm. During the southwest monsoon season (June to September) the district receives about 92% of the annual normal rainfall. July is the rainiest month with average rainfall of 429.7 mm. The variation in the rainfall from year to year is some large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 236 % of the annual normal occurred in year 1988, while the lowest annual rainfall which was 56 % of the normal occurred in 1979. In this fifty year period there were five 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 1700 mm in 29 years out of 39 years for which continuous data is available.

On an average there are 58 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 Pali to 62 at Kathghora.

The heaviest rainfall in 24 hours recorded at any station in the district was 433.6 mm at Kathghora on 24 November 1958.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the Pendra Road observatory in the neighbouring Bilaspur district. From the beginning of March, temperatures begin to rise rapidly till mid-June. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 25°C. In the latter part of the summer season i.e. May and early part of June, the maximum temperature may sometimes reach about 45°C on individual days. During the latter part of summer until the onset of the monsoon by second week of June, days are uncomfortable with hot dusty winds. However, the afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the advance of the southwest monsoon into the district towards the middle of June, the day temperatures drop rapidly while drop in night temperature is comparatively small. With the withdrawal of the monsoon by about first week of October, there is rapid drop in the night temperatures while both the temperatures begin to decrease rapidly after October. December and January form the coolest part of the year when the mean maximum temperature is about 25°C and mean minimum temperature is about 11°C. In winter months, cold waves sometimes affect the district in the wake of western disturbances passing across north India, minimum temperatures may sometimes go down to about 3°C on individual days. These temperatures may be lowered by 1°C -2°C in some area of hills.

## **HUMIDITY**

In the south west monsoon months, air is generally humid and relative humidity ranges between 60% and 85% in mornings and it ranges between 55% and 80% in the afternoon. Air is generally mild humid in post monsoon and winter seasons. Generally throughout the year the humidity is less in the afternoon than in the mornings. Summer is the driest part of the year when the value of relative humidity is about 25% to 30% in the afternoons.

## **CLOUDINESS**

During the monsoon season skies are heavily clouded to overcast. In the latter part of summer and post monsoon season there is moderate cloudiness. During the winter months, skies are generally clear or lightly clouded. Generally cloudiness is more in the afternoons than in the mornings.

## **WINDS**

Winds are generally light to moderate with a little strengthening in the latter part of summer and early part of monsoon season. In the southwest monsoon season winds are mostly northerly to northwesterly and sometimes westerly to southwesterly winds are also observed in the district. In the rest of the year winds generally blow from north direction and calm winds are also sometimes observed. During the monsoon season, when depressions affect the weather of the district, the district may experience occasionally gusty winds

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season cross the east coast and moving in some west direction pass through or in the neighbourhood of the district causing widespread and locally heavy rain and gusty winds. Occasionally post monsoon storms from the Bay of Bengal also affect the weather of the district. Thunderstorm occurs in the district throughout the year. Its frequency is more in the latter part of summer season and in the southwest monsoon season. Hailstorm and dust storm occur occasionally during the pre-monsoon season. Fog occurs occasionally in the mornings of post monsoon, winter and monsoons months particularly in hilly area.



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

| STATION          | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|------|--------|--|--------|--------------------------------|-------------|
|                  |                      |   |      |      |      |      |      |       |       |       |       |      |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Kartala          | 10                   | a | 7.4  | 8.0  | 7.9  | 3.2  | 1.1  | 160.9 | 450.2 | 383.8 | 224.9 | 63.1 | 8.9  | 2.3  | 1321.7 | 134                                      | 82     | 207.5                          | 30 Jun 2005 |
|                  |                      | b | 0.4  | 0.7  | 0.8  | 0.4  | 0.1  | 6.8   | 18.0  | 15.6  | 10.6  | 2.9  | 0.4  | 0.3  | 57.0   | (2003)                                   | (2006) |                                |             |
| Kathgora         | 48                   | a | 13.9 | 13.2 | 10.5 | 6.7  | 11.4 | 201.5 | 448.3 | 429.7 | 228.1 | 46.6 | 10.8 | 5.6  | 1426.3 | 200                                      | 54     | 433.6                          | 24 Nov 1958 |
|                  |                      | b | 1.0  | 1.0  | 0.9  | 0.7  | 0.8  | 8.2   | 18.0  | 16.8  | 11.1  | 2.3  | 0.5  | 0.3  | 61.6   | (1961)                                   | (1979) |                                |             |
| Korba            | 23                   | a | 20.1 | 12.8 | 5.6  | 29.0 | 7.6  | 206.1 | 492.3 | 472.7 | 237.4 | 56.4 | 12.5 | 10.6 | 1563.1 | 205                                      | 67     | 358.0                          | 12 Aug 2004 |
|                  |                      | b | 0.6  | 0.9  | 0.3  | 0.1  | 0.4  | 8.5   | 17.2  | 15.7  | 10.1  | 3.1  | 0.7  | 0.6  | 58.2   | (1988)                                   | (1993) |                                |             |
| Kotaghat         | 27                   | a | 13.6 | 19.6 | 12.2 | 12.5 | 6.9  | 182.3 | 344.1 | 396.1 | 175.1 | 37.5 | 6.6  | 12.5 | 1219.0 | 154                                      | 50     | 224.0                          | 01 Aug 1969 |
|                  |                      | b | 1.2  | 2.0  | 1.1  | 1.1  | 0.6  | 8.4   | 16.4  | 17.0  | 9.7   | 2.5  | 0.4  | 0.5  | 60.9   | (1961)                                   | (1965) |                                |             |
| Pali             | 11                   | a | 12.8 | 6.2  | 3.0  | 2.3  | 5.4  | 144.1 | 413.4 | 347.1 | 257.0 | 46.8 | 1.7  | 0.0  | 1239.8 | 140                                      | 83     | 195.0                          | 06 Aug 2005 |
|                  |                      | b | 0.5  | 0.6  | 0.3  | 0.3  | 0.7  | 7.4   | 15.4  | 13.4  | 9.9   | 2.1  | 0.2  | 0.0  | 50.8   | (2001)                                   | (2009) |                                |             |
| Korba (District) |                      | a | 13.6 | 12.0 | 7.8  | 10.7 | 6.5  | 179.0 | 429.7 | 405.9 | 224.5 | 50.1 | 8.1  | 6.2  | 1354.1 | 236                                      | 56     |                                |             |
|                  |                      | b | 0.7  | 1.0  | 0.7  | 0.5  | 0.5  | 7.9   | 17.0  | 15.7  | 10.3  | 2.6  | 0.4  | 0.3  | 57.6   | (1988)                                   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**KORBA**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 701 – 800   | 1            | 2001 – 2100 | 0            |
| 801 – 900   | 0            | 2101 – 2200 | 1            |
| 901 – 1000  | 2            | 2201 – 2300 | 0            |
| 1001 -1100  | 2            | 2301 – 2400 | 1            |
| 1101-1200   | 6            | 2401 – 2500 | 0            |
| 1201-1300   | 6            | 2501 – 2600 | 0            |
| 1301-1400   | 4            | 2601 – 2700 | 0            |
| 1401–1500   | 5            | 2701 – 2800 | 0            |
| 1501-1600   | 4            | 2801 – 2900 | 0            |
| 1601-1700   | 2            | 2901 – 3000 | 0            |
| 1701-1800   | 2            | 3001 - 3100 | 0            |
| 1801-1900   | 1            | 3101 – 3200 | 1            |
| 1901-2000   | 1            |             |              |

**(Data available for 39 years)**

## **KORIYA DISTRICT**

Koriya is a northwestern district of Chhattisgarh state. The district has some hill ranges. The height of the lower tableland is about 550 m above mean sea level. The peak height in the district is about 840 m.

The climate of this district is characterised with a dry hot in summer and good rainfall in the monsoon season. The year may be divided in to four seasons. Winter season is from December to February. Summer season is from March to the middle of June and is followed by southwest monsoon season till the first week of October. The period of October to November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for five rain gauge 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 1212.0 mm. During the southwest monsoon months (June to September) the district receives 94% of the annual normal rainfall. July is the rainiest month with average rainfall of 377.0 mm. The variation in the rainfall from year to year is not large. In the fifty year period from 1961 to 2010, the highest annual rainfall amounting to 147 % of the normal occurred in year 2003, while the lowest annual rainfall which was only 50 % of the normal occurred in 1979. In this fifty year period there were six years in which the 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 1500 mm in 20 years out of 31 for which continuous data is available.

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 50 at Bharatpur to 63 at Sonhat.

The heaviest rainfall in 24 hours recorded at any station in the district was 326.4 mm at Baikunthpur on 4 July 1915.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description that follows is based on the records of the meteorological data of Ambikapur observatory in neighbouring Surguja district. After February there is continuous increase in temperature. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 25°C. On individual days in the months of May and early part of June, the maximum temperature may be as high as 43°C. During the latter part of summer until the onset of the monsoon by about the second week of June, days are uncomfortable with hot dusty winds. With the onset of the southwest monsoon day temperatures come down appreciably. However, night temperatures in June are generally as high as in May. With the withdrawal of monsoon by first week of October, the day temperature begins to decrease while drop in night temperature is appreciable. The day temperatures in October are about the same as in the monsoon season, but the night becomes cooler. After October both day and night temperatures decrease rapidly. December and January are the coldest months with the mean maximum temperature about 23°C and mean minimum about 9°C. During winter season, cold waves affect the district in the wake of western disturbances passing across north India, and minimum temperature may sometimes go down to about 2°C on individual days. In hilly areas the temperatures may be lowered by 1 - 2°C.

## **HUMIDITY**

In the south west monsoon months, particularly in July, August and September air is mostly humid with its value of relative humidity ranges between 80% and 88%. Air is generally mild humid in post monsoon and winter seasons. The relative humidity in the afternoon is generally lower than

in morning. Summer season is the driest part of the year with the value of relative humidity in the afternoon at about 25%.

## **CLOUDINESS**

During southwest monsoon season skies are generally heavily clouded to overcast. In the latter half of summer and post monsoon months cloudiness is moderate. During the winter months sky is generally clear or lightly clouded. In May and October cloudiness is more 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 the southwest monsoon season winds mostly blow from west and southwest directions. Sometimes northerly winds are also observed in the district. From September northerly winds start to appear in the district and northerly winds become predominant in post monsoon, winter and summer season. From March southerly winds start to appear in the district and become predominant in the southwest 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 westward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in latter part of summer and in southwest monsoon season. Hailstorms and dust storms occur occasionally in summer season. Fog occasionally occurs in the post monsoon, winter and monsoon season particularly in hilly areas.

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

| STATION           | No. of Years of Data |        | JAN         | FEB         | MAR         | APR        | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV        | DEC        | ANNUAL         | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |               | HEAVIEST RAINFALL IN 24 HOURS* |             |
|-------------------|----------------------|--------|-------------|-------------|-------------|------------|-------------|--------------|---------------|---------------|---------------|-------------|------------|------------|----------------|--|---------------|--------------------------------|-------------|
|                   |                      |        |             |             |             |            |             |              |               |               |               |             |            |            |                | HIGHEST                                  | LOWEST        | AMOUNT (mm)                    | DATE        |
| Baikunthpur       | 44                   | a<br>b | 13.2<br>0.9 | 10.0<br>0.8 | 8.8<br>0.7  | 3.0<br>0.3 | 6.0<br>0.4  | 193.0<br>8.2 | 379.6<br>16.5 | 351.2<br>15.0 | 208.2<br>10.2 | 37.5<br>2.3 | 9.6<br>0.6 | 8.1<br>0.5 | 1228.2<br>56.4 | 136<br>(1961)                            | 50<br>(1979)  | 326.4                          | 04 Jul 1915 |
| Bharatpur         | 10                   | a<br>b | 4.5<br>0.5  | 5.9<br>0.5  | 0.6<br>0.1  | 0.0<br>0.0 | 1.7<br>0.2  | 232.4<br>8.3 | 383.2<br>15.2 | 370.8<br>16.1 | 218.3<br>8.4  | 6.3<br>1.0  | 1.0<br>0.1 | 0.1<br>0.0 | 1224.8<br>50.4 | 177<br>(2003)                            | 88<br>(2005)  | 300.4                          | 15 Jun 2001 |
| Janakpur          | 19                   | a<br>b | 10.5<br>0.6 | 1.3<br>0.1  | 6.6<br>0.5  | 1.2<br>0.2 | 3.6<br>0.3  | 124.3<br>5.7 | 404.3<br>16.4 | 367.7<br>15.7 | 222.2<br>10.4 | 17.5<br>1.3 | 5.5<br>0.7 | 2.1<br>0.1 | 1166.8<br>52.0 | 151<br>(1998)                            | 46<br>(1965)  | 248.0                          | 15 Sep 1993 |
| Mahendragarh      | 10                   | a<br>b | 9.5<br>0.8  | 16.7<br>1.1 | 12.2<br>1.1 | 4.1<br>0.6 | 1.5<br>0.3  | 129.4<br>6.4 | 321.9<br>14.9 | 328.1<br>13.5 | 215.5<br>10.6 | 41.7<br>3.0 | 6.6<br>0.4 | 5.0<br>0.4 | 1092.2<br>53.1 | 135<br>(2004)                            | 105<br>(2006) | 320.0                          | 20 Sep 2004 |
| Sonhat            | 12                   | a<br>b | 7.8<br>0.8  | 12.9<br>0.7 | 19.1<br>1.6 | 9.7<br>0.7 | 11.6<br>0.9 | 189.2<br>8.9 | 396.2<br>17.9 | 346.2<br>15.6 | 295.1<br>12.0 | 47.8<br>3.6 | 9.9<br>0.3 | 1.9<br>0.2 | 1347.4<br>63.2 | 143<br>(2003)                            | 99<br>(2004)  | 251.0                          | 11 Jun 2002 |
| Koriya (District) |                      | a<br>b | 9.1<br>0.7  | 9.4<br>0.6  | 9.5<br>0.8  | 3.6<br>0.4 | 4.9<br>0.4  | 173.7<br>7.5 | 377.0<br>16.2 | 352.8<br>15.2 | 231.9<br>10.3 | 30.2<br>2.2 | 6.5<br>0.4 | 3.4<br>0.2 | 1212.0<br>54.9 | 147<br>(2003)                            | 50<br>(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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**KORIYA**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 – 700   | 2            | 1201-1300   | 1            |
| 701 – 800   | 1            | 1301-1400   | 3            |
| 801 – 900   | 1            | 1401–1500   | 4            |
| 901 – 1000  | 4            | 1501-1600   | 6            |
| 1001 -1100  | 1            | 1601-1700   | 0            |
| 1101-1200   | 7            | 1701-1800   | 1            |

**(Data available for 31 years)**

## **MAHASAMUND DISTRICT**

The climate of this district is characterized by dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. Summer season follows thereafter and continues till about the second week of June. The southwest monsoon season is from the middle of June to the first week of October. October and November months constitute the post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for four raingauge stations for the period ranging from 14 to 42 years. The details of 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 1205.7 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 92% of the annual normal rainfall, July being the month with the highest rainfall of 369.5 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 185% of the normal. In the year 1993, 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 the rainfall was less than 80% of the normal in 10 years. Considering the district as a whole, there was one occasion of three consecutive years and three occasions of two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 901 mm and 1500 mm in 16 years out of 27.

On an average there are 54 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 52 at Mahasamund and Saraipali to 59 at Basna.



The heaviest rainfall in 24 hours recorded at any station in the district was 508.3 mm at Saraipali on 29 August 2003.

## **TEMPERATURE**

There is no meteorological observatory in the district. Hence, the climatological description of the district which follows is based on the meteorological data of neighbouring observatory of Raipur. From March, temperatures begin to rise steadily till first week of June. May is usually the hottest month of the year with mean maximum temperature about 42 °C and mean minimum temperature about 28 °C. May and the early part of June prior to the onset of southwest monsoon is rather hot and the day temperature sometimes reaches to 46 °C on individual days and the dust raising winds add to the discomfort. The arrival of southwest monsoon air over the district by about the second week of June brings relief, and thereafter, weather sometimes becomes pleasant during the monsoon season. Towards the end of monsoon season in September, the day temperatures increase slightly and the rise is maintained in October after the withdrawal of the monsoon. But the night temperatures begin to drop from September onwards. After October the day temperatures begin to drop rapidly. December and January are usually the coldest months with the mean maximum temperature about 28°C and mean minimum about 13°C. Cold waves sometimes affect the district in association with the passage of western disturbances across northern India in winter season. Under such conditions, the minimum temperatures may go down to 7°C on individual days.

## **HUMIDITY**

In the southwest monsoon season the air is generally humid with values of relative humidity about 75% to 90% during July to September. After the monsoon season humidity decreases and the air is generally dry in the afternoons of winter and summer season. The driest part of the year is summer season when the value of relative humidity in the afternoon is at about 25% whereas it is about 45% in the morning.

## **CLOUDINESS**

During the southwest monsoon months skies are generally heavily clouded to overcast. In the latter half of the summer and post monsoon months the clouding is moderate, the afternoons are much cloudy than the mornings. 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.

## **WINDS**

Winds are generally light to moderate with some increase in force in the latter part of summer and southwest monsoon season. In the post monsoon and winter months, winds are mostly calm and northeasterlies are also sometimes observed in the same season. In the month of March, winds are variable in direction. By April southwesterlies and westerlies winds blow and they become predominant during the period from May to September.

## **SPECIAL WEATHER PHENOMENA**

During the monsoon season, depressions originating in the Bay of Bengal cross the east coast of India and move in some westerly direction. In their passage across the central parts of the country, these storms affect the district and its neighbourhood and cause widespread heavy rain and strong winds. Occasional storm from the Bay of Bengal in October also affect the district. Thunderstorms occur throughout the year and their frequency being highest in the late summer and southwest monsoon months and least in the period from October to February. Thunderstorms during the period February to June are sometimes accompanied by squall, less frequently with hail and dust storm. Fog occurs occasionally in winter months.

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

| STATION                  | No.<br>of<br>Years<br>of<br>Data |        | JAN        | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV        | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|--------------------------|----------------------------------|--------|------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|-------------|------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                          |                                  |        |            |             |             |             |             |              |               |               |               |             |            |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Basna                    | 14                               | a<br>b | 6.9<br>0.4 | 10.2<br>0.8 | 3.4<br>0.4  | 4.5<br>0.8  | 20.3<br>2.1 | 167.6<br>8.9 | 387.7<br>16.3 | 369.6<br>15.3 | 243.4<br>9.6  | 73.0<br>3.6 | 1.6<br>0.3 | 11.9<br>0.6 | 1300.1<br>59.1 | 192<br>(2003)                                  | 80<br>(2005) | 453.0                             | 29 Aug 2003 |
| Mahasamund               | 42                               | a<br>b | 3.0<br>0.3 | 6.2<br>0.6  | 9.1<br>0.6  | 6.3<br>0.6  | 12.1<br>1.2 | 175.4<br>8.1 | 309.8<br>14.8 | 297.8<br>14.1 | 167.5<br>8.1  | 44.0<br>2.8 | 5.3<br>0.4 | 3.7<br>0.3  | 1040.2<br>51.9 | 192<br>(1961)                                  | 48<br>(1992) | 287.0                             | 28 Aug 1915 |
| Pithora                  | 19                               | a<br>b | 4.3<br>0.3 | 12.4<br>0.8 | 25.5<br>1.2 | 10.4<br>0.9 | 15.1<br>1.3 | 193.0<br>7.4 | 426.3<br>14.6 | 309.0<br>13.6 | 225.0<br>10.2 | 28.7<br>2.2 | 2.4<br>0.3 | 2.8<br>0.3  | 1254.9<br>53.1 | 197<br>(1961)                                  | 73<br>(1965) | 221.7                             | 22 Aug 1946 |
| Saraipali                | 28                               | a<br>b | 6.2<br>0.2 | 5.9<br>0.4  | 2.2<br>0.2  | 2.9<br>0.3  | 14.7<br>1.1 | 211.6<br>8.2 | 354.3<br>14.4 | 373.7<br>14.6 | 206.3<br>9.7  | 33.9<br>2.0 | 6.7<br>0.4 | 8.6<br>0.5  | 1227.0<br>52.0 | 156<br>(1994)                                  | 83<br>(1980) | 508.3                             | 29 Aug 2003 |
| Mahasamund<br>(District) |                                  | a<br>b | 5.1<br>0.3 | 8.7<br>0.7  | 10.1<br>0.6 | 6.0<br>0.7  | 15.6<br>1.4 | 186.9<br>8.1 | 369.5<br>15.0 | 337.5<br>14.4 | 210.6<br>9.4  | 44.9<br>2.6 | 4.0<br>0.4 | 6.8<br>0.4  | 1205.7<br>54.0 | 185<br>(1961)                                  | 48<br>(1993) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**MAHASAMUND**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 501 – 600   | 1            | 1401–1500   | 4            |
| 601 – 700   | 2            | 1501-1600   | 1            |
| 701 – 800   | 2            | 1601-1700   | 0            |
| 801 – 900   | 2            | 1701-1800   | 0            |
| 901 – 1000  | 3            | 1801-1900   | 0            |
| 1001 -1100  | 3            | 1901-2000   | 1            |
| 1101-1200   | 4            | 1901 - 2100 | 0            |
| 1201-1300   | 0            | 2101 – 2200 | 1            |
| 1301-1400   | 2            | 2201 – 2300 | 1            |

**(Data available for 27 years)**

## **MUNGELI DISTRICT**

Mungeli district has a hilly terrain in north and plains of low elevation in south. The climate of this district is characterized by dry hot in summer and good rainfall in the monsoon season. The year may be divided in to four seasons. Winter season is from December to February and is followed by summer till the middle of June. Thereafter, southwest monsoon season is up to September. The period of October and November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for two rain gauge stations for period of 15 and 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 1176.1 mm. During the southwest monsoon season (June to September) the district receives about 90% of the annual normal rainfall. July and August are the rainiest months with an average rainfall of 346.3 mm. The variation in the rainfall from year to year is not large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 156% of the annual normal occurred in year 1961, while the lowest annual rainfall which was 59% of the normal occurred in year 1992. In this period there were eight years in which the annual rainfall in the district was less than 80% of the normal. During this 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 901 mm and 1500 mm in 28 years out of 35 years for which continuous data is available.

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 is 56 at Mungeli and 61 at Khurai.

The heaviest rainfall in 24 hours recorded at any station in the district was 266.7 mm at Mungeli on 23 August 1889.

## **TEMPERATURE**

There is no meteorological observatory in the district. So the description that follows is based on the records of the Pendra Road observatory in the neighbouring Bilaspur district. This observatory is situated near the northwestern border of the district which is at a higher elevation. From March temperatures begin to rise rapidly till the middle of June. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 25°C. In the latter part of the summer season i.e. May and early part of June, the maximum temperature may sometimes reach about 44°C on individual days. During the latter part of summer until the onset of the monsoon, days are uncomfortable with hot dusty winds. However, thundershowers occur in the afternoon on some days and bring welcome relief though only temporarily. With the advance of the southwest monsoon into the district towards the middle of June, the day temperatures drop rapidly while drop in night temperature is comparatively small. With the withdrawal of the monsoon by about first week of October, there is rapid drop in the night temperatures while both the temperatures begin to decrease only after October. December and January are the coolest part of the year when the mean maximum temperature is about 25°C and mean minimum temperature is about 11°C. In winter months, cold waves sometimes affect the district in the wake of western disturbances passing across north India, minimum temperatures may sometimes go down to about 3°C on individual days. The temperatures may be high by 1°C to 2°C in southern part of the district.

## **HUMIDITY**

In the south west monsoon months, air is generally humid, and relative humidity ranges between 65% and 90% in the mornings and it ranges between 55% and 80% in the afternoons. Air is generally mild humid in post monsoon and winter season. The relative humidity is generally less in the

afternoon than in the mornings. Summer is the driest part of the year when the value of relative humidity is about 25% to 30% in the afternoon.

## **CLOUDINESS**

During southwest monsoon season skies are heavily clouded to overcast. In the latter part of summer and post monsoon seasons there is moderate cloudiness. During the winter months, skies are generally clear or lightly clouded. Generally cloudiness is more in the afternoons than in the mornings.

## **WINDS**

Winds are generally light to moderate with a little strengthening in the latter part of summer and early part of monsoon season. In the southwest monsoon season winds are mostly northerly to northwesterly and sometimes westerly to southwesterly winds are also observed in the district. In the rest of the year winds generally blow from north direction and calm winds are also sometimes observed. During the monsoon season, when depressions affect the weather of the district, the district may experience gusty winds

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season cross the east coast and moving in some west direction pass through or in the neighbourhood of the district causing widespread and locally heavy rain and gusty winds. Occasionally post monsoon storms from the Bay of Bengal may also affect the weather of the district. Thunderstorm occurs in the district throughout the year. Its frequency is more in the latter part of summer season and in the southwest monsoon season. Hailstorm and dust storm occur occasionally during the pre-monsoon season. Fog occurs occasionally in the mornings of post monsoon and winter seasons and in monsoon months in the hilly areas.

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

| STATION               | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT         | NOV        | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|-----------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|-------------|------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                       |                                  |        |             |             |             |             |             |              |               |               |               |             |            |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Khurai                | 15                               | a<br>b | 5.0<br>0.3  | 18.0<br>0.7 | 16.7<br>1.1 | 4.8<br>0.6  | 6.1<br>0.7  | 137.5<br>7.5 | 369.1<br>18.1 | 392.7<br>18.1 | 260.1<br>11.9 | 35.9<br>1.7 | 0.0<br>0.0 | 12.9<br>0.6 | 1258.8<br>61.3 | 141<br>(1961)                                  | 74<br>(1965) | 154.4                             | 08 Jul 1945 |
| Mungeli               | 49                               | a<br>b | 14.4<br>1.0 | 15.1<br>1.0 | 13.5<br>1.2 | 10.3<br>0.8 | 10.6<br>0.9 | 160.7<br>8.2 | 341.8<br>16.0 | 281.4<br>13.8 | 181.3<br>9.0  | 42.4<br>2.7 | 9.8<br>0.6 | 11.8<br>0.6 | 1093.1<br>55.8 | 173<br>(1961)                                  | 64<br>(1992) | 266.7                             | 23 Aug 1889 |
| Mungeli<br>(District) |                                  | a<br>b | 9.7<br>0.6  | 16.5<br>0.9 | 15.1<br>1.2 | 7.6<br>0.7  | 8.4<br>0.8  | 149.1<br>7.9 | 355.5<br>17.0 | 337.0<br>16.0 | 220.7<br>10.5 | 39.2<br>2.2 | 4.9<br>0.3 | 12.4<br>0.6 | 1176.1<br>58.7 | 156<br>(1961)                                  | 59<br>(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.

\*\* Years of occurrence given in brackets.



**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**MUNGELI**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 - 700   | 1            | 1301-1400   | 2            |
| 701 - 800   | 1            | 1401-1500   | 0            |
| 801 – 900   | 4            | 1501-1600   | 0            |
| 901 – 1000  | 6            | 1601-1700   | 0            |
| 1001 -1100  | 6            | 1701-1800   | 0            |
| 1101-1200   | 5            | 1801-1900   | 1            |
| 1201-1300   | 9            |             |              |

**(Data available for 35 years)**

## **NARAYANPUR DISTRICT**

Narayanpur district has hilly terrain and some plain area of low elevation. The peak height in the district is about 935 m above mean sea level. The climate of this district is characterized by dry hot in summer and good rainfall during the monsoon season. The year may be divided into four seasons. Summer (Pre- monsoon) season from March to the middle of June is followed by southwest monsoon season, which extends upto first week of October. Thereafter, the post monsoon season begins and lasts till November. Winter season, which follows thereafter, lasts till the end of February.

### **RAINFALL**

Records of rainfall in the district are available for only one rain gauge station for the period of 45 years. The details of rainfall at this station and for the district as a whole are given in Table 1 and 2. The average annual rainfall in the district is 1357.8 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 89% of the annual normal rainfall. July and August are the rainiest months with an average rainfall of about 405 mm. The annual rainfall in the district varies over a small range. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1990 when it amounted to 160% of the normal. In year 1965, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 54% of the normal. In this period the rainfall was less than 80% of the normal in 3 years and none of them were consecutive. It is seen from Table 2 that the annual rainfall was between 1001 mm and 1700 mm in 25 years out of 30.

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.

The heaviest rainfall in 24 hours recorded at the station in the district was 281.8 mm at Narayanpur on 06 July 2001

## **TEMPERATURE**

There is no meteorological observatory in the district so the description which follows is based on the meteorological data and climatological conditions prevailing at Jagdalpur observatory in the neighbouring Bastar district. After February, temperatures begin to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 38°C and mean minimum temperature about 24°C. In May and early part of June, the maximum temperature may reach at about 41°C. Thundershowers sometimes occur in the afternoons and bring some relief from the heat. With the onset of the southwest monsoon season over the district by about the second week of June the weather becomes slightly cool and pleasant, the day temperatures go down appreciably but the drop in the night temperatures is slight. After withdrawal of monsoon by about the first week of October the day temperatures increase slightly. After October both day and night temperatures steadily decrease. December and January are the coldest months of the year with the mean maximum temperature about 28°C and mean minimum temperature about 11°C. Cold waves sometimes 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 5°C on some individual days. These temperatures may be lowered by 1- 2°C in hilly areas.

## **HUMIDITY**

The relative humidity is more in morning than in the evening throughout the year. During the southwest monsoon season and post monsoon season the air is generally humid with value of relative humidity of the order of 65% to 90%. Humidity decreases rapidly in the afternoons during winter and summer season. Summer season is the driest part of the year with value of relative humidity especially in the afternoon is of the order of 40%.

## **CLOUDINESS**

During the southwest monsoon season, skies are heavily clouded to overcast. From October cloudiness decreases. 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 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 experiences gusty winds. In pre-monsoon and southwest monsoon season winds mainly blow from southwest and west direction. Sometimes southerlies, northeasterlies, and northwesterlies are also observed during this period. From October to February winds mostly blow from north and northeast direction, sometimes southerlies and southwesterlies are also observed in February.

## **SPECIAL WEATHER PHENOMENA**

Depressions originating in the Bay of Bengal during the southwest monsoon season and early post-monsoon season affect the weather of the district and its neighbourhood and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in southwest monsoon season. Thunderstorms occur during February to May are occasionally accompanied with hail and duststorm. Thunderstorms during pre-monsoon season are occasionally accompanied with squalls. Fog occurs in winter and post monsoon seasons and sometimes also observed during monsoon season in hilly areas.

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

| STATION                  | No.<br>of<br>Years<br>of<br>Data |   | JAN | FEB | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC | ANNUAL | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |        | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|--------------------------|----------------------------------|---|-----|-----|------|------|------|-------|-------|-------|-------|------|------|-----|--------|--|--------|-----------------------------------|-------------|
|                          |                                  |   |     |     |      |      |      |       |       |       |       |      |      |     |        | HIGHEST  | LOWEST | AMOUNT<br>(mm)                    | DATE        |
| Narayanpur               | 45                               | a | 8.1 | 9.0 | 10.4 | 17.5 | 19.4 | 186.2 | 398.4 | 410.6 | 207.1 | 74.1 | 10.9 | 6.1 | 1357.8 | 160  | 54     | 281.8                             | 06 Jul 2001 |
|                          |                                  | b | 0.3 | 0.6 | 0.5  | 1.2  | 1.1  | 9.2   | 17.0  | 18.2  | 11.2  | 4.2  | 0.7  | 0.4 | 64.6   | (1990)   | (1965) |                                   |             |
| Narayanpur<br>(District) |                                  | a | 8.1 | 9.0 | 10.4 | 17.5 | 19.4 | 186.2 | 398.4 | 410.6 | 207.1 | 74.1 | 10.9 | 6.1 | 1357.8 | 160  | 54     |                                   |             |
|                          |                                  | b | 0.3 | 0.6 | 0.5  | 1.2  | 1.1  | 9.2   | 17.0  | 18.2  | 11.2  | 4.2  | 0.7  | 0.4 | 64.6   | (1990)   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**NARAYANPUR**  
**(Data 1962-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 701 – 800   | 1            | 1501-1600   | 5            |
| 801 – 900   | 0            | 1601-1700   | 1            |
| 901 – 1000  | 0            | 1701-1800   | 2            |
| 1001 -1100  | 4            | 1801-1900   | 1            |
| 1101-1200   | 5            | 1901-2000   | 0            |
| 1201-1300   | 4            | 2001-2100   | 0            |
| 1301-1400   | 4            | 2101-2200   | 1            |
| 1401–1500   | 2            |             |              |

(Data available for 30 years)

## **RAIGARH DISTRICT**

Raigarh district has two types of physiographic features namely Mahanadi plain in south and hilly areas in north. The climate of this district is characterised by dry hot in summer and well distributed rainfall in the monsoon season. The year may be divided into four seasons. Winter season is from December to February, followed by summer (pre-monsoon) season from March to mid-June. The period from mid-June to September constitutes the southwest monsoon season. The period of October and November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for eight raingauge stations for period ranging from 15 to 46 years. The average annual rainfall in the district as a whole is 1321.2 mm. The details of rainfall at these stations and for the district as a whole are given in Table 1 and 2. During the monsoon months June to September the district receives rainfall of about 90% of the annual rainfall. July is the rainiest month with average rainfall of 390.8 mm. The variation in the rainfall from year to year is not much large. In the fifty year period 1961 to 2010, the highest annual rainfall amounting to 186% of the normal occurred in year 1961, while the lowest annual rainfall which was only 67% of the normal occurred in year 1965. In this period there were five years in which the annual rainfall in the district was less than 80% of the normal. During this period there was one occasion of two consecutive years of such a low rainfall. It is seen from Table 2 that the rainfall was between 1001 mm and 1600 mm in 32 years out of 39.

On an average there are 63 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 Sarangarh to 71 at Lailungi.

The heaviest rainfall in 24 hours recorded at any station in the district was 360.9 mm at Raigarh on 10 July 1958.

## **TEMPERATURE**

There is one meteorological observatory in the district at Raigarh at an altitude of 220 metre above mean sea level. So the records of this observatory may be taken as representative of the meteorological conditions in the district in general. Temperatures begin to increase rapidly from about the beginning of March. May is usually the hottest month with the mean maximum temperature at 41.4°C and mean minimum temperature at 27.5 °C. The heat in May and early part of June till the onset of the monsoon is oppressive and maximum temperature reaches at 46°C on individual days. The onset of the monsoon by about mid-June brings some relief from hot weather as the temperatures decrease appreciably. In September due to break in the monsoon or clear sky which are common, the day temperatures increase slightly and this increase continues in October. The day and night temperature begin to decrease rapidly after October. December and January are generally the coldest months with average of maximum temperature at 28.1°C and mean minimum temperature at 13.2°C. Cold waves sometimes 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 7 °C on individual days. The temperatures may be lowered by 1-2 °C in hilly area.

The highest maximum temperature ever recorded at Raigarh was 48.3°C on 8 May 1973 and the lowest minimum temperature ever recorded was -6.4°C on 24 December 1959.

## **HUMIDITY**

The value of relative humidity is generally lower in the afternoons than in the mornings. In the southwest monsoon months the air is mostly humid with value of relative humidity of the order of 53% to 85%. In the post monsoon season relative humidity start to decrease and in winter season air



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

## **CLOUDINESS**

During monsoon months skies are heavily clouded to overcast. In the post-monsoon season cloudiness is moderate and in winter months skies are generally clear or lightly clouded. In 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 mainly blow from southwest direction. In the post monsoon and winter season, winds mainly blow from northeast and northwest directions. In the summer season, winds blow from northeast and northwest directions and sometimes southeasterlies and southwesterlies are also observed in the district.

## **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 and cause gusty winds and widespread heavy rain. Thunderstorms occur during summer and southwest monsoon season. Dust storms occur occasionally during summer. Thunderstorms in the summer season are sometimes associated with hail. Fog occasionally occurs in the mornings of winter months.

Tables 3, 4, 5 and 6 give the normals of temperature and relative humidity, cloudiness, mean wind speed and direction and special weather phenomena respectively for Raigarh observatory.

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

| STATION            | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|--------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|------|--------|--|--------|--------------------------------|-------------|
|                    |                      |   |      |      |      |      |      |       |       |       |       |      |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Dharamjaigarh      | 36                   | a | 15.3 | 8.7  | 7.5  | 15.6 | 25.3 | 224.1 | 427.1 | 341.2 | 229.1 | 53.2 | 10.5 | 12.2 | 1369.8 | 168                                      | 43     | 254.0                          | 17 Aug 1923 |
|                    |                      | b | 1.1  | 0.7  | 0.5  | 0.8  | 1.9  | 9.4   | 17.8  | 16.7  | 11.0  | 2.9  | 0.6  | 0.6  | 64.0   | (1961)                                   | (1962) |                                |             |
| Gharghoda (Hydro)  | 19                   | a | 8.9  | 7.0  | 15.7 | 11.5 | 14.5 | 197.7 | 387.9 | 392.1 | 214.5 | 52.4 | 6.6  | 7.4  | 1316.2 | 149                                      | 67     | 225.6                          | 30 Jun 1964 |
|                    |                      | b | 0.8  | 0.8  | 1.6  | 1.2  | 1.1  | 8.5   | 17.6  | 17.4  | 10.1  | 2.9  | 0.7  | 0.4  | 63.1   | (1961)                                   | (1976) |                                |             |
| Ghargoda           | 22                   | a | 15.9 | 4.6  | 15.9 | 2.5  | 11.9 | 175.8 | 383.3 | 346.7 | 279.2 | 43.5 | 4.8  | 7.9  | 1292.0 | 151                                      | 85     | 194.0                          | 12 Aug 2004 |
|                    |                      | b | 0.6  | 0.5  | 0.8  | 0.4  | 1.1  | 8.5   | 16.4  | 15.8  | 11.9  | 2.0  | 0.5  | 0.6  | 59.1   | (1990)                                   | (2009) |                                |             |
| Kharsiya           | 22                   | a | 8.9  | 4.1  | 5.6  | 3.8  | 30.2 | 198.9 | 421.4 | 382.9 | 238.4 | 65.0 | 15.7 | 7.2  | 1382.1 | 147                                      | 62     | 340.2                          | 07 Sep 2003 |
|                    |                      | b | 0.6  | 0.4  | 0.5  | 0.5  | 1.8  | 8.3   | 16.7  | 14.7  | 10.7  | 3.1  | 0.6  | 0.5  | 58.4   | (1994)                                   | (2009) |                                |             |
| Lailungi           | 15                   | a | 10.0 | 17.3 | 11.4 | 15.2 | 14.0 | 257.0 | 391.1 | 337.4 | 216.6 | 64.9 | 8.5  | 3.4  | 1346.8 | 149                                      | 53     | 171.0                          | 12 Aug 2004 |
|                    |                      | b | 0.5  | 1.0  | 1.0  | 1.2  | 1.5  | 11.1  | 19.2  | 8.1   | 13.4  | 2.9  | 0.5  | 0.4  | 70.8   | (2007)                                   | (2010) |                                |             |
| Raigarh            | 36                   | a | 13.5 | 16.4 | 8.9  | 16.7 | 25.0 | 198.2 | 372.0 | 383.4 | 223.8 | 39.2 | 7.4  | 6.8  | 1311.3 | 226                                      | 64     | 360.9                          | 10 Jul 1958 |
|                    |                      | b | 1.1  | 1.5  | 1.0  | 1.3  | 1.9  | 9.7   | 16.3  | 16.4  | 11.5  | 3.1  | 0.7  | 0.5  | 65.0   | (1961)                                   | (1998) |                                |             |
| Raigarh (Obsy)     | 46                   | a | 11.9 | 16.0 | 20.3 | 16.0 | 33.2 | 212.7 | 425.8 | 446.2 | 247.2 | 44.2 | 7.1  | 7.7  | 1488.3 | 200                                      | 64     | 315.2                          | 25 Aug 1970 |
|                    |                      | b | 1.0  | 1.3  | 1.6  | 1.4  | 2.4  | 9.5   | 17.6  | 17.0  | 10.9  | 3.0  | 0.5  | 0.4  | 66.6   | (1961)                                   | (1965) |                                |             |
| Sarangarh          | 42                   | a | 8.3  | 12.0 | 7.6  | 12.5 | 16.1 | 175.5 | 318.2 | 279.4 | 171.5 | 44.2 | 9.1  | 8.7  | 1063.1 | 194                                      | 75     | 207.8                          | 08 Sep 1961 |
|                    |                      | b | 0.6  | 0.8  | 0.8  | 1.0  | 1.2  | 8.5   | 14.8  | 13.6  | 8.4   | 3.0  | 0.6  | 0.5  | 53.8   | (1961)                                   | (2004) |                                |             |
| Raigarh (District) |                      | a | 11.6 | 10.8 | 11.6 | 11.7 | 21.3 | 205.0 | 390.8 | 363.7 | 227.5 | 50.8 | 8.7  | 7.7  | 1321.2 | 186                                      | 67     |                                |             |
|                    |                      | b | 0.8  | 0.9  | 1.0  | 1.0  | 1.6  | 9.2   | 17.0  | 16.2  | 11.0  | 2.9  | 0.6  | 0.5  | 62.7   | (1961)                                   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**RAIGARH**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 801 – 900   | 1            | 1701 – 1800 | 2            |
| 901 - 1000  | 1            | 1801 – 1900 | 0            |
| 1001 – 1100 | 8            | 1901 - 2000 | 1            |
| 1101 - 1200 | 3            | 2001 – 2100 | 0            |
| 1201 - 1300 | 6            | 2101 - 2200 | 0            |
| 1301 – 1400 | 6            | 2201 - 2300 | 0            |
| 1401 – 1500 | 0            | 2301 - 2400 | 0            |
| 1501 – 1600 | 9            | 2401 - 2500 | 1            |
| 1601 – 1700 | 1            |             |              |

(Data available for 39 years)

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

| 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   | 27.9                     | 13.3                     | 33.4                          | 07-01-1973               | 6.8                          | 22-01-1963 | 69                    | 49       |
| February  | 30.8                     | 16.2                     | 39.4                          | 28-02-2006               | 7.8                          | 08-02-1997 | 64                    | 40       |
| March     | 35.5                     | 20.5                     | 43.0                          | 29-03-1972               | 12.2                         | 06-03-2003 | 51                    | 31       |
| April     | 39.8                     | 24.8                     | 46.0                          | 28-04-1973               | 14.4                         | 07-04-2001 | 42                    | 26       |
| May       | 41.4                     | 27.5                     | 48.3                          | 08-05-1973               | 18.7                         | 27-05-2002 | 47                    | 30       |
| June      | 37.4                     | 26.8                     | 47.2                          | 03-06-1953<br>06-06-1955 | 19.5                         | 19-06-1963 | 65                    | 53       |
| July      | 32.2                     | 25.1                     | 41.8                          | 06-07-1982               | 18.6                         | 25-07-1995 | 84                    | 74       |
| August    | 31.2                     | 25.0                     | 39.0                          | 28-08-2003               | 18.4                         | 09-08-2001 | 85                    | 79       |
| September | 32.2                     | 24.6                     | 38.0                          | 01-09-1969               | 20.2                         | 04-09-1991 | 82                    | 75       |
| October   | 32.4                     | 22.2                     | 38.6                          | 05-10-2005               | 1.4                          | 23-10-2000 | 73                    | 62       |
| November  | 30.3                     | 17.5                     | 36.6                          | 03-11-2000               | 9.3                          | 30-11-1970 | 68                    | 53       |
| December  | 28.2                     | 13.1                     | 34.4                          | 03-12-2004               | 6.4                          | 24-12-1959 | 70                    | 51       |
| Annual    | 33.3                     | 21.1                     | 48.3                          | 08-05-1973               | 6.4                          | 24-12-1959 | 71                    | 60       |

**TABLE – 4**  
**Mean Cloud Amount <sup>\*\*</sup>(Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(RAIGARH)**

|                       | Jan  | Feb  | Mar  | Apr  | May  | Jun | Jul | Aug | Sep | Oct  | Nov  | Dec  | Annual |
|-----------------------|------|------|------|------|------|-----|-----|-----|-----|------|------|------|--------|
| <b>0830 HOURS IST</b> |      |      |      |      |      |     |     |     |     |      |      |      |        |
| a                     | 21   | 21   | 22   | 20   | 18   | 5   | 2   | 1   | 7   | 17   | 22   | 23   | 180    |
| b                     | 2    | 1    | 2    | 2    | 3    | 9   | 15  | 16  | 9   | 3    | 2    | 1    | 63     |
| c                     | 1.3  | 0.8  | 1.0  | 1.1  | 1.7  | 4.4 | 5.7 | 6.0 | 4.3 | 1.8  | 0.9  | 0.7  | 2.5    |
| <b>1730 HOURS IST</b> |      |      |      |      |      |     |     |     |     |      |      |      |        |
| a                     | 17.5 | 17.2 | 19.6 | 14.8 | 11.8 | 3.3 | 2.0 | 1.2 | 3.2 | 12.2 | 15.8 | 19.2 | 137.7  |
| b                     | 2    | 1    | 2    | 2.3  | 4    | 10  | 17  | 15  | 11  | 5    | 2    | 1    | 72     |
| c                     | 1.5  | 1.1  | 1.1  | 1.5  | 2.8  | 4.8 | 6.4 | 5.4 | 4.7 | 2.8  | 1.6  | 1.2  | 2.9    |

a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
<sup>\*\*</sup> 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(RAIGARH)**

|                      | Jan | Feb | Mar | Apr    | May       | Jun | Jul | Aug | Sep | Oct        | Nov   | Dec    | Annual |
|----------------------|-----|-----|-----|--------|-----------|-----|-----|-----|-----|------------|-------|--------|--------|
| Wind speed in km/hr  | 2.5 | 4.2 | 3.3 | 3.7    | 4.4       | 5.2 | 4.3 | 4.6 | 3.2 | 2.9        | 3.1   | 2.5    | 3.7    |
| Direction in morning | NE  | NE  | NE  | NE/SE  | SE/SW /NE | SW  | SW  | SW  | SW  | NE         | NE    | NE     |        |
| Direction in evening | NW  | NW  | NW  | SW/ NW | NW/ SW    | SW  | SW  | SW  | SW  | SW/ SE/ NE | NE/NW | NW/ NE |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(RAIGARH)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.3 | 0.6 | 0.8 | 0.9 | 1.2 | 2.0 | 0.9 | 0.8 | 0.8 | 0.2 | 0.0 | 0.0 | 8.5    |
| Hail                  | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2    |
| Dust storm            | 0.0 | 0.0 | 0.1 | 0.3 | 0.4 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9    |
| Fog                   | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2    |
| Squall                | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0    |

## **RAIPUR DISTRICT**

Raipur is situated in the plain region of Chhattisgarh. It occupies the southeastern part of the upper Mahanadi valley and some hills of low elevation in the south. Mahanadi is the principal river of the district. Raipur is a capital of Chhattisgarh state.

The climate of this district is characterized by dry hot in summer and well distributed rains in the monsoon season. The year may be divided into four seasons. Winter season commences from December and lasts till the end of February. The summer (pre-monsoon) season follows thereafter and continues till about the second week of June. Southwest monsoon season is from the middle of June to first week of October and thereafter post monsoon season starts and lasts till November.

### **RAINFALL**

Records of rainfall in the district are available for thirteen rain gauge stations for period ranging from 10 to 48 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 1129.3 mm. The variation in the rainfall from year to year is not large. About 89% of annual rainfall is received during southwest monsoon months; June to September. July is the rainiest month of the year with average rainfall of 320.3 mm. In the fifty year period from 1961 to 2010, the highest annual rainfall amounting to 161% of the annual normal occurred in year 1970, while the lowest annual rainfall which was only 60 % of the normal occurred in year 1965. There were nine years in this period when annual rainfall was less than 80% of the normal and 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 1400 mm in 27 years out of 48.

On an average there are 54 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 46 at Pindron to 61 at Labhandi Agro, Mana Raipur observatory and Raipur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 370.3 mm at Raipur observatory on 04 August 1910.

## **TEMPERATURE**

There are two meteorological observatories in the district, one at Raipur and the other at Mana Raipur. The data of Mana Raipur is of very less years. Hence, the climatological description of the district which follows is based on the meteorological data of observatory at Raipur. From about the beginning of March, temperatures begin to rise steadily till first week of June. May is usually the hottest month of the year with mean maximum temperature at 41.7 °C and mean minimum temperature at 27.6 °C. May and the early part of June prior to the onset of the southwest monsoon is rather hot and the day temperature sometimes reaches to about 46°C and the dust raising winds add to the discomfort. The arrival of the monsoon air over the district by about the second week of June brings relief and thereafter sometimes the weather becomes cool and pleasant. Towards the end of monsoon season in the first week of October, the day temperatures increase slightly and the rise is maintained in October after withdrawal of the monsoon. But the night temperatures begin to drop from September onwards. From about the middle of November both day and night temperatures begin to drop rapidly and December and January are usually the coldest months with an average maximum temperature about 28°C and the mean minimum about 13°C. Cold waves sometimes affect the district in association with the passage of western disturbances across northern India during winter season. Under such conditions, the minimum temperatures go down to 7°C on individual days.

The highest maximum temperature ever recorded at Raipur was 47.0 °C on 28<sup>th</sup> May 1998 and the lowest minimum was 6.6 °C on 11th December 1996.

## **HUMIDITY**

In the southwest monsoon season the air is generally humid with values of relative humidity about 75% to 90% during July to September. After the monsoon

season humidity decreases and the air is generally dry in the afternoons of winter and summer season. The driest part of the year is summer season when the value of relative humidity in the afternoon is about 25% whereas it is about 45% in the morning.

## **CLOUDINESS**

During the southwest monsoon months skies are generally heavily clouded to overcast. In the latter half of the summer and the post monsoon months the cloudiness is moderate, the afternoons are much cloudy than the mornings. 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.

## **WINDS**

Winds are generally light to moderate with some increase in force in the latter part of summer and southwest monsoon season. In the post monsoon and winter months, winds are mostly calm and northeasterlies are also sometimes observed. In the month of March, winds are variable in direction. By April southwesterly and westerly winds blow in the district and they become predominant during the period from May to September.

## **SPECIAL WEATHER PHENOMENA**

During the monsoon season, depressions originating in the Bay of Bengal cross the east coast of India and move in some westerly direction. In their passage across the central parts of the country, these storms affect the district and its neighbourhood and cause widespread heavy rain and strong winds. An occasional storm from the Bay of Bengal in October also affects the district. Thunderstorms occur throughout the year and their frequency being highest in the late summer and southwest monsoon months and least in the period from October to February. Thunderstorms during the period February to June are sometimes accompanied by



squall, less frequently with hail and dust storm. Fog occurs occasionally in winter and monsoon months.

Tables 3, 4, 5 and 6 give the normals of temperature and humidity, cloudiness, mean wind speed and direction and frequency of special weather phenomena respectively for Raipur observatory.

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

| STATION            | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP           | OCT          | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|--------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|---------------|--------------|-------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                    |                                  |        |             |             |             |             |             |              |               |               |               |              |             |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Arang              | 29                               | a<br>b | 7.4<br>0.5  | 4.9<br>0.5  | 2.7<br>0.3  | 3.2<br>0.2  | 10.8<br>0.9 | 196.7<br>7.6 | 317.1<br>12.9 | 316.3<br>13.3 | 183.0<br>7.7  | 35.7<br>1.4  | 10.0<br>0.4 | 10.3<br>0.8 | 1098.1<br>46.5 | 141<br>(1990)                                  | 70<br>(1965) | 318.0                             | 04 Aug 1910 |
| Baghbabna          | 12                               | a<br>b | 0.0<br>0.0  | 0.0<br>0.0  | 0.0<br>0.0  | 0.0<br>0.0  | 0.0<br>0.0  | 162.5<br>8.7 | 238.2<br>14.5 | 254.4<br>16.7 | 191.1<br>11.8 | 138.9<br>6.0 | 0.0<br>0.0  | 0.0<br>0.0  | 985.1<br>57.7  | 107<br>(1990)                                  | -            | 204.1                             | 30 Jun 2007 |
| Bhatagaon          | 26                               | a<br>b | 0.5<br>0.1  | 11.2<br>0.9 | 9.0<br>0.6  | 6.9<br>0.6  | 35.8<br>1.3 | 233.7<br>8.9 | 351.8<br>13.9 | 338.7<br>13.0 | 208.1<br>8.6  | 77.8<br>3.4  | 9.0<br>0.5  | 4.0<br>0.3  | 1286.5<br>52.1 | 152<br>(1961)                                  | 49<br>(1965) | 267.0                             | 23 Jul 1986 |
| Budni              | 32                               | a<br>b | 6.9<br>0.6  | 10.9<br>0.9 | 12.5<br>0.9 | 7.5<br>0.6  | 16.2<br>1.0 | 159.9<br>7.2 | 365.4<br>15.7 | 326.8<br>13.8 | 228.7<br>9.0  | 53.3<br>3.0  | 6.0<br>0.4  | 5.2<br>0.3  | 1199.3<br>53.4 | 161<br>(1961)                                  | 39<br>(1988) | 237.5                             | 17 Aug 1984 |
| Kanki              | 41                               | a<br>b | 7.8<br>0.6  | 7.2<br>0.7  | 11.6<br>0.8 | 5.2<br>0.5  | 14.0<br>0.8 | 148.3<br>7.7 | 338.0<br>15.1 | 297.9<br>13.5 | 182.7<br>8.9  | 55.3<br>2.8  | 6.8<br>0.3  | 6.7<br>0.3  | 1081.5<br>52.0 | 189<br>(1961)                                  | 56<br>(1965) | 321.3                             | 12 Sep 1942 |
| Kendri             | 30                               | a<br>b | 1.4<br>0.2  | 5.0<br>0.4  | 10.7<br>0.4 | 3.3<br>0.3  | 10.5<br>0.8 | 193.8<br>8.0 | 278.4<br>13.1 | 296.4<br>13.1 | 179.4<br>8.6  | 37.6<br>2.7  | 7.6<br>0.6  | 4.0<br>0.1  | 1028.1<br>48.3 | 174<br>(1961)                                  | 59<br>(2006) | 291.0                             | 23 Jun 1986 |
| Labhandi           | 18                               | a<br>b | 8.4<br>1.0  | 7.9<br>1.3  | 21.2<br>1.4 | 14.5<br>1.6 | 29.3<br>2.7 | 193.3<br>9.5 | 290.7<br>14.5 | 259.2<br>13.4 | 166.4<br>8.9  | 46.0<br>2.8  | 12.6<br>0.9 | 8.4<br>0.7  | 1057.9<br>58.7 | 147<br>(1964)                                  | 76<br>(1965) | 136.4                             | 28 Jun 1955 |
| Labhandi<br>(Agro) | 23                               | a<br>b | 16.1<br>1.4 | 11.6<br>1.1 | 6.6<br>0.7  | 14.5<br>1.2 | 14.6<br>1.4 | 183.7<br>9.1 | 368.1<br>16.6 | 336.0<br>14.4 | 187.1<br>9.8  | 49.9<br>3.0  | 10.1<br>0.6 | 28.5<br>1.8 | 1226.8<br>61.1 | 138<br>(1994)                                  | 61<br>(1979) | 263.0                             | 01 Aug 2005 |

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

| STATION               | No. of Years of Data |        | JAN         | FEB         | MAR         | APR         | MAY         | JUN          | JUL           | AUG           | SEP          | OCT         | NOV         | DEC        | ANNUAL         | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |              | HEAVIEST RAINFALL IN 24 HOURS* |             |
|-----------------------|----------------------|--------|-------------|-------------|-------------|-------------|-------------|--------------|---------------|---------------|--------------|-------------|-------------|------------|----------------|--|--------------|--------------------------------|-------------|
|                       |                      |        |             |             |             |             |             |              |               |               |              |             |             |            |                | HIGHEST                                  | LOWEST       | AMOUNT (mm)                    | DATE        |
| Lakholi               | 18                   | a<br>b | 0.0<br>0.0  | 7.7<br>0.7  | 13.9<br>0.8 | 5.0<br>0.6  | 5.3<br>0.7  | 203.7<br>8.6 | 314.7<br>14.3 | 310.4<br>13.5 | 202.8<br>8.6 | 32.4<br>2.3 | 11.6<br>0.6 | 5.2<br>0.3 | 1112.7<br>51.0 | 170<br>(1980)                            | 36<br>(1965) | 343.8                          | 13 Jul 1958 |
| Mana (Raipur-AP) Obsy | 31                   | a<br>b | 15.0<br>1.2 | 14.7<br>1.3 | 14.6<br>1.6 | 16.0<br>1.3 | 27.8<br>2.5 | 212.3<br>9.2 | 352.5<br>15.3 | 341.1<br>14.9 | 190.4<br>9.7 | 50.6<br>2.8 | 14.7<br>0.6 | 7.2<br>0.6 | 1256.9<br>61.0 | 149<br>(2003)                            | 68<br>(1988) | 273.0                          | 30 Jun 2007 |
| Pindron               | 27                   | a<br>b | 4.8<br>0.4  | 5.6<br>0.5  | 8.4<br>0.6  | 2.5<br>0.2  | 11.2<br>0.9 | 147.6<br>7.2 | 302.1<br>14.0 | 285.0<br>11.9 | 169.0<br>7.8 | 32.5<br>1.7 | 4.2<br>0.2  | 3.2<br>0.2 | 976.1<br>45.6  | 200<br>(1961)                            | 57<br>(1965) | 325.9                          | 12 Sep 1942 |
| Raipur                | 10                   | a<br>b | 11.8<br>0.7 | 5.2<br>0.4  | 7.4<br>0.8  | 1.4<br>0.2  | 17.3<br>0.9 | 231.9<br>8.4 | 296.7<br>13.3 | 247.2<br>13.4 | 203.7<br>9.6 | 51.7<br>2.4 | 10.5<br>0.7 | 8.6<br>0.3 | 1093.4<br>51.1 | 132<br>(2007)                            | 85<br>(2008) | 297.0                          | 30 Jun 2007 |
| Raipur (Obsy)         | 48                   | a<br>b | 12.1<br>1.0 | 14.1<br>1.2 | 17.0<br>1.5 | 13.3<br>1.4 | 26.7<br>2.3 | 211.8<br>9.4 | 350.8<br>15.0 | 336.2<br>14.9 | 227.7<br>9.5 | 47.5<br>2.9 | 11.0<br>0.7 | 8.8<br>0.7 | 1277.0<br>60.5 | 168<br>(1970)                            | 64<br>(1988) | 370.3                          | 04 Aug 1910 |
| Raipur (District)     |                      | a<br>b | 7.1<br>0.6  | 8.2<br>0.8  | 10.4<br>0.8 | 7.2<br>0.7  | 16.9<br>1.2 | 190.7<br>8.4 | 320.3<br>14.5 | 303.5<br>13.8 | 193.9<br>9.1 | 54.6<br>2.9 | 8.8<br>0.5  | 7.7<br>0.5 | 1129.3<br>53.8 | 161<br>(1970)                            | 60<br>(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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**RAIPUR**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 601 – 700   | 2            | 1301-1400   | 3            |
| 701 – 800   | 2            | 1401-1500   | 5            |
| 801 – 900   | 5            | 1501-1600   | 2            |
| 901 – 1000  | 3            | 1601-1700   | 3            |
| 1001 -1100  | 4            | 1701-1800   | 0            |
| 1101-1200   | 9            | 1801-1900   | 2            |
| 1201-1300   | 8            |             |              |

(Data available for 48 years)

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

| MONTH     | Mean<br>Maximum<br>Temperature | Mean<br>Minimum<br>Temperature | Highest Maximum<br>ever recorded |            | Lowest Minimum<br>ever recorded |            | Relative<br>Humidity (%) |             |
|-----------|--------------------------------|--------------------------------|----------------------------------|------------|---------------------------------|------------|--------------------------|-------------|
|           | °C                             | °C                             | °C                               | Date       | °C                              | Date       | 0830<br>IST              | 1730<br>IST |
| January   | 27.8                           | 13.6                           | 35.5                             | 27-01-2009 | 6.8                             | 17-01-2003 | 68                       | 44          |
| February  | 31.0                           | 16.5                           | 39.1                             | 12-02-2009 | 8.7                             | 08-02-1997 | 62                       | 35          |
| March     | 35.2                           | 20.6                           | 42.0                             | 30-03-1996 | 12.8                            | 06-03-2003 | 49                       | 29          |
| April     | 39.9                           | 24.8                           | 45.4                             | 28-04-1999 | 17.2                            | 02-04-1996 | 42                       | 23          |
| May       | 41.7                           | 27.6                           | 47.0                             | 28-05-1998 | 18.1                            | 11-05-1998 | 44                       | 27          |
| June      | 37.4                           | 26.7                           | 46.8                             | 05-06-2003 | 19.5                            | 24-06-1998 | 64                       | 51          |
| July      | 31.4                           | 24.6                           | 37.9                             | 02-07-1996 | 20.1                            | 28-07-2010 | 85                       | 76          |
| August    | 30.3                           | 24.4                           | 34.7                             | 31-08-2005 | 21.0                            | 28-08-1996 | 87                       | 79          |
| September | 31.6                           | 24.3                           | 36.1                             | 25-09-2009 | 20.1                            | 27-09-2005 | 82                       | 74          |
| October   | 31.8                           | 22.0                           | 36.0                             | 24-10-2000 | 15.4                            | 27-10-2009 | 77                       | 64          |
| November  | 30.1                           | 17.3                           | 37.9                             | 07-11-2008 | 10.9                            | 28-11-1998 | 72                       | 54          |
| December  | 28.3                           | 13.3                           | 32.4                             | 22-12-2008 | 6.6                             | 11-12-1996 | 68                       | 47          |
| Annual    | 33.0                           | 21.3                           | 47.0                             | 28-05-1998 | 6.6                             | 11-12-1996 | 67                       | 50          |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(RAIPUR)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 18  | 17  | 18  | 14  | 10  | 1   | 0   | 0   | 2   | 10  | 15  | 22  | 128    |
| b                     | 1   | 1   | 0   | 1   | 1   | 5   | 12  | 13  | 4   | 2   | 1   | 0   | 41     |
| c                     | 1.6 | 1.5 | 1.5 | 1.6 | 2.5 | 5.3 | 6.4 | 6.7 | 5   | 2.8 | 1.6 | 1   | 3.1    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 16  | 17  | 14  | 8   | 3   | 0   | 0   | 0   | 0   | 5   | 9   | 17  | 88     |
| b                     | 1   | 0   | 0   | 0   | 1   | 4   | 10  | 10  | 4   | 1   | 1   | 0   | 32     |
| c                     | 1.6 | 1.2 | 1.8 | 2.6 | 3.6 | 5.7 | 6.7 | 6.8 | 5.7 | 3.6 | 2.2 | 1.4 | 3.6    |

a: Days with clear sky.

b: Days with sky overcast.

c: Mean cloud amount in Okta.

\*\* 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 - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(RAIPUR)**

|                      | Jan  | Feb        | Mar         | Apr  | May  | Jun  | Jul      | Aug      | Sep        | Oct  | Nov  | Dec  | Annual |
|----------------------|------|------------|-------------|------|------|------|----------|----------|------------|------|------|------|--------|
| Wind speed in km/hr  | 3.6  | 4.4        | 4.4         | 6.0  | 7.7  | 10.0 | 9.5      | 8.6      | 6.4        | 3.9  | 3.4  | 2.8  | 5.9    |
| Direction in morning | C/NE | NE/C       | C/NE/<br>SW | SW/W | W/SW | SW/W | SW       | SW       | W/C/S<br>W | C/NE | NE/C | C/NE |        |
| Direction in evening | C/NE | C/W/N<br>E | W/SW<br>/C  | W/SW | W    | SW/W | SW/<br>W | SW/<br>W | SW/C       | C/NE | C/NE | C/NE |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(RAIPUR)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.1 | 0.3 | 0.9 | 0.6 | 0.6 | 2.1 | 2.7 | 1.9 | 3.2 | 0.5 | 0.2 | 0.0 | 13.1   |
| Hail                  | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.2    |
| 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                   | 0.3 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 1.0    |
| Squall                | 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    |

## **RAJNANDGAON DISTRICT**

Rajnandgaon district has almost plain areas of low elevation and some areas of low hills in northwestern part. The climate of this district is characterized by dry hot in summer and well distributed rainfall during the monsoon season. The year may be divided into four seasons. Summer season is from March to middle of June. The period from middle of June to September is of southwest monsoon season. October and November constitute the post monsoon season. The winter season is from December to February.

### **RAINFALL**

Records of rainfall in the district are available for eleven raingauge stations for period ranging from 10 to 48 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 1130.8 mm. The variation in the rainfall from year to year is large. About 90% of annual rainfall is received in southwest monsoon months (June to September). July and August are the rainiest months of the year with average rainfall of 332 mm. In the fifty year period from 1961 to 2010, there were 39 years for which annual data is available. During this period, the highest annual rainfall amounting to 208 % of the annual normal occurred in year 1967, while the lowest annual rainfall which was only 64% of the normal occurred in year 1974. There were seven years in this period when annual rainfall was less than 80% of the normal and 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 1400 mm in 26 years out of 39.

On an average there are 50 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 Gondai to 56 at Rajnandgaon observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 392.0 mm at Rajnandgaon on 21 September 1965.

## **TEMPERATURE**

There is a meteorological observatory in the district at Rajnandgaon located at an altitude of 330 m. So the description which follows is based on the records of this observatory. Temperatures begin to rise from about the beginning of March till May which is the hottest month with mean maximum temperature is 39.5 °C and mean minimum temperature is 25.3 °C. The heat in summer is quite intense and sometimes hot dust raising winds add to discomfort. The day temperatures on individual days during the period April to early part of June goes up to about 45°C. With the onset of the monsoon by about mid -June there is appreciable drop in temperatures and sometimes weather becomes slightly cool and pleasant. After the withdrawal of the monsoon in first week of October there is a slight increase in the day temperatures but the nights become cooler. After October both the day and night temperatures decrease rapidly till January. December and January are the coldest months with average maximum temperature at 24.1 °C and average minimum temperature at 13.4 °C. Sometimes cold waves affect the district in the winter months in association with the wake of western disturbances which move across north India, the minimum temperature go down to about 7°C on individual days. The temperatures may be lowered by 1-2°C in hilly areas.

The highest maximum temperature ever recorded at Rajnandgaon was 46.7 °C on 22<sup>nd</sup> May 1989 and the lowest minimum temperature ever recorded was 6.0 °C on 04 January 1991.

## **HUMIDITY**

The value of relative humidity is generally high during the monsoon months and it ranges at about 60% to 85%. The humidity starts to decrease in October. It is comparatively less during rest of the year. The driest part of the year is the summer season, when the average humidity is about 30% in the afternoon and about 45% in the morning.

Rajnandgaon observatory has no sufficient data for cloudiness, wind and special weather phenomena so the description which follows is based on data of Durg observatory in neighbouring Durg district.

## **CLOUDINESS**

During the monsoon season sky is heavily clouded or overcast. In the latter part of summer season and early part of post monsoon season, skies are moderately clouded. During the rest of the year and in winter season skies are mostly clear or lightly clouded. On some days in winter, when western disturbances affect the weather of the district, skies are heavily clouded.

## **WINDS**

Winds are generally light to moderate throughout the year with some strengthening in force during latter summer and southwest monsoon season. During the period of pre-monsoon and southwest monsoon months, winds generally blow from southwest direction. During post monsoon and winter seasons winds generally blow from north and northeast direction. In the month of March, winds generally blow from north and northeast direction and southwest wind also appears in the district.

## **SPECIAL WEATHER PHENOMENA**

Storms and depressions originating in the Bay of Bengal during the post monsoon and southwest monsoon months move in a westerly direction towards the district or its neighbourhood causing widespread heavy rain and gusty winds. Thunderstorms occur frequently during the period February to October. Fog occasionally occurs during winter season and during monsoon season in hilly areas.

Table 3 gives the normals of temperature and relative humidity for Rajnandgaon observatory.



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

| STATION                | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT   | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|------------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|-------|------|------|--------|--|--------|--------------------------------|-------------|
|                        |                      |   |      |      |      |      |      |       |       |       |       |       |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Ambagarh Chowki        | 41                   | a | 10.7 | 16.6 | 7.5  | 4.9  | 13.6 | 186.7 | 378.3 | 345.3 | 217.5 | 34.9  | 6.8  | 6.4  | 1229.2 | 177                                      | 56     | 310.6                          | 19 Aug 1939 |
|                        |                      | b | 0.5  | 1.0  | 0.3  | 0.5  | 0.8  | 7.6   | 16.2  | 14.7  | 9.8   | 2.0   | 0.3  | 0.5  | 54.2   | (1961)                                   | (1969) |                                |             |
| Chhuikhadan            | 46                   | a | 12.8 | 10.5 | 7.8  | 3.8  | 11.7 | 139.0 | 258.8 | 260.9 | 148.5 | 37.7  | 9.7  | 12.2 | 913.4  | 184                                      | 56     | 263.1                          | 14 Sep 1961 |
|                        |                      | b | 0.8  | 1.0  | 0.5  | 0.3  | 0.8  | 7.1   | 13.5  | 13.4  | 8.3   | 2.4   | 0.5  | 0.6  | 49.2   | (1961)                                   | (2009) |                                |             |
| Churria                | 13                   | a | 4.5  | 12.4 | 6.1  | 1.2  | 3.3  | 170.2 | 389.0 | 291.2 | 128.7 | 36.0  | 11.1 | 1.2  | 1054.9 | 186                                      | 81     | 210.9                          | 24 Jun 2002 |
|                        |                      | b | 0.4  | 0.6  | 0.3  | 0.2  | 0.2  | 6.5   | 14.7  | 12.9  | 7.8   | 1.6   | 0.3  | 0.1  | 45.6   | (1994)                                   | (2009) |                                |             |
| Dongargaon             | 10                   | a | 22.1 | 4.4  | 8.3  | 5.1  | 0.0  | 184.2 | 343.9 | 290.6 | 148.6 | 37.5  | 14.2 | 4.9  | 1063.8 | 144                                      | 94     | 147.6                          | 25 Jun 2002 |
|                        |                      | b | 0.6  | 0.2  | 0.6  | 0.3  | 0.0  | 6.8   | 14.8  | 15.0  | 6.6   | 1.9   | 0.4  | 0.3  | 47.5   | (2005)                                   | (2004) |                                |             |
| Dongargarh             | 39                   | a | 10.2 | 7.5  | 3.8  | 1.9  | 7.2  | 182.6 | 335.0 | 323.0 | 175.6 | 53.0  | 10.4 | 7.8  | 1118.0 | 169                                      | 63     | 359.4                          | 01 Aug 1959 |
|                        |                      | b | 0.4  | 0.6  | 0.5  | 0.3  | 0.4  | 8.3   | 15.4  | 14.7  | 9.0   | 2.9   | 0.6  | 0.6  | 53.7   | (2005)                                   | (1974) |                                |             |
| Gondai                 | 42                   | a | 8.2  | 3.2  | 12.9 | 1.8  | 9.7  | 158.4 | 289.8 | 246.8 | 165.9 | 41.7  | 13.4 | 19.5 | 971.3  | 242                                      | 23     | 192.0                          | 22 Jun 2002 |
|                        |                      | b | 0.3  | 0.2  | 0.5  | 0.2  | 0.6  | 7.0   | 12.4  | 11.5  | 7.9   | 2.3   | 0.4  | 0.5  | 43.8   | (1967)                                   | (1971) |                                |             |
| Kairagarh              | 48                   | a | 9.7  | 11.2 | 9.2  | 4.0  | 11.1 | 147.8 | 283.9 | 280.9 | 176.9 | 49.1  | 11.8 | 9.7  | 1005.3 | 158                                      | 67     | 192.0                          | 15 Jun 2004 |
|                        |                      | b | 0.6  | 0.8  | 0.7  | 0.4  | 0.8  | 7.4   | 13.8  | 13.5  | 8.8   | 2.8   | 0.6  | 0.5  | 50.7   | (2003)                                   | (2009) |                                |             |
| Manpur                 | 10                   | a | 12.2 | 0.0  | 0.0  | 1.2  | 0.0  | 185.0 | 378.1 | 523.7 | 195.1 | 127.3 | 15.0 | 4.6  | 1442.2 | 178                                      | 71     | 274.2                          | 13 Jun 2001 |
|                        |                      | b | 0.2  | 0.0  | 0.0  | 0.1  | 0.0  | 5.0   | 14.4  | 15.1  | 9.1   | 3.2   | 0.3  | 0.4  | 47.8   | (2001)                                   | (2009) |                                |             |
| Mohala                 | 10                   | a | 19.7 | 2.9  | 5.6  | 1.2  | 0.0  | 206.3 | 328.6 | 411.5 | 173.0 | 35.1  | 10.5 | 0.7  | 1195.1 | 123                                      | 96     | 180.0                          | 14 Jun 2001 |
|                        |                      | b | 0.9  | 0.3  | 0.3  | 0.1  | 0.0  | 5.9   | 14.2  | 15.7  | 8.3   | 2.2   | 0.3  | 0.1  | 48.3   | (2005)                                   | (2004) |                                |             |
| Rajnandgaon            | 47                   | a | 15.0 | 8.8  | 11.1 | 7.6  | 14.1 | 198.2 | 362.7 | 350.5 | 223.4 | 68.0  | 11.1 | 6.0  | 1276.5 | 217                                      | 35     | 392.0                          | 21 Sep 1965 |
|                        |                      | b | 1.0  | 0.7  | 0.9  | 0.6  | 1.2  | 8.4   | 14.4  | 14.2  | 9.3   | 3.2   | 0.7  | 0.4  | 55.0   | (1961)                                   | (1974) |                                |             |
| Rajnandgaon (Obsy)     | 24                   | a | 14.4 | 10.5 | 20.4 | 10.9 | 35.4 | 189.6 | 282.1 | 348.0 | 199.4 | 43.1  | 4.2  | 11.6 | 1169.6 | 147                                      | 76     | 215.4                          | 21 Jun 1986 |
|                        |                      | b | 1.5  | 0.7  | 1.7  | 0.9  | 2.4  | 8.0   | 13.2  | 14.5  | 8.9   | 2.6   | 0.6  | 0.8  | 55.8   | (1986)                                   | (1991) |                                |             |
| Rajnandgaon (District) |                      | a | 12.7 | 8.0  | 8.4  | 4.0  | 9.6  | 177.1 | 330.0 | 333.9 | 177.5 | 51.2  | 10.7 | 7.7  | 1130.8 | 208                                      | 64     |                                |             |
|                        |                      | b | 0.7  | 0.6  | 0.6  | 0.4  | 0.7  | 7.1   | 14.3  | 14.1  | 8.5   | 2.5   | 0.5  | 0.4  | 50.4   | (1967)                                   | (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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**RAJNANDGAON**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 701 – 800   | 4            | 1601 - 1700 | 1            |
| 801 – 900   | 3            | 1701 - 1800 | 0            |
| 901 - 1000  | 9            | 1801 – 1900 | 0            |
| 1001 – 1100 | 6            | 1901 – 2000 | 1            |
| 1101 - 1200 | 3            | 2001 – 2100 | 0            |
| 1201 - 1300 | 6            | 2101 - 2200 | 0            |
| 1301 – 1400 | 2            | 2201 - 2300 | 0            |
| 1401 – 1500 | 3            | 2301 - 2400 | 1            |
| 1501 – 1600 | 0            |             |              |

(Data available for 39 years)

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

| 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   | 24.0                     | 13.3                     | 34.1                          | 30-01-1990               | 6.0                          | 04-01-1991               | 69                    | 52       |
| February  | 28.4                     | 15.2                     | 36.7                          | 27-02-1989               | 6.2                          | 01-02-2008               | 61                    | 39       |
| March     | 32.9                     | 18.7                     | 40.2                          | 31-03-1984               | 10.2                         | 01-03-2000               | 51                    | 34       |
| April     | 37.0                     | 23.1                     | 44.1                          | 29-04-1999               | 13.8                         | 03-04-1996               | 44                    | 23       |
| May       | 39.5                     | 25.3                     | 46.7                          | 22-05-1989               | 18.0                         | 10-05-1995               | 47                    | 30       |
| June      | 34.8                     | 24.1                     | 45.6                          | 12-06-1986<br>06-06-1983 | 14.0                         | 30-06-2001<br>30-06-2003 | 65                    | 52       |
| July      | 30.4                     | 23.2                     | 40.4                          | 11-07-1992               | 12.0                         | 20-07-1995               | 84                    | 74       |
| August    | 28.6                     | 23.3                     | 40.5                          | 10-08-1992               | 17.9                         | 08-08-1992               | 88                    | 80       |
| September | 29.2                     | 23.2                     | 35.4                          | 02-09-1992               | 16.0                         | 26-09-1994               | 86                    | 77       |
| October   | 29.6                     | 21.3                     | 38.0                          | 04-10-2002               | 15.4                         | 30-10-1992<br>26-10-1983 | 78                    | 67       |
| November  | 26.4                     | 17.0                     | 33.2                          | 06-11-1981               | 10.0                         | 24-11-1981               | 70                    | 54       |
| December  | 24.2                     | 13.5                     | 31.6                          | 18-12-1985               | 7.4                          | 23-12-1984               | 69                    | 58       |
| Annual    | 30.4                     | 20.1                     | 46.7                          | 22-05-1989               | 6.0                          | 04-01-1991               | 68                    | 53       |

## **SUKMA DISTRICT**

Sukma is the southernmost district of Chhattisgarh state. The climate of this district is characterized by dry hot in summer and good rain during the monsoon season. The year may be divided into four seasons. Summer season from March to the first week of June is followed by southwest monsoon season which extends up to about the first week of October. The period of October and November is of post monsoon season. Winter season follows thereafter and lasts till the end of February.

### **RAINFALL**

Records of rainfall in the district are available for three raingauge stations for the period ranging from 17 to 45 years. The details of 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 1388.6 mm. The rainfall in the southwest monsoon season (June to September) constitutes about 86% of the annual normal rainfall, July and August being the months with the highest rainfall of about 383 mm. The annual rainfall in the district varies over a small range. In the fifty year period of 1961 to 2010, the highest annual rainfall was in year 2006 when it amounted to 171% of the normal. In the year 1968, the annual rainfall in the district was the lowest in the fifty year period and amounted to only 60% of the normal. In this fifty year period the rainfall was less than 80% of the normal in 10 years and there were three occasions of two consecutive years of such a low rainfall. It is seen from Table 2 that the annual rainfall was between 1101 mm and 1700 mm in 25 years out of 38.

On an average there are 66 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 Konta to 78 at Sukma Hydro.

The heaviest rainfall in 24 hours recorded at any station in the district was 340.0 mm at Konta on 03 August 2006.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description that follows is based on the records of Jagdalpur observatory in the neighbouring Bastar district. After February, temperature begins to rise rapidly till first week of June. May is the hottest month with the mean maximum temperature about 38°C and mean minimum temperature about 24°C. In latter part of the summer season, the maximum temperature may sometimes reach about 44°C on individual days. With the advance of southwest monsoon into the district towards the middle of June, the weather becomes slightly cool and pleasant. With the withdrawal of the monsoon by about the first week of October, the day temperatures increase slightly but night temperatures continue to drop. After October both the temperatures steadily decrease. December and January are generally the coldest months with the mean maximum temperature about 28°C and mean minimum temperature about 11°C. In winter months, cold waves sometimes affect the district in the wake of western disturbances which move across north India and the minimum temperature may go down to about 4°C.

The temperatures may be high by 1°C to 2°C in areas of low elevation and low by 1-2°C in hilly area of the district.

## **HUMIDITY**

The relative humidity is generally high during southwest monsoon and post monsoon seasons and it ranges between 65% and 90%. The humidity is more in the mornings than the evenings. The humidity decreases rapidly in the afternoons during winter and summer seasons. The driest part of the year is the summer season, when humidity is at about 35% to 40% in the afternoons.

## **CLOUDINESS**

During southwest monsoon season the skies are generally heavily clouded to overcast. Cloudiness decreases from October and clear or lightly clouded skies are common during the winter and early summer season. Cloudiness is generally more in the afternoon than the morning. Some days in winter, 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 latter part of summer and southwest monsoon season and light in the rest of the year. During the post-monsoon and winter seasons winds generally blow from north and northeast direction. Southerly and southwesterly winds are also observed in February. During summer season winds mostly blow from southwest direction. Sometimes southerly, northeasterly and northwesterly winds are also observed during this period. Winds generally blow from southwest or west direction during the southwest monsoon season. Sometimes northwesterly winds are also observed during September.

## **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 neighbourhood causing widespread heavy rain and gusty winds. Thunderstorms generally occur throughout the year. Its frequency is more in southwest monsoon season. Thunderstorms during the summer season are sometimes accompanied by hail and dust storm. Fog occurs in winter and post monsoon seasons and sometimes also observed during monsoon season in hilly area.

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

| STATION             | No.<br>of<br>Years<br>of<br>Data |   | JAN  | FEB | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT   | NOV  | DEC | ANNUAL | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |        | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|---------------------|----------------------------------|---|------|-----|------|------|------|-------|-------|-------|-------|-------|------|-----|--------|--|--------|-----------------------------------|-------------|
|                     |                                  |   |      |     |      |      |      |       |       |       |       |       |      |     |        | HIGHEST  | LOWEST | AMOUNT<br>(mm)                    | DATE        |
| Konta               | 45                               | a | 1.2  | 3.4 | 2.4  | 10.1 | 15.8 | 148.2 | 364.5 | 325.2 | 179.0 | 83.1  | 12.6 | 4.5 | 1150.0 | 150  | 72     | 340.0                             | 03 Aug 2006 |
|                     |                                  | b | 0.1  | 0.2 | 0.2  | 0.7  | 0.9  | 7.1   | 16.2  | 15.3  | 9.4   | 4.4   | 0.7  | 0.2 | 55.4   | (1978)   | (1979) |                                   |             |
| Sukma               | 45                               | a | 2.6  | 0.7 | 1.8  | 15.8 | 26.3 | 199.0 | 386.4 | 375.0 | 266.7 | 85.2  | 11.9 | 3.8 | 1375.2 | 201  | 72     | 325.0                             | 03 Aug 2006 |
|                     |                                  | b | 0.2  | 0.1 | 0.1  | 0.9  | 1.3  | 8.6   | 17.5  | 18.1  | 12.4  | 4.6   | 0.6  | 0.2 | 64.6   | (2006)   | (1972) |                                   |             |
| Sukma<br>(Hydro)    | 17                               | a | 11.4 | 4.3 | 14.2 | 36.6 | 60.6 | 206.4 | 388.7 | 455.4 | 294.4 | 123.2 | 37.1 | 8.5 | 1640.8 | 191  | 71     | 325.0                             | 04 Aug 2006 |
|                     |                                  | b | 0.7  | 0.4 | 0.7  | 2.6  | 4.3  | 9.4   | 18.2  | 19.7  | 13.3  | 6.8   | 1.5  | 0.4 | 78.0   | (2006)   | (2001) |                                   |             |
| Sukma<br>(District) |                                  | a | 5.1  | 2.8 | 6.1  | 20.8 | 34.2 | 184.5 | 379.9 | 385.2 | 246.7 | 97.2  | 20.5 | 5.6 | 1388.6 | 171  | 60     |                                   |             |
|                     |                                  | b | 0.3  | 0.2 | 0.3  | 1.4  | 2.2  | 8.4   | 17.3  | 17.7  | 11.7  | 5.3   | 0.9  | 0.3 | 66.0   | (2006)   | (1968) |                                   |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**SUKMA**  
**(Data 1961-2010)**

| <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          | 5                   |
| 901 – 1000         | 0                   | 1701-1800          | 2                   |
| 1001 -1100         | 9                   | 1801-1900          | 0                   |
| 1101-1200          | 3                   | 1901-2000          | 0                   |
| 1201-1300          | 6                   | 2001-2100          | 0                   |
| 1301-1400          | 5                   | 2101-2200          | 0                   |
| 1401–1500          | 4                   | 2201 - 2300        | 0                   |
| 1501-1600          | 2                   | 2301 -2400         | 1                   |

**(Data available for 38 years)**

## **SURAJPUR DISTRICT**

Surajpur district is situated in the northern part of the Chhattisgarh state. The district has almost areas of low elevation and some areas of hills. It has an average elevation of 528 metre above mean sea level.

The climate of this district is characterised by dry hot in summer and good rainfall in the monsoon season. The year may be divided into four seasons. Winter season is from December to February, followed by summer (pre-monsoon) season till the second week of June. Southwest monsoon season is from mid-June to September. The period of October to November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for four raingauge stations for period ranging from 12 to 47 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 1301.0 mm. During the southwest monsoon months (June to September) the district receives 89% of the annual rainfall, July being the rainiest month with an average value of rainfall of 416.1 mm. The variation in the rainfall from year to year is not much large. In the fifty year period from 1961 to 2010, the highest annual rainfall amounting to 162% of the normal occurred in year 1973, while the lowest annual rainfall which was only 43% of the normal occurred in year 1979. In this fifty year period there were eight years in which the rainfall in the district was less than 80% of the normal and there is one occasion when such a low rainfall has occurred in two consecutive years. It is seen from Table 2 that rainfall was between 1001 mm and 1600 mm in 21 years out of 34.



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 48 at Ramonujnagar to 59 at Samaria.

The heaviest rainfall in 24 hours recorded at any station in the district was 540.0 mm at Samaria on 13 August 2003.

## **TEMPERATURE**

There is no meteorological observatory in the district so the description that follows is based on the records of the meteorological data of Ambikapur observatory in neighbouring Surguja district. After February there is continuous increase in temperature. May is the hottest month with the mean maximum temperature about 39°C and mean minimum temperature about 25°C. On individual days in the months of May and early part of June, the maximum temperature may be as high as 43°C. During the latter part of summer until the onset of the monsoon by about the second week of June, days are uncomfortable with hot dusty winds. With the onset of the southwest monsoon in the second week of June, day temperatures come down appreciably. However, night temperatures in June are generally as high as in May. The day temperatures in October are about the same as in the monsoon season, but the night becomes cooler. After October both day and night temperatures decrease rapidly. December and January are the coldest months with an average of maximum temperature about 23°C and mean minimum about 9°C. During winter season, cold waves sometimes affect the district in the wake of western disturbances passing across north India and minimum temperature may sometimes go down to about 1 or 2°C on individual days. The temperatures may be high by 1-2°C in area of low elevation and low by 1-2°C in high elevated areas.

## **HUMIDITY**

In the southwest monsoon months, particularly in July, August and September air is mostly humid and its value of relative humidity ranges between 80% and 90%. Air is generally mild humid in post monsoon and winter seasons. The relative humidity in the afternoon is generally lower than the morning. Summer is the driest part of the year with the value of relative humidity in the afternoon at about 25%.

## **CLOUDINESS**

During the monsoon months skies are heavily clouded to overcast. In the latter half of summer and post monsoon months cloudiness is moderate. During the winter months sky is generally clear or lightly clouded. On some days in winter, when western disturbances affect the weather of the district, skies are heavily clouded. In May and October cloudiness is more 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 the southwest monsoon season winds mostly blow from west, southwest and south directions. Sometimes northerly winds are also observed in the district. From September northerly winds start to appear in the district and they become predominant in post monsoon, winter and summer season. From March southerly winds start to appear in the district and become predominant in the southwest 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 westward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in latter part of summer and southwest monsoon season. Hailstorms and dust storms occur occasionally in summer season. Fog occasionally occurs in the post monsoon and winter month.

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

| STATION                | No.<br>of<br>Years<br>of<br>Data |        | JAN         | FEB         | MAR         | APR         | MAY        | JUN          | JUL           | AUG           | SEP           | OCT          | NOV         | DEC         | ANNUAL         | ANNUAL RAINFALL<br>AS % OF NORMAL<br>& YEARS** |              | HEAVIEST RAINFALL<br>IN 24 HOURS* |             |
|------------------------|----------------------------------|--------|-------------|-------------|-------------|-------------|------------|--------------|---------------|---------------|---------------|--------------|-------------|-------------|----------------|--|--------------|-----------------------------------|-------------|
|                        |                                  |        |             |             |             |             |            |              |               |               |               |              |             |             |                | HIGHEST  | LOWEST       | AMOUNT<br>(mm)                    | DATE        |
| Pratappur              | 24                               | a<br>b | 10.2<br>0.6 | 18.4<br>1.2 | 9.6<br>0.7  | 3.7<br>0.1  | 5.3<br>0.4 | 200.3<br>8.2 | 463.0<br>16.8 | 348.5<br>14.9 | 229.4<br>10.3 | 32.3<br>2.1  | 6.4<br>0.3  | 10.0<br>0.6 | 1337.1<br>56.2 | 156<br>(1994)                                  | 58<br>(1988) | 249.0                             | 18 Jun 1994 |
| Ramonujnagar           | 12                               | a<br>b | 4.3<br>0.4  | 17.7<br>0.4 | 13.0<br>0.5 | 0.0<br>0.0  | 0.0<br>0.0 | 175.9<br>8.3 | 388.4<br>13.0 | 279.4<br>13.0 | 105.9<br>5.7  | 94.4<br>4.3  | 18.0<br>1.2 | 13.9<br>1.0 | 1110.9<br>47.8 | 76<br>(1991)                                   | -            | 200.0                             | 23 Jul 1991 |
| Samaria                | 17                               | a<br>b | 10.4<br>1.0 | 14.9<br>1.1 | 15.6<br>0.7 | 11.9<br>0.3 | 3.0<br>0.2 | 258.2<br>8.4 | 434.2<br>16.5 | 406.5<br>15.2 | 248.3<br>11.1 | 100.6<br>3.5 | 4.8<br>0.3  | 9.0<br>0.5  | 1517.4<br>58.8 | 184<br>(2003)                                  | 47<br>(1982) | 540.0                             | 13 Aug 2003 |
| Surajpur               | 47                               | a<br>b | 11.4<br>0.8 | 11.6<br>0.9 | 7.0<br>0.6  | 8.3<br>0.5  | 9.2<br>0.7 | 191.3<br>8.4 | 378.7<br>16.5 | 336.7<br>15.0 | 210.8<br>9.8  | 61.1<br>2.5  | 7.5<br>0.4  | 4.8<br>0.4  | 1238.4<br>56.5 | 203<br>(2001)                                  | 45<br>(1979) | 255.0                             | 31 Aug 2003 |
| Surajpur<br>(District) |                                  | a<br>b | 9.1<br>0.7  | 15.6<br>0.9 | 11.3<br>0.6 | 6.0<br>0.2  | 4.4<br>0.3 | 206.4<br>8.3 | 416.1<br>15.7 | 342.8<br>14.5 | 198.6<br>9.2  | 72.1<br>3.1  | 9.2<br>0.6  | 9.4<br>0.6  | 1301.0<br>54.7 | 162<br>(1973)                                  | 43<br>(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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**SURAJPUR**  
**(Data 1961-2010)**

| <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          | 5                   |
| 601 – 700          | 0                   | 1501-1600          | 1                   |
| 701 – 800          | 0                   | 1601-1700          | 1                   |
| 801 – 900          | 2                   | 1701-1800          | 0                   |
| 901 – 1000         | 3                   | 1801-1900          | 3                   |
| 1001 -1100         | 3                   | 1901-2000          | 1                   |
| 1101-1200          | 4                   | 2001 - 2100        | 1                   |
| 1201-1300          | 5                   | 2101 – 2200        | 1                   |
| 1301-1400          | 3                   |                    |                     |

(Data available for 34 years)

## **SURGUJA DISTRICT**

Surguja district is situated in the northern part of Chhattisgarh state. The district is spread over plateaus, plain lands and hills. The peak height in the district is about 990 metre above mean sea level.

The climate of this district is characterised by dry hot in summer and good rainfall in the monsoon season. The year may be divided into four seasons. Winter season is from December to February. Summer (pre-monsoon) season is from March to the second week of June and is followed by southwest monsoon season till September. The period of October and November is of post monsoon season.

### **RAINFALL**

Records of rainfall in the district are available for five rain gauge stations for the period ranging from 16 to 47 years. The details of 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 1386.9 mm. The annual rainfall in the district from year to year varies over a small range. The rainfall in the southwest monsoon season (June to September) constitutes about 90% of the annual normal rainfall. July is the rainiest month with average rainfall of 403.7 mm. In the fifty year period 1961 to 2010, the highest annual rainfall was in year 1961 when it amounted to 199 % of the normal. In year 2010, the annual rainfall in the district was the lowest and amounted to only 57 % of the normal. In this period the rainfall was less than 80% of the normal in 4 years and none of them were consecutive. It is seen from Table 2 that annual rainfall was between 1101 mm and 1700 mm in 30 years out of 42.

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 59 at Lundra to 71 at Ambikapur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 456.7 mm at Ambikapur observatory on 24 July 1991.

## **TEMPERATURE**

There is one meteorological observatory in the district at Ambikapur so the description that follows is based on the records of the meteorological data of this observatory. After February there is continuous increase in temperature. May is the hottest month with the mean maximum temperature at 39.4°C and mean minimum temperature at 24.8°C. On individual days in the months of May and early part of June, the maximum temperature may be as high as 43°C. During the latter part of summer until the onset of the monsoon by about the second week of June, days are uncomfortable with hot dusty winds. With the onset of the southwest monsoon in the second week of June, day temperatures come down appreciably. However, night temperatures in June are generally as high as in May. The day temperatures in October are about the same as in the monsoon season, but the night becomes cooler. With the withdrawal of monsoon by first week of October, the day temperature begins to decrease while drop in night temperature is appreciable. After October both day and night temperatures decrease rapidly. December and January are the coldest months with the mean maximum temperature at about 23°C and mean minimum at about 9°C. During winter season, cold waves sometimes affect the district in the wake of western disturbances passing across north India and minimum temperature may sometimes go down to about 2°C on individual days. In hilly areas (eastern part) the temperature may be lowered by 2-3°C.

The highest maximum temperature ever recorded at Ambikapur observatory was 44.9°C on 4 June 1995 and the lowest minimum was 0.9°C on 13 January 1989.

## **HUMIDITY**

In the southwest monsoon months, particularly in July, August and September air is mostly humid with its value of relative humidity ranges between 79% and 88%. Air is generally mild humid in post monsoon and winter seasons. The relative humidity in the afternoons is generally lower than in mornings. Summer is the driest part of the year with the value of relative humidity in the afternoon at about 27%.

## **CLOUDINESS**

During southwest monsoon season skies are generally heavily clouded to overcast. In the latter half of summer and post monsoon months cloudiness is moderate. During the winter months sky is generally clear or lightly clouded. On some days in winter, when western disturbances affect the weather of the district, skies are heavily clouded. In May and October cloudiness is more particularly in the afternoons.

## **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 the southwest monsoon season winds mostly blow from west and southwest directions. Sometimes northerly winds are also observed in the district. From September northerly winds start to appear in the district and become predominant in post monsoon, winter and summer seasons. From March southerly winds appear in the district and become predominant in the southwest 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 westward movement after crossing the coast and cause gusty winds and widespread heavy rain. Thunderstorms generally occur throughout the year. Its frequency is more in latter part of summer and in southwest monsoon season. Hailstorms and dust storms occur occasionally in summer season. Fog occasionally occurs in the post monsoon and winter seasons. Sometimes fog occurs during southwest monsoon season in hilly areas.

Tables 3, 4, 5 and 6 give the normals of temperature and relative humidity, cloudiness, wind speed and wind direction and special weather phenomena respectively for Ambikapur observatory.

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

| STATION            | No. of Years of Data |   | JAN  | FEB  | MAR  | APR  | MAY  | JUN   | JUL   | AUG   | SEP   | OCT  | NOV  | DEC  | ANNUAL | ANNUAL RAINFALL AS % OF NORMAL & YEARS** |        | HEAVIEST RAINFALL IN 24 HOURS* |             |
|--------------------|----------------------|---|------|------|------|------|------|-------|-------|-------|-------|------|------|------|--------|--|--------|--------------------------------|-------------|
|                    |                      |   |      |      |      |      |      |       |       |       |       |      |      |      |        | HIGHEST                                  | LOWEST | AMOUNT (mm)                    | DATE        |
| Ambikapur          | 36                   | a | 31.0 | 17.2 | 19.3 | 11.0 | 21.6 | 246.6 | 400.7 | 350.4 | 224.7 | 53.7 | 13.9 | 9.7  | 1399.8 | 152                                      | 69     | 341.6                          | 27 Jun 1945 |
|                    |                      | b | 2.0  | 1.6  | 1.8  | 1.1  | 2.0  | 10.0  | 18.0  | 15.9  | 11.1  | 3.7  | 1.0  | 0.8  | 69.0   | (1994)                                   | (1974) |                                |             |
| Ambikapur (Obsy)   | 47                   | a | 20.2 | 22.7 | 18.1 | 14.2 | 20.0 | 227.7 | 445.9 | 365.3 | 227.4 | 61.1 | 10.4 | 10.5 | 1443.5 | 158                                      | 55     | 456.7                          | 24 Jul 1991 |
|                    |                      | b | 1.6  | 2.1  | 1.8  | 1.3  | 1.9  | 9.8   | 18.3  | 16.6  | 11.8  | 3.8  | 0.8  | 0.8  | 70.6   | (1961)                                   | (2010) |                                |             |
| Bharatanagar       | 16                   | a | 47.5 | 0.3  | 13.3 | 0.0  | 3.5  | 238.9 | 398.3 | 442.9 | 252.6 | 36.0 | 6.3  | 10.0 | 1449.6 | 134                                      | 112    | 301.0                          | 09 Jan 1995 |
|                    |                      | b | 0.8  | 0.1  | 1.2  | 0.0  | 0.2  | 9.6   | 15.3  | 18.4  | 10.7  | 2.9  | 0.1  | 0.5  | 59.8   | (1995)                                   | (1999) |                                |             |
| Lundra             | 21                   | a | 8.7  | 0.3  | 5.8  | 6.1  | 3.6  | 247.5 | 395.5 | 334.4 | 227.0 | 46.1 | 6.9  | 2.3  | 1284.2 | 143                                      | 101    | 276.0                          | 08 Sep 2000 |
|                    |                      | b | 0.6  | 0.1  | 0.2  | 0.4  | 0.2  | 8.8   | 17.8  | 16.6  | 10.6  | 2.9  | 0.3  | 0.3  | 58.8   | (1994)                                   | (1990) |                                |             |
| Sitapur            | 29                   | a | 13.4 | 9.9  | 7.1  | 4.9  | 6.2  | 258.9 | 378.0 | 335.0 | 244.2 | 84.9 | 7.8  | 6.6  | 1356.9 | 239                                      | 70     | 287.2                          | 19 Jun 1994 |
|                    |                      | b | 0.9  | 0.7  | 0.8  | 0.5  | 0.5  | 11.1  | 18.3  | 17.2  | 11.5  | 4.1  | 0.4  | 0.5  | 66.5   | (1961)                                   | (1992) |                                |             |
| Surguja (District) |                      | a | 24.2 | 10.1 | 12.7 | 7.2  | 11.0 | 243.9 | 403.7 | 365.6 | 235.2 | 56.4 | 9.1  | 7.8  | 1386.9 | 199                                      | 57     |                                |             |
|                    |                      | b | 1.2  | 0.9  | 1.2  | 0.7  | 1.0  | 9.9   | 17.5  | 16.9  | 11.1  | 3.5  | 0.5  | 0.6  | 65.0   | (1961)                                   | (2010) |                                |             |

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.

\*\* Years of occurrence given in brackets.

**TABLE - 2**  
**Frequency of Annual Rainfall in the District**  
**SURGUJA**  
**(Data 1961-2010)**

| Range in mm | No. of years | Range in mm | No. of years |
|-------------|--------------|-------------|--------------|
| 701 – 800   | 1            | 1801 – 1900 | 2            |
| 801 – 900   | 0            | 1901 - 2000 | 2            |
| 901 - 1000  | 2            | 2001 – 2100 | 1            |
| 1001 – 1100 | 1            | 2101 - 2200 | 0            |
| 1101 - 1200 | 7            | 2201 - 2300 | 0            |
| 1201 - 1300 | 4            | 2301 - 2400 | 0            |
| 1301 – 1400 | 10           | 2401 - 2500 | 0            |
| 1401 – 1500 | 5            | 2501 - 2600 | 0            |
| 1501 – 1600 | 2            | 2601 - 2700 | 0            |
| 1601 – 1700 | 2            | 2701 - 2800 | 1            |
| 1701 – 1800 | 2            |             |              |

(Data available for 42 years)

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

| 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   | 23.2                     | 9.1                      | 30.5                          | 27-01-2009               | 0.9                          | 13-01-1989 | 77                    | 50       |
| February  | 26.7                     | 11.8                     | 34.8                          | 22-02-1967               | 2.5                          | 10-02-1974 | 67                    | 40       |
| March     | 32.2                     | 16.1                     | 39.7                          | 29-03-2010               | 7.8                          | 02-03-1971 | 51                    | 29       |
| April     | 37.3                     | 21.2                     | 43.8                          | 28-04-1999               | 10.6                         | 01-04-1968 | 39                    | 23       |
| May       | 39.4                     | 24.8                     | 44.8                          | 30-05-1988               | 16.1                         | 04-05-1987 | 43                    | 28       |
| June      | 35.5                     | 24.8                     | 44.9                          | 04-06-1995               | 19.3                         | 09-06-1971 | 66                    | 55       |
| July      | 29.8                     | 23.2                     | 38.3                          | 01-07-1987               | 16.4                         | 06-07-1987 | 86                    | 81       |
| August    | 29.4                     | 23.0                     | 36.0                          | 02-08-1972               | 19.8                         | 05-08-1989 | 88                    | 83       |
| September | 29.8                     | 22.2                     | 35.7                          | 10-09-2003               | 15.7                         | 29.9.1972  | 86                    | 79       |
| October   | 29.3                     | 18.1                     | 34.5                          | 05-10-1966               | 9.4                          | 31-10-1954 | 79                    | 64       |
| November  | 26.2                     | 12.9                     | 32.4                          | 07-11-1976<br>04-11-1981 | 4.2                          | 30-11-1970 | 77                    | 57       |
| December  | 23.5                     | 9.0                      | 29.5                          | 22-12-1985               | 1.6                          | 26-12-1995 | 77                    | 54       |
| Annual    | 30.2                     | 18.0                     | 44.9                          | 04-06-1995               | 0.9                          | 13-01-1989 | 70                    | 53       |

**TABLE – 4**  
**Mean Cloud Amount \*\* (Okta of the Sky) and Mean Number**  
**of days of Clear and Overcast Skies**  
**(AMBIKAPUR)**

|                       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| <b>0830 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 19  | 18  | 19  | 17  | 16  | 4   | 0   | 0   | 4   | 15  | 20  | 22  | 154    |
| b                     | 2   | 2   | 2   | 1   | 1   | 7   | 14  | 14  | 8   | 3   | 1   | 1   | 56     |
| c                     | 1.6 | 1.5 | 1.5 | 1.5 | 1.8 | 4.4 | 6.2 | 6.3 | 4.6 | 2.1 | 1.3 | 1.0 | 2.8    |
| <b>1730 HOURS IST</b> |     |     |     |     |     |     |     |     |     |     |     |     |        |
| a                     | 16  | 14  | 13  | 10  | 6   | 1   | 0   | 0   | 1   | 9   | 14  | 18  | 102    |
| b                     | 2   | 1   | 2   | 2   | 3   | 10  | 15  | 14  | 9   | 3   | 2   | 1   | 64     |
| c                     | 1.9 | 1.8 | 2.3 | 2.7 | 3.5 | 5.7 | 6.6 | 6.8 | 5.6 | 3.1 | 1.9 | 1.5 | 3.6    |

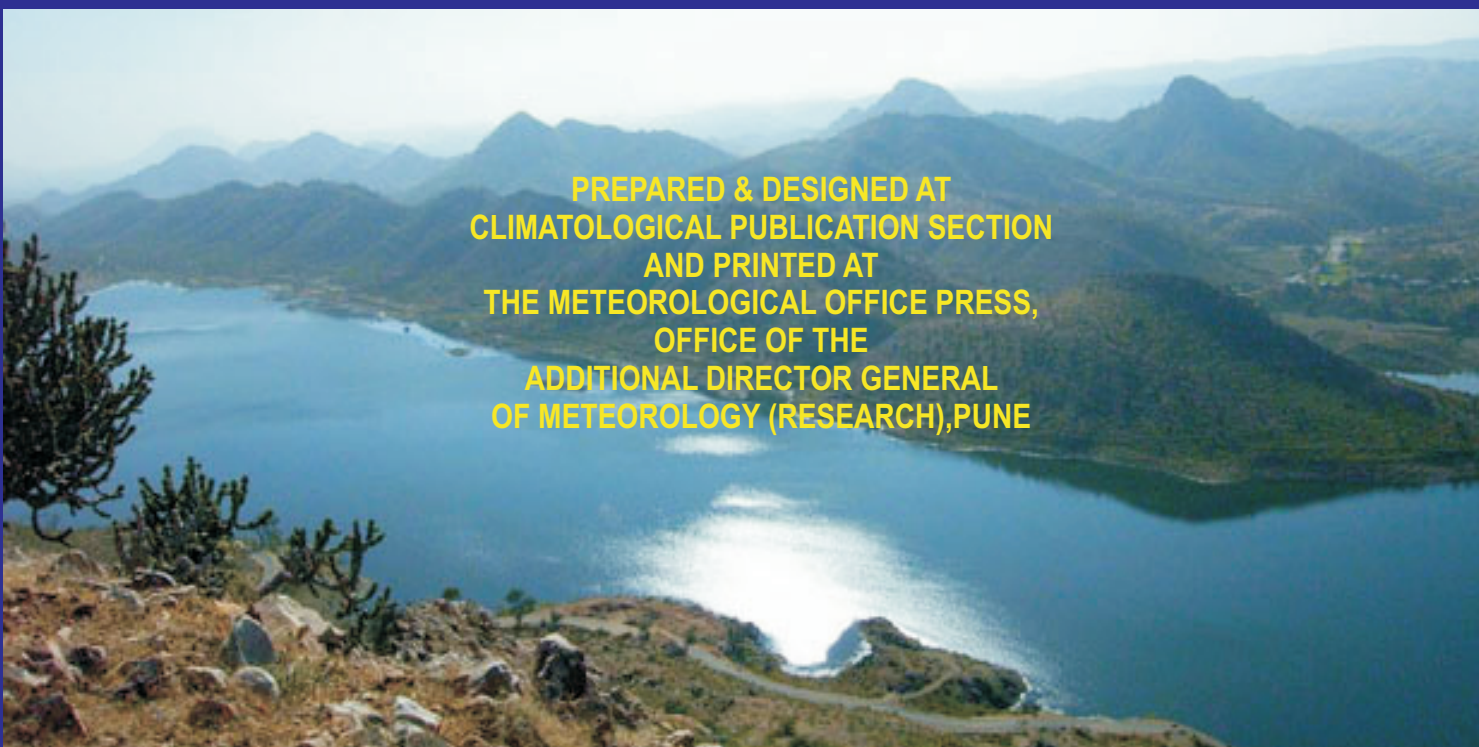
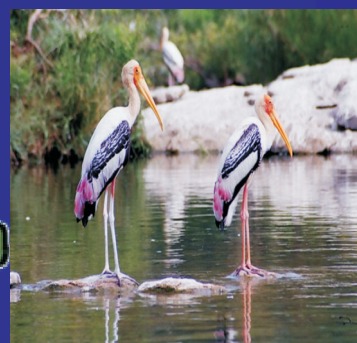
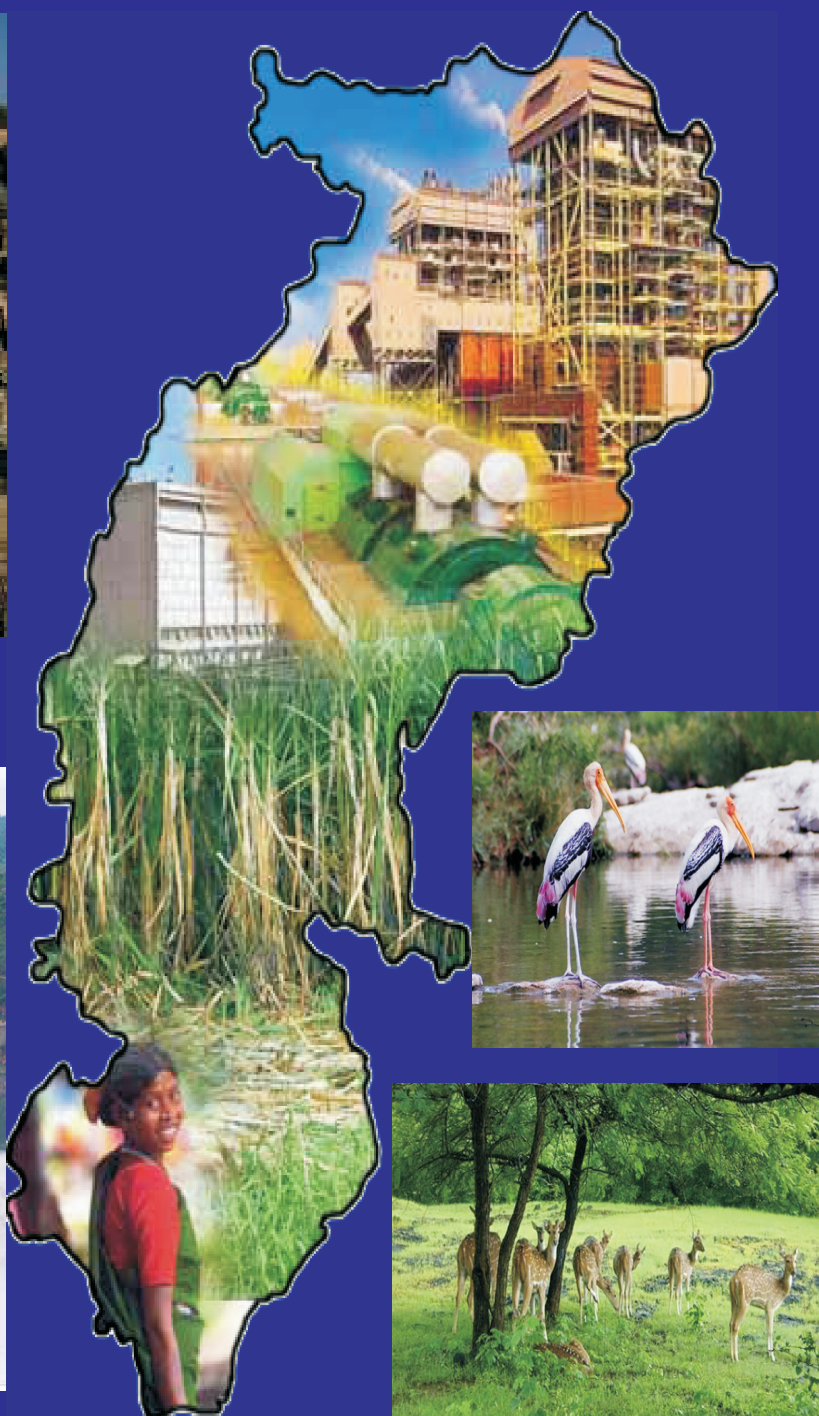
- a: Days with clear sky.  
b: Days with sky overcast.  
c: Mean cloud amount in Okta.  
\*\* Okta = Unit equal to area of one eighth of the sky used in specifying cloud amount.  
For example: 1 Okta means 1/8<sup>th</sup> of the sky covered.

**TABLE - 5**  
**Mean Wind Speed and Predominant Wind Direction**  
**(AMBIKAPUR)**

|                      | Jan | Feb | Mar   | Apr   | May        | Jun        | Jul        | Aug        | Sep   | Oct | Nov | Dec | Annual |
|----------------------|-----|-----|-------|-------|------------|------------|------------|------------|-------|-----|-----|-----|--------|
| Wind speed in km/hr  | 2.6 | 3.2 | 3.9   | 4.4   | 4.3        | 5.0        | 4.1        | 3.5        | 3.4   | 2.9 | 2.6 | 3.6 | 3.6    |
| Direction in morning | C   | C/N | C/N/S | C/N/S | C/SW/<br>W | C/W/<br>SW | C/W/<br>SW | C/W/<br>SW | C/N/S | C/N | C/N | C   |        |
| Direction in evening | C/N | N/C | N/C   | C/N   | N          | N/C/W      | C/W/<br>SW | C/W/N      | C/N   | C/N | C/N | C/N |        |

**TABLE - 6**  
**Special Weather Phenomena**  
**(AMBIKAPUR)**

| Mean No. of Days With | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------|
| Thunder               | 0.2 | 0.7 | 0.7 | 0.7 | 1.3 | 3.9 | 3.6 | 3.1 | 1.4 | 0.5 | 0.0 | 0.1 | 16.2   |
| Hail                  | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |
| Dust storm            | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1    |
| Fog                   | 1.4 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.3 | 0.7 | 3.3    |
| Squall                | 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    |



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