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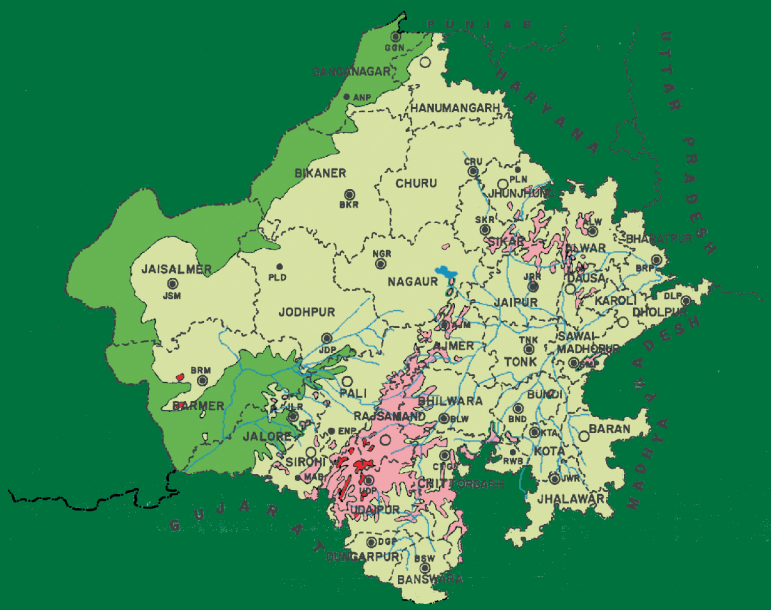
MINISTRY OF EARTH SCIENCES
भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

राजस्थान की जलवायु

CLIMATE OF RAJASTHAN



CLIMATOLOGICAL SUMMARIES OF STATES SERIES - No. 16

ISSUED BY

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

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PREFACE

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, energy, industry require climatological information pertaining to different regions of the country, for planning and executing projects, with a view to derive maximum advantage from meteorological and/or climatological conditions. Keeping these requirements in view, it was decided by India Meteorological Department to publish a series of "Climatological Summaries" for each state in the country incorporating the district climatological summaries. The sixteenth issue in the series of 'State Climatological Summaries' is "Climate of Rajasthan", which is the revised version of its earlier publication No.6 brought out in the year 1988.

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

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

The designing and printing has been done by DTP unit, under the supervision of Shri Philipose Abraham.

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

NEW DELHI
December, 2010

AJIT TYAGI
DIRECTOR GENERAL OF METEOROLOGY

INDIA METEOROLOGICAL DEPARTMENT
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15	End users	State Gazetteers Unit, Central and State Ministries of Agriculture, Science & Technology, Education, Irrigation and Power, Disaster Management Agencies, Research Institutes and Agricultural Universities.
17	Abstract	The publication contains extensive information on the climate of Rajasthan and its districts based on rainfall, temperature, winds, clouds and other weather parameters. The information on droughts, excessive rainfall, depressions and cyclonic storms are also included in the publication.
18	Key words	State Summary, District Summary, Physical Features, Climatic Classification, Heaviest Rainfall, Highest Maximum Temperature, Lowest Minimum Temperature, Rainfall Variability, Seasonal Rainfall, Annual Rainfall, Mean Maximum Temperature, Mean Minimum Temperature.

INTRODUCTION

The climatology of the state of Rajasthan in terms of various meteorological parameters is described in the first chapter. It is followed by a detailed description of the climate of each district in the succeeding chapters. In this publication, the districts of Rajasthan state which were in existence as on 1st January 2009, have been considered and the climatology of these districts, arranged in alphabetical order is presented.

The normals of meteorological parameters used for describing the climate are generally based on data for the period 1961 to 1990, except in the case of rainfall. The normals of rainfall are based on the data for the period 1951 to 2000. These data are obtained from National Data Centre, Pune. The extreme values of temperature and rainfall presented in the publication are based on the data updated upto the year 2009 and 2006 respectively.

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EAST RAJASTHAN

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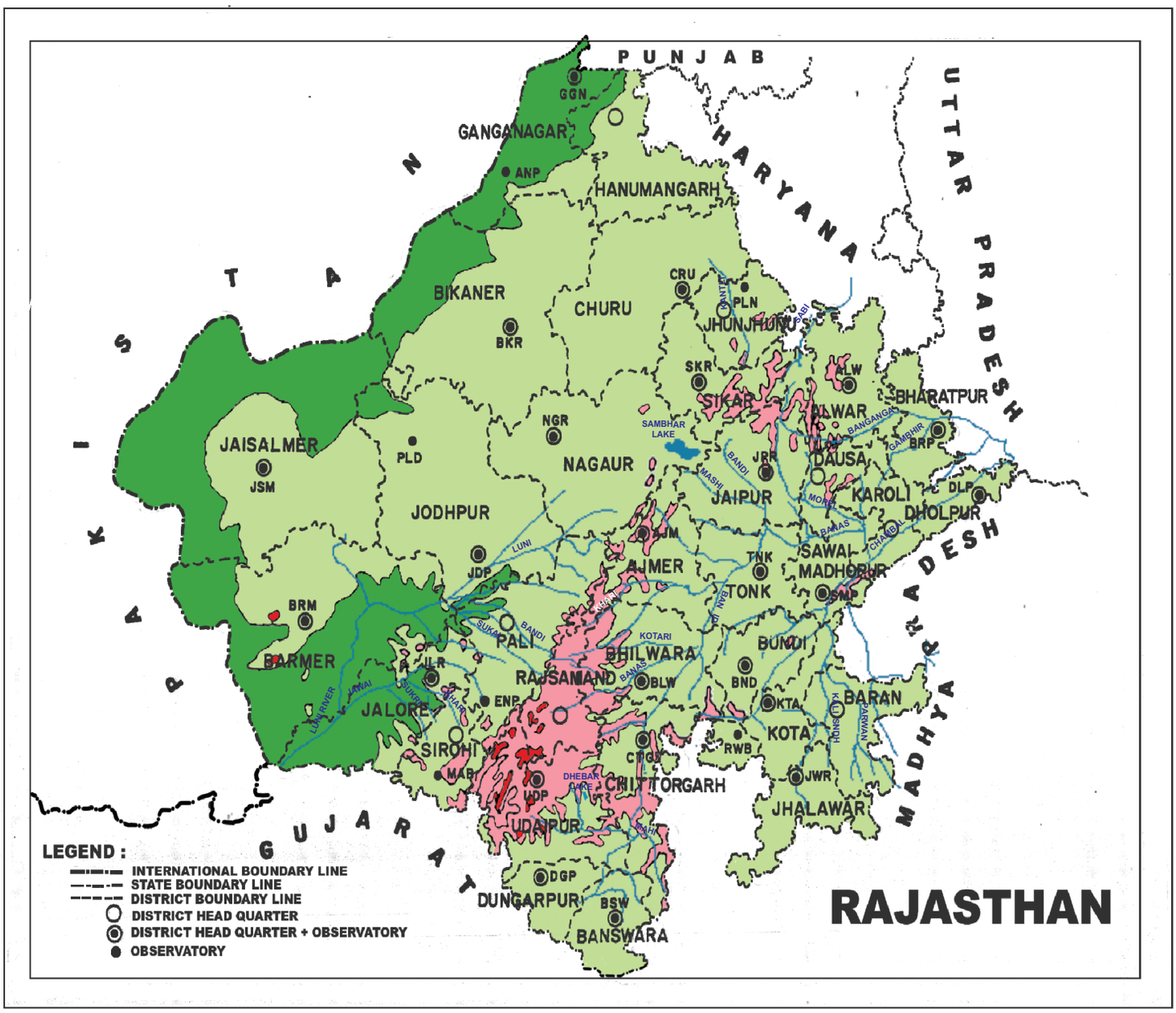

RIVERS & LAKES

<200 m

200 - 500 m

500 - 1000 m

> 1000 m

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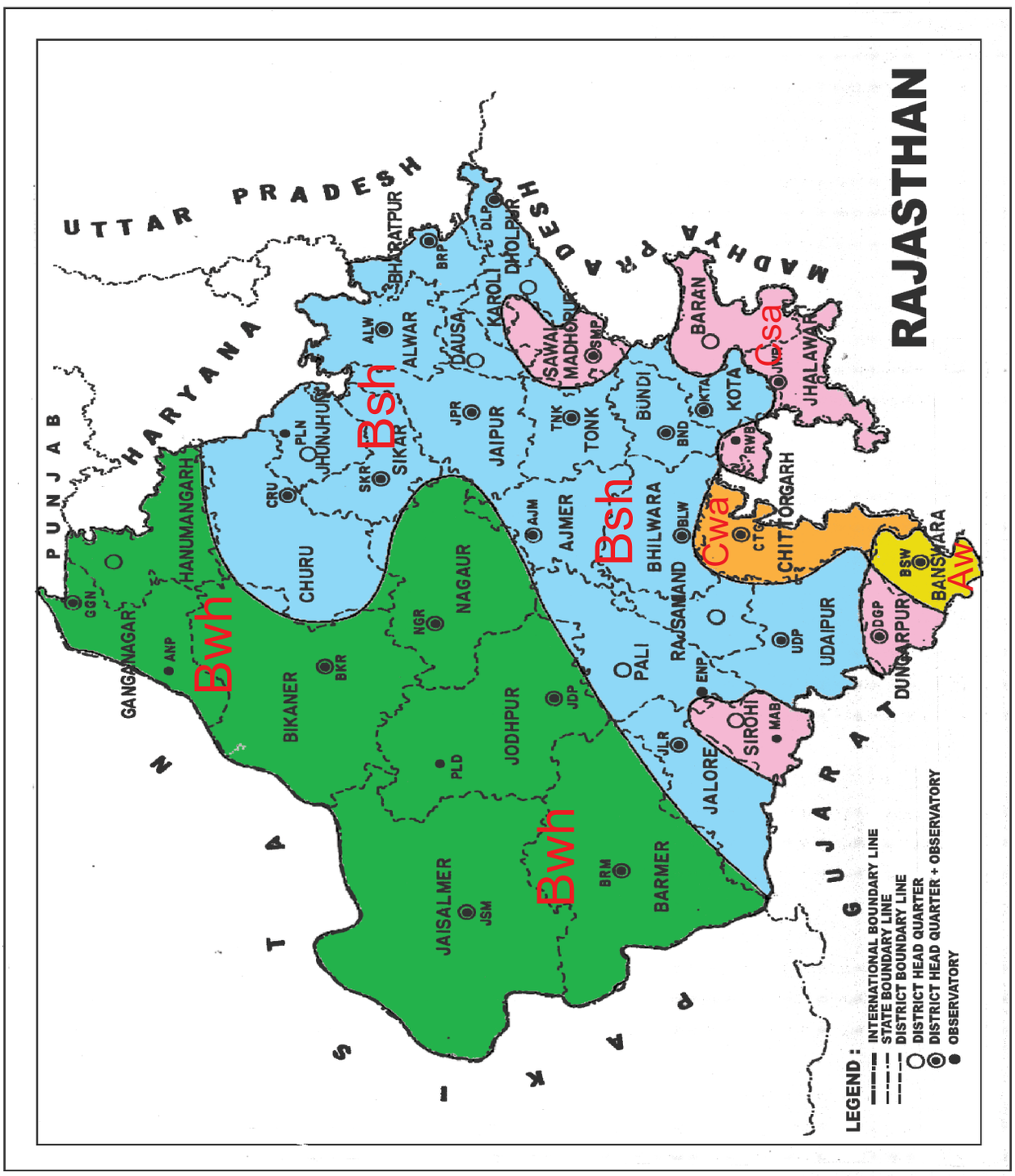
FIG. 1(a) :INSET

FIG. 2 : CLIMATIC CLASSIFICATION



Bwh — Tropical Desert,arid, hot

Bsh — Tropical Steppe, semi arid, hot

Cwa — Sub tropical monsoon with mild & dry winter, hot summer

Csa — Mild winter, dry & hot summer

Aw — Tropical savanna hot, seasonally dry (winter)

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

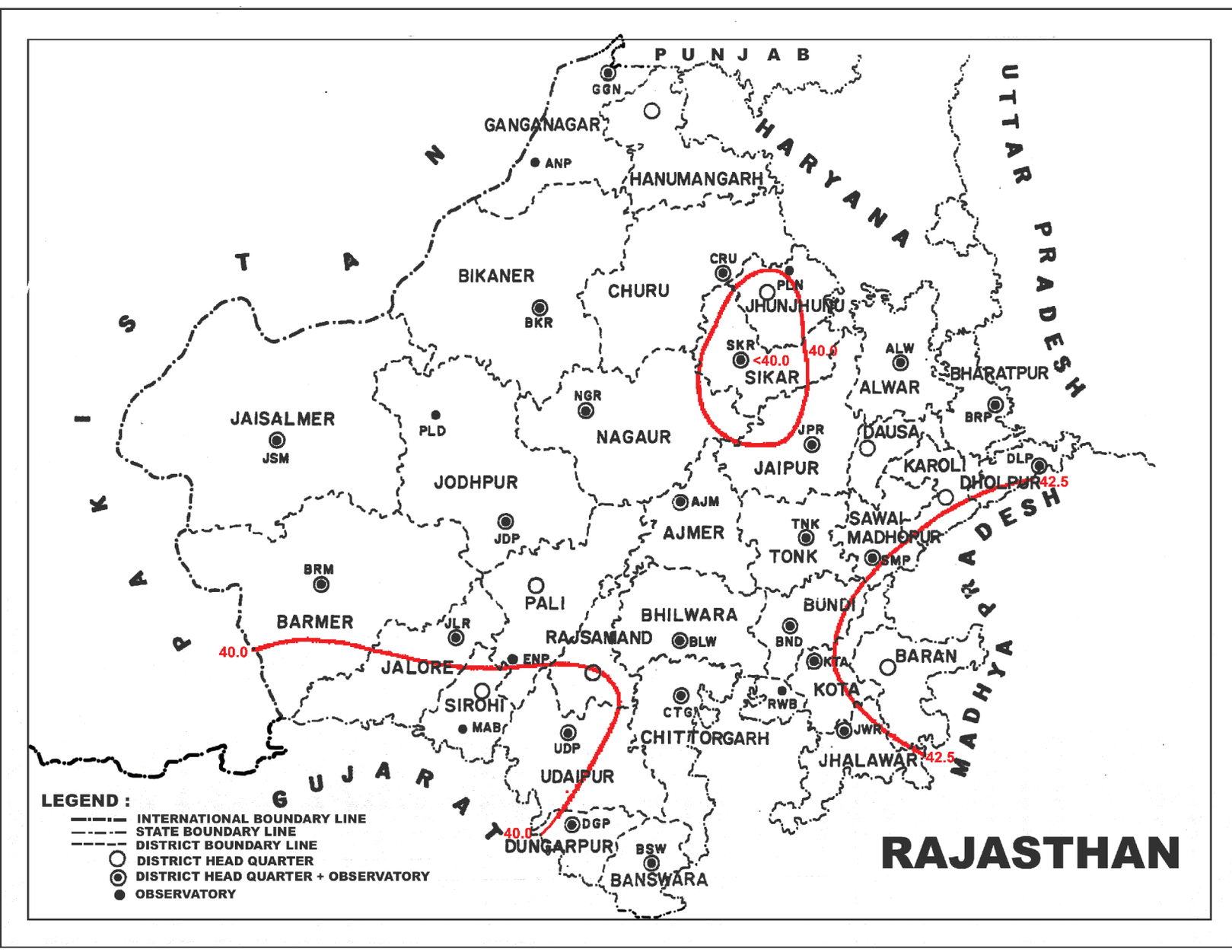

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FIG. 2(b) : MEAN MAXIMUM TEMPERATURE (°C) - JULY

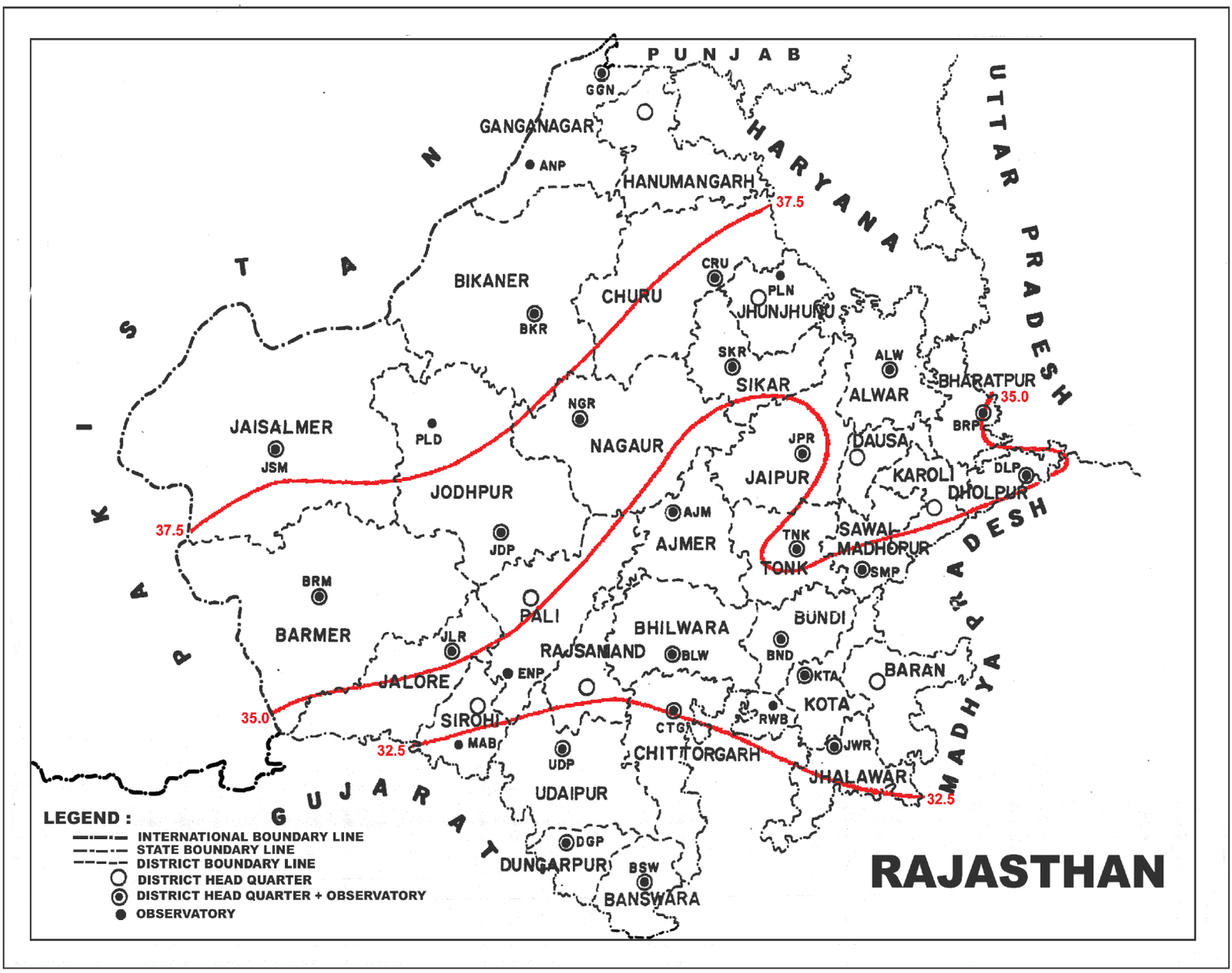

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FIG. 2(c) :MEAN MAXIMUM TEMPERATURE (°C) - OCTOBER

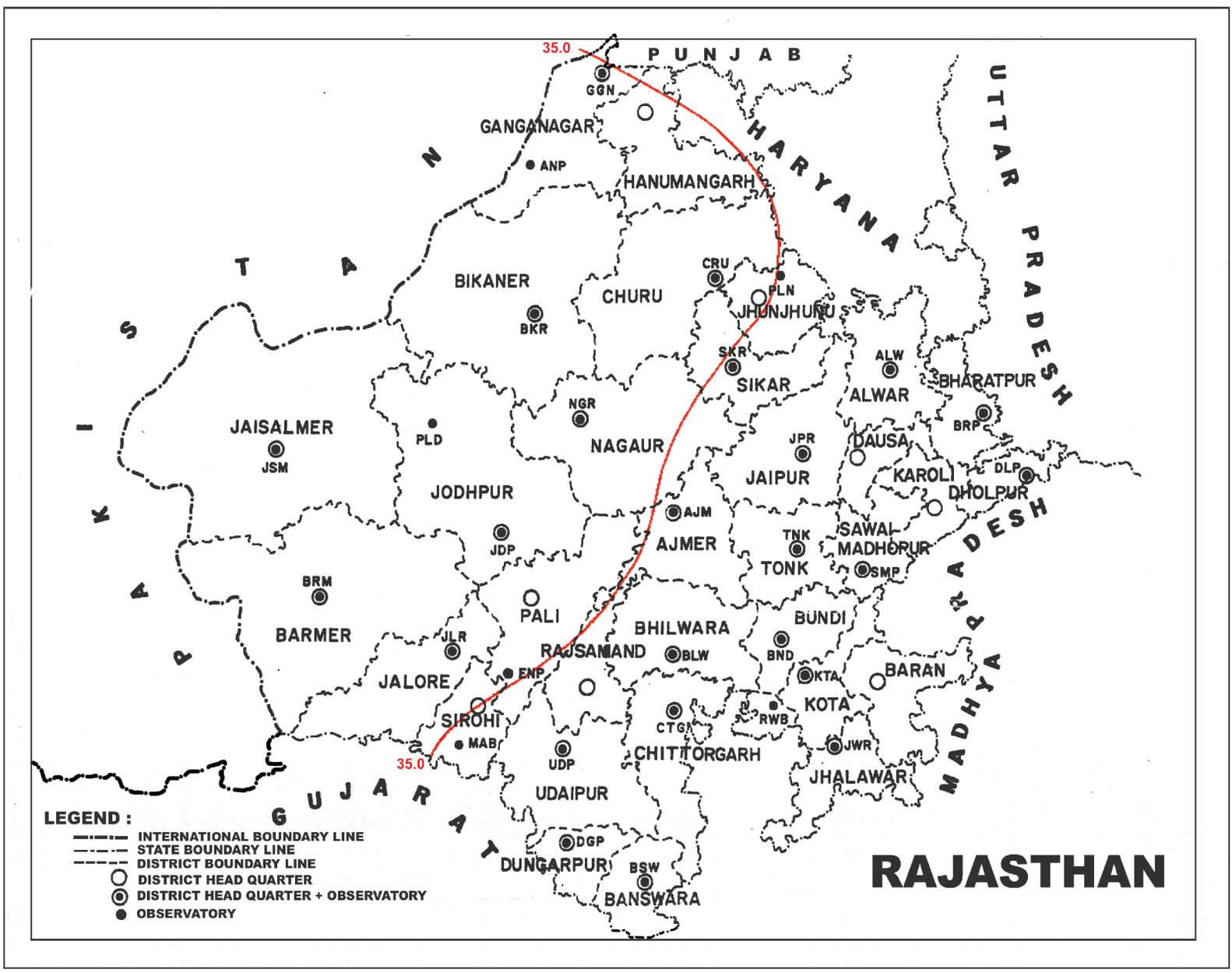

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FIG. 2 (d) : MEAN MAXIMUM TEMPERATURE (°C) -JANUARY

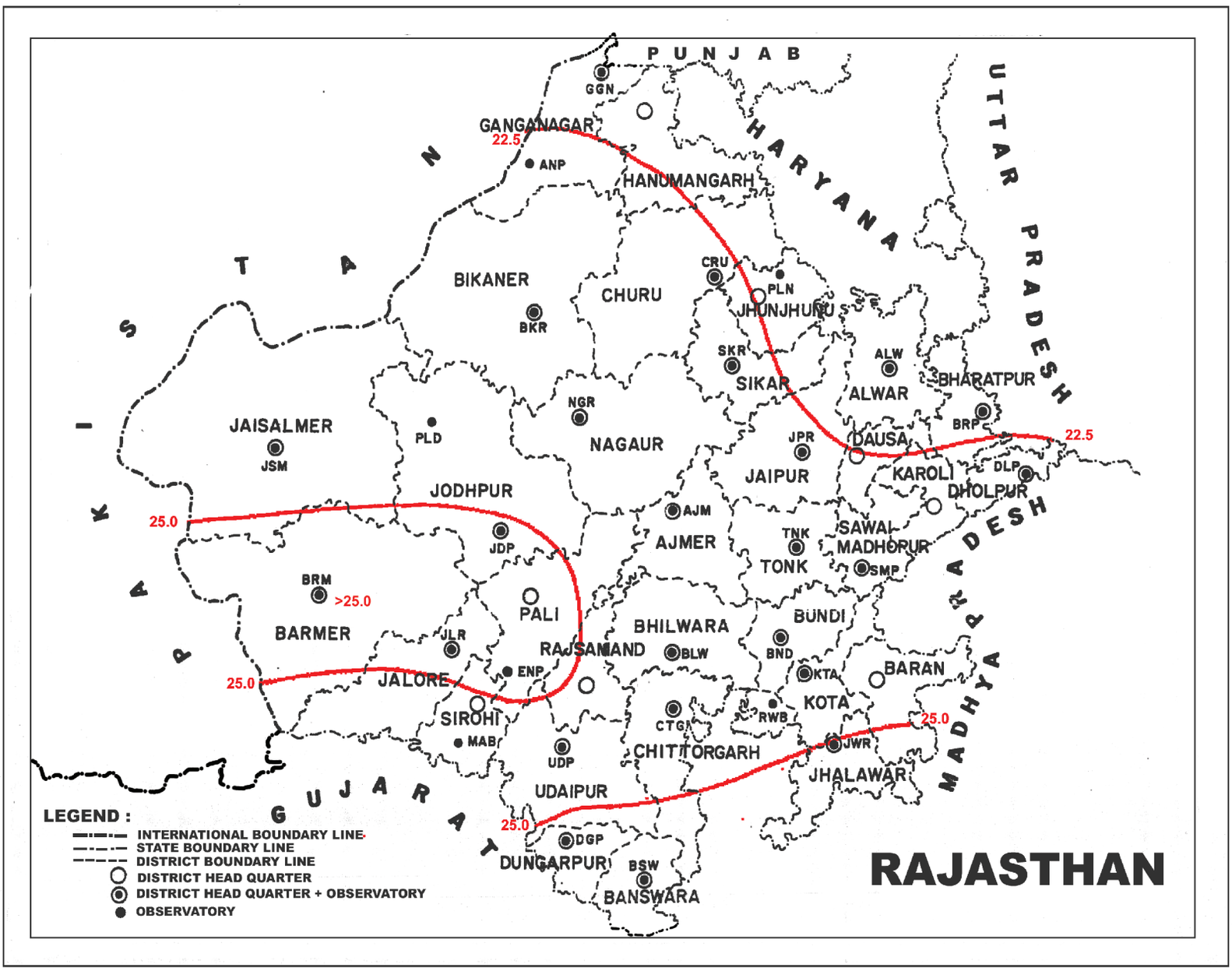

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FIG. 3(a) : MEAN MINIMUM TEMPERATURE (°C) - JANUARY

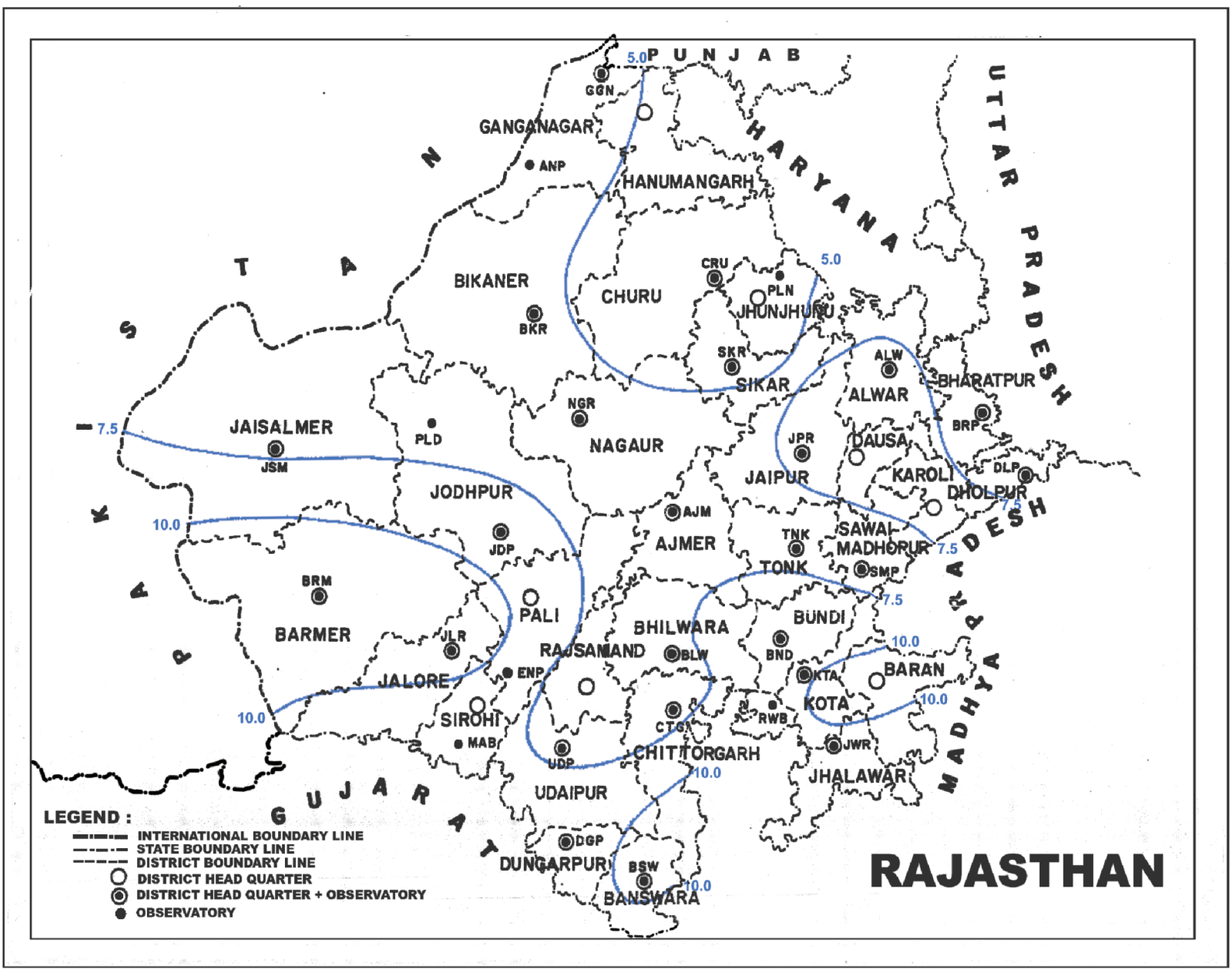

FIG. 3(b) : MEAN MINIMUM TEMPERATURE (°C) - APRIL

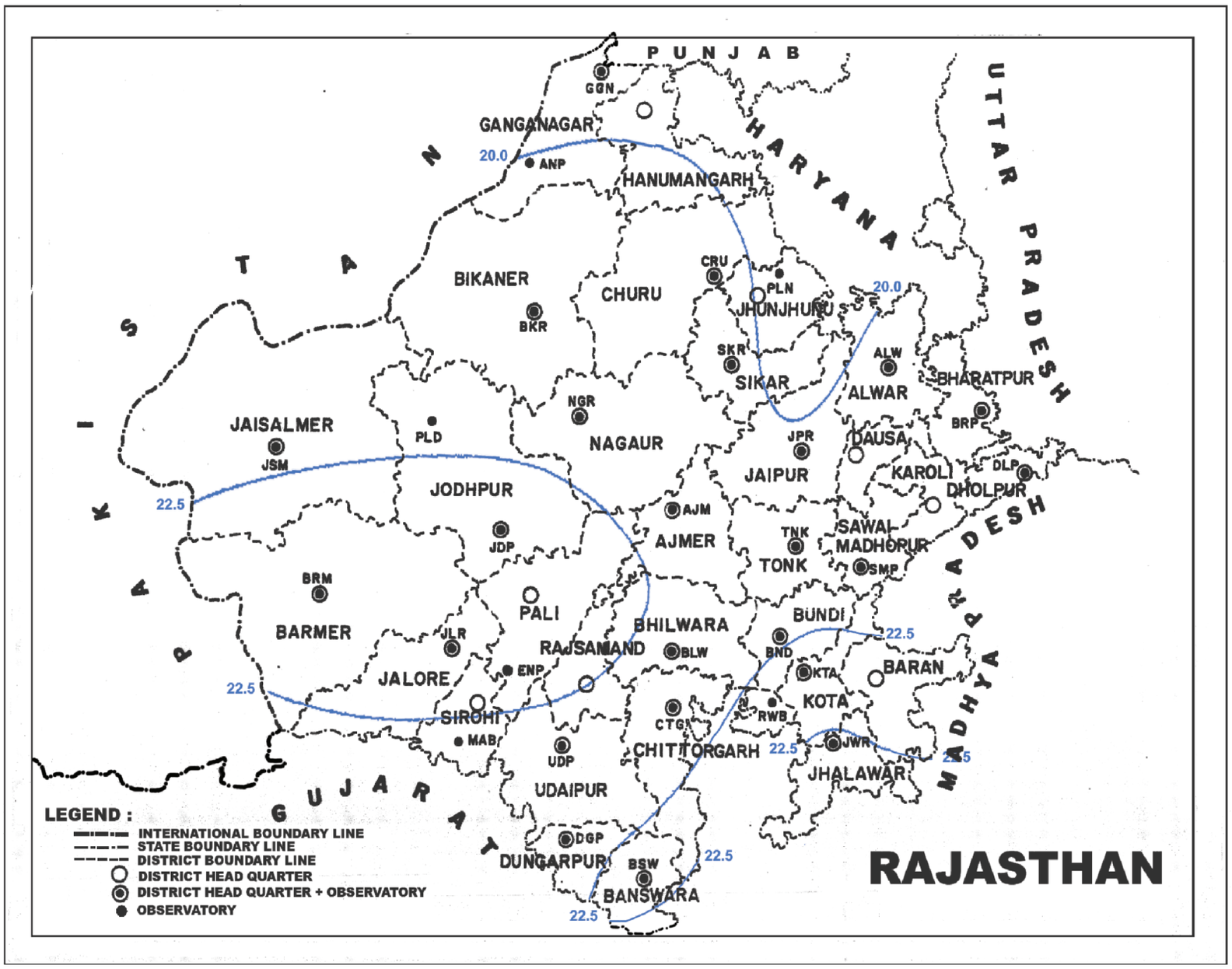

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FIG. 3(c) : MEAN MINIMUM TEMPERATURE (°C) - JULY

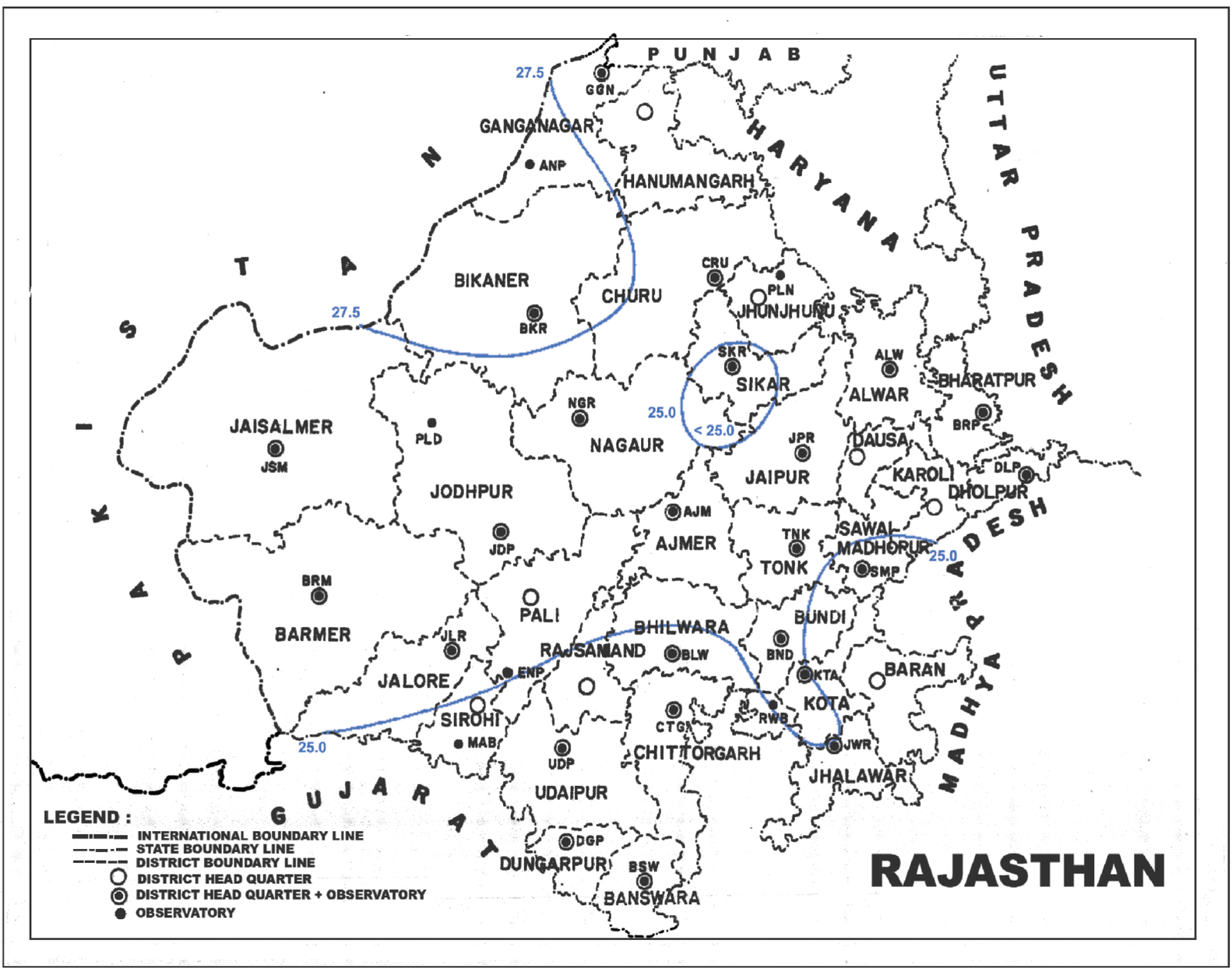

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FIG. 3(d) : MEAN MINIMUM TEMPERATURE (°C) - OCTOBER

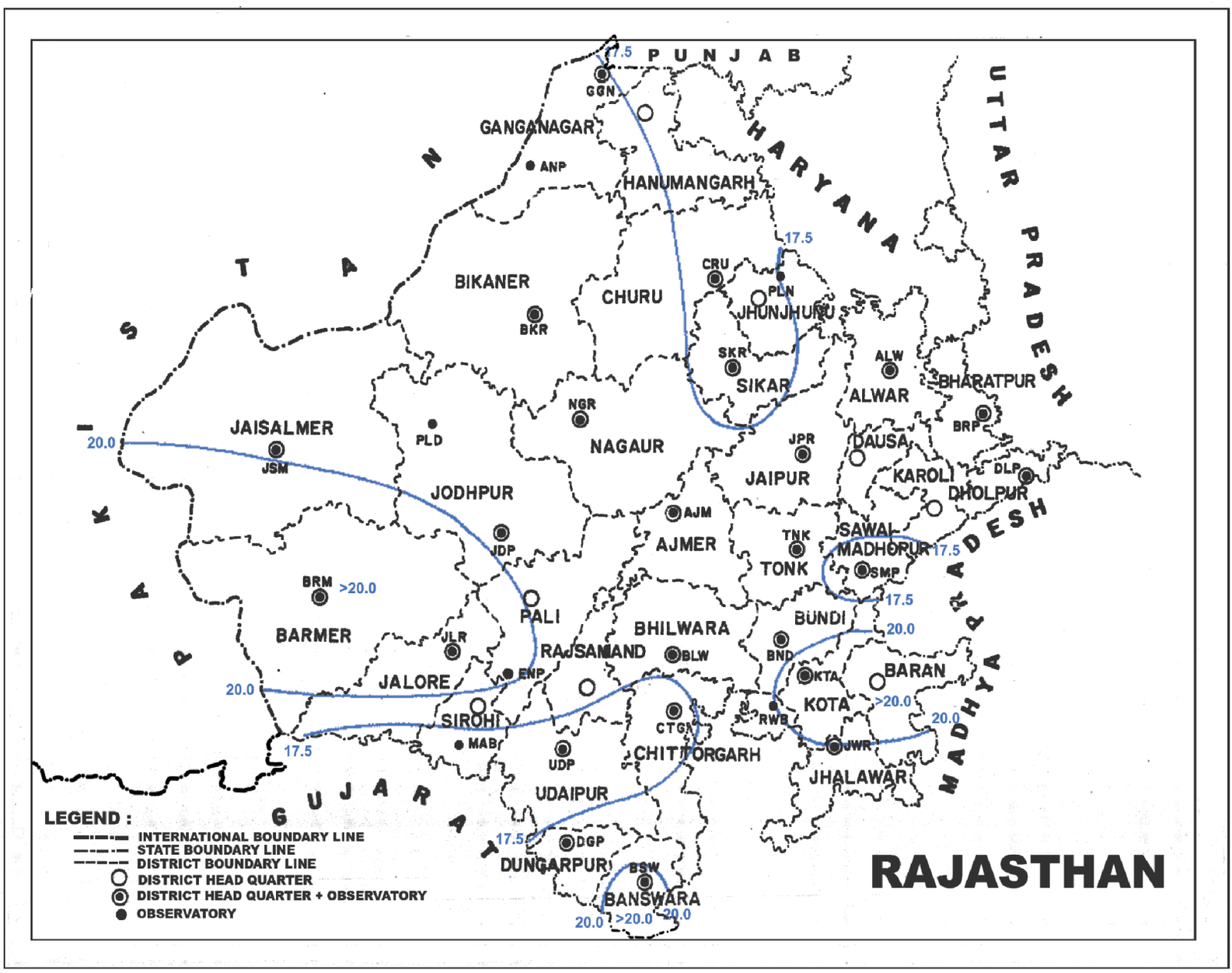

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FIG. 4 : HIGHEST MAXIMUM TEMPERATURE (°C) EVER RECORDED

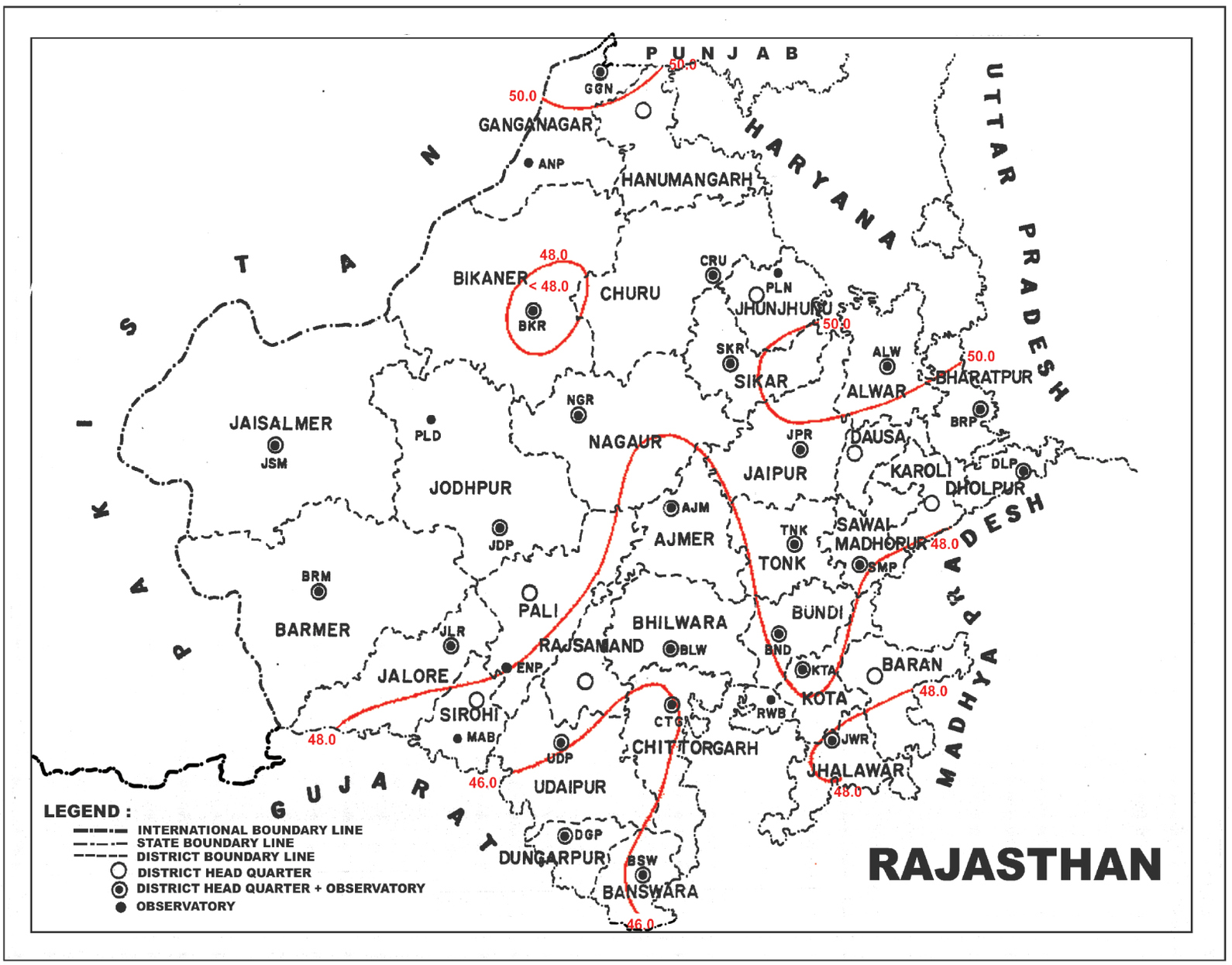

FIG. 5 : LOWEST MINIMUM TEMPERATURE (°C) EVER RECORDED

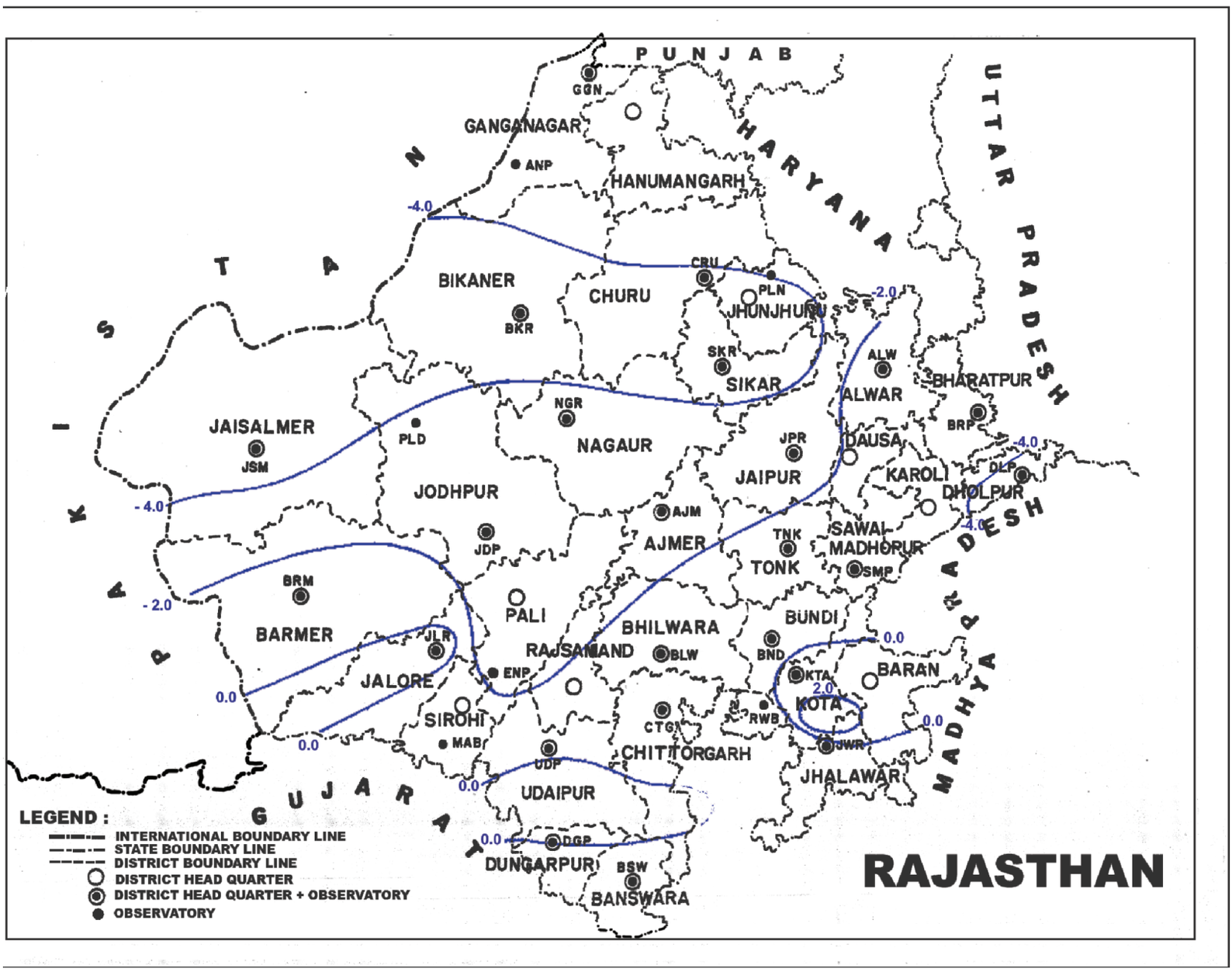

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FIG. 6 : ANNUAL NORMAL RAINFALL (cm)

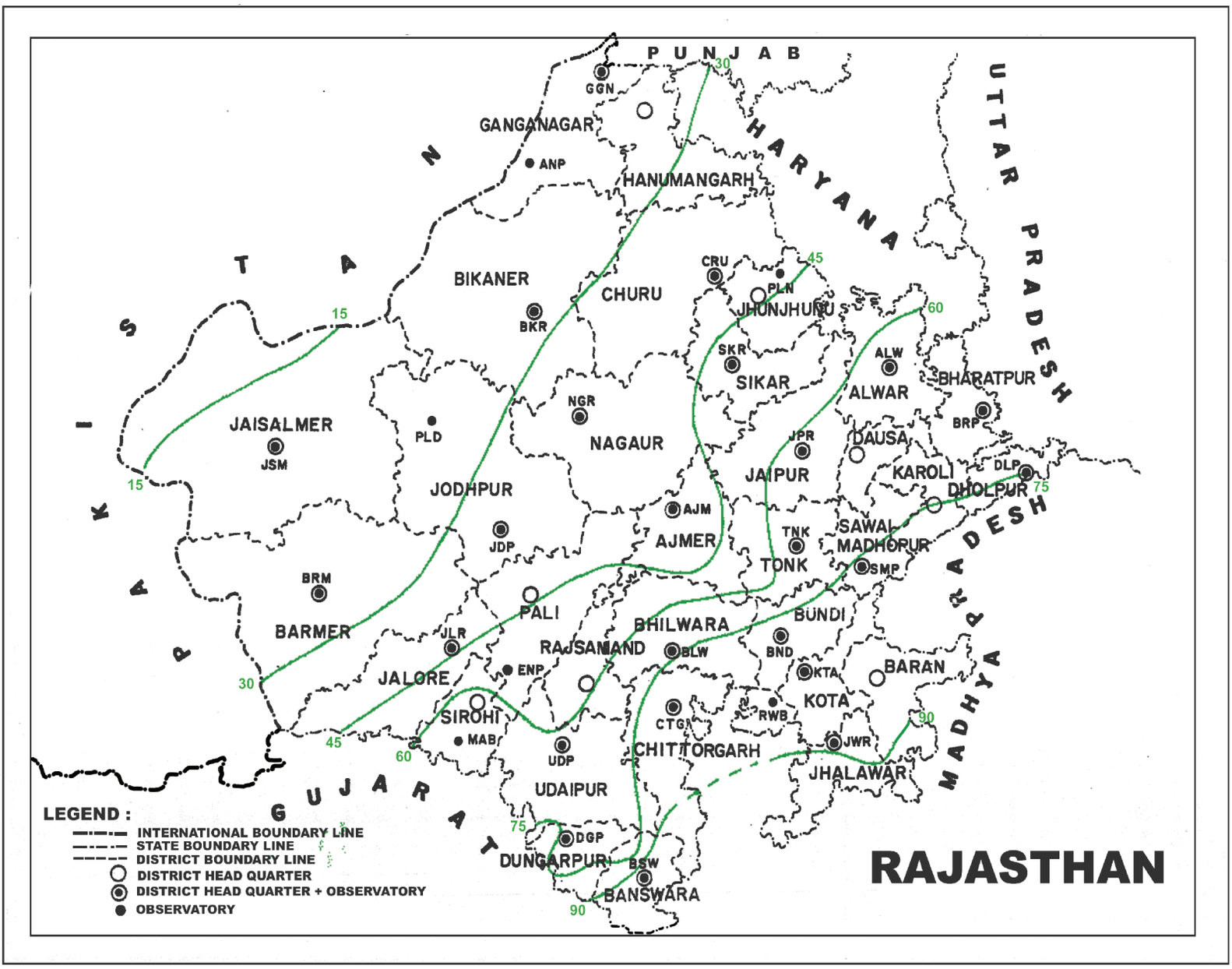

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FIG. 6(a) : SEASONAL RAINFALL (cm) - COLD WEATHER SEASON - JANUARY-FEBRUARY

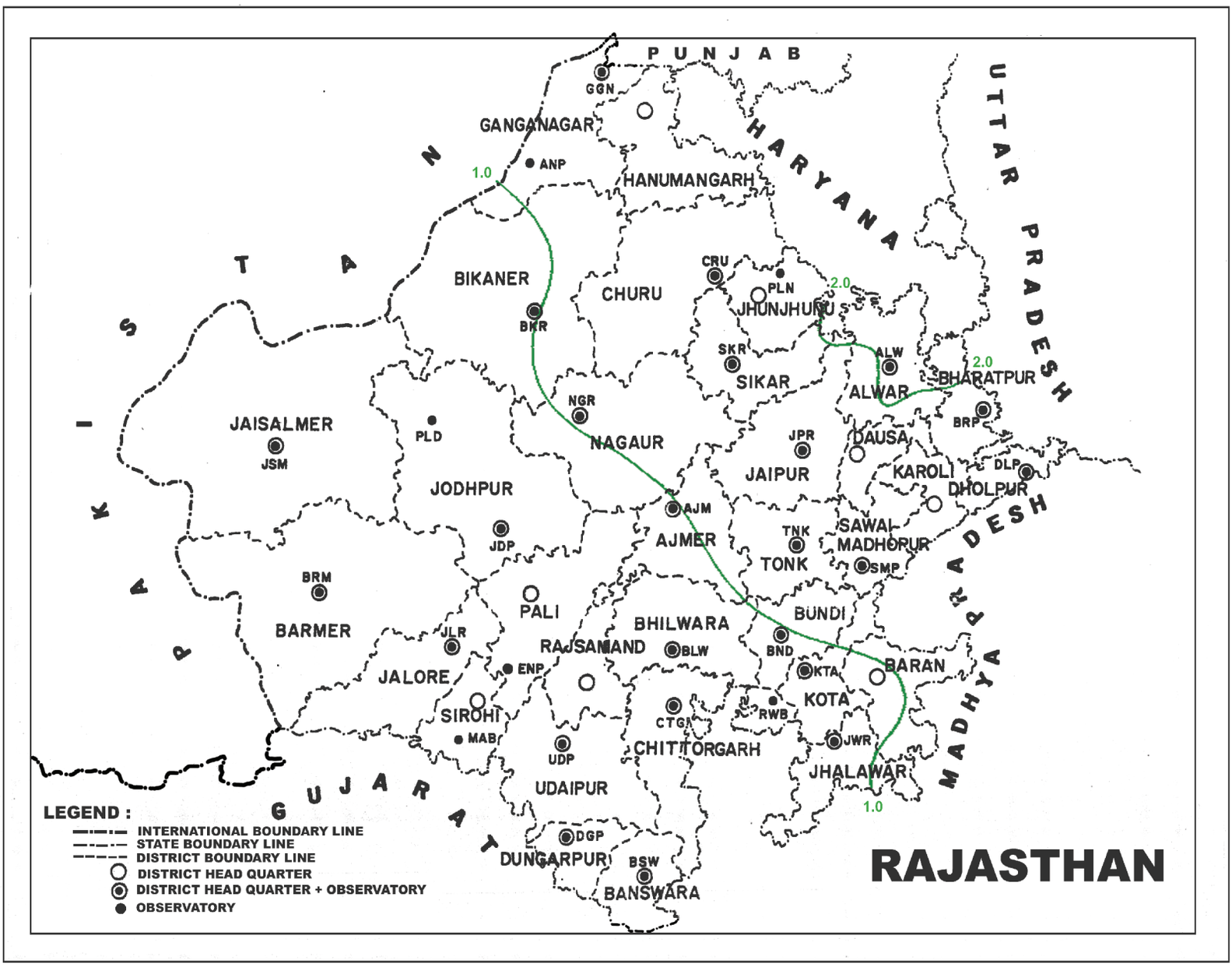

FIG. 6(b) : SEASONAL RAINFALL (cm) - PREMONSOON (HOT WEATHER) SEASON - MARCH - MAY

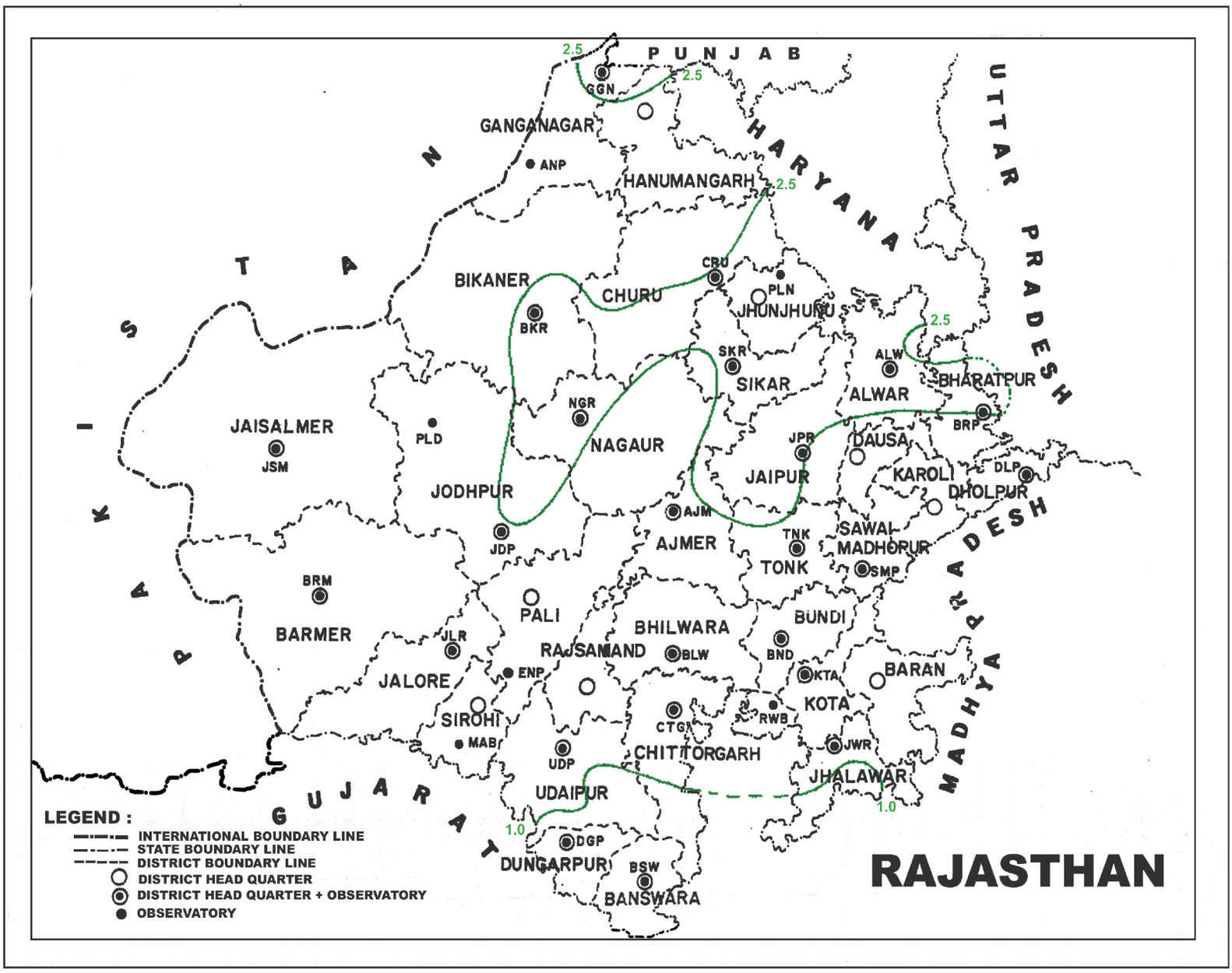

FIG. 6(c) : SEASONAL RAINFALL (cm) - MONSOON SEASOON - JUNE - SEPTEMBER

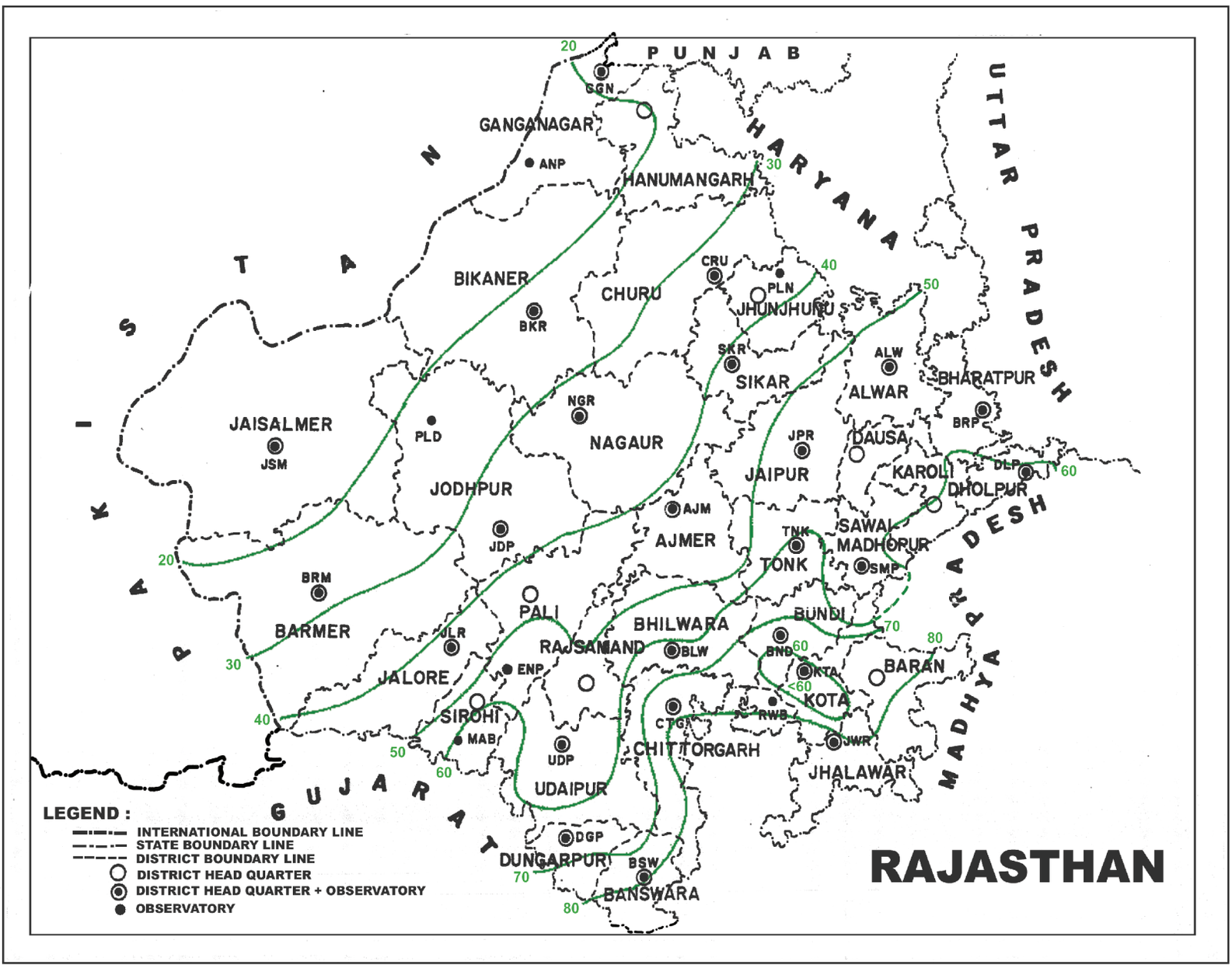

FIG. 6(d) : SEASONAL RAINFALL (cm) - POST MONSOON SEASON - OCTOBER - DECEMBER

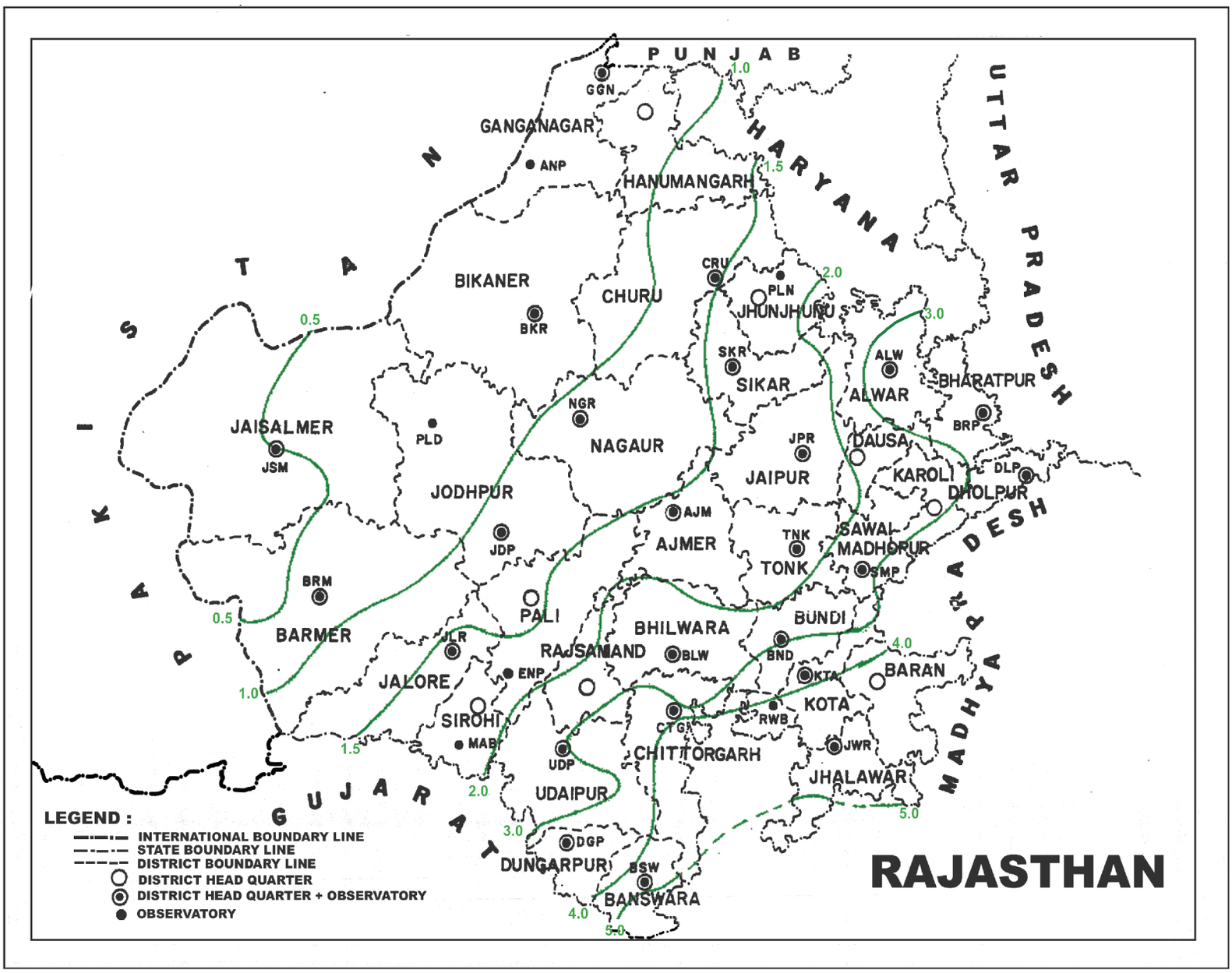

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FIG. 7 : DISTRICT NORMALS OF SEASONAL AND ANNUAL RAINFALL (1951-2000)
EAST RAJASTHAN

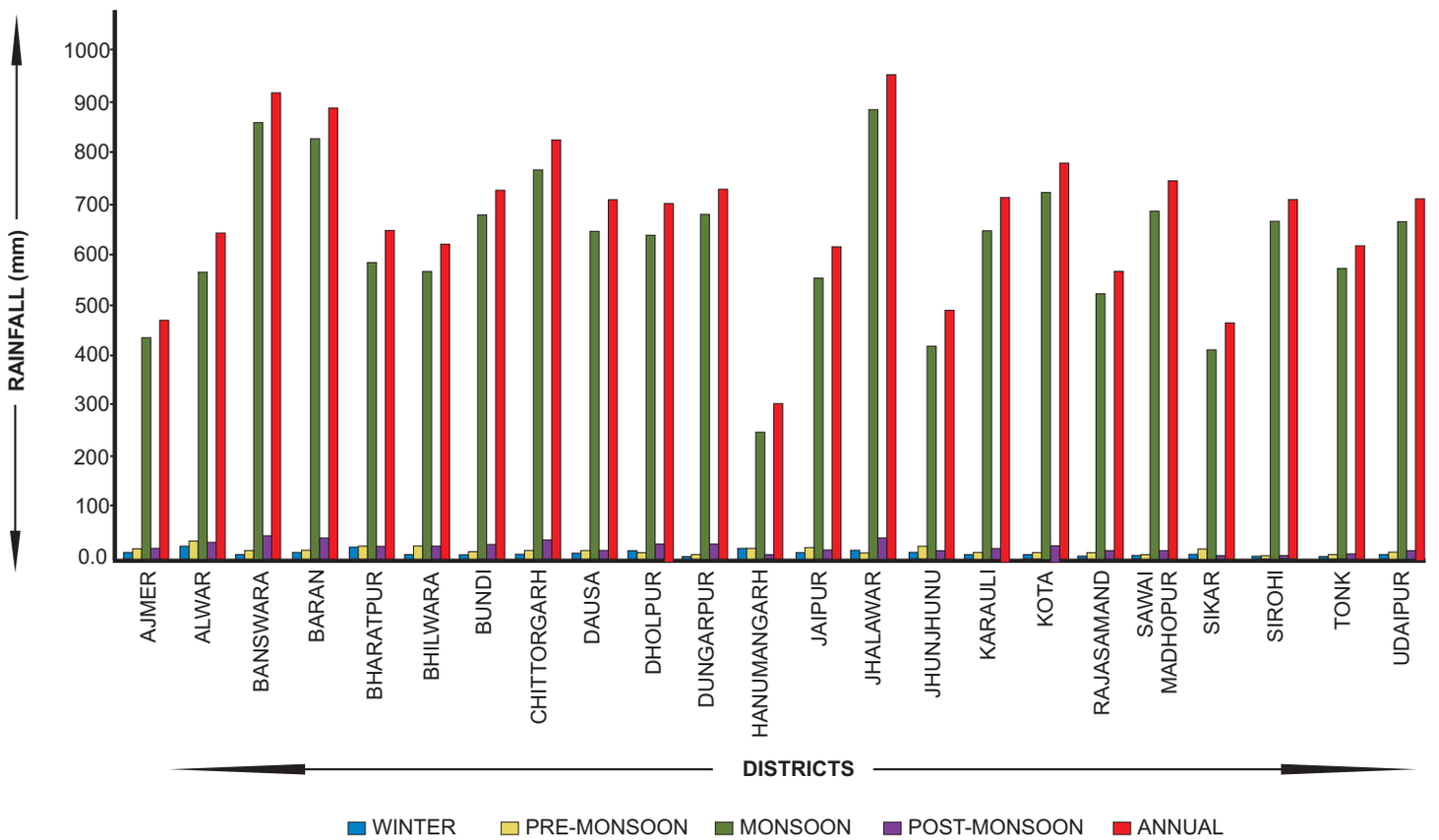

FIG. 7(a) : DISTRICT NORMALS OF SEASONAL AND ANNUAL RAINFALL (1951-2000)
WEST RAJASTHAN

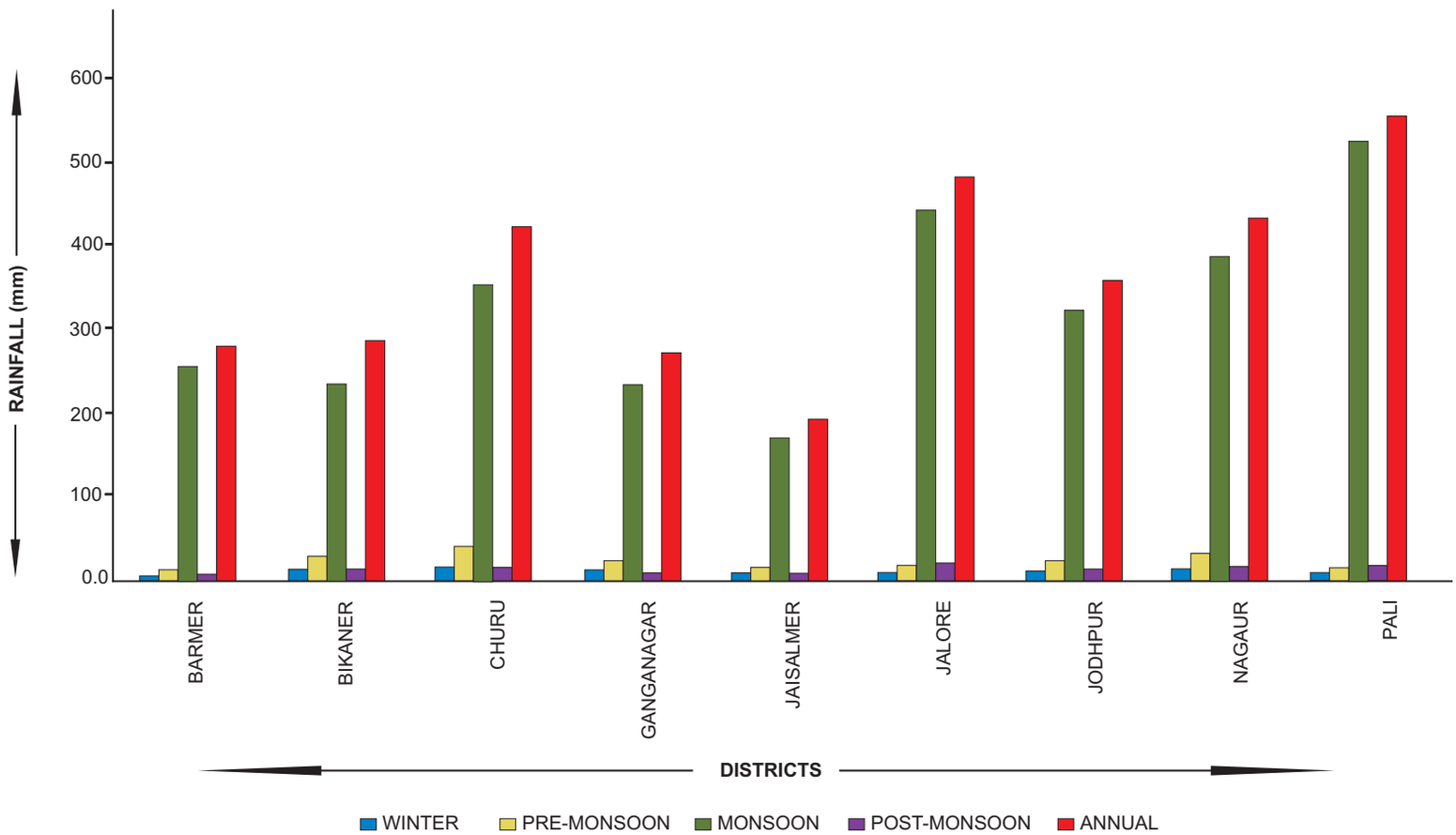

FIG. 8 : CATCHMENT AREAS WITH ANNUAL RAINFALL (mm)
(105, 106, 107, 108, 202, 403, 404, 405,406, 407 & 600)

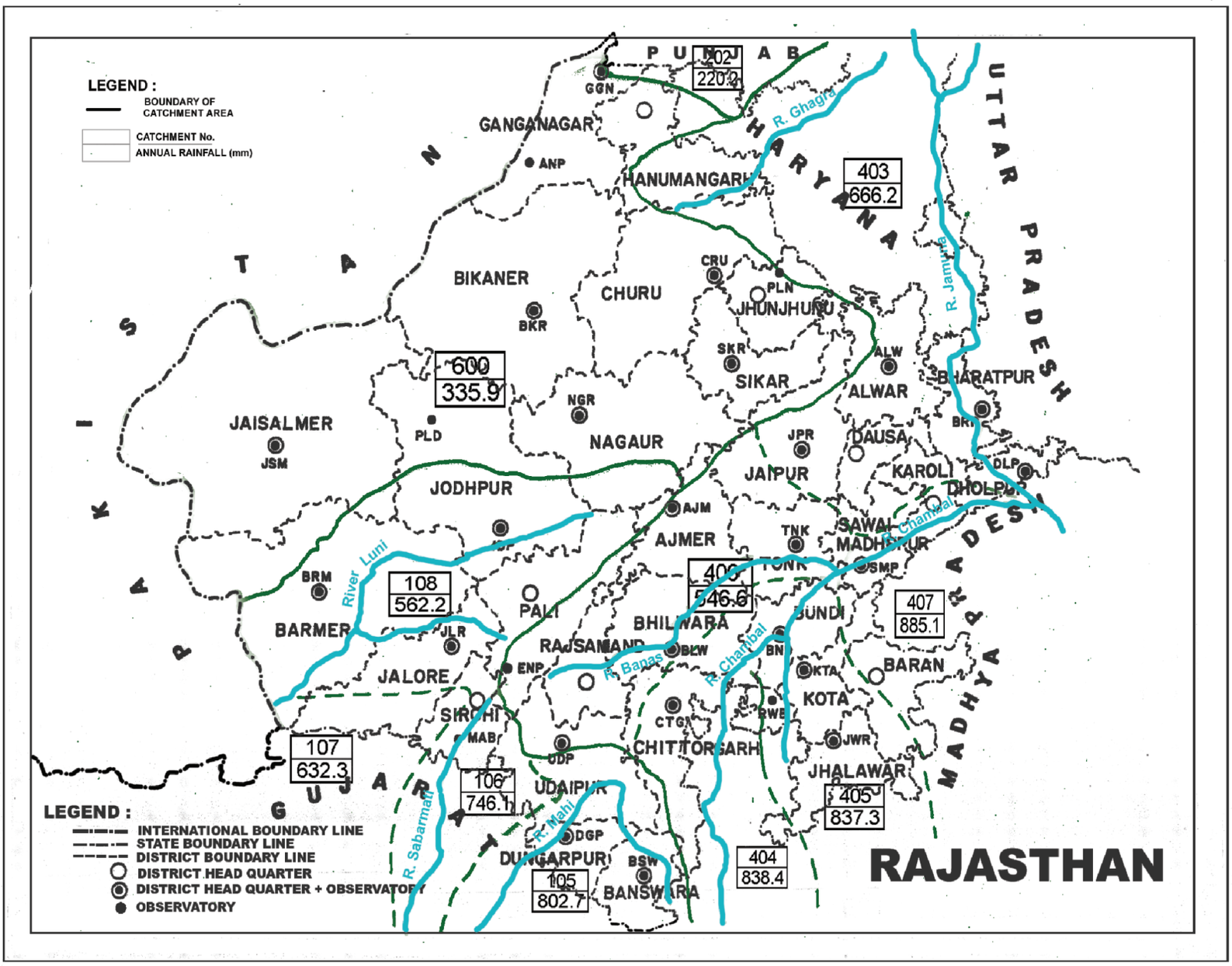

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FIG. 9 : COEFFICIENT OF RAINFALL VARIATION - ANNUAL

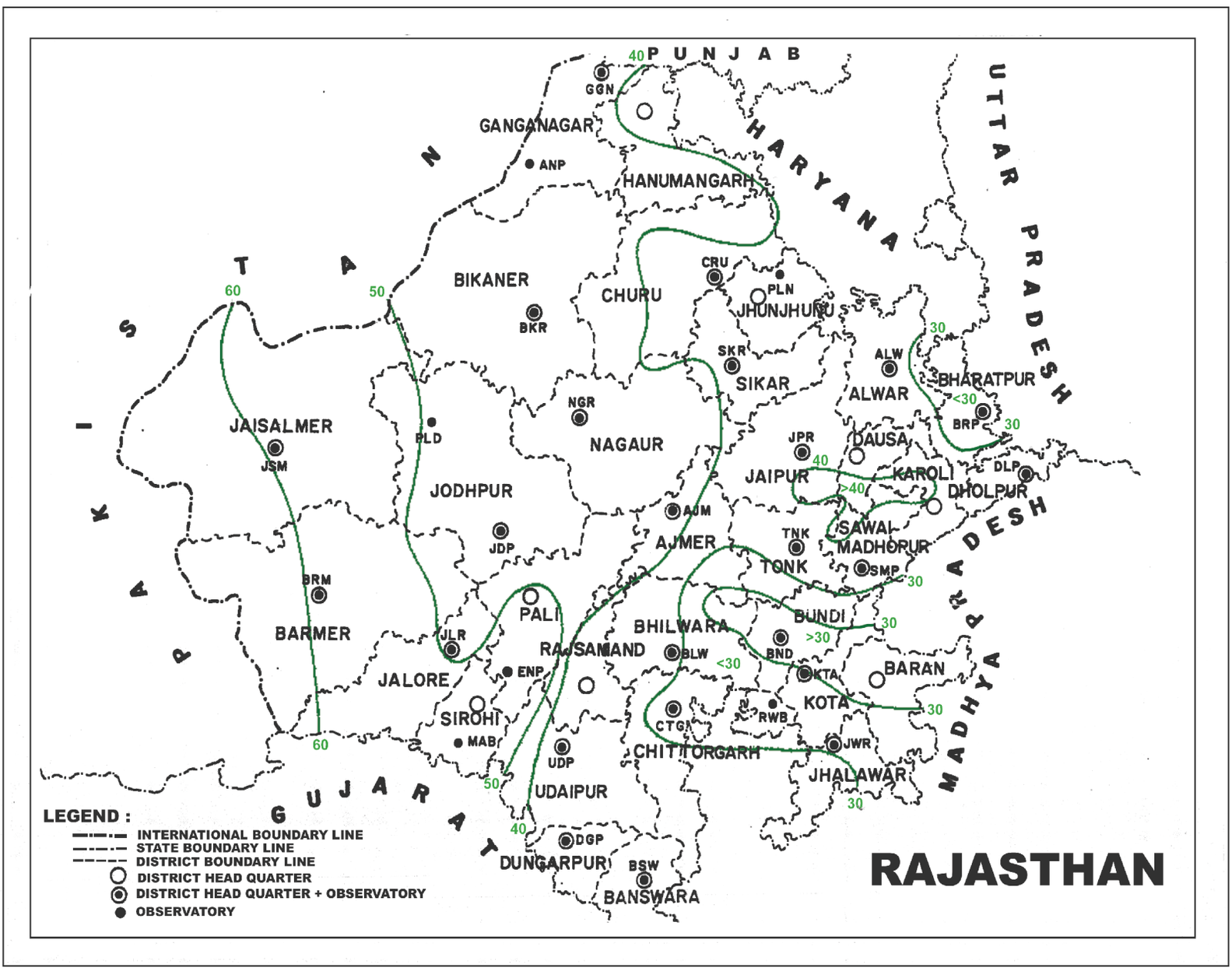

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FIG. 9(a) :COEFFICIENT OF RAINFALL VARIATION- PRE-MONSOON SEASON (MARCH - MAY)

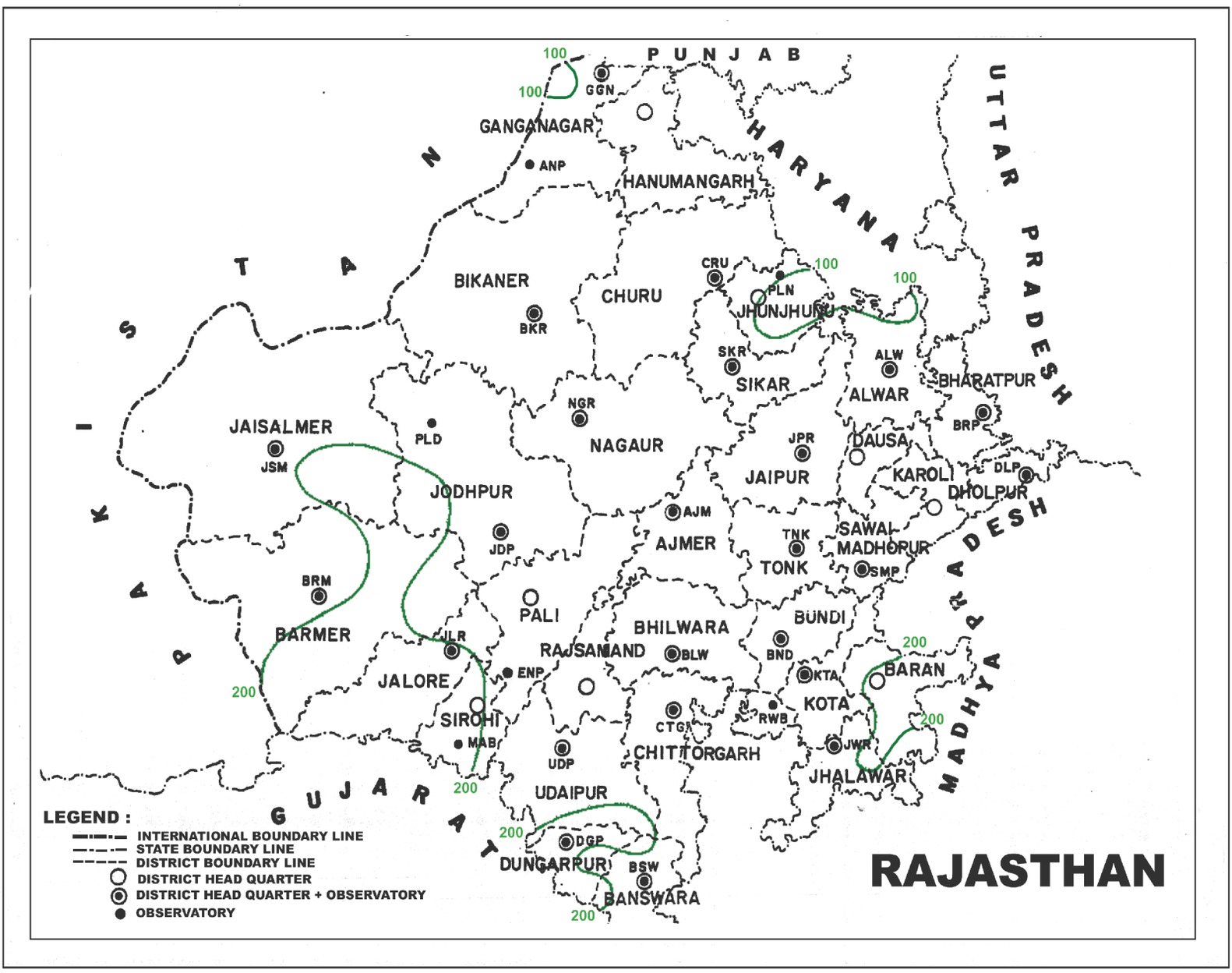

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FIG. 9(b) :COEFFICIENT OF RAINFALL VARIATION - SOUTHWEST MONSOON SEASON (JUNE - SEPTEMBER)

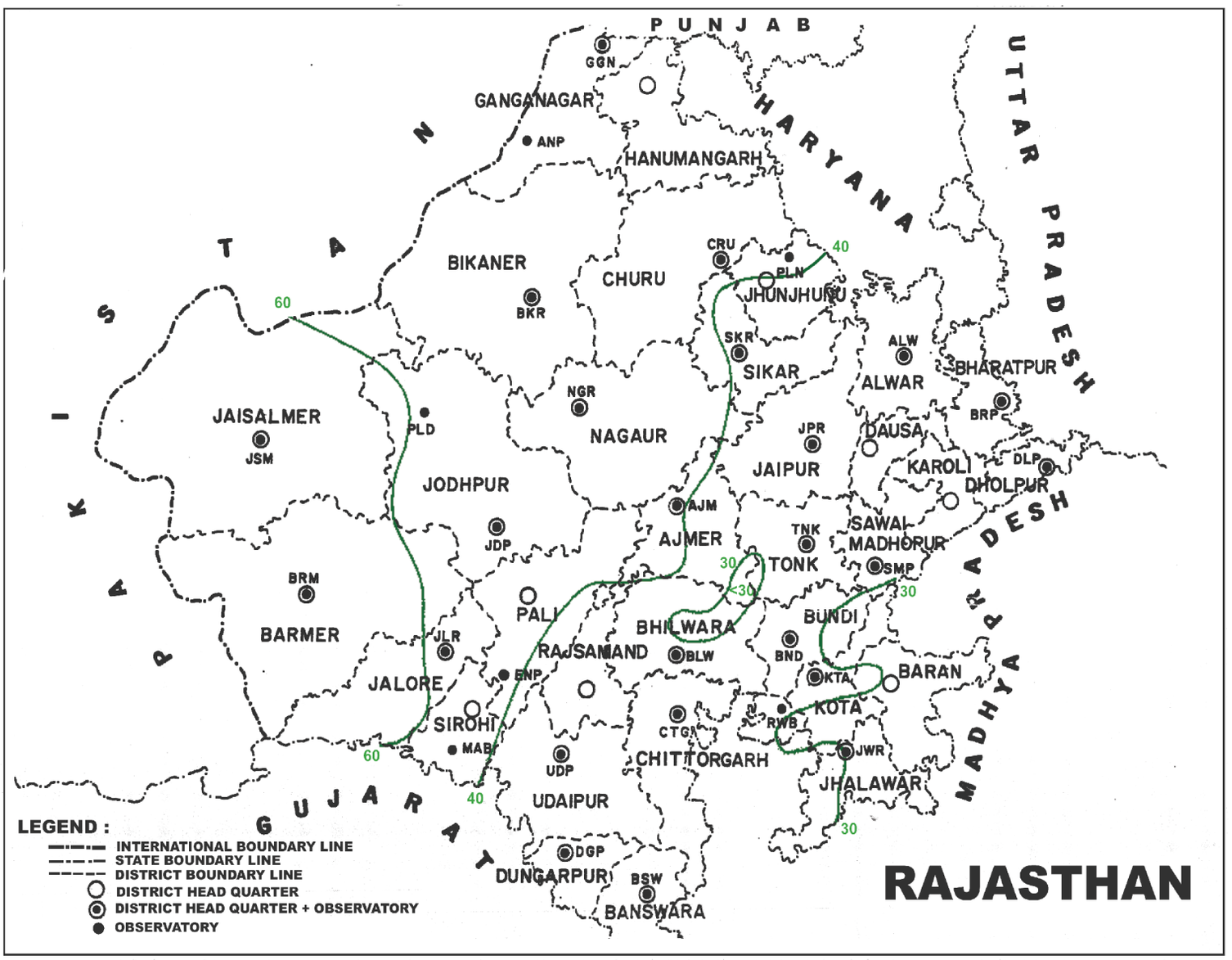

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FIG. 9(c) :COEFFICIENT OF RAINFALL VARIATION - POST- MONSOON SEASON (OCTOBER - DECEMBER)

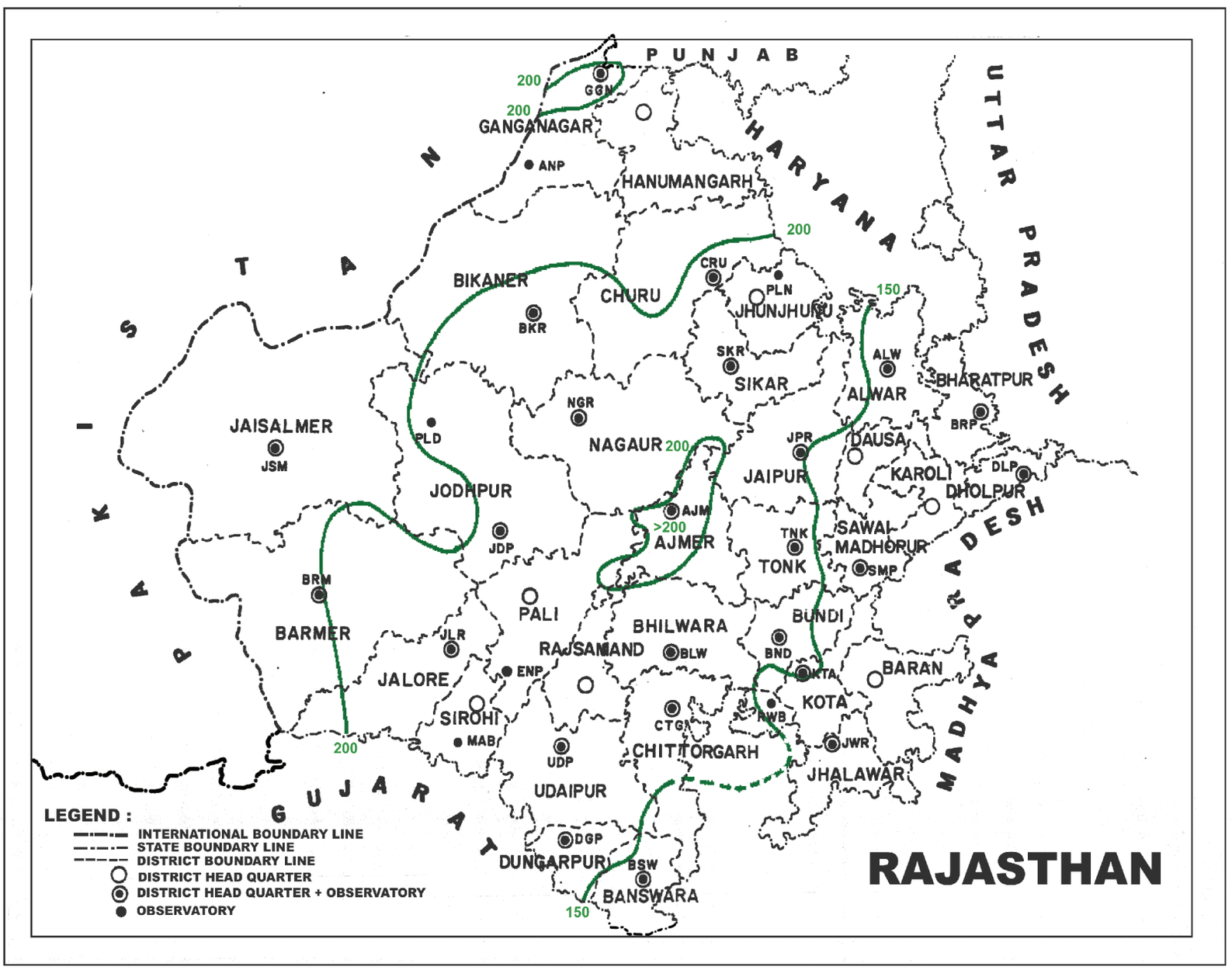

FIG. 9(d) :COEFFICIENT OF RAINFALL VARIATION - WINTER SEASON (JANUARY - FEBRUARY)

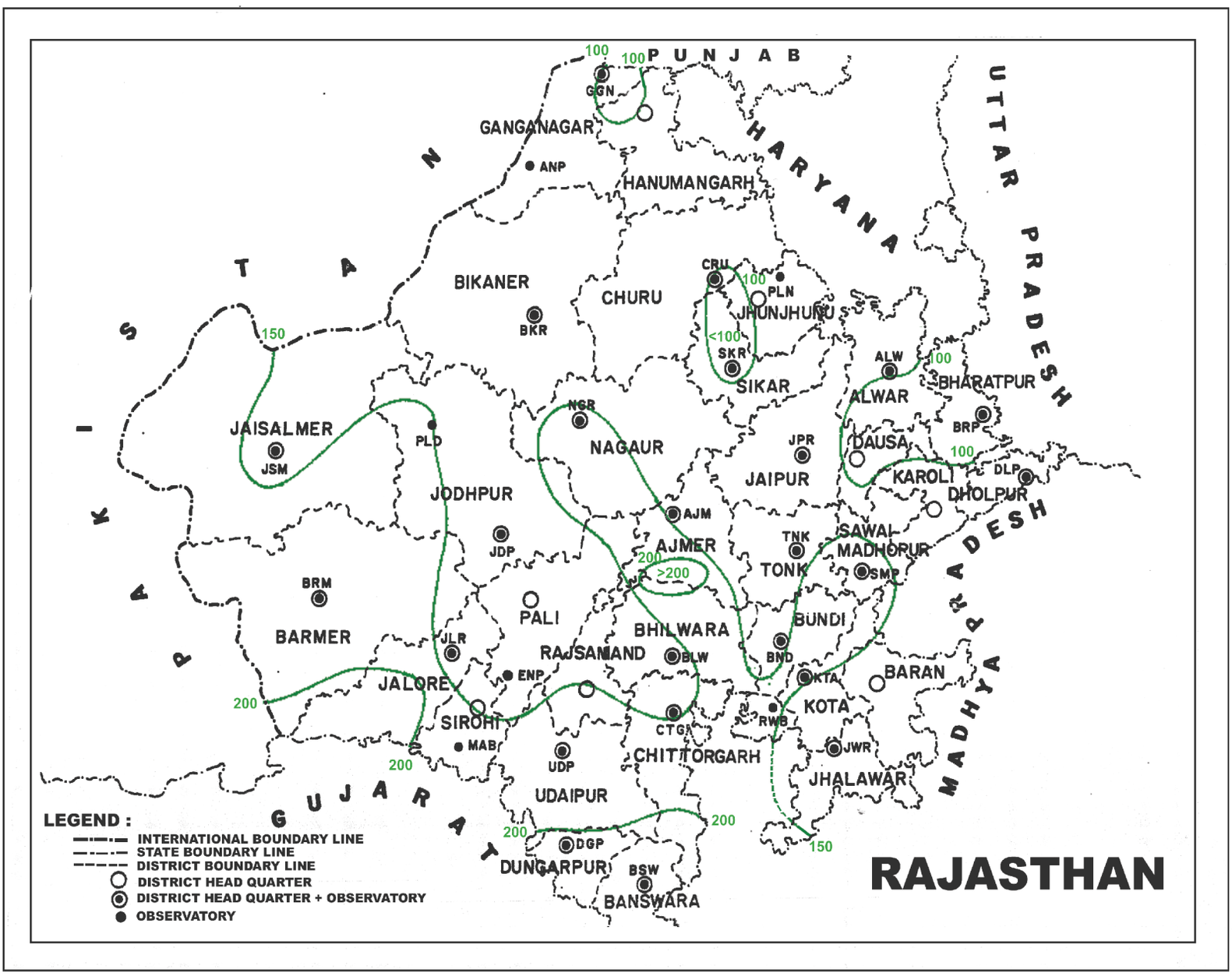

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FIG. 10 :AREA AFFECTED BY DROUGHT(1951-2000)

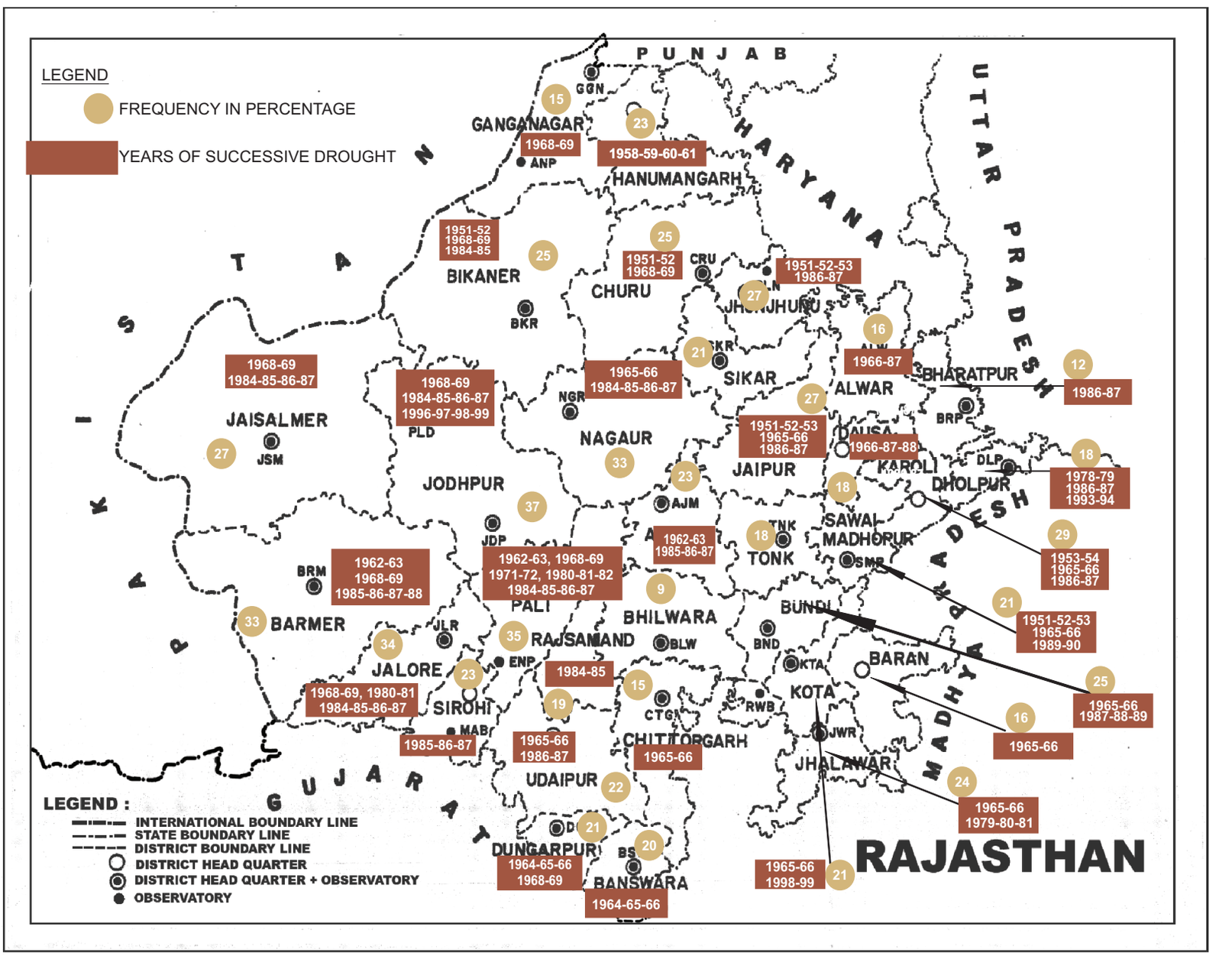

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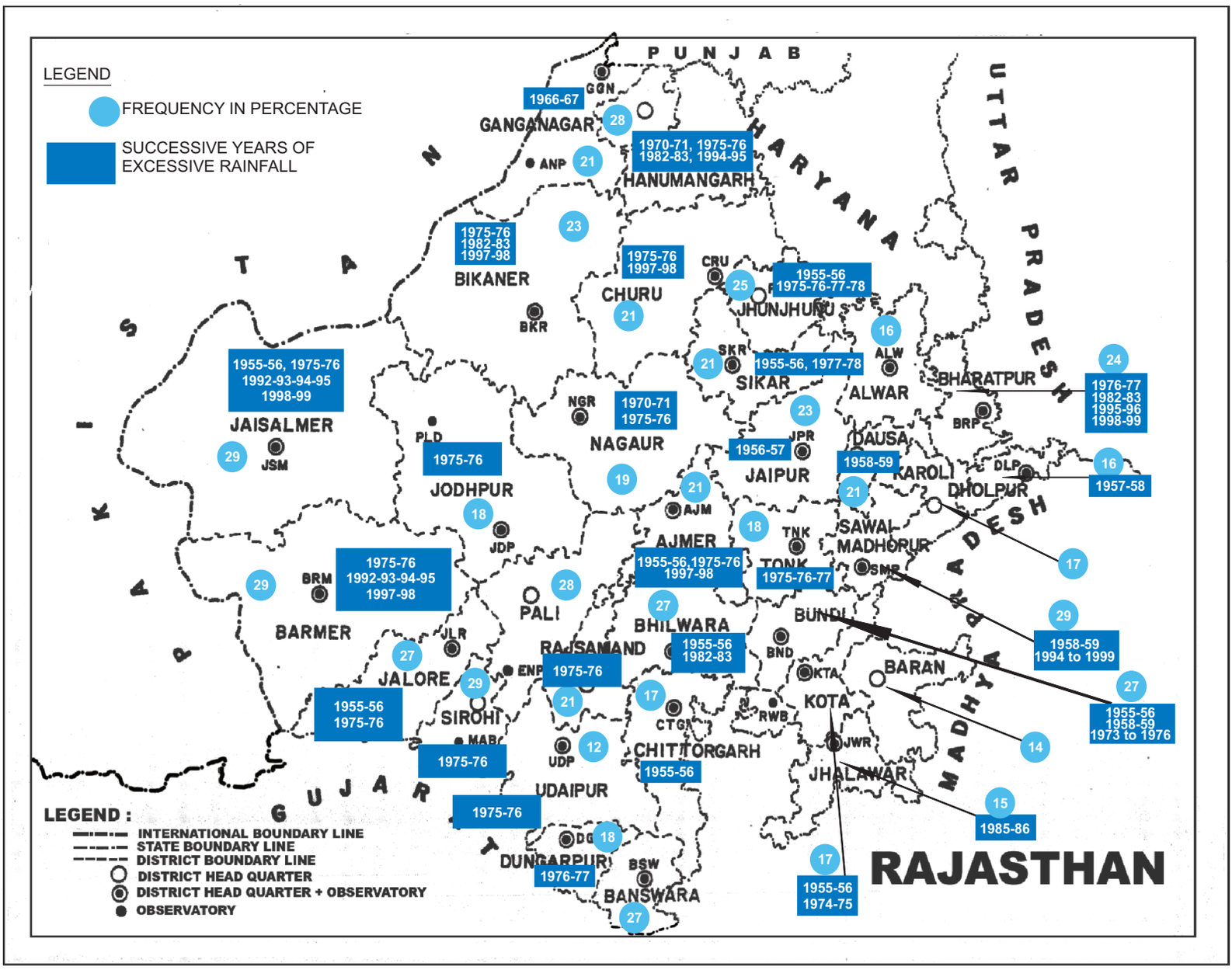
FIG. 11 :AREA AFFECTED BY EXCESSIVE RAINFAL (1951-2000)



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STATE CLIMATOLOGICAL SUMMARY

THE CLIMATE OF RAJASTHAN

General Description

The state of Rajasthan is located in the northwestern part of the Republic of India. It is the largest state covering an area of 3,42,239 square kilometers, bounded by 23°30'North and 30°11'North latitude and 69°East and 78°East longitude. The state shares its west and northwestern boundary with Pakistan which is about 1070 km. Gujarat and part of Madhya Pradesh on its south, rest of Madhya Pradesh and Uttar Pradesh on its east and Punjab and Haryana on its north and northeast. This state has a type of rhomboid shape and stretches lengthwise 869 km from west to east and 826 km from north to south. The tropic of Cancer passes through its southern tip in the Banswara district. This state is practically free from maritime influence. Orographic features and absence of maritime influence affect the climate of the state to a large extent. The physical features of the state are shown in Fig. 1. The inset Fig. 1(a) indicates its position in the country.

The distinguishing feature of the state is the Aravalli range, the strong barrier which divides the plains of Marwar (lying between 24°37' and 27°42'North Latitudes and 70°05' and 75°22' East Longitude) from the high table land of Mewar (lying between 23°49' and 25°28'North Latitude and 73°01' and 74°49'East Longitude). The range which commences at the 'Ridge' at Delhi, comes into prominence near the town of Ajmer, where it appears in a succession of parallel hills. The highest point, on which is perched the fort of Taragarh, rises immediately above the city of Ajmer to a height of about 870 metres above sea level between 395 and 425 metres above the valley at its base. The 'Nagpahar' or serpent hill, 5 km west of Ajmer city, attains a slightly lower elevation. About 16 km from Ajmer, the hills disappear for a short distance but in the neighbourhood of Beawar form a compact double range which approach each other southward and finally meet near Todgarh, from where a

succession of hills and valleys extends to the farthest extremity of the Merwara. Thence the range gradually becomes bolder and more precipitous, till it finally terminates in the southeast corner of the Sirohi district near Mount Abu.

The plateau on which the town of Ajmer stands, marks the highest point in plains of India and from the hills, which surround the land slopes away on every side. The range of hills between Ajmer and Nasirabad marks the dividing watershed of the Indian sub-continent. The rain which falls on the southern or Nasirabad side, finds its way by the river Chambal into the Bay of Bengal; that which falls on the other side is discharged by Luni into the Gulf of Kutch. Further south the water shed is still more clearly marked and is the high wall of rock which separates Marwar from Mewar.

The entire portion of West Rajasthan formerly known as Marwar (lying 24°37' and 27°42' North Latitude and 70°05' and 70°22' East Longitude) is sterile, sandy and inhospitable but improves gradually from a mere desert in the far west and north to comparatively fertile and habitable lands in the northeast, east and southeast in the neighbourhood of the Aravalli hills. The 'great desert', forming the whole of the West Rajasthan – Sind frontier, extends from the edge of the Rann of Kutch beyond the Luni river northward and between it and what has been called the 'little desert' on the east is a zone of absolutely barren country, consisting of a rocky land cut off by limestone ridges, which to some extent protect it from the desert sands. These places are covered with sand hills, shaped generally in long straight ridges, which seldom meet but run in parallel lines. Some of these ridges may be 3 kilometres long. The only important river in west Rajasthan is the Luni or salt river (the Lonavari or Lavanavari) which rises in the hills southwest of Ajmer city and was first known as Sagarmati. After passing Govingarh in the Ajmer district, it is joined by the Sarsuti (Saraswati) which has its source in the sacred lake of Puskar, and from this point it is called the Luni. After a course of about 320 km generally west to southwest it is finally lost in the marshy ground at the head of the Rann of Kutch. It receives the drainage brought by the mountain torrents down the western slopes of the Aravalli hills between Ajmer and Abu. It has several tributaries, the chief being the Lilri, the Raipur Luni, the Guhiya, the Bundi, the Sukri and the Jawai on the left bank and the Jojri on the right, but none of them is perennial.

The other principal rivers are the Chambal and its tributary, the Banas. The Chambal (the Charmwati) rises in Central India some 14 km southwest of the cantonment of Mhow and after flowing generally north for 315 km, enters Mewar in the extreme east near the old fort of Chaurasgarh. From Bahinsrorgarh the Chambal flows northeast for some 10 km and the rest of its course lies in or along the borders of the Bundi, Kota, Jaipur, Dholpur and Gwalior districts. It eventually falls into the Jamuna 40 km southwest of Etawah in Uttar Pradesh.

The Banas (the 'hope of the forest') rises in the Aravalli, about 65 kms northwest of Udaipur and flows southward until it reaches Gogunda plateau, when it turns to the east and cutting through the outlying ridges of the Aravalli, burst into open country. Its subsequent course lies in or along the borders of Udaipur, Ajmer, Jaipur, Bundi, Tonk districts and it eventually falls into the Chambal. Its total length is about 480 km.

The river Banganga originates from the low hills of Bairath (Jaipur district) flows eastward entering Sawai Madhopur and Bharatpur districts. The river Gambhiri which originates from Karoli hills in Sawai Madhopur district passes through the parts of Bharatpur district and joins the river Jamuna. The river Mahi also originates from the Mhow ranges at Madhya Pradesh. It enters Rajasthan state near Khandu Village (Banswara district).

The state is divided into two sub-divisions namely: a) West Rajasthan b)East Rajasthan. There are 32 districts in the state.

	West Rajasthan		**East Rajasthan**				
1	Barmer	1	Ajmer	10	Dholpur	19	Sawai Madhopur
2	Bikaner	2	Alwar	11	Dungarpur	20	Sikar
3	Churu	3	Banswara	12	Hanumangarh	21	Sirohi
4	Ganganagar	4	Baran	13	Jaipur	22	Tonk
5	Jaisalmer	5	Bharatpur	14	Jhalawar	23	Udaipur
6	Jalore	6	Bhilwara	15	Jhunjhunu		
7	Jodhpur	7	Bundi	16	Karoli		
8	Nagaur	8	Chittorgarh	17	Kota		
9	Pali.	9	Dausa	18	Rajsamand		

Climate

Areas in Rajasthan state under each climatic pattern based on Koppen's classification are shown in Fig. 1. This broad classification is based on the variation of temperature and rainfall. West Rajasthan has a climate: Tropical desert, Arid; hot (BWh). The districts adjacent to Madhya Pradesh have a climate type marginally varying between the types Tropical Savanna – Hot; seasonally dry (Aw) and Interior Mediterranean, Mild winter; dry and hot summer (Csa) and Sub Tropical Monsoon with mild and dry winter, hot summer (Cwa).

The districts Jaisalmer, Barmer, Jodhpur, Bikaner, Nagaur, Ganganagar, Hanumangarh from West Rajasthan have Tropical Desert, Arid and hot climate (Bwh). Baran, Sirohi, Dungarpur, Sawai Madhopur, Jhalawar districts of East Rajasthan have interior Mediterranean mild winter, dry and hot summer (Csa). The Chittorgarh district has a climate type marginally varying between the types Interior Mediterranean, mild winter, dry and hot summer (Csa) and sub-tropical monsoon, mild and dry winter, hot summer (Cwa). Banswara district of east Rajasthan has climate of Tropical Savanna – Hot, seasonally dry winter (Aw). Remaining districts of east Rajasthan belongs to the climate type: Tropical Steppe, semi arid, hot (Bsh).

The year may be divided into four seasons. The winter season from January to February is followed by the premonsoon season from March to May. The period from June to September constitutes the southwest monsoon season and the period from October to December form the post monsoon season.

The period from November to March is generally very unpleasant due to biting cold over the entire state, when a series of severe cold waves associated with western disturbances affect the entire state. In the summer months from April to June, weather is very dry and uncomfortable. Due to lower temperatures, the plateau regions are, however, comparatively less uncomfortable in summer. Weather tends to be oppressive during July due to high humidity and temperature. The rest period of the monsoon is fairly comfortable due to reduced day temperature, although humidity continues to be high.

Atmospheric Sea Level Pressure and Winds:

The seasonal variation of atmospheric pressure over the state takes place in a systematic manner with a maximum in the winter (January) and a minimum in the monsoon season (July). The pressure gradient over the state generally remains weak except during the late summer and monsoon season. During winter the higher pressure is to the north. In July, the pressure decreases from south to north in Rajasthan.

The winds are light and mainly from northwest-north-northeast over the state in January, turn gradually anticlockwise and are replaced by light northwesterly to westerly or southwesterly winds in April. With the advance of the summer, the pressure gradient increases and correspondingly the winds from northwest to southwest also strengthen reaching their maximum strength in July. In July, the pressure decreases from west-southwest to east-northeast over the state. October is the month of transition, with weakest pressure gradient. From October onwards, the change over of the pressure and wind pattern commences and north-northeasterly winds appear. Table 1 gives the monthly mean wind speed in kmph, for the observatory stations in the two sub-divisions.In addition, predominant wind directions in the morning and evening have been included. For each sub-division, the mean monthly wind speed is given at the end of the respective sub-divisional table.

Temperature:

Table 2 gives the mean daily maximum and minimum temperatures at the observatory stations and for each of the two subdivisions. Fig. 2(a, b, c, d) and 3(a, b, c, d) show the distribution of mean maximum and mean minimum temperatures respectively for the selected months. Fig. 4 and 5 give the extremes of temperature ever recorded in respect of observatory stations. These values were obtained based on data available upto the year 2009.

Day temperatures are more or less uniform over the plains except during the winter and monsoon season, when temperatures increase southwards and northwards respectively. In general, the night minimum temperatures are lower in higher latitudes except during the southwest monsoon when they are more or less

uniform. Both day and night temperatures are lower over the plateau and at high level stations than over the plains.

May is the hottest month with the mean maximum temperature at about 41°C -42°C in the plains, the plateau regions and elevated places recording 2°C to 4°C lower.

The highest maximum temperature ever recorded at an individual station in the plains is 50.6°C at Alwar on 10 May 1956, which is about 10°C higher than the normal of the warmest month. Mount Abu, a hill station registered the highest maximum temperature at 39.2°C on 15 May 1985, which was 7°C higher than the normal for the warmest month.

January is the coldest month in the state when the mean minimum temperature for the state as a whole is 7.4°C varying from 4°C in the north to 12°C in the south. During winter, much lower temperature may be experienced in the wake of western disturbances. On such occasions, minimum temperature 2°C - 5°C below the freezing point can be registered at few stations in the northern parts of Rajasthan. The lowest minimum temperature ever recorded at an individual plain station was -5.9°C at Jaisalmer on 12 January 1967, while the hill station of Abu had recorded the lowest temperature of -7.4°C on 12 December 1994. These were 12.8°C and 13.1°C below the respective normals for the coldest months.

The maximum temperature rise rapidly from February onwards till May and minimum temperature from February onwards till June. The increase in maximum in the period from January to May ranges from 13°C to 20°C at individual stations as we proceed from south to north of the state. From the beginning of June to the end of July, the maximum temperature falls by about 3°C to 7°C whereas the minimum temperature falls only by about 3°C to 5°C from June to September. A slight rise in the maximum temperature is experienced in the month of September due to increased insolation. The night temperatures start falling rapidly after September while day temperatures follow this trend after October and both attain lowest values by January. The fall in minimum temperature and maximum temperature is about

8°C to 15°C and 5°C to 7°C respectively during these periods. In both cases, the fall increases from southern parts of the state to the northern parts.

July and August have the smallest diurnal range of temperature of about 9°C in the state. The diurnal range increases rapidly after the withdrawal of the monsoon. During the period from November to May, the diurnal range is of the order of 15°C to 18°C, being greatest in November.

Humidity

Table 3 gives the mean relative humidity at 0830 and 1730 hours IST for the individual stations in the two subdivisions. The relative humidity is generally high during the period from July to September. It is about 45%-47% in June rising to a little less than 70% during August in West Rajasthan and to about 76%-77% in East Rajasthan. The diurnal variation in relative humidity is least during monsoon being higher in West Rajasthan. The relative humidity is least during the summer afternoons when it becomes about 20 to 30% in major parts of the state making the summer very dry and hot. The diurnal variation is highest during the period January and February.

Cloudiness and Sunshine

The period from October to May is cloudless or lightly clouded, the part of the period from January to March being more clouded. Afternoons are however, comparatively more clouded than forenoons, in this period. In April and May the sky remains cloudless or lightly clouded over the state. During monsoon season skies are heavily clouded especiallly during July and August, when generally sky is covered with 4 oktas of cloud in West Rajasthan, and with 5 oktas of cloud in East Rajasthan respectively. On an average in each of these two months, the sky remains overcast for 5 days and clear on 7 days per month in West Rajasthan and for more than 8-9 days and clear on 4-5 days per month in East Rajasthan. During October, clouding decreases to a great extent over the entire state.

Tables 4 and 4(a) give the mean number of days with clear skies, overcast skies and the mean monthly total cloud amount at 0830 and 1730 hours IST respectively.

For general information, the mean hours of bright sunshine for different months for some observatory stations in the state are indicated in Table 4(b).

Rainfall

Table 5 gives district wise and sub-divisional normals for monthly and annual rainfall and the number of rainy days. For the hilly regions, rainfall data of individual hill station (elevation exceeding 1067m) are given in Table 5(a). Fig 6 and 6(a) to 6(d) show the annual and seasonal distribution of rainfall. Fig. 7 and 7(a) shows the districtwise seasonal and annual rainfall for each of the two sub-divisions and provide a measure for comparison of seasonal rainfall with the annual rainfall.

The total annual rainfall in state varies from14 cm over the extreme northwestern parts to 1000 cm over the southeastern parts. The southwest monsoon is the principal rainy season when the state receives 91% of its annual rainfall. Rainfall in the winter season (January-February) is about 2% of the annual total rainfall in the summer season (March-May) is about 3% and in the post-monsoon season (October-December) it is about 4%.

Southern/southeastern districts adjacent to Madhya Pradesh constitute the area of maximum rainfall in the state. Pali and Jalore districts on the west of Aravalli hills receive maximum amount of rain of 50 cm and 43 cm in West Rajasthan. In the north/northwest districts Bikaner, Ganganagar, Jaisalmer receive annual rainfall of 26cm, 24cm and 17cm respectively, annual rainfall over Jaisalmer district being the lowest. These districts and the adjoining areas constitute the driest zone of the state. The mean annual rainfall in the East and West Rajasthan is about 64.9 cm and 32.7 cm respectively with the districts of East Rajasthan receiving more rainfall than those of West Rajasthan.

The southwest monsoon sets in over the eastern parts of the state by about the last week of June and extends over the entire state by the first week of July. July and August are the rainiest months, each accounting individually to about 34% of the annual rainfall. In each of these months, there are about 5 rainy days (with daily rainfall of about atleast 2.5 cm) in West Rajasthan and about 9 -10 rainy days in East Rajasthan.

The withdrawal of the southwest monsoon begins from the northern western parts of the state around 1st September and by 15th September monsoon withdraws from the entire state.

During winter (January-February), East and West Rajasthan receive 1 cm and 0.7 cm of rainfall respectively, which is although small in amount is of great significance for agriculture. This rainfall occurs in association with western disturbances which move from west to east across the northern parts of the country.

Table 6 gives the monthly and annual rainfall for various river catchments numbers 105, 106, 107, 108, 202, 403, 404, 405, 406, 407 and 600 in the state. The annual rainfall of these river catchments is shown in Fig. 8.

Rainfall Variability

Coefficient of variation (cv) which is expressed in percentage is defined as:

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

Where σ = Standard Deviation N = Normal of the annual rainfall

The following discussion gives the picture of rainfall variability, in different seasons as well as year as a whole. Fig. 9 and Fig. 9(a) to 9(d) indicate the rainfall variability for the whole year, pre monsoon, southwest monsoon, post monsoon and winter season respectively.

Co-efficient of variation (cv) of annual rainfall is more than 60% in extreme western parts of the state. In southeastern and extreme eastern parts of the state, it is less than 30%. In other parts of the state it ranges between 30% to 60%. In the months of January and February, the cv is extremely high and it ranges from 100 to 200. It increases from northeast to southwest. During the summer months i.e. March to May, it is the lowest in the northeastern parts of the state, adjacent to Haryana state, which is less than 100% and increases to its southwestern and extreme southern parts of the state which is greater than 200%. During the southwest

monsoon season cv is more than 60% in the extreme western parts of the state. In the extreme southern parts of the state, it is less than 35% and in the other parts of the state, it ranges from 30 to 60%. During post monsoon season cv is less than 150 in eastern parts of the state while in the extreme northern-northwestern parts of the state cv is greater than 200. In other regions of the state it varies in between 150 and 200.

Droughts and Excessive Rainfall

A. **Droughts:** Meteorologically drought over an area or place may be defined as a situation when annual rainfall over the area or place is less than 75% of the normal. It is further classified as 'moderate drought' if rainfall deficit is between 25 to 50% and 'severe drought' when it is more than 50%.

Areas where frequency of drought as defined above is 20% of the years examined are classified as 'drought areas' and areas having drought condition for more than 40% of the years under consideration represent "chronically drought affected areas".

Drought conditions which prevailed over Rajasthan during the 50 year period from 1951-2000 are described below:

a) West Rajasthan

All districts in this sub-division viz. Barmer (16), Bikaner (12), Churu (12), Ganganagar (7), Jaisalmer (13), Jalore (15), Jodhpur (18), Nagaur (14) and Pali (16) became the victims of 'drought' for the number of years as indicated within the brackets against each district. All the districts in the sub-division except Ganganagar experienced the drought conditions for more than 20% of the years under consideration and may therefore, be classified as 'Drought Areas', while Jodhpur district very nearly satisfies the criteria for being classified as a 'chronically drought affected area'.

The severity of drought not only depends upon the order of rainfall deficiency in a single year, but also on the continued occurrence of deficient rain in successive years, even though the deficiency in each such successive year may not be as high

as in a single year. Occasions of occurrence of drought conditions in successive years, were very frequent in the case of this sub-division.

The details of yearwise occurrence of successive drought during the 50 year period 1951 to 2000 over each district are given in Table (i).

Table (i)

Years of successive droughts and the Affected districts.

Years of Successive Drought	Affected Districts
1951-1952	Bikaner, Churu
1962-1963	Barmer, Pali
1965-1966	Nagaur
1968-1969	Barmer, Bikaner, Churu, Ganganagar, Jaisalmer, Jalore, Jodhpur, Pali
1971-1972	Pali
1980-1981	Jalore
1980-1981-1982	Pali
1984-1985-1986-1987	Bikaner, Jaisalmer, Jalore, Jodhpur ,Nagaur, Pali
1985-1986-1987-1988	Barmer
1996-1997-1998-1999	Jodhpur

The above table clearly brings out the area which was simultaneously affected by drought conditions. Further, rainfall of less than 50% of the annual normal representing severe drought conditions occurred in various districts as indicated in the following table.

Table (ii)

Districtwise years of severe drought with lowest percentage of annual rainfall and year

Districts	Years of Severe Drought (Rainfall < 50%)	Lowest amount of rainfall in cms (expressed as % of annual normal) with year
Barmer	1966, 1968, 1969, 1974, 1987	4.5 cm in 1969 (18%)
Bikaner	1963, 1968, 1991	7.5 cm in 1968 (29%)
Churu	1952	17.1 cm in 1952 (46%)
Ganganagar	1968	11.2 cm in 1968 (46%)
Jaisalmer	1963, 1968, 1969, 1974, 1987, 1991	2.2 cm in 1969 (13%)
Jalore	1968, 1969, 1974, 1980, 1986, 1987, 1991	9.1 cm in 1968 (21%)
Jodhpur	1968, 1969, 1987, 1996, 1997, 1998, 1999	1.6 cm in 1998 (5%)
Nagaur	1951, 1963, 1987	16.4 cm in 1951 (42%)
Pali	1969, 1974, 1981, 1987	16.0 cm in 1969 (32%)

It can be seen that the lowest district rainfall expressed as percentage of the annual normal was only 5% recorded in Jodhpur district in 1998.

The sub-division had experienced widespread drought in the years 1951, 1963, 1968, 1969, 1972, 1974, 1984, 1985, 1986, 1987 and 1991, when the number of districts experiencing drought condition was 6, 7, 8, 9, 7, 6, 7, 7, 6, 8 and 7 respectively. In the year 1969 whole sub-division was affected by drought condition. Moreover, it happens to be successive year of drought in eight districts and five districts affected by severe drought condition.

b) East Rajasthan

All the districts in this subdivision viz. Ajmer (11), Alwar (7), Banswara (9), Baran (7), Bharatpur (6), Bhilwara (4), Bundi (11), Chittorgarh (7), Dausa (7), Dholpur (8), Dungarpur (10), Hanumangarh (9), Jaipur (13), Jhalawar (11), Jhunjhunu (13), Karoli (12), Kota (10), Rajsamand (8), Sawai Madhopur (10),

Sikar (10), Sirohi (10), Tonk (8) and Udaipur (11) experienced drought conditions for the number of years as indicated within brackets against each district.

14 districts viz. Ajmer (23%), Banswara (20%), Bundi (25%), Hanumangarh (23%), Dungarpur (21%), Jaipur (27%), Jhalawar (24%), Jhunjhunu (27%), Karoli (29%), Kota (21%), Sawai Madhopur (21%), Sikar (21%), Sirohi (23%) and Udaipur (23%) had drought condition for more than 20% of the years and may therefore, be classified as drought areas.

Occasions of occurrence of drought conditions in successive years were very frequent in this sub-division also. The following Table (iii) depicts districtwise years of successive drought during the 50 year period 1951 to 2000.

Table (iii)

Districtwise years of Successive Drought

Districts	Years of Successive Drought
Jaipur, Jhunjhunu, Sawai Mahodpur	1951-1952-1953
Karoli	1953-1954
Hanumangarh	1958-1959-1960-1961
Ajmer	1962-1963
Bundi, Baran, Chittorgah,Jaipur, Jhalawar, Karoli, Kota, Sawai Madhopur, Udaipur	1965-1966
Banswara, Dungarpur	1964-1965-1966
Dungarpur	1968-1969
Dholpur	1978-1979
Jhalawar	1979-1980-1981
Rajsamand	1984-1985
Ajmer, Sirohi	1985-1986-1987
Alwar, Bharatpur, Dholpur, Jaipur, Jhunjhunu, Karoli, Udaipur	1986-1987
Dausa	1986-1987-1988
Bundi	1987-1988 -1989
Sawai Madhopur	1989 -1990
Dholpur	1993 -1994
Kota	1998 -1999

The above table clearly brings out the area which was simultaneously affected by drought conditions. Further, rainfall of less than 50% of the annual normal rainfall representing severe drought conditions occurred in various districts as indicated in the following Table (iv).

Table (iv)

Districtwise years of severe drought with lowest percentage of annual rainfall and year

District	Years of Severe Drought (Rainfall < 50%)	Lowest amount of rainfall in cm (expressed as % of annual normal) with year
Ajmer	1972, 1987	21.4 cm in 1972 (47%)
Alwar	1987	28.5 cm in 1987 (46%)
Banswara	1966	38.8 cm in 1966 (44%)
Baran	1965	37.8 cm in 1965 (44%)
Bharatpur	1979	19.9 cm in 1979 (32%)
Bhilwara	1951	27.9 cm in 1951 (47%)
Chittorgarh	1951	28.6 cm in 1951 (36%)
Dungarpur	1966	31.5 cm in 1966 (45%)
Hanumangarh	1951, 1969, 1974	9.9 cm in 1969 (34%)
Jhunjhunu	1951, 1968, 1999	19.0 cm in 1951 (40%)
Karoli	1989	31.6 cm in 1989 (46%)
Sikar	1972	21.6 cm in 1972 (47%)
Sirohi	1974, 1987	17.8 cm in 1987 (32%)
Tonk	1951	29.9 cm in 1951 (49%)

It can be seen that the lowest district annual rainfall expressed as percentage of annual normal was only 32% recorded in Bharatpur and Sirohi districts in year 1979 and 1987 respectively. 1951, 1965, 1972 and 1987 were the years of widespread drought when the number of districts experiencing drought was 21, 16, 16 and 17 respectively out of 23 districts in the sub-division.

During the period 1951 – 2000, there was no drought anywhere in the state in the 9 years, viz. 1955, 1956, 1967, 1973, 1975, 1976, 1977, 1983 and 1992. In the 9 years period viz. 1959, 1961, 1970, 1978, 1990, 1994, 1995, 1996 and 1997, only one district experienced the drought condition. 1951, 1965, 1972 and 1987 were the year of widespread drought in the state when the number of districts experiencing

drought was 27, 21, 23 and 25 respectively out of 32 districts of the state. During the above 50 years period, Sikar and Tonk districts had never fallen in the grip of drought in any two consecutive years.

B. Excessive rainfall

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

Fig.11 shows the percentage frequency of excessive rainfall and successive years of excessive rainfall during the period 1951-2000.

West Rajasthan

The following Table (v) gives the district-wise excessive rainfall years and highest annual rainfall (expressed as percentage of normal) with the year of occurrence.

Table (v)
Districtwise years of excessive rainfall with highest percentage of annual rainfall and year

District	Years of Excessive Rainfall (Rainfall > 125%)	Highest amount of rainfall (expressed as % of annual normal) with year
Barmer	1955, 1959, 1961, 1967, 1973, 1975, 1976, 1990, 1992, 1993, 1994, 1995, 1997, 1998	75.3 cm in 1990 (299%)
Bikaner	1959, 1964, 1975, 1976, 1978, 1982, 1983, 1992, 1995, 1997, 1998.	53. 8 cm in 1997 (208%)
Churu	1964, 1970, 1975, 1976, 1978, 1983, 1988, 1995, 1997, 1998	79.4 cm in 1978 (214%)
Ganganagar	1956, 1966, 1967, 1976, 1978, 1983, 1990, 1992, 1995, 1997	55.7 cm in 1997 (229%)
Jalore	1952, 1955, 1956, 1959, 1961, 1973, 1975, 1976, 1983, 1992, 1994, 1997	95.0 cm in 1956 (219%)
Jodhpur	1956, 1967, 1970, 1973, 1975, 1976, 1983, 1990, 1992	66.4 cm in 1975 (207%)
Jaisalmer	1953, 1955, 1956, 1961, 1973, 1975, 1976, 1983, 1992, 1993, 1994, 1995, 1998, 1999	48.4 cm in 1973 (280%)
Nagaur	1955, 1964, 1970, 1971, 1975, 1976, 1983, 1995	113.1 cm in 1975 (289%)
Pali	1955, 1959, 1961, 1967, 1970, 1973, 1975, 1979, 1983, 1990, 1992, 1994, 1997	109.3 cm in 1973 (219%)

From the above table it is seen that during the 50 year period from 1951-2000, there were 27 years in which some districts or other in the sub-division recorded excessive rainfall, the maximum and minimum amount being 299% and 207% of the normal annual rainfall in the year 1990 and 1975 for the district Barmer and Jodhpur respectively.

The districts Barmer and Jaisalmer have got maximum number (14) years with excessive rainfall while Nagaur has got minimum number (8) years with such

rainfall. In the year 1975, 1976 and 1983 eight district out of nine districts of the subdivision received excessive rainfall. Successive years of excessive rainfall are shown against each district in Table (vi).

Table (vi)
Districtwise Successive years of Excessive Rainfall

District	Successive Years of Excessive Rainfall
Barmer	1975-1976, 1992-1993-1994-1995, 1997-1998
Bikaner	1975-1976, 1982-1983, 1997-1998
Churu	1975-1976, 1997-1998
Ganganagar	1966-1967
Jaisalmer	1955-1956, 1975-1976, 1992-1993-1994-1995, 1998-1999
Jalore	1955-1956, 1975-1976
Jodhpur	1975-1976
Nagaur	1970-1971, 1975-1976

All the districts of the subdivision except Ganganagar and Pali experienced excessive rainfall in successive year 1975-1976. Districts Barmer and Jaisalmer experienced excessive rainfall in four consecutive years 1992-1995. Only Pali district had no occasion when district experienced such rainfall in two consecutive years.

The heaviest rainfall recorded at any station for one day in the subdivision was 780.3 mm at Parbatsar station in Nagaur district on 16 September 1900.

East Rajasthan

The following Table (vii) gives the district wise excessive rainfall years and highest annual rainfall (expressed as percentage of normal) with the year of occurrence.

Table (vii)
Districtwise years of excessive rainfall with highest percentage of annual rainfall and year

District	Years of Excessive Rainfall	Highest amount of rainfall (expressed as % of annual normal) with year
Ajmer	1955, 1956, 1973, 1975, 1976, 1979, 1983, 1994, 1997, 1998	90.5 cm in 1975 (199%)
Alwar	1955, 1958, 1967, 1976, 1983, 1985, 1995	108.3 cm in 1995 (175%)
Baran	1956, 1961, 1971, 1975, 1982, 1994	131.4 cm in 1975 (153%)
Banswara	1952, 1954, 1959, 1961, 1973, 1976, 1978, 1981, 1984, 1990, 1994, 1997	163.2 cm in 1973 (185%)
Bharatpur	1955, 1958, 1961, 1967, 1976, 1977, 1982, 1983, 1995, 1996, 1998, 1999	105.2 cm in 1958 (169%)
Bhilwara	1952, 1955, 1956, 1958, 1961, 1970, 1973, 1976, 1982, 1983, 1990, 1994	96.6 cm in 1994 (163%)
Bundi	1955, 1956, 1958, 1959, 1961, 1969, 1971, 1973, 1974, 1975, 1976, 1979	117.4 cm in 1956 (168%)
Chittorgarh	1952, 1955, 1956, 1959, 1961, 1973, 1976, 1994	141.3 cm in 1973 (178%)
Dausa	1955, 1958, 1959, 1961, 1975, 1978, 1981, 1995	115.6 cm in 1995 (170%)
Dholpur	1955, 1957, 1958, 1961, 1967, 1977, 1992	119.8 cm in 1977 (177%)
Dungarpur	1959, 1973, 1976, 1977, 1984, 1990, 1994, 1996, 1998	130.1 cm in 1977 (186%)
Hanumangarh	1966, 1970, 1971, 1975, 1976, 1978, 1982, 1983, 1992, 1994, 1995	60.0 cm in 1978 (205%)
Jaipur	1956, 1957, 1959, 1971, 1975, 1977, 1981, 1983, 1990, 1995, 1997	125.9 cm in 1977 (211%)
Jhalawar	1952, 1961, 1969, 1971, 1973, 1985, 1986	144,6 cm in 1961 (157%)

Table (vii) (contd…)
Districtwise years of excessive rainfall with highest percentage of annual rainfall and year

District	Years of Excessive Rainfall	Highest amount of rainfall (expressed as % of annual normal) with year
Jhunjhunu	1955, 1956, 1964, 1967, 1975, 1976, 1977, 1978, 1988, 1993, 1995, 1997	84.3 cm in 1978 (177%)
Karoli	1956, 1961, 1971, 1975, 1983, 1992, 1995	116.0 cm in 1961 (169%)
Rajsamand	1959, 1967, 1973, 1975, 1976, 1983, 1990, 1992, 1994	111.3 cm in 1973 (200%)
Kota	1955, 1956, 1961, 1971, 1974, 1975, 1977, 1986	127.5 cm in 1971 (168%)
Sawai Madhopur	1956, 1958, 1959, 1961, 1971, 1975, 1981, 1983, 1994, 1995, 1996, 1997, 1998, 1999	112. 2 cm in 1956 (154%)
Sikar	1955, 1956, 1964, 1967, 1970, 1975, 1977, 1978, 1983, 1995	103.4 cm in 1977 (225%)
Sirohi	1952, 1956, 1959, 1961, 1967, 1970, 1973, 1975, 1976, 1983, 1990, 1992, 1994	152.5 cm in 1973 (274%)
Tonk	1956, 1961, 1971, 1973, 1975, 1976, 1977, 1983	94.5 cm in 1971 (155%)
Udaipur	1954, 1959, 1973, 1975, 1976, 1994	143.6 cm in 1973 (206%)

From the above table it may be seen that during the period under consideration, there were 37 years in which some districts or the other in the sub-division recorded excessive rainfall, the maximum and the minimum amount being 274% and 153% of the normal annual rainfall in the year 1973 and 1975 for the Sirohi and Baran districts respectively. Excessive rain occurred in the each and every districts of the sub-division viz. Ajmer (10), Alwar (7), Banswara (12), Baran (6), Bharatpur (12), Bhilwara (12), Bundi (12), Chittorgarh (8), Dausa (8), Dholpur (7), Dungarpur (9), Hanumangarh (11), Jaipur (11), Jhalawar (7), Jhunjhunu (12), Karoli (7), Kota (8), Rajsamand (9), Sawai Madhopur (14), Sikar (10), Sirohi (13), Tonk (8), and Udaipur (6), in 6 to 14 years as shown within the brackets against

each district. In the year 1975 and 1976, 15 and 14 districts out of 23 districts of sub-division received excessive rainfall.

Table (viii)
Districtwise Successive years of Excessive Rainfall

District	Successive Years of Excessive Rainfall
Ajmer	1955-1956, 1975-1976, 1997-1998
Bharatpur	1976-1977, 1982-1983, 1995-1996, 1998-1999
Bhilwara	1955-1956, 1982-1983
Bundi	1955-1956, 1958-1959, 1973-1974-1975-1976
Hanumangarh	1970-9171, 1975-1976, 1982-1983, 1994-1995
Chittorgarh	1955-1956
Dausa	1958-1959
Dungarpur	1976-1977
Jaipur	1956-1957
Jhalawar	1985-1986
Jhunjhunu	1955-1956, 1975-1976-1977-1978
Rajsamand	1975-1976
Kota	1955-1956, 1974-1975
Sawai Madhopur	1958-1959, 1994-1995-1996-1997-1998-1999
Sikar	1955-1956, 1977-1978
Sirohi	1975-1976
Tonk	1975-1976-1977
Udaipur	1975-1976
Dholpur	1957-1958

Districts Sawai Madhopur (1994-1999), Bundi (1973-1976), Jhunjhunu (1975-1978) and Tonk (1975-1977) had experienced excessive rainfall in 6, 4, 4 and 3 successive years respectively in the years mentioned in brackets against each district. Four districts in the sub-division viz. Alwar, Banswara, Baran and Karoli had no consecutive years of excessive rainfall in the period under consideration. Eight districts of sub-division registered excessive rainfall in the consecutive years 1975-1976. The heaviest rainfall in 24 hours recorded at any station in the sub-division was 802.9 mm at Chittor in Chittorgarh district on 14 July 1982.

Cyclonic Storms and Depressions

Cyclonic storms and depressions which mostly affect India originate and or intensify over the Bay of Bengal, mostly during May to November or December. Some of them originating over the Arabian Sea also affect Konkan, Gujarat, Saurasthra and Kutch and northwest India during the above period. They usually travel west to northwest and cross the coast. In general, storms and depressions weaken on entering land. Hence Rajasthan situated far inland, does not experience the full fury of the severe storms/depressions like the coastal regions. During the course of their movement, the disturbances sometimes turn or recurve towards north or northeast. This point of turning progressively shifts westwards till September. For example, the disturbances in May recurve, while still out in the Bay of Bengal. As such, the few of them which cross the coast and travel inland weaken far away from the state and cannot affect it. The disturbances during the period June to September form over the head Bay of Bengal and traveling westwards pass across the state of Madhya Pradesh. During this period sometimes they move west/northwestwards as far as Rajasthan. With the advance of the above period, the tracks of the bay storms and depressions progressively shift south. In association with these systems, heavy to very heavy rain occurs over the area affected by them.

The track of the bay cyclones is even more southerly in October and November and these have no influence on Rajasthan weather. The bay cyclonic storms/depressions which reach the state generally become considerably weak due to long land travel. Maximum number of storms/depressions from the Bay of Bengal affect the state in the month of August/September.

Table VII gives the total number of storms/depressions which affected each of the two sub-divisions during the 110 years period ending 2000. For this purpose, depressions affecting more than one sub-division have been counted separately for each sub-division. The last column gives the total number of depressions/storms which affected the state as a whole during this period. For this purpose, each depression is counted as one even though it may have affected more than one sub-division. During the period 1891-2000, 197 storms/depressions influenced the weather of Rajasthan state.

Other Weather Phenomena

Thunderstorms and Duststorms

Convective activity is essential for the occurrence of thunderstorms and dust storms. With the advance of the summer, thunder activity becomes pronounced due to ground heating. When the moisture is insufficient in the atmosphere, dry thunderstorms or dust storms occur. Maximum numbers of thunderstorms occur, with the approach of the monsoon current, while dust storms are mainly confined to the summer months March-June. Premonsoon and monsoon thunderstorms are sometimes severe and accompanied by hail. Squall is uncommon in the state. The average number of days of thunderstorms during the monsoon season is about 11 in West Rajasthan and 10 in East Rajasthan, the maximum being in July in both the subdivisions. The average annual number of thunderstorms in the West and East Rajasthan are 17.0 and 15.0. In the winter months, the state experiences thunderstorms sometimes accompanied by hail in association with western disturbances. Thunder activity is minimum in the months from November to January in both the sub-divisions.

Fog

Hill fog occurs during the monsoon season at few places, when air is almost saturated and is easily cooled below the dew point while rising over high elevations. Conditions like light to calm winds, clear skies etc., which favour occurrence of radiation fog exist after the withdrawal of the monsoon till February. But due to lack of sufficient moisture, fog occurs only occasionally, the maximum frequency of occurrence being 0.8 in December and January in both West and East Rajasthan.

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

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
WEST RAJASTHAN														
Barmer	a	5.1	6.0	7.2	9.2	11.4	12.2	10.2	8.9	7.4	5.7	4.6	5.1	7.7
	m	NW/C/N	NW/C	C/NW/N	C/SW/W	SW	SW	SW	SW	SW	C/NW	C/NW/N	NW/N/C	
	e	NE/N	NE/N	W/SW	SW/W	SW	SW	SW	SW	SW	C/SW	C/NE/N	C/NE/N	
Bikaner (P.B.O)	a	4.3	5.4	6.8	7.5	9.9	12.6	10.8	9.9	8.4	5.3	4.0	4.0	7.4
	m	C/SE	C/SE	C/SE	SW/SE	SW	SW	SW	SW	SW	C/SW	C/S/SE	C/SE	
	e	C/N	NW/N	NW/SW	SW	SW	SW	SW	SW	SW	C/SW	C/N	C/N	
Bikaner	a	2.8	3.8	5.1	6.3	8.5	10.9	9.1	8.2	6.8	4.0	2.7	2.4	5.9
	m	C/SE	C/SE	C/SE	SW/SE	SW	SW	SW	SW	SW	C/SW	C/SE	C/SE	
	c	C/N	NW/N	NW/SW/N	SW/NW	SW	SW	SW	SW	SW	C/SW/NW	C/N	C/N	
Churu	a	3.3	4.8	6.0	6.4	8.2	10.7	9.4	7.6	6.1	4.1	2.9	2.9	6.0
	m	C/S	C/S	C/S	S/SW	SW/W	W	W/SW	W/SW	W/SW	C/S/SW	C/S	C/S	
	e	C/N	N	N/NW/W	W/N/NW	W	W	SW/W	W/SW	W/SW/N	C/N	C/N	C/N	
Erinpura (Jawaibandh)	a	2.8	3.8	5.0	5.5	7.3	8.8	7.2	6.1	5.0	3.9	2.8	2.4	5.1
	m	C/S	C/S	C/S	C/S	C/SW/S	SW/S	SW/C	C/SW	C/SW	C/S	C/S	C/S	
	e	C/N	C/SW	W/C/SW	W/SW	SW/W	SW/W	SW/C	SW/C	C/SW	C/S/SW	C/SW	C/N	
Jaisalmer	a	6.3	7.1	8.4	10.2	14.7	20.5	18.4	15.8	12.2	6.8	5.5	5.7	11.0
	m	C/NE	C/NE	C/SW	SW	SW	SW	SW	SW	SW	SW/C	C/NE	C/NE	
	e	NE/N	N/NE/NW	SW/NW/W	SW	SW	SW	SW	SW	SW	SW	N/NE	NE	
Jalore	a	3.5	4.6	6.6	9.0	13.1	12.7	11.2	10.0	8.2	4.8	2.7	2.8	7.4
	m	C/NW	C/NW	C/NW	C/NW	SW/C/NW	SW	SW/W	SW/W	C/W	C/NW	C/NW	C/NW	
	e	C/NE/NW	NW/C	NW/SW/W	NW/SW/W	SW/W	SW	SW	SW	SW/W	C/NW/W	C/NW	C/NE	
Jodhpur	a	6.3	7.3	7.9	8.3	12.0	18.1	13.0	10.6	8.3	5.4	5.7	6.1	9.1
	m	NE	NE	NE/C	SW	SW	SW	SW	SW	SW	C/NE	NE/C	NE	
	e	NE	NE	W/SW	SW/W	SW	SW	SW	SW	SW	C/SW	C/NE	C/NE	
Nagaur	a	5.2	6.3	7.7	8.4	11.0	14.4	12.0	9.8	8.3	5.3	4.4	4.9	8.1
	m	NE	E/SE/NE	S/SW/SE	SW/S	SW/S	SW	SW	SW	SW/W	SW/S	E/NE	NE/N/E	
	e	NW/N	NW/N	NW/SW	SW/NW	SW/S	SW	SW/S	SW/S	SW/S	NW/SW	NW/N	N/NW/NE	

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
WEST RAJASTHAN														
Phalodi	a m e	6.0 N/SE/S N	7.6 SE/S/E N/W/NW	9.1 S/SW/SE W/SW	10.3 SW/S SW/W	13.0 SW SW	16.4 SW SW	12.8 SW SW	12.2 SW SW/S	10.4 SW SW/S	7.4 S/SW SW/S/W	5.7 SE/S N/SW	5.6 N N	9.7
Sriganganagar	a m e	2.3 C/SE C/N/NW	3.0 C/SE C/NW/N	4.0 C/NE C/NW	4.6 C/SE/NE NW/C	4.9 C/SW C/NW	6.4 SW SW/C	5.9 SW C/SW	4.7 SW/C C/SW	3.5 C/SW C/SW	2.6 C/SE C/NE	1.8 C/SE C	1.6 C/SE C	3.8
Sub Div. Mean	**a**	**4.4**	**5.4**	**6.7**	**7.8**	**10.4**	**13.1**	**10.9**	**9.4**	**7.7**	**5.0**	**3.9**	**3.9**	**7.4**

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

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Ajmer	a m e	3.5 C/NE C/NE/SW	4.3 C/NE SW/NW	5.8 C/SW SW/NW	7.3 C/SW SW	10.3 SW SW/W	12.1 SW/W SW/W	10.2 SW/W SW/W	8.9 SW/W SW/W	7.2 SW/W SW/W	4.1 C/SW C/SW	3.3 C/NE C/NE	3.2 C/NE C/NE	6.7
Alwar	a m e	2.1 C C/NW/NE	2.8 C C/NW	3.4 C/SW NW	4.2 C/NW NW	6.1 C/NW NW	6.3 C/NW NW/C	4.6 C/NW C/SW	3.4 C/NW C/SW	3.2 C/NW C/NW	2.0 C/NE C/NW	1.8 C C	1.6 C C/NW	3.5
Banswara	a m c	4.7 SE/E NW	5.6 SE NW	6.0 SE NW/W	6.2 SW W/SW	9.4 SW W/SW	9.8 SW SW	7.7 SW SW	6.4 SW SW	4.3 SW SW	4.0 SE NW	4.5 SE C/NW	4.9 SE NW	6.1
Bharatpur	a m e	3.0 C/W C/N/NW	3.6 C/W C/N	4.2 C/W C/N/NW	4.6 C/W W/NW	5.2 W/C/SW NW/W	6.3 W/C/SW C/N	4.8 C/W/SW C/SW	3.7 C/W C/SW	3.7 C/W/SW C/N	3.0 C/W C/N	2.1 C/W C/NW/N	2.3 C/W C/N	3.9
Bhilwara	a m e	3.9 C/NE NE/C	4.8 C/NE NE	5.3 C/NE/SW SW/NW/NE	6.4 SW SWNW	8.8 SW SW/NW	11.4 SW SW	9.9 SW SW	7.8 SW SW	6.0 SW/NW SW/NW	4.4 C/SW NE/NW	3.3 C/NE C/NE	3.5 C/NE NE/C	6.3
Chambal (Rawat Bhata Dam)	a m e	3.1 C C/NE	3.7 C C/NW	4.3 C C/NW	5.1 C C/NW	6.8 C/SW/NW C/SW/NW	9.1 C/SW C/SW	7.3 C/SW C/SW	5.5 C/SW C/SW	4.2 C/SW/NW C/SW	2.8 C C/NE	2.6 C C/NE	2.7 C C/NE	4.8
Chittorgarh	a m e	3.9 C/NE/N NE/C/N	4.2 C/NE/N NE/NW	4.7 C/S/NE NW/SW/W	5.4 C/S SW/W	7.0 SW/S SW	9.3 SW SW	7.8 SW SW	6.3 SW SW	4.5 C/SW/S SW	3.2 C/S C/NE	3.2 C/NE C/NE	3.4 C/NE/N C/NE	5.2
Dholpur	a m e	3.4 C/W C/W	4.3 C/W C/N	5.2 C/W C/W	5.9 C/W C/W	7.3 C/W C/W	8.6 C/W C/W	7.0 C/W C/W	5.4 C/W C/W	4.6 C/W C	3.0 C C	2.5 C C	2.7 C C	5.0
Dungarpur	a m e	1.7 C C/NE	2.5 C C/SW	3.3 C/NE C/SW	4.2 C/SW SW	7.3 SW/W SW	9.4 SW/W SW	7.6 SW SW	5.4 C/SW/W SW/C	3.6 C/SW/W C/SW	1.7 C C	1.5 C C	1.5 C C	4.1

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Jaipur (Sanganer)	a m e	4.0 C/E C/NW	4.6 C/E NW/C	6.0 C/E NW	7.3 C/NW NW	9.8 NW/C NW/W	9.4 W/NW NW/W	8.1 W/NW W	7.7 NW/W W/C/NW	6.7 NW/C W/NW	5.1 C/E/NW C/NW	3.6 C/E C/NW	3.5 C/E C/NW	6.3
Jhalawar	a m e	3.6 C/NE/N NE/N	4.4 C/N/NE N/NE	5.3 C/N/NE N/W	6.4 C/W/N NW/W	9.8 W W	13.0 W W	10.5 W/SW W	7.5 W/SW W/SW	5.4 W/SW W/NW	3.2 C/NE/N C/N/NE	2.5 C/N/NE C/N/NE	3.0 C/N/NE NE/C	6.2
Kota	a m e	3.0 C/NW C/NE	3.7 C/NW C/NW	5.1 C/W C/NW	5.5 C/NW C/NW	9.3 NW/C/W NW/C	13.5 W/NW NW/W	10.9 W SW/NW	9.3 W C/W	7.6 W/C/NW C/NW	4.1 C/NW C	2.9 C C	2.8 C/NW C/NE	6.5
Kota (A)	a m e	5.5 C/W NE/E	6.4 C/W NE/N	7.7 W/C/NW NE/N	9.9 W/NW NW/N	13.1 W NW/W	15.8 W W/SW	13.6 W W/SW	11.7 W W	10.3 W W/NW/N	6.5 W/C/NW NE/E/N	4.5 C/W NE	4.5 C/W NE/E	9.1
Kota PBO	a m e	4.5 C/NW NE	5.1 C/NW NE	6.1 C/NW NE	7.2 NW NW	9.6 W/NW NW	12.5 W SW/W/NW	12.6 W/SW SW/W	9.9 W W/NW	8.1 NW/W NW	5.2 C/NW/W NE	4.0 C/NW NE	4.1 C/NW/E NE	7.4
Pilani	a m e	5.4 SW/C NW/N	6.3 SW/SE NW/N/W	7.0 SW NW/W	7.6 SW/W NW/W	9.6 SW/W NW/W	12.0 W/SW W	9.4 SW/W W	7.8 SW/W W	7.1 SW/W W/NW	5.3 SW/W NW/W	4.6 SW/C NW	4.6 SW NW/N	7.2
Sawai Madhopur	a m e	3.2 C/NE C/N	3.0 C/N/SW C/N	3.1 C/SW NW/N	4.3 C/SW NW/N	5.4 C/W NW	5.7 NW/W NW	5.7 W/C/SW C/W/SW	4.4 C/W C/W	4.3 C/SW C/NW	2.6 C/SW C/N	2.6 C/SW C/N	1.9 C/SW/N C/N	3.8
Sikar	a m e	4.0 C C/W	4.4 C C/W	4.5 C C/W	4.8 C C/W	5.5 C/W C/W	6.7 C/W C/W	6.6 C/W C/W	4.3 C C/W	4.4 C C/W	4.6 C C	3.2 C C	3.1 C C/W	4.7

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Tonk	a	4.5	5.6	6.4	7.5	9.9	11.7	10.1	8.5	7.5	4.8	3.9	4.4	7.1
	m	NW/W	NW/W	W	W	W	W	W	W	W	W	W/NW	NW/W	
	e	W/NW	NW/W	W/NW	W	W	W	W	W	W	NW/W	C/W/NW	W/NW	
Udaipur/Dabok(A)	a	5.6	6.4	7.3	8.2	10.7	12.9	11.0	9.0	6.8	5.2	4.5	4.7	7.7
	m	C/NW	C/NW	C/NW	C/NW	SW	SW	SW	SW/C	C/SW	C/NW	C/NW	C/NW	
	e	C/E/NE	C/E/W	W	W	W	SW/W	SW	SW	SW/W	C/NE/W	C/NE/E	C/NE/E	
Udaipur (City)	a	1.6	2.2	2.9	3.8	5.0	6.4	5.0	3.9	2.9	1.5	1.1	1.3	3.1
	m	C/W	C/W	C/W	C/W	C/W	SW	SW/C/W	C/W/SW	C/W	C	C	C	
	e	C/W	C/W/SW	W/C/SW	W/SW	SW/W	SW	SW/W	SW/W	SW/W	C/W	C/W	C/W/NE/E	
Sub Div. Mean	**a**	**3.7**	**4.4**	**5.2**	**6.1**	**8.3**	**10.1**	**8.5**	**6.8**	**5.6**	**3.8**	**3.1**	**3.2**	**5.7**
HILL STATION														
Mount Abu	a	3.6	5.0	5.6	7.0	8.0	9.1	8.8	7.5	5.4	3.9	3.5	3.2	5.9
	m	C/SW	C/SW	C/SW	C/SW	SW/C	SW	SW	C/SW	C/SW	C/SW	C	C	
	e	C/SW	C/SW	SW/C	SW/C	SW	SW	SW	SW/C	C/SW	C/SW	C/SW	C/SW	

a: Mean Wind Speed in km per hour.
m: Predominant wind direction in the morning.
e: Predominant wind direction in the evening.
Var Variable.
C: Calm.
* Hill stations not considered for sub-divisional mean.

TABLE II

MEAN DAILY MAXIMUM AND MEAN DAILY MINIMUM TEMPERATURE (°C)

WEST RAJASTHAN

STATIONS		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Barmer	Max	25.6	28.6	34.2	39.2	41.8	40.2	36.7	35.0	36.2	37.0	32.2	27.2	34.5
	Min	10.6	13.1	18.7	24.4	26.5	27.2	26.3	25.5	24.6	22.3	16.5	11.7	20.6
Bikaner (P.B.O.)	Max	22.8	25.8	31.2	37.8	41.3	42.1	38.7	37.0	37.3	36.1	30.2	24.1	33.7
	Min	5.1	9.1	14.9	21.5	26.0	29.0	28.1	26.9	24.8	18.8	11.7	6.8	18.6
Bikaner	Max	23.2	26.0	32.2	38.2	41.8	41.6	38.0	36.9	37.0	36.3	30.9	25.1	33.9
	Min	5.7	9.0	15.3	22.0	26.6	28.9	27.9	27.0	25.1	19.1	11.9	6.4	18.7
Churu	Max	22.7	25.6	31.7	37.7	41.2	41.3	37.4	35.8	36.1	35.3	30.1	24.5	33.3
	Min	4.4	7.8	13.7	19.9	24.8	27.9	27.0	25.6	23.4	17.3	10.3	5.1	17.3
Erinpura/Jawaibandh	Max	26.3	28.8	33.9	38.2	40.3	38.2	33.6	31.6	33.7	35.2	31.8	27.8	33.3
	Min	8.0	10.8	16.7	22.6	26.0	26.5	25.4	24.2	23.7	20.3	14.2	9.7	19.0
Jailsalmer	Max	23.8	26.9	32.7	38.2	41.6	40.6	37.5	35.9	36.3	36.1	31.1	25.2	33.8
	Min	6.9	10.3	15.9	21.9	25.2	26.8	26.3	25.3	23.9	19.9	13.2	8.2	18.6
Jalore	Max	25.6	27.8	34.0	39.1	41.1	39.7	35.4	33.2	35.2	36.6	31.8	26.4	33.8
	Min	10.5	13.7	19.4	25.4	28.3	28.8	27.0	25.8	25.9	23.0	16.5	11.2	21.3
Jodhpur	Max	25.4	28.1	33.8	38.9	41.5	40.2	36.1	34.2	35.5	36.4	31.8	26.9	34.1
	Min	8.9	11.4	17.1	22.7	26.6	28.0	26.7	25.4	24.2	19.8	14.5	10.3	19.6
Nagaur	Max	23.8	26.6	32.7	38.0	41.2	40.5	36.4	34.8	35.5	36.2	30.6	25.3	33.5
	Min	6.0	9.6	15.2	20.9	25.1	27.3	25.9	24.8	23.3	18.4	12.1	7.2	18.0

TABLE II (Contd…)

MEAN DAILY MAXIMUM AND MEAN DAILY MINIMUM TEMPERATURE (°C)

WEST RAJASTHAN

STATIONS		***JAN***	***FEB***	***MAR***	***APR***	***MAY***	***JUN***	***JUL***	***AUG***	***SEP***	***OCT***	***NOV***	***DEC***	***ANNUAL***
Phalodi	Max	24.2	27.3	33.2	38.7	41.9	41.3	37.8	36.2	37.0	36.8	31.4	25.7	34.3
	Min	6.5	9.8	15.8	21.8	25.4	26.6	26.1	25.2	23.6	19.5	13.2	7.5	18.4
Sriganganagar	Max	21.4	23.8	29.4	36.4	40.6	41.7	38.2	37.0	36.7	35.0	29.2	23.0	32.7
	Min	5.4	8.1	13.4	19.2	23.9	28.0	27.3	26.4	23.7	17.6	11.0	6.1	17.5
Sub Div. Mean	**Max**	**24.1**	**26.8**	**32.6**	**38.2**	**41.3**	**40.7**	**36.9**	**35.2**	**36.0**	**36.1**	**31.0**	**25.6**	**33.7**
	Min	**7.1**	**10.2**	**16.0**	**22.0**	**25.9**	**27.7**	**26.7**	**25.6**	**24.2**	**19.6**	**13.2**	**8.2**	**18.9**

TABLE-II

MEAN DAILY MAXIMUM AND MEAN DAILY MINIMUM TEMPERATURE(°C)

EAST RAJASTHAN

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Ajmer	Max	23.8	26.5	32.0	37.5	40.4	39.1	34.3	32.0	33.6	34.6	29.8	25.2	32.4
	Min	7.2	10.2	15.7	21.9	26.4	26.9	25.3	24.3	23.6	18.8	12.8	8.2	18.4
Alwar	Max	21.8	24.8	31.6	37.3	40.6	40.6	35.3	33.1	33.9	33.7	28.9	23.3	32.1
	Min	7.6	10.6	16.4	22.8	27.0	29.3	27.0	25.8	24.5	19.2	13.2	8.9	19.4
Banswara	Max	27.9	30.4	35.0	39.5	40.8	37.4	32.2	30.2	32.8	34.9	32.6	28.7	33.5
	Min	12.3	14.6	18.9	23.8	26.4	25.7	24.1	23.2	22.7	20.3	16.8	13.1	20.2
Bharatpur	Max	22.4	25.5	32.4	38.7	42.1	41.7	34.9	33.7	35.0	34.4	29.6	24.5	32.9
	Min	7.2	9.2	14.3	20.6	25.7	28.0	26.4	25.6	23.9	19.0	12.7	8.1	18.4
Bhilwara	Max	23.9	27.0	32.7	37.8	40.9	39.1	33.5	31.4	33.1	34.0	30.0	25.4	32.4
	Min	7.5	10.2	15.5	21.6	25.7	26.3	24.6	23.4	22.2	18.1	12.9	8.8	18.1
Chambal (Rawat Bhata Dam)	Max	24.7	27.5	33.2	38.1	41.0	38.7	33.2	31.0	32.8	34.0	29.9	25.7	32.5
	Min	9.6	12.1	17.4	22.8	26.8	27.0	24.8	23.7	22.7	18.9	14.2	10.6	19.2
Chittorgarh	Max	24.5	26.7	33.0	38.2	40.7	38.5	32.5	30.6	32.9	33.9	29.7	25.8	32.3
	Min	6.7	8.6	14.3	20.4	24.6	25.3	23.6	22.5	21.2	16.8	11.6	7.5	16.9
Dholpur	Max	23.3	26.7	32.9	39.5	42.4	41.7	35.5	33.5	34.4	34.9	30.3	24.7	33.3
	Min	6.3	9.4	14.2	21.2	26.1	28.6	26.5	25.2	23.7	18.3	12.0	7.0	18.2
Dungarpur	Max	26.2	28.9	34.4	38.6	40.0	37.6	32.0	30.1	32.5	34.4	31.1	27.6	32.8
	Min	8.7	11.1	15.8	21.5	25.3	25.7	24.1	23.4	22.5	18.9	14.8	10.3	18.5
Jaipur (Sangner)	Max	22.6	25.2	31.2	37.0	40.1	39.3	34.2	32.3	33.7	33.9	29.1	24.2	31.9
	Min	7.9	10.6	15.7	21.4	25.3	27.2	25.7	24.5	23.0	18.9	13.5	8.9	18.5
Jhalawar	Max	25.4	28.1	34.0	39.0	42.0	39.3	33.5	31.3	32.9	34.3	30.7	26.5	33.1
	Min	8.7	11.4	16.7	22.3	26.4	26.8	24.4	23.6	22.7	18.7	13.9	9.6	18.8

TABLE-II (contd…)
MEAN DAILY MAXIMUM AND MEAN DAILY MINIMUM TEMPERATURE(°C)
EAST RAJASTHAN

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Kota	Max	24.5	27.8	33.8	38.9	41.8	40.2	34.6	32.0	33.4	34.7	31.0	26.0	33.2
	Min	9.3	12.4	18.0	24.3	28.1	28.1	25.3	24.4	23.9	20.6	14.9	10.7	20.0
Kota (A)	Max	23.7	27.0	33.0	38.8	42.0	39.9	34.1	32.0	33.9	34.5	30.0	25.2	32.8
	Min	10.6	13.5	18.9	25.0	29.1	29.0	26.4	25.2	24.9	21.6	16.1	11.8	21.0
Kota (PBO)	Max	23.6	26.2	32.5	39.0	42.4	40.3	34.3	32.0	34.3	34.6	29.8	25.1	32.8
	Min	9.8	11.9	17.1	23.6	28.3	28.5	25.9	24.8	24.6	20.8	15.2	10.9	20.1
Pilani	Max	22.4	25.2	31.3	36.9	40.2	40.6	36.3	34.8	35.5	35.0	29.9	24.2	32.7
	Min	4.5	7.7	13.6	19.2	23.9	27.3	26.2	25.1	23.0	17.5	11.1	5.4	17.0
Sawai Madhopur	Max	24.3	26.5	32.8	38.8	42.3	41.2	34.3	32.3	34.3	34.7	30.6	25.5	33.1
	Min	6.2	8.2	13.8	20.4	25.1	26.5	24.1	22.9	21.9	17.2	12.4	7.9	17.2
Sikar	Max	22.7	25.5	31.3	36.8	39.7	39.6	35.3	33.6	34.2	34.2	29.3	23.8	32.2
	Min	4.3	7.1	12.6	18.5	22.9	25.7	24.9	24.1	22.2	16.7	10.0	5.1	16.2
Tonk	Max	23.6	26.5	32.8	38.3	41.4	40.4	35.2	32.9	34.2	34.9	30.0	25.1	32.9
	Min	6.9	9.7	15.5	22.3	26.5	28.5	26.5	25.4	24.1	19.3	13.0	8.0	18.8
Udaipur/ Dabok (A)	Max	24.2	26.9	32.3	37.2	39.5	37.1	31.9	30.0	32.3	33.6	29.4	25.3	31.6
	Min	7.1	9.3	14.3	20.3	25.0	26.0	24.5	23.1	21.4	16.9	11.8	7.9	17.3
Udaipur (City)	Max	24.2	27.1	32.2	36.4	38.4	36.1	31.1	29.5	31.5	33.1	29.6	25.9	31.3
	Min	7.1	9.6	15.0	20.4	23.9	24.6	23.0	22.1	20.6	16.4	11.7	8.1	16.9
Sub Div. Mean	**Max**	**24.0**	**26.8**	**32.7**	**38.1**	**40.9**	**39.4**	**33.9**	**31.9**	**33.6**	**34.3**	**30.1**	**25.4**	**32.6**
	Min	**7.8**	**10.4**	**15.7**	**21.7**	**25.9**	**27.1**	**25.2**	**24.1**	**23.0**	**18.6**	**13.2**	**8.8**	**18.5**
HILL STATION														
Mount Abu	Max	20.0	21.7	25.9	30.0	31.9	29.3	24.8	23.1	25.4	27.5	24.4	21.6	25.5
	Min	5.7	8.0	12.8	17.4	19.8	19.0	18.3	17.6	16.9	14.4	10.2	6.6	13.9

*Hill stations not considered for sub-divisional mean.

TABLE III
MEAN RELATIVE HUMIDITY(%)
RAJASTHAN WEST

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Barmer	M	51	49	44	42	54	68	77	79	72	54	50	51	58
	E	28	26	22	22	23	34	49	53	42	29	31	30	32
Bikaner (P.B.O)	M	67	53	48	34	36	60	66	70	63	49	51	64	54
	E	31	22	21	15	16	25	44	48	37	26	32	37	30
Bikaner	M	63	56	47	36	36	52	68	72	65	47	48	59	54
	E	30	28	22	17	15	25	45	49	38	24	30	34	30
Churu	M	72	65	56	46	44	54	71	77	70	57	60	69	62
	E	38	33	28	25	24	32	54	58	48	32	34	39	37
Erinpura/	M	75	66	53	49	54	66	78	83	76	62	68	77	67
Jawaibandh	E	44	46	33	33	33	44	64	71	59	47	49	51	47
Jaisalmer	M	57	52	45	43	55	65	73	75	70	53	52	57	58
	E	30	26	22	21	21	29	44	48	38	27	29	32	31
Jalore	M	55	52	44	42	55	65	75	79	69	54	52	56	58
	E	33	32	27	26	29	39	56	61	48	34	36	37	38
Jodhpur	M	54	49	38	35	45	60	73	80	72	52	48	54	55
	E	26	24	17	15	18	31	50	58	45	26	27	30	31
Nagaur	M	54	49	42	39	42	57	72	75	65	48	48	52	54
	E	43	36	32	28	23	36	55	60	47	36	44	43	40
Phalodi	M	59	55	48	44	51	64	73	76	70	53	50	55	58
	E	32	29	27	26	25	32	46	50	39	28	31	32	33
Sriganganagar	M	81	75	65	48	39	48	68	72	68	62	71	81	65
	E	43	37	33	23	21	27	49	53	45	37	43	48	38
Sub Div.Mean	**M**	**60**	**54**	**46**	**40**	**45**	**57**	**70**	**74**	**67**	**52**	**53**	**59**	**56**
	E	**37**	**32**	**28**	**24**	**24**	**35**	**53**	**57**	**47**	**34**	**37**	**40**	**37**

M: MORNING

E: EVENING

TABLE III
MEAN RELATIVE HUMIDITY(%)
RAJASTHAN EAST

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Ajmer	M	65	56	41	35	38	57	75	80	69	54	56	64	58
	E	34	28	21	22	22	36	58	67	53	34	37	40	38
Alwar	M	80	71	58	47	44	53	73	79	71	66	68	78	66
	E	49	43	38	32	32	40	64	71	61	48	48	53	48
Banswara	M	48	44	38	38	53	68	80	83	76	56	51	54	57
	E	31	27	23	21	24	42	64	70	55	35	34	36	39
Bharatpur	M	80	73	62	47	43	53	79	82	76	65	68	77	67
	E	52	43	35	31	26	39	68	70	58	43	48	56	47
Bhilwara	M	61	52	40	32	35	55	77	82	74	54	55	62	57
	E	29	23	17	15	18	35	61	71	55	32	33	34	35
Chambal (Rawat Bhata Dam)	M	67	57	43	35	39	60	79	86	78	63	65	70	62
	E	37	29	24	22	23	41	68	77	61	37	37	40	41
Chittorgarh	M	73	61	46	36	44	62	81	86	78	62	64	72	64
	E	38	30	23	19	21	39	65	72	55	35	37	41	40
Dholpur	M	64	56	45	33	33	47	74	79	72	54	52	60	56
	E	45	38	27	22	23	35	65	72	62	44	43	47	44
Dungarpur	M	67	57	43	46	62	75	88	90	82	68	65	69	68
	E	37	31	25	26	30	46	70	78	65	45	41	41	45
Jaipur (Sangner)	M	63	56	43	30	33	51	74	81	69	48	50	60	55
	E	33	27	18	14	17	31	60	68	50	28	31	37	34
Jhalawar	M	63	52	35	29	34	58	78	85	78	59	58	65	58
	E	33	27	19	16	17	36	62	74	59	34	32	35	37
Kota	M	63	51	37	29	31	52	72	80	72	56	56	63	55
	E	38	30	22	18	20	38	62	74	60	37	36	42	40
Kota (A)	M	57	47	33	23	28	51	73	80	67	47	48	58	51
	E	32	26	17	12	14	32	59	68	50	28	30	34	34
Kota P.B.O	M	67	58	44	30	33	52	75	80	66	51	54	64	56
	E	43	36	25	16	18	34	61	70	50	34	36	42	39
Pilani	M	69	63	54	43	43	56	75	82	75	58	58	66	62
	E	35	29	23	20	22	33	57	64	51	33	31	34	36
Sawai Madhopur	M	75	63	47	34	34	50	76	83	73	57	62	73	61
	E	41	32	23	20	19	34	62	71	54	37	41	44	40
Sikar	M	61	53	47	41	47	56	73	77	68	54	53	58	57
	E	37	34	30	26	31	37	59	63	51	34	35	38	40
Tonk	M	73	66	54	45	47	60	77	84	77	64	66	74	66
	E	51	43	38	34	32	43	66	74	61	48	52	56	50
Udaipur/Dabok (a)	M	65	55	41	34	41	64	79	84	76	59	60	67	60
	E	33	28	20	19	24	44	68	75	58	34	35	37	40
Udaipur (City)	M	66	59	46	41	45	66	79	82	74	62	62	67	62
	E	41	34	28	29	33	51	70	75	63	43	45	45	46
Sub Div.Mean	**M**	**66**	**58**	**45**	**36**	**40**	**57**	**77**	**82**	**74**	**58**	**59**	**66**	**60**
	E	**39**	**32**	**25**	**22**	**23**	**38**	**63**	**71**	**57**	**37**	**38**	**42**	**41**
HILL STATION														
Mount Abu	M	54	47	40	33	35	74	93	95	81	56	57	61	61
	E	38	31	27	22	28	52	80	87	71	42	41	44	47

Hill stations not considered for sub-divisional mean

M: MORNING

E: EVENING

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
WEST RAJASTHAN														
Barmer	a	18	16	15	18	21	8	1	2	11	24	21	18	173
	b	0	1	1	1	0	2	6	6	1	0	0	0	18
	c	1.6	1.7	1.9	1.6	1.0	3.2	5.4	5.2	2.6	0.8	0.9	1.5	2.3
Bikaner P.B.O	a	16	13	13	17	22	20	7	7	17	25	23	16	196
	b	1	1	1	0	1	1	2	3	1	0	0	1	12
	c	2.2	2.2	2.5	1.7	1.1	1.3	3.7	3.6	1.4	0.7	0.9	2.3	2.0
Bikaner	a	17	14	14	16	22	20	7	6	16	26	22	17	197
	b	1	1	1	0	0	1	2	2	1	0	0	1	10
	c	2.0	2.0	2.0	1.6	0.9	1.3	3.3	3.3	1.4	0.5	0.8	1.7	1.7
Churu	a	17	15	15	17	22	19	8	6	15	25	22	17	198
	b	1	1	1	0	1	1	3	3	1	0	0	1	13
	c	1.9	2.0	1.8	1.6	1.2	1.6	3.6	3.7	1.7	0.6	1.0	1.6	1.9
Erinpura (Jawaibandh)	a	19	16	18	19	23	8	1	1	6	22	21	17	171
	b	2	2	2	1	1	6	18	18	5	1	1	1	58
	c	1.9	2.2	2.0	1.7	1.0	3.9	6.4	6.5	3.9	1.1	1.4	1.9	2.8
Jaisalmer	a	20	17	18	20	27	18	10	9	17	25	22	19	222
	b	1	1	1	1	0	1	3	3	1	0	1	1	14
	c	1.5	1.8	1.6	1.5	0.5	1.7	3.4	3.4	1.5	0.5	0.8	1.5	1.6
Jalore	a	24	19	23	23	26	12	4	4	14	25	24	25	223
	b	0	1	0	0	0	2	10	8	2	0	1	0	24
	c	0.9	1.3	0.8	0.7	0.5	2.6	5.2	5.1	2.4	0.6	0.7	0.8	1.8
Nagaur	a	21	19	22	23	26	21	4	4	19	28	24	23	234
	b	1	1	0	0	0	1	5	5	1	0	0	1	15
	c	1.6	1.7	1.4	1.3	0.7	2.0	4.8	4.3	1.9	0.5	0.9	1.3	1.9
Phalodi	a	18	16	15	18	24	20	6	5	15	25	23	17	202
	b	0	1	1	0	0	1	2	2	1	0	0	1	9
	c	1.5	1.7	1.6	1.2	0.6	1.4	3.1	3.4	1.6	0.5	0.8	1.4	1.6
Sriganganagar	a	19	14	17	16	22	22	12	11	21	28	25	19	226
	b	2	2	1	1	1	1	3	2	1	0	0	1	15
	c	2.0	2.2	2.0	1.6	1.0	1.1	2.9	2.6	1.0	0.3	0.7	1.8	1.6
Sub Div. Mean	**a**	**19**	**16**	**17**	**19**	**24**	**17**	**6**	**6**	**15**	**25**	**23**	**19**	**206**
	b	**1**	**1**	**1**	**0**	**0**	**2**	**5**	**5**	**2**	**0**	**0**	**1**	**18**
	c	**1.7**	**1.9**	**1.8**	**1.5**	**0.9**	**2.0**	**4.2**	**4.1**	**1.9**	**0.6**	**0.9**	**1.6**	**1.9**

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

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Ajmer	a	19	17	18	18	23	14	4	3	11	25	21	19	192
	b	1	1	1	1	1	2	7	8	3	0	1	1	27
	c	1.6	1,7	1,6	1,6	0.9	2.5	5.0	5.4	2.8	0.8	1.1	1.5	2.2
Alwar	a	19	18	20	19	22	18	5	3	12	24	24	20	204
	b	2	1	1	1	1	2	6	7	4	1	1	1	28
	c	1.9	2.1	1.7	1.5	1.2	2.1	4.7	5.1	2.8	0.9	1.0	1.6	2.2
Banswara	a	24	21	25	25	23	8	4	2	12	23	23	24	214
	b	2	2	2	2	1	4	7	7	4	2	2	2	37
	c	1.0	1.0	0.8	0.8	0.9	3.3	4.7	5.3	3.3	1.4	1.0	1.0	2.0
Bharatpur	a	20	21	19	21	22	24	18	7	7	20	25	23	230
	b	1	1	1	1	1	2	10	7	3	1	1	1	30
	c	1.6	1.6	1.3	1.1	0.9	2.0	4.6	4.4	2.3	0.6	0.8	1.2	1.9
Bhilwara	a	19	16	17	20	22	13	1	1	6	23	21	18	177
	b	2	2	1	1	1	4	16	18	6	1	2	2	56
	c	2.0	2.1	2.0	1.9	1.2	3.4	6.3	6.5	3.7	1.1	1.7	2.0	2.8
Chambal	a	21	19	23	23	24	14	3	2	13	24	21	21	208
(Rawat Bhata	b	1	1	0	0	0	3	12	17	5	1	1	1	42
Dam)	c	1.1	1.1	0.8	0.6	0.6	2.3	5.2	5.7	2.7	0.8	1.0	1.0	1.9
Chittorgarh	a	21	21	25	22	26	17	10	7	18	24	25	23	239
	b	2	1	0	0	1	3	10	15	3	1	1	1	38
	c	1.6	1.2	0.8	0.9	0.6	2.3	4.2	5.1	2.0	0.9	0.8	1.1	1.8
Dholpur	a	21	19	22	23	23	17	6	6	13	26	22	24	222
	b	3	2	1	1	1	4	13	13	5	1	2	2	48
	c	1.8	1.5	1.3	1.0	0.9	2.5	5.1	5.2	3.0	0.7	1.2	1.4	2.1
Dungarpur	a	20	18	20	20	20	4	0	0	5	18	21	18	164
	b	1	0	0	1	1	3	13	14	3	1	1	1	39
	c	1.5	1.6	1.4	1.5	1.4	4.4	6.5	6.4	3.9	1.6	1.4	1.6	2.8

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Jaipur	a	15	13	15	16	19	13	3	2	9	20	20	15	160
(Sanganer)	b	1	1	1	0	1	2	8	8	2	1	0	1	26
	c	1.9	2.1	2.0	1.8	1.3	2.6	5.3	5.6	3.0	1.0	1.3	1.7	2.5
Jhalawar	a	24	24	25	26	24	17	14	8	15	27	25	25	254
	b	1	0	0	0	2	3	5	6	2	0	0	0	19
	c	0.9	0.7	0.7	0.8	1.0	2.3	3.8	4.8	2.7	0.5	0.8	0.8	1.7
Kota	a	23	21	22	21	24	16	2	1	13	25	23	24	215
	b	1	1	0	1	1	2	12	16	4	1	1	1	41
	c	1.4	1.3	1.5	1.5	0.8	2.6	5.7	6.1	3.4	0.9	1.3	1.6	2.3
Kota (A)	a	17	16	18	18	23	11	3	2	8	20	20	18	174
	b	1	1	0	0	0	2	8	8	3	1	1	1	26
	c	1.5	1.5	1.4	1.2	0.8	2.8	5.3	5.6	3.1	1.1	1.2	1.5	2.3
Kota PBO	a	19	15	17	20	21	12	2	1	7	21	21	17	173
	b	1	1	0	0	0	2	7	9	2	1	1	1	25
	c	1.5	1.6	1.4	1.1	0.9	2.8	5.4	5.7	2.8	1.1	1.2	1.5	2.3
Pilani	a	21	18	19	21	23	20	10	9	18	27	25	22	233
	b	1	1	1	0	1	1	3	4	1	0	0	1	14
	c	1.8	1.8	1.8	1.4	1.0	1.7	3.6	3.6	1.7	0.5	0.9	1.4	1.8
Sawaii	a	25	23	27	26	29	23	10	10	22	27	25	27	274
Madhopur	b	2	1	1	1	0	2	13	13	2	1	2	1	39
	c	0.9	1.0	0.7	0.5	0.5	1.4	4.5	4.5	1.6	0.5	0.9	0.8	1.5
Sikar	a	22	19	21	23	20	15	6	7	16	27	26	24	226
	b	0	0	0	0	0	0	2	2	1	0	0	0	5
	c	0.9	0.8	0.7	0.6	0.8	1.2	2.5	2.4	1.3	0.3	0.4	0.7	1.1

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Tonk	a	20	17	19	19	23	14	5	2	12	24	22	22	199
	b	0	0	0	0	0	1	3	4	1	0	1	0	10
	c	1.6	1.6	1.6	1.3	1.0	2.4	4.7	5.0	2.7	0.8	1.2	1.4	2.1
Udaipur/Dabok (A)	a	18	16	18	18	24	10	3	2	9	20	21	18	177
	b	1	1	0	0	0	2	9	11	3	1	1	0	29
	c	1.4	1.4	1.4	1.3	0.6	3.2	5.8	5.9	3.1	1.0	1.1	1.4	2.3
Udaipur (City)	a	24	23	24	24	27	15	6	5	13	26	24	24	235
	b	1	0	0	1	0	2	8	9	3	0	0	0	24
	c	1.0	1.0	1.0	1.0	0.5	2.7	5.4	5.6	2.8	0.7	1.0	1.0	2.0
Sub Div. Mean	**a**	**21**	**19**	**21**	**21**	**23**	**14**	**5**	**4**	**12**	**24**	**23**	**21**	**208**
	b	**1**	**1**	**1**	**1**	**1**	**2**	**9**	**10**	**3**	**1**	**1**	**1**	**32**
	c	**1.4**	**1.4**	**1.3**	**1.2**	**0.9**	**2.5**	**4.9**	**5.2**	**2.7**	**0.9**	**1.1**	**1.3**	**2.1**
HILL STATION														
Mount Abu	a	25	22	22	22	25	13	1	1	14	26	24	23	218
	b	1	1	1	0	1	6	23	23	4	1	1	1	63
	c	0.8	1.0	1.1	0.9	0.8	4.1	6.7	6.9	3.1	0.6	0.7	0.9	2.3

a: Days with clear sky.
b: Days with sky overcast.
c: Mean cloud amount.
** Okta = Unit, equal to area of one eighth of the sky used in specifying cloud amount. For Example: 1 Okta means $1/8^{th}$ of the sky covered.
* Hill stations not considered for sub-divisional mean.

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
WEST RAJASTHAN														
Barmer	a	18	14	14	14	19	15	3	1	6	18	20	17	159
	b	0	1	1	1	0	1	4	4	1	0	0	0	13
	c	1.8	2.0	2.4	2.3	1.3	2.4	4.7	5.0	3.3	1.4	1.3	1.8	2.5
Bikaner	a	14	13	10	12	14	14	5	2	9	18	20	12	143
(P.B.O)	b	1	1	1	0	1	1	4	3	1	0	0	1	14
	c	2.4	2.6	3.1	2.6	2.2	2.3	4.6	5.1	2.6	1.4	1.0	2.3	2.7
Bikaner	a	15	12	12	10	16	13	4	3	9	19	19	16	148
	b	1	1	1	1	0	1	2	2	1	0	0	0	10
	c	2.0	2.2	2.6	2.4	1.6	2.1	4.2	4.3	2.4	1.0	1.0	1.9	2.3
Churu	a	16	14	12	12	14	12	4	3	7	21	20	16	151
	b	1	1	1	1	1	1	3	3	1	0	0	0	13
	c	1.9	2.2	2.4	2.4	2.0	2.4	4.6	4.8	2.7	1.0	1.1	1.8	2.4
Erinpura	a	17	16	16	14	19	8	0	0	3	17	19	17	146
(Jawaibandh)	b	1	2	2	2	1	6	15	16	5	1	1	1	53
	c	2.0	2.2	2.5	2.4	1.6	3.8	6.5	6.4	4.6	1.9	1.8	2.1	3.1
Jaisalmer	a	18	15	15	15	19	17	11	9	13	24	22	18	196
	b	1	1	1	1	1	1	3	3	1	0	0	1	14
	c	1.6	1.8	2.2	2.0	1.2	1.7	3.4	3.4	1.9	0.8	0.9	1.5	1.9
Jalore	a	22	18	21	22	25	16	6	5	13	19	22	22	211
	b	0	1	1	0	0	1	4	4	1	0	1	0	13
	c	1.1	1.3	1.2	1.0	0.5	2.1	4.3	4.1	2.1	1.1	0.8	0.9	1.7
Nagaur	a	21	18	21	18	20	18	3	3	14	23	25	23	207
	b	1	1	0	1	1	1	5	5	2	0	0	0	17
	c	1.7	1.9	1.8	2.2	1.6	2.5	5.1	4.7	2.5	0.9	1.0	1.3	2.3
Phalodi	a	16	14	12	12	16	16	8	4	9	20	22	17	166
	b	0	1	1	1	0	1	2	2	0	0	0	0	8
	c	1.5	1.8	2.0	2.0	1.5	1.6	3.2	3.6	2.2	0.9	1.0	1.4	1.9
Sriganganagar	a	16	12	14	15	19	19	7	4	14	26	23	15	184
	b	1	2	1	1	1	1	3	3	1	0	0	2	16
	c	2.0	2.3	2.5	2.1	1.4	1.5	3.8	4.0	1.8	0.5	0.9	1.9	2.1
Sub Div.	**a**	**17**	**15**	**15**	**14**	**18**	**15**	**5**	**3**	**10**	**21**	**21**	**17**	**171**
Mean	**b**	**1**	**1**	**1**	**1**	**1**	**1**	**5**	**5**	**1**	**0**	**0**	**1**	**18**
	c	**1.8**	**2.0**	**2.3**	**2.1**	**1.5**	**2.2**	**4.4**	**4.5**	**2.6**	**1.1**	**1.1**	**1.7**	**2.3**

a: Days with clear sky.
b: Days with sky overcast.
c: Mean cloud amount.
** Okta = Unit, equal to area of one eighth of the sky used in specifying cloud amount.
For example: 1 Okta means $1/8^{th}$ 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 HOURS IST

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Ajmer	a	18	14	17	16	17	12	3	3	8	20	20	17	165
	b	0	1	1	1	1	2	7	7	2	1	1	1	25
	c	1.6	2.0	1.9	2.1	1.7	2.7	5.1	5.3	3.3	1.3	1.3	1.7	2.5
Alwar	a	18	13	16	15	16	5	2	1	5	20	22	20	153
	b	1	1	1	1	1	2	6	5	2	1	0	0	21
	c	2.0	2.5	2.5	2.6	2.6	3.8	5.7	5.5	3.8	1.4	1.4	1.8	3.0
Banswara	a	23	20	25	24	24	10	4	2	10	23	23	23	211
	b	2	2	2	2	1	3	5	5	4	2	2	2	32
	c	1.0	1.0	0.9	0.9	0.7	2.7	4.2	4.7	3.2	1.1	1.3	1.1	1.9
Bharatpur	a	20	17	19	18	20	14	5	5	10	24	23	21	196
	b	1	1	1	1	1	2	9	6	2	1	1	1	27
	c	1.5	1.7	1.5	1.5	1.6	2.7	4.9	4.6	2.8	0.8	0.9	1.3	2.1
Bhilwara	a	19	16	17	16	16	3	1	0	3	17	18	19	145
	b	2	2	1	3	2	6	18	19	7	2	3	1	66
	c	1.9	2.4	2.3	2.6	2.3	4.7	5.9	6.7	4.8	2.0	2.0	2.1	3.3
Chambal	a	21	20	21	18	13	6	1	0	6	20	21	21	168
(Rawat Bhata	b	1	1	1	1	2	5	15	18	6	1	1	1	53
Dam)	c	1.1	1.1	1.1	1.4	1.9	3.5	5.9	6.3	3.5	1.1	1.2	1.1	2.4
Chittorgarh	a	22	20	24	18	18	15	9	5	18	21	24	21	215
	b	1	1	0	1	1	3	12	15	2	1	1	1	39
	c	1.3	1.4	1.0	1.7	1.8	3.0	4.3	5.4	2.3	1.2	1.0	1.4	2.2
Dholpur	a	21	19	21	19	19	14	5	5	12	24	24	23	206
	b	2	2	2	1	2	5	14	13	6	1	1	1	50
	c	1.6	1.6	1.6	1.7	1.6	3.0	5.5	5.3	3.3	0.9	1.2	1.3	2.4
Dungarpur	a	21	18	19	20	23	6	0	0	4	17	22	21	171
	b	0	0	0	0	0	2	7	9	2	1	1	0	22
	c	1.3	1.6	1.7	1.8	1.2	3.3	5.5	5.8	3.6	1.7	1.3	1.2	2.5
Jaipur	a	13	11	11	10	12	6	1	1	3	14	17	13	112
(Sanganer)	b	1	1	1	1	1	3	8	8	2	1	1	0	28
	c	2.0	2.4	2.6	2.7	2.2	3.4	6.0	6.1	3.7	1.5	1.5	1.9	3.0
Jhalawar	a	25	23	24	24	21	15	14	8	13	26	25	25	243
	b	0	0	0	0	2	3	5	6	3	0	0	0	19
	c	0.9	0.7	0.9	1.2	1.6	2.7	3.9	4.8	3.3	0.8	0.7	0.8	1.9
Kota	a	20	19	18	17	18	4	1	0	4	20	21	22	164
	b	1	1	1	1	1	4	12	15	5	1	1	1	44
	c	1.4	1.5	2.0	2.4	1.9	3.9	6.0	6.4	4.1	1.4	1.3	1.5	2.8
Kota (PBO)	a	18	13	14	13	11	4	0	0	1	14	19	16	123
	b	0	1	0	0	0	3	9	9	2	1	1	0	26
	c	1.4	1.9	1.9	2.0	2.1	4.0	6.1	6.2	3.9	1.5	1.3	1.6	2.8
Kota (A)	a	16	13	14	11	11	5	2	1	3	13	17	15	121
	b	0	1	0	1	0	3	8	9	2	1	1	0	26
	c	1.6	1.8	1.9	2.3	2.2	3.9	6.0	6.2	4.0	1.6	1.5	1.7	2.9
Pilani	a	19	15	16	17	17	13	4	4	12	23	23	20	183
	b	1	1	1	0	1	1	3	4	1	0	1	1	15
	c	1.9	2.2	2.4	2.2	1.9	2.4	4.6	4.4	2.7	1.0	1.0	1.5	2.4
Sawai	a	27	23	26	25	25	22	9	9	20	27	25	27	265
Madhopur	b	1	1	1	1	1	2	13	12	2	1	2	0	37
	c	0.7	0.9	0.9	0.8	0.8	1.8	4.6	4.5	1.8	0.5	0.9	0.6	1.6

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

STATION		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
EAST RAJASTHAN														
Sikar	a	18	16	15	15	13	9	3	2	10	21	22	19	163
	b	0	0	0	0	0	0	2	2	0	0	0	0	4
	c	1.0	1.1	1.1	1.1	1.3	1.6	2.9	2.8	1.7	0.6	0.6	0.8	1.4
Tonk	a	18	16	16	14	17	6	1	1	5	18	20	19	151
	b	0	0	0	0	0	1	4	4	1	1	1	0	12
	c	1.5	1.9	2.1	2.1	2.0	3.4	5.4	5.3	3.2	1.4	1.4	1.6	2.6
Udaipur (City)	a	22	21	21	20	21	12	5	5	9	18	22	22	198
	b	1	0	0	1	0	3	9	10	4	1	0	0	29
	c	1.1	1.2	1.6	1.6	1.2	2.9	5.8	6.0	3.8	1.8	1.4	1.3	2.5
Udaipur/Dabok(A)	a	16	16	15	11	14	6	1	1	2	12	18	17	129
	b	1	0	1	1	1	3	10	13	3	1	1	0	35
	c	1.6	1.7	2.1	2.1	1.9	3.8	6.1	6.4	4.5	2.1	1.5	1.6	2.9
Sub Div. Mean	**a**	**20**	**17**	**18**	**17**	**17**	**9**	**4**	**3**	**8**	**20**	**21**	**20**	**174**
	b	**1**	**1**	**1**	**1**	**1**	**3**	**9**	**9**	**3**	**1**	**1**	**1**	**32**
	c	**1.4**	**1.6**	**1.7**	**1.8**	**1.7**	**3.2**	**5.2**	**5.4**	**3.4**	**1.3**	**1.2**	**1.4**	**2.4**
HILL STATION														
Mount Abu	a	24	21	23	20	22	12	1	1	5	22	24	23	198
	b	1	1	0	1	1	3	18	19	5	1	1	0	51
	c	0.9	1.0	1.2	1.3	0.9	3.0	6.1	6.4	3.8	1.1	0.8	1.0	2.3

a: Days with clear sky.
b: Days with sky overcast.
c: Mean cloud amount.
** Okta = Unit, equal to area of one eighth of the sky used in specifying cloud amount. For Example: 1 Okta means 1/8th of the sky covered.
* Hill stations not considered for sub-divisional mean.

TABLE IV (b)
MEAN NUMBER OF HOURS OF BRIGHT SUNSHINE PER DAY
RAJASTHAN

STATION	*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Barmer	9.3	9.1	8.9	9.9	10.4	9.2	6.7	7.0	9.1	9.7	9.4	8.9	107.5
Jaipur (Sangner)	8.6	8.9	8.8	9.0	8.1	5.9	4.4	4.8	7.5	9.2	9.1	8.7	93.0
Sriganganagar	7.1	7.1	8.4	8.8	9.5	8.0	6.8	8.6	8.6	8.7	8.5	6.8	96.8

TABLE – V
MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS
WEST RAJASTHAN

DISTRICT		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Barmer	a	1.2	1.4	2.2	2.3	6.9	20.6	88.9	80.5	41.1	3.4	2.8	0.4	251.7
	b	0.1	0.2	0.1	0.2	0.5	1.2	4.1	4.0	2.1	0.3	0.2	0.0	13.0
Bikaner	a	4.3	6.9	5.9	4.8	14.4	27.3	80.2	68.4	35.9	5.9	2.6	1.9	258.5
	b	0.5	0.6	0.6	0.5	1.1	1.8	4.4	4.1	2.2	0.4	0.2	0.2	16.6
Churu	a	6.0	7.3	6.1	4.4	16.0	36.6	129.1	104.7	47.7	7.9	2.7	2.5	371.0
	b	0.5	0.7	0.7	0.5	1.4	2.5	6.0	5.7	2.5	0.5	0.2	0.3	21.5
Ganganagar	a	4.3	5.9	5.1	5.5	8.0	23.5	79.7	76.7	29.1	1.6	1.6	2.4	243.4
	b	0.4	0.6	0.5	0.5	0.7	1.4	4.0	3.6	1.5	0.1	0.1	0.2	13.6
Jaisalmer	a	1.6	2.8	1.9	3.0	6.6	18.6	59.6	50.1	23.4	2.3	1.9	1.1	172.9
	b	0.2	0.4	0.2	0.3	0.5	1.1	3.2	2.4	1.4	0.2	0.1	0.1	10.1
Jalore	a	2.1	1.4	2.9	1.7	8.9	32.7	164.7	136.4	66.5	8.1	7.5	1.0	433.9
	b	0.2	0.2	0.1	0.2	0.6	1.9	6.1	6.0	3.0	0.4	0.4	0.1	19.2
Jodhpur	a	2.7	2.9	2.6	4.8	10.0	29.3	110.7	101.4	47.1	5.4	2.4	1.4	320.7
	b	0.3	0.3	0.3	0.3	0.8	2.0	5.3	5.2	2.5	0.3	0.2	0.1	17.6
Nagaur	a	4.4	5.8	2.8	4.2	14.7	37.9	143.9	115.4	50.3	6.2	2.7	2.9	391.2
	b	0.4	0.5	0.3	0.4	1.2	2.4	6.5	6.5	3.0	0.4	0.2	0.3	22.1
Pali	a	2.4	1.7	2.0	1.8	6.6	5.0	177.7	162.3	82.9	7.1	3.3	1.1	498.9
	b	0.3	0.2	0.1	0.2	0.5	2.5	6.7	7.3	3.6	0.5	0.2	0.1	22.2
Sub.Div.	**a**	**3.2**	**4.0**	**3.5**	**3.6**	**10.2**	**30.7**	**114.9**	**99.5**	**47.1**	**5.3**	**3.1**	**1.6**	**326.7**
Mean.	**b**	**0.3**	**0.4**	**0.3**	**0.3**	**0.8**	**1.9**	**5.1**	**5.0**	**2.4**	**0.3**	**0.2**	**0.1**	**17.1**

TABLE – V
MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS
EAST RAJASTHAN

DISTRICT		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Ajmer	a	4.2	2.4	2.3	2.2	8.9	42.3	169.0	153.4	58.1	8.0	2.3	1.8	454.9
	b	0.3	0.2	0.2	0.2	0.6	2.2	7.1	7.1	2.9	0.4	0.2	0.1	21.5
Alwar	a	9.7	10.0	5.8	5.4	15.9	42.3	191.3	211.9	99.1	18.7	3.8	4.7	618.6
	b	0.8	1.0	0.6	0.6	1.2	2.6	8.9	9.4	4.3	0.9	0.3	0.4	31.0
Banswara	a	2.6	0.4	1.9	1.0	4.3	96.2	283.9	297.1	154.5	24.8	12.1	3.4	882.2
	b	0.2	0.0	0.1	0.1	0.2	4.1	11.5	12.4	6.0	0.9	0.5	0.2	36.2
Baran	a	7.2	3.2	2.9	1.6	6.3	73.5	292.3	311.2	122.6	25.3	9.0	3.9	859.0
	b	0.6	0.3	0.3	0.2	0.5	4.2	11.4	13.3	5.9	1.0	0.5	0.4	38.6
Bharatpur	a	8.8	8.2	5.2	3.8	11.0	44.8	193.7	226.0	97.9	16.1	3.3	3.6	622.4
	b	0.7	0.8	0.6	0.4	0.9	2.7	9.5	10.2	4.7	0.8	0.3	0.3	31.9
Bhilwara	a	4.1	3.1	2.9	2.2	9.0	64.8	194.9	207.1	83.3	10.5	7.3	3.6	592.8
	b	0.3	0.3	0.2	0.2	0.7	3.7	9.0	9.5	4.2	0.6	0.4	0.2	29.3
Bundi	a	4.7	3.1	3.1	2.0	7.7	60.5	261.3	232.9	98.5	15.0	7.5	2.6	698.9
	b	0.4	0.3	0.3	0.2	0.7	3.4	10.6	10.8	4.7	0.6	0.3	0.2	32.5
Chittorgarh	a	3.8	1.6	2.2	2.5	8.0	75.6	254.2	290.0	120.0	18.7	14.8	2.5	793.9
	b	0.3	0.2	0.2	0.2	0.7	3.9	9.8	11.4	5.4	0.9	0.6	0.2	33.8
Dausa	a	9.2	6.9	3.8	3.5	13.3	53.8	234.9	236.6	93.3	16.3	4.5	3.7	679.8
	b	0.7	0.7	0.5	0.3	1.1	3.2	10.6	10.8	5.0	0.8	0.4	0.3	34.4
Dholpur	a	7.7	8.5	6.0	2.0	6.4	46.2	200.4	260.8	109.6	22.1	3.5	3.9	677.1
	b	0.7	0.7	0.5	0.3	0.6	2.4	9.7	10.9	4.9	1.1	0.3	0.3	32.4
Dungarpur	a	1.8	0.7	1.6	1.2	5.3	81.5	228.2	237.3	109.5	15.1	15.0	2.4	699.6
	b	0.2	0.1	0.1	0.1	0.2	3.5	9.8	9.7	4.5	0.7	0.5	0.1	29.5
Hanumangarh	a	7.4	8.6	6.3	4.3	10.5	26.9	103.0	83.2	30.9	5.0	3.1	3.4	292.6
	b	0.6	0.7	0.6	0.4	0.8	1.7	4.4	3.9	1.7	0.3	0.2	0.3	15.6
Jaipur	a	7.1	7.9	3.1	5.2	16.4	56.6	217.3	193.6	71.1	12.6	2.9	3.0	596.8
	b	0.6	0.7	0.4	0.4	1.2	3.0	9.5	9.4	4.1	0.7	0.3	0.3	30.6
Jhalawar	a	7.3	2.3	3.8	1.6	6.6	84.9	279.2	341.7	149.9	26.8	12.2	4.9	921.2
	b	0.7	0.2	0.4	0.2	0.6	4.4	11.2	12.7	6.3	1.1	0.7	0.4	38.9
Jhunjhunu	a	8.2	9.5	6.2	4.9	20.1	45.6	155.2	145.6	60.3	11.6	3.4	5.6	476.2
	b	0.8	0.9	0.7	0.6	1.5	2.9	7.6	7.4	3.4	0.8	0.3	0.4	27.3
Karoli	a	8.7	6.7	3.6	2.4	10.1	48.9	217.9	265.7	97.3	16.8	4.8	3.7	686.6
	b	0.7	0.6	0.4	0.2	0.7	2.7	10.1	11.1	4.8	0.8	0.3	0.3	32.7
Kota	a	6.1	2.2	2.9	1.9	6.9	58.7	261.6	261.4	125.5	21.4	7.1	3.0	758.7
	b	0.6	0.2	0.4	0.2	0.6	3.6	10.4	11.4	5.7	0.9	0.4	0.3	34.7
Rajsamand	a	3.9	2.3	4.1	2.7	11.3	67.9	179.3	178.4	83.9	12.8	6.9	3.0	556.5
	b	0.3	0.2	0.2	0.2	0.8	3.7	8.4	8.6	4.2	0.8	0.5	0.2	28.1
Sawaimadhopur	a	7.8	7.2	3.6	3.7	10.3	54.9	249.6	263.8	98.1	20.5	5.2	4.0	728.7
	b	0.6	0.6	0.4	0.3	0.8	3.2	10.3	11.4	4.8	1.0	0.3	0.3	34.0
Sikar	a	7.4	8.2	3.9	4.1	18.7	45.4	168.3	135.4	53.2	8.3	3.8	2.9	459.6
	b	0.7	0.7	0.5	0.5	1.2	2.8	7.6	6.9	3.1	0.5	0.3	0.3	25.1

TABLE – V (Contd…)
MEAN RAINFALL (mm) AND NUMBER OF RAINY DAYS
EAST RAJASTHAN

DISTRICT		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Sirohi	a	1.2	0.7	1.1	0.8	3.1	59.2	177.6	188.1	112.7	9.3	2.3	0.6	556.7
	b	0.1	0.1	0.1	0.1	0.2	2.9	7.5	8.0	3.9	0.5	0.2	0.1	23.7
Tonk	a	4.1	5.1	2.1	2.2	8.4	63.1	219.0	210.8	76.1	12.6	4.1	2.3	609.9
	b	0.4	0.4	0.2	0.2	0.7	3.2	9.6	9.9	4.0	0.6	0.3	0.2	29.7
Udaipur	a	2.9	1.8	3.6	2.3	7.5	77.3	231.3	226.4	117.0	16.0	9.2	1.9	697.2
	b	0.3	0.2	0.2	0.2	0.6	3.9	10.3	10.5	5.4	1.0	0.5	0.1	33.2
Sub.Div.	**a**	**5.9**	**4.8**	**3.6**	**2.8**	**9.8**	**59.6**	**215.8**	**224.3**	**96.6**	**15.8**	**6.4**	**3.2**	**648.6**
Mean.	**b**	**0.5**	**0.4**	**0.3**	**0.3**	**0.7**	**3.2**	**9.3**	**9.9**	**4.5**	**0.8**	**0.4**	**0.3**	**30.6**

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

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

STATIONS		*JAN*	*FEB*	*MAR*	*APR*	*MAY*	*JUN*	*JUL*	*AUG*	*SEP*	*OCT*	*NOV*	*DEC*	*ANNUAL*
Abu	a	5.4	1.9	4.2	4.0	9.9	88.7	621.9	574.8	244.0	16.9	16.3	2.4	1590.3
(Obsy)	b	0.3	0.2	0.2	0.2	0.6	4.6	16.0	17.3	6.9	1.0	0.7	0.3	48.3
Mount Abu	a	6.7	3.2	3.7	4.4	15.0	116.0	593.5	659.2	242.7	15.5	14.1	3.0	1677.0
	b	0.4	0.4	0.1	0.2	1.0	5.7	16.8	18.8	7.2	0.9	0.8	0.3	52.6

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

Hill stations not considered for subdivisional mean.

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

Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
1. River Mahi (Catchment No. 105)												
Districts/parts of districts within this Catchment:												
East Rajasthan : Banswara, Dungapur, Chittorgarh, Udaipur												
2.5	0.7	2.0	1.2	5.2	90.1	255.6	271.1	137.0	20.8	13.8	2.7	802.7
2. River Sabarmati (Catchment No. 106)												
Districts/parts of districts within this Catchment:												
East Rajasthan : Udaipur, Dungarpur												
2.7	1.6	3.6	1.5	6.4	76.2	267.5	240.5	124.2	14.8	5.4	1.7	746.1
3. Streams of Kathiwar (Catchment No. 107)												
Districts/parts of districts within this Catchment:												
East Rajasthan : Sirohi												
3.2	2.0	2.8	2.1	8.5	58.2	223.3	203.0	112.8	8.7	6.2	1.5	632.3
4. River Luni (Catchment No. 108)												
Districts/parts of districts within this Catchment:												
East Rajasthan : Ajmer, Sirohi, Udaipur, Rajasmand												
West Rajasthan : Barmer, Jalore, Jodhpur, Nagaur, Pali												
3.1	2.6	3.7	3.5	14.2	71.4	191.1	175.4	79.5	10.4	4.7	2.6	562.2
5. River Sutlej between Bhakra Dam Site and the Beas, excluding the Beas (Catchment No. 202)												
Districts/parts of districts within this Catchment:												
West Rajasthan : Ganganagar												
4.1	5.7	5.0	5.5	7.6	22.2	76.9	75.3	12.5	1.4	1.4	2.6	220.2
6. River Yamuna upto its confluence with river Chambal (excluding Chambal) (Catchment No. 403)												
Districts/parts of districts within this Catchment:												
East Rajasthan : Alwar, Bharatpur, Dholpur, Jaipur, Jhunjhunu, Sawai Madhopur, Sikar												
7.9	8.6	5.9	2.3	7.5	45.9	198.8	253.4	107.3	21.3	3.5	4.0	666.2

TABLE – VI (Contd)
MEAN RAINFALL (mm) OVER DIFFERENT RIVER CATCHMENTS OF RAJATHAN

Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
7.	**River Chambal upto Kota Dam Site (Catchment No. 404)**											
	Districts/parts of districts within this Catchment:											
	East Rajasthan : Chittorgarh, Jhalawar											
5.5	2.0	3.2	2.6	7.8	72.7	269.8	295.2	142.3	19.0	14.6	3.6	838.4
8.	**River Chambal from Kota Dam Site to its confluene with River Banas (excluding river Banas) (Catchment No. 405)**											
	Districts/parts of districts within this Catchment:											
	East Rajasthan : Baran, Bundi, Jhalawar, Kota, Sawai Madhopur, Jaipur											
6.4	3.2	3.0	1.4	6.6	72.3	290.5	300.1	116.8	24.3	9.4	3.4	837.3
9.	**River Banas (Catchment No. 406)**											
	Districts/parts of districts within this Catchment:											
	East Rajasthan : Ajmer, Bhilwara, Chittorgarh, Dausa, Jaipur, Sawai Madhopur, Rajasmand, Tonk, Udaipur											
4.0	2.6	3.3	2.6	9.6	59.5	184.4	182.5	76.5	12.4	6.3	2.8	546.6
10.	**River Chambal from its confluence with River Banas to its confluence with river Yamuna (Catchment No. 407)**											
	Districts/parts of districts within this Catchment:											
	East Rajasthan : Chittorgarh, Jhalawar											
10.2	3.4	3.1	3.3	5.2	78.9	314.5	295.2	135.7	23.0	7.4	5.2	885.1
11.	**Thar Parkar Desert (Catchment No. 600)**											
	Districts/parts of districts within this Catchment:											
	West Rajasthan : Bikaner, Churu, Ganganagar, Jodhpur, Barmer, Nagaur, Jaisalmer											
4.7	5.9	4.1	4.2	14.1	34.2	118.3	97.7	41.8	6.0	2.7	2.2	335.9

TABLE – VII

STORMS AND DEPRESSIONS AFFECTING RAJASTHAN

DURING 1891 – 2000

MONTH	***NO. OF STORMS/DEPRESSIONS RAJASTHAN***		***STATE AS A WHOLE***
	EAST	WEST	
January	NIL	1	1
February	NIL	NIL	NIL
March	NIL	NIL	NIL
April	1	1	1
May	1	1	2
June	11	9	15
July	42	20	47
August	64	34	65
September	55	18	56
October	9	3	9
November	1	NIL	1
December	NIL	NIL	NIL
Total	**194**	**87**	**197**

DISTRICT CLIMATOLOGICAL SUMMARIES OF WEST RAJASTHAN

BARMER DISTRICT

The characteristic feature of the climate of this district in common with the adjoining districts of Rajasthan is its dryness, large diurnal range of temperature and the fitful and erratic nature of the rainfall. The year may be divided into four seasons, the winter from November to March, the summer from April to June, the southwest monsoon season from July to mid September and the post monsoon season from mid September to the end of October.

RAINFALL

Records of rainfall in the district are available for eight raingauge stations, for period ranging from 11 to 50 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 251.7 mm. In general, the rainfall over the district decreases towards the west. About 84% of the annual rainfall occurs during the months June to September, mostly in association with depression of Bay origin which reaches the district. The variation in the rainfall from year to year is not very large. During the fifty year period 1951 to 2000, the highest annual rainfall in the district amounting to 299% of the annual normal was recorded in 1990 whereas the lowest annual rainfall which was only 18% of the normal was recorded in 1969. In the same fifty year period there were 19 years when the annual rainfall was less than 80% of the normal. There were four occasions when such a low rainfall occurred in two consecutive years and one occasion of four consecutive years. The erratic nature of the rainfall in the district will be evident from Table 1. For example Balotra had 250% of the normal rainfall in 1995 while in 1969 there was 4% of the normal rainfall in this station. Rainless years or years with extremely scanty rainfall are not unknown particularly in the western

parts of the district. In 36 years out of 48, rainfall in the district was between 101 mm and 400 mm.

The average number of rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district is only 13. This number varies from 08 at Jasol to17 at Siwana.

The heaviest rainfall in 24 hours recorded at any station in the district was 370.0 mm at Pachpadra on 12 August 1992.

TEMPERATURE

There is a meteorological observatory in the district at Barmer. The data of this station can be taken as representative of the meteorological condition over the district as a whole. The hot season commences by beginning of March when the temperature begins to rise rapidly and attains its highest value in May or June. May is the hottest month with the mean daily maximum temperature at 41.8^{o}C and the mean daily minimum temperature at 26.5^{o}C. Throughout the summer, heat is intense and scorching wind prevails. In the hot season the district is affected by heat waves and maximum temperature may rise to about 48^{o}C-50^{o}C. With the onset of the monsoon in the first week of July there is decrease in temperature. After the withdrawal of the monsoon by about the first week of September there is increase in day temperature and a secondary maximum is recorded in the month of October. However, night temperatures decrease steadily. In the month of November when the winter season sets in, both day and night temperatures decrease rapidly till January which is the coldest month with the mean daily maximum temperature at about 25.6^{o}C and the mean daily minimum temperature at about 10.6^{o}C. The diurnal range of temperature is large in all the months. On some days the minimum temperature often falls one to two degrees below the freezing point of water in January and frost occurs. The drop in night temperature, especially in winter is rather sudden and very trying.

HUMIDITY

As mentioned earlier, the climate is very dry. Even during the brief monsoon period the air is dry in between the fitful rains. The humidity in monsoon is about 70% in the mornings.

CLOUDINESS

In July and August skies are heavily clouded and occasionally overcast. During the rest of the year skies are clear or lightly clouded.

WINDS

Winds are generally light in the post monsoon and winter months. In later part of summer and southwest monsoon months winds are moderate. In post monsoon and winter months winds blow from directions between northwest and northeast. In the month of March, southwesterly winds appear and strengthen in later months. In later part of summer and southwest monsoon season southwesterly winds are predominant.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions during July and August, originating in the Bay of Bengal move west or west-northwest and reach the district or its neighbourhood towards the later stages of their travel, causing gusty winds and heavy rain. Thunderstorms practically occur throughout the year. Its frequency is more in later part of summer and southwest monsoon season. Dust storms occur in summer and southwest monsoon season. In the winter months occasional fog occurs.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BARMER

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Balotra	24	a	1.6	0.8	2.7	0.2	2.5	10.5	115.3	63.2	37.4	2.0	2.2	0.0	238.4	250	04	337.0	26 Jul 1995
		b	0.0	0.0	0.1	0.0	0.2	0.8	3.5	2.9	1.7	0.1	0.1	0.0	9.4	(1995)	(1969)		
Barmer	44	a	0.9	2.0	0.9	3.0	7.3	23.4	88.0	85.7	39.2	4.6	3.4	0.2	258.6	289	14	312.2	07 Aug 1990
		b	0.1	0.3	0.1	0.3	0.5	1.4	4.3	4.2	2.2	0.4	0.2	0.0	14.0	(1990)	(1968)		
Barmer (Obsy)	50	a	1.2	1.9	3.3	5.3	8.6	30.6	82.9	89.3	38.7	5.8	2.9	0.5	271.0	285	18	255.5	13 Aug 1944
		b	0.1	0.3	0.2	0.4	0.6	1.8	4.6	4.3	2.2	0.4	0.2	0.1	15.2	(1990)	(1968)		
Chotan	44	a	1.0	1.9	2.3	2.6	6.5	24.9	90.0	89.3	42.4	2.3	2.9	0.2	266.3	286	14	355.6	26 Aug 1944
		b	0.1	0.3	0.1	0.3	0.4	1.3	4.4	4.2	2.4	0.2	0.2	0.0	13.9	(1990)	(1969)		
Jasol	11	a	0.0	0.0	0.0	0.0	1.2	6.2	60.0	58.8	45.5	0.0	0.0	0.0	171.7	260	56	193.0	26 Oct 1917
		b	0.0	0.0	0.0	0.0	0.1	0.6	2.5	2.9	1.7	0.0	0.0	0.0	7.8	(1961)	(1955)		
Pachpadra	45	a	1.6	1.5	1.9	2.0	7.9	19.3	83.7	76.6	42.6	3.6	2.5	0.6	243.8	313	13	370.0	12 Aug 1992
		b	0.1	0.1	0.1	0.2	0.6	1.1	4.5	4.5	2.2	0.3	0.3	0.0	14.0	(1992)	(1966)		
Sheo	45	a	1.1	1.4	2.7	2.5	7.7	19.5	73.4	70.0	24.3	4.6	2.4	0.9	210.5	249	15	203.2	28 Jul 1929
		b	0.2	0.2	0.2	0.3	0.5	1.0	3.9	3.8	1.7	0.3	0.1	0.1	12.3	(1961)	(1968)		
Siwana	44	a	2.2	1.8	3.9	3.0	13.1	30.5	118.2	111.2	58.3	4.1	6.2	1.0	353.5	298	11	205.0	18 Aug 1973
		b	0.2	0.3	0.2	0.3	0.7	1.8	4.8	5.0	2.9	0.4	0.3	0.1	17.0	(1990)	(1969)		
Barmer (District)		a	1.2	1.4	2.2	2.3	6.9	20.6	88.9	80.5	41.1	3.4	2.8	0.4	251.7	299	18		
		b	0.1	0.2	0.1	0.2	0.5	1.2	4.1	4.0	2.1	0.3	0.2	0.0	13.0	(1990)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
001 – 100	4	401 – 500	4
101 – 200	15	501 – 600	3
201 – 300	12	601 – 700	0
301 – 400	9	701 – 800	1

(Data available for 48years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(BARMER)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	25.6	10.6	36.6	1990 Jan 17	-1.7	1935 Jan 15	51	28
February	28.6	13.1	39.4	1943 Feb 27	3.8	1984 Feb 21	49	26
March	34.2	18.7	43.3	1946 Mar 30 2004 Mar 21	4.5	1979 Mar 09	44	22
April	39.2	24.4	48.3	1958 Apr 25	12.2	1945 Apr 02	42	22
May	41.8	26.5	49.9	1995 May 10	16.7	1931 May 31	54	23
June	40.2	27.2	48.7	1994 Jun 07	16.2	1964 Jun 14	68	34
July	36.7	26.3	45.5	2006 Jul 05	19.4	1936 Jul 07	77	49
August	35.0	25.5	43.7	1987 Aug 21	20.0	1941 Aug 25 2006 Aug 20	79	53
September	36.2	24.6	45.9	2001 Sep 25	16.7	1935 Sep 30	72	42
October	37.0	22.3	43.1	2002 Oct 11	13.9	1933 Oct 30	54	29
November	32.2	16.5	39.4	2001 Nov 01	6.7	1946 Nov 29	50	31
December	27.2	11.7	35.2	2003 Dec 09	2.3	1959 Dec 17	51	30
Annual	34.5	20.6					58	32

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.1	6.0	7.2	9.2	11.4	12.2	10.2	8.9	7.4	5.7	4.6	5.1	7.7

TABLE - 5
Special Weather Phenomena
(BARMER)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.4	0.6	0.8	1.6	2.0	3.9	2.9	1.6	0.7	0.1	0.1	14.8
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	0.1	0.2	0.3	0.8	1.1	1.1	0.7	0.2	0.0	0.1	0.0	0.0	4.6
Fog	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3

BIKANER DISTRICT

The district has a desert climate, with large variations of temperature and scanty rainfall. The winter period from November to March is followed by the summer from April to June. The period from July to mid September is the period of rains. Mid September to October is the transitional period.

RAINFALL

The records of rainfall in the district are available for seven raingauge station for the period ranging from 23 to 45 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 258.5 mm. The rainfall in general increases from the northeast towards the southeast. In the northwestern portions of the district for which no rainfall are available, the rainfall is likely to be much less than in the southeastern half of the district. About 82% of the annual rainfall is received from the southwest monsoon season. July is the rainiest month. The variation in the annual rainfall from year to year is not large. In the fifty year period from 1951 to 2000 the highest annual rainfall in the district amounting to 208% of the normal occurred in 1997. 1968 was the year with the lowest rainfall which was 29% of the normal. The variation in the annual rainfall from year to year may be much larger in the northwestern portions of the district. In the same fifty year period, rainfall less than 80% of the normal occurred in 16 years. In the district as a whole, there were four occasions when two consecutive years had less than 80% of the normal rainfall. It will be seen from Table 2 that in 41 years out of 47, the rainfall in the district was between 101mm and 400 mm.

On an average there are 17 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 08 at Palana to 21 at Bikaner (PBO) observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 265.9 mm at Palana on 07 August 1933.

TEMPERATURE

There are two meteorological observatories in the district at Bikaner and Bikaner (PBO). The records of these stations may be taken as representative of the meteorological conditions in the district as a whole. The temperature rises rapidly after March. May and June are generally the hottest months with the mean daily maximum temperature at about 41.7^{o}C and mean daily minimum temperature at about 27.6^{o}C. The summer months are intensely hot with scorching dust laden winds, the day temperatures sometimes go upto 49^{o}C. With the advance of the southwest monsoon by about the middle of July temperatures decrease a little, but the oppressiveness of weather continues due to the increased humidity.

After the later half of September when the monsoon withdraws the day temperatures increase a little but the night temperatures begin to drop. From November the drop in both day and night temperatures is more rapid. The diurnal range of temperature is very large particularly in the winter months. The drop in temperatures after nightfall is rather sudden and trying. January is the coldest month with the mean daily maximum temperature at about 23.0^{o}C and mean daily minimum temperature at about 5.4^{o}C. During the winter season cold waves affect the district in the wake of passing western disturbances and the minimum temperatures sometimes drop down to about three to four degrees below the freezing point of water and frost occurs.

The highest maximum temperature ever recorded at Bikaner and Bikaner (PBO) was 49.4^{o}C on 28 May 1914and 47.6^{o}C on 10 June 1979 and 20 June 1980 respectively and the lowest minimum temperature was –4.0^{o}C on 26 January 1964 and -3.8^{o}C on 12 June 1967 respectively.

HUMIDITY

Except during the short rainy period humidity is low and even during the rainy period air is drier in between rains. The summer months are the driest, especially in the afternoons in April and May when relative humidity is of the order of 15% to 20%.

CLOUDINESS

Even during the rainy parts of the year, skies are only moderately clouded on many days. Overcast or heavily clouded skies prevail only on few days. In the rest of the year skies are lightly clouded, except in the winter season when in association with western disturbances, cloudy skies prevail for short spells of a day or two.

WINDS

Except for moderate winds during the period May to September winds are generally light. In the summer and southwest monsoon season, southwesterly winds prevail. In the post monsoon and winter season, light southeasterly wind blows in the morning and light northerly winds blow in the afternoon. March is the transitional month from which southwesterly winds start blowing and it continues.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions in July and August which form at the head of the Bay of Bengal and move in a westerly northwesterly direction reach Rajasthan towards the later stages of their travel causing strong gusty winds and widespread heavy rains. Thunderstorms occur throughout the year with more frequency in summer and southwest monsoon season. Dust storms occur in hot season. Dust storms and thunderstorms are occasionally accompanied with squalls and sometimes with hail. Sand storms are more frequent in hot season in west Rajasthan.

Tables 3, 4 and 5 and 3(a), 4(a) and 5(a) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Bikaner and Bikaner PBO observatories.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BIKANER

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST / LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **		HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Bikaner	38	a	4.0	8.1	6.6	3.8	16.8	29.3	82.0	59.1	43.8	3.1	2.1	1.9	260.6	212 (1959)	18 (1968)	126.0	17 Jul 1981
		b	0.5	0.6	0.6	0.4	1.1	1.9	4.4	3.8	2.2	0.3	0.2	0.2	16.2				
Bikner (Obsy)	44	a	5.7	9.1	8.0	5.2	19.2	34.2	84.0	72.6	45.1	5.2	3.5	2.5	294.3	208 (1983)	18 (1968)	165.6	25 Sep 1945
		b	0.8	0.7	0.8	0.6	1.4	2.3	4.8	4.7	2.6	0.4	0.2	0.2	19.5				
Bikaner PBO (Obsy)	23	a	7.5	9.3	10.1	11.9	28.7	40.5	106.4	65.5	25.1	18.5	2.7	0.8	327.0	190 (1983)	43 (1984)	128.5	17 Jul 1981
		b	0.8	0.8	1.0	1.1	2.2	2.4	5.4	4.2	2.2	1.0	0.2	0.1	21.4				
Kolayat Magra	45	a	3.0	5.4	4.7	3.5	11.9	22.4	72.5	68.1	30.9	2.9	2.6	2.7	230.6	206 (1983)	26 (1963)	138.0	06 Aug 1973
		b	0.4	0.6	0.6	0.4	1.1	1.5	4.0	3.8	2.1	0.2	0.2	0.2	15.1				
Lunkaransar	45	a	4.8	9.0	5.7	4.7	8.5	22.4	78.7	77.3	32.4	3.0	2.8	3.4	252.7	230 (1978)	36 (1968)	233.0	24 Jul 2000
		b	0.6	0.8	0.5	0.4	0.8	1.9	4.6	4.5	2.2	0.2	0.1	0.3	16.9				
Palana	27	a	0.9	0.9	2.0	1.2	2.1	11.8	39.3	46.3	27.4	4.1	1.4	0.8	138.2	263 (1964)	0 (1973)	265.9	07 Aug 1933
		b	0.1	0.0	0.2	0.1	0.2	0.7	2.4	2.4	1.4	0.2	0.0	0.1	7.8				
Surpura/Nokha	44	a	4.2	6.6	4.0	3.5	13.7	30.5	98.7	89.9	46.3	4.5	3.2	1.4	306.5	251 (1975)	26 (1991)	152.4	06 Sep 1942
		b	0.4	0.7	0.4	0.3	1.0	2.1	5.4	5.5	2.7	0.5	0.2	0.2	19.4				
Bikaner (District)		a	4.3	6.9	5.9	4.8	14.4	27.3	80.2	68.4	35.9	5.9	2.6	1.9	258.5	208 (1997)	29 (1968)		
		b	0.5	0.6	0.6	0.5	1.1	1.8	4.4	4.1	2.2	0.4	0.2	0.2	16.6				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
001 – 100	1	301 – 400	11
101 – 200	13	401 – 500	3
201 – 300	17	501 – 600	2

(Data available for 47 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(BIKANER)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.2	5.7	32.9	1991 Jan 28	-4.0	1964 Jan 26	63	30
February	26.0	9.0	37.2	1953 Feb 28	-2.5	1974 Feb 07	56	28
March	32.2	15.3	42.8	1924 Mar 25	-0.6	1898 Mar 04	47	22
April	38.2	22.0	47.2	1925 Apr 24	8.3	1953 Apr 01	36	17
May	41.8	26.6	49.4	1914 May 28	13.7	1960 May 08	36	15
June	41.6	28.9	48.9	1897 Jun 10	17.8	1888 Jun 04	52	25
July	38.0	27.9	47.8	1963 Jul 07	20.5	1974 Jul 04	68	45
August	36.9	27.0	43.4	1987 Aug 25	20.6	1983 Aug 29	72	49
September	37.0	25.1	43.9	1915 Sep 11	16.5	1972 Sep 24	65	38
October	36.3	19.1	42.2	1951 Oct 05	7.6	1964 Oct 30	47	24
November	30.9	11.9	38.5	2001 Nov 02	0.6	1937 Nov 30	48	30
December	25.1	6.4	33.5	2003 Dec 09	-2.8	1950 Dec	59	34
				2008 Dec 05				
Annual	33.9	18.7					54	30

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.8	3.8	5.1	6.3	8.5	10.9	9.1	8.2	6.8	4.0	2.7	2.4	5.9

TABLE - 5
Special Weather Phenomena
(BIKANER)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.8	0.9	1.9	2.1	5.4	5.0	6.0	5.9	3.0	0.9	0.2	0.2	32.3
Hail	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Dust storm	0.0	0.3	0.7	1.5	2.7	2.6	1.8	0.7	0.1	0.1	0.0	0.0	10.5
Fog	1.5	0.6	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.9	3.5

TABLE – 3(a)
Normals of Temperature and Relative Humidity
(BIKANER PBO)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.8	5.1	28.8	1974 Jan 18	-3.8	1967 Jan 12	67	31
February	25.8	9.1	35.1	1980 Feb 27	-2.5	1974 Feb 07	53	22
March	31.2	14.9	41.4	1984 Mar 31	5.3	1979 Mar 10	48	21
April	37.8	21.5	45.6	1979 Apr 27	10.6	1967 Apr 06	34	15
May	41.3	26.0	47.5	1984 May 28	15.2	1979 May 03	36	16
June	42.1	29.0	47.6	1979 Jun 10 1980 Jun 20	21.4	1983 Jun 11	50	25
July	38.7	28.1	45.3	1968 Jul 03 1979 Jul 09	20.5	1974 Jul 04	66	44
August	37.0	26.9	43.0	1979 Aug 01	23.5	1979 Aug 20	70	48
September	37.3	24.8	42.5	1974 Sep 21	16.5	1972 Sep 24	63	37
October	36.1	18.8	41.1	1968 Oct 05	10.7	1983 Oct 29	49	26
November	30.2	11.7	36.5	1979 Nov 04	3.3	1966 Nov 30	51	32
December	24.1	6.8	30.7	1968 Dec 11	-0.7	1973 Dec 28	64	37
Annual	33.7	18.6					54	30

TABLE – 4(a)
Mean Wind Speed in km/hr.
(BIKANER PBO)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.3	5.4	6.8	7.5	9.9	12.6	10.8	9.9	8.4	5.3	4.0	4.0	7.4

TABLE – 5(a)
Special Weather Phenomena
(BIKANER PBO)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.8	0.5	1.8	2.2	6.2	4.2	6.3	4.3	3.4	1.4	0.8	0.8	32.7
Hail	0.3	0.0	0.3	0.1	0.4	0.0	0.0	0.1	0.2	0.1	0.1	0.0	1.6
Dust storm	0.0	0.3	1.3	1.6	1.9	2.0	2.3	0.9	0.3	0.3	0.0	0.0	10.9
Fog	0.8	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.8	2.8

CHURU DISTRICT

The district has a dry desert climate, with large variations of temperature and scanty rainfall. The winter period from November to March is followed by the summer season from April to June. The period from July to mid September is the southwest monsoon season. Mid September to October is the period of transition from monsoon to the cold season.

RAINFALL

Records of rainfall in the district are available for eight raingauge stations, for period ranging from 43 to 44 years. Tables1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 371.0 mm. The rainfall in general increases from the northwest towards the southeast and varies from 308.4 mm at Dungargarh and 344.8 mm at Sardarshahar to 419.8 mm at Sujangarh. About 86% of the annual rainfall is received during the southwest monsoon period. July is the rainiest month. The variation in the rainfall from year to year is not very large. During the fifty year period 1951 to 2000, the highest annual rainfall in the district occurred in 1978, when it amounted to 214% of the normal. 1952 was the year with the lowest annual rainfall when it amounted to 46% of the normal. During this fifty year period, the rainfall was less than 80% of the normal in 18 years. Four consecutive years of such a low rainfall occurred once and two consecutive years occurred twice during this period, in the district. It will be seen from Table 2 that the rainfall in the district was between 201 mm and 500 mm in 35 years out of 47.

On an average there are 21 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 19 at Dungargarh to 25 at Churu Observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 319.0 mm at Taranagar/Reni on 22July 1978.

TEMPERATURE

The only meteorological observatory in the district is at Churu and the temperature and other meteorological records of this station may be taken as representative of the climatic conditions over the district in general. Temperature rises rapidly after March. May and June are the hottest months with the mean daily maximum temperature at about 41.2^{o}C and 41.3^{o}C and the mean daily minimum temperature at about 24.8^{o}C and 27.9^{o}C respectively. In summer months, the weather is intensely hot with scorching dust laden winds and the day temperatures sometimes go upto about 49^{o}C. With the advance of the southwest monsoon season early in July, temperature decreases a little. But the oppressiveness of the weather continues, due to increased humidity. After the middle of September when the monsoon withdraws, the temperatures begin to decrease gradually and after about the middle of November rapidly. The diurnal range of temperature is very large particularly in the winter months. The drop in temperature after October is rather sudden and trying. January is the coldest month with the mean daily minimum temperature at 4.4^{o}C and the mean daily maximum temperature at 22.7^{o}C. During winter season, cold waves in association with passing western disturbances, affect the district and the minimum temperatures sometimes drop to four to five degrees below the freezing point of water and frost occurs.

The highest maximum temperature ever recorded at Churu was 49.9 ^{o}C on 26 May 1998 and the lowest minimum temperature was –4.6^{o}C on 28 December 1973, 16 January 1974 and 07 February 1974 respectively.

HUMIDITY

Except during the brief southwest monsoon period when the relative humidity is above 60% the air is generally dry. Even during the rainy period, the air is drier in between the rains. The summer is the driest period of the year when the relative humidity, particularly in the afternoons is below 30%.

CLOUDINESS

Even during the monsoon period, the skies are only moderately clouded on many days and overcast or heavily clouded skies prevail only on a few days. In the rest of the year, skies are lightly clouded or clear except during the winter season, when in association with passing western disturbances cloudy skies prevail for short spells of a day or two.

WINDS

Winds are generally light with some strengthening in force during the later part of the summer season and the southwest monsoon season. In the period from May to October winds blow mainly from directions between southwest and west. During post monsoon and winter season, winds are generally light. The winds from south in morning are more common and in the afternoon they increase in strength and are mainly from north. In April, the morning winds are mostly from directions between south and southwest while in the afternoons, they are predominantly from directions between west and northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal in the southwest monsoon season move across the central parts of the country and reach the district during the last stages of activity and cause widespread rain before dissipating. An occasional post monsoon storm and depression also affects the district. Thunderstorms occur throughout the year with higher frequency during

southwest monsoon season. Dust storms occur in the hot season. In the wake of western disturbances, occasional fog occurs in the cold season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
CHURU

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Churu	43	a	6.2	6.6	6.1	3.2	13.4	32.4	124.6	99.1	46.1	6.8	2.3	2.3	349.1	190	45	210.0	21 Jul 1993
		b	0.6	0.7	0.8	0.4	1.3	2.3	5.9	5.6	2.4	0.4	0.3	0.3	21.0	(1978)	(1951)		
Churu (Obsy)	44	a	7.1	9.1	8.8	6.5	21.4	42.1	142.3	104.1	50.8	13.6	3.1	3.0	411.9	202	50	209.0	21 Jul 1993
		b	0.8	0.9	0.9	0.7	2.0	3.1	7.1	5.7	2.9	0.7	0.4	0.3	25.5	(1978)	(1965)		
Dungargarh	44	a	5.1	5.4	4.3	3.9	12.3	30.4	102.4	94.2	41.9	4.3	2.5	1.7	308.4	293	21	262.0	26 Jul 1983
		b	0.5	0.6	0.5	0.4	1.0	2.3	5.3	5.1	2.2	0.3	0.2	0.2	18.6	(1983)	(1969)		
Rajgarh	44	a	8.3	10.0	6.9	3.6	17.4	43.5	137.1	109.5	59.8	9.1	2.6	3.5	411.3	236	40	223.0	06 Sep 1977
		b	0.7	0.7	0.7	0.3	1.2	2.4	6.0	6.0	2.5	0.5	0.2	0.4	21.6	(1978)	(1981)		
Ratangarh	44	a	4.2	6.4	5.5	4.2	19.1	30.7	139.0	106.4	44.4	8.1	2.8	2.1	372.9	192	32	170.2	22 Jul 1929
		b	0.4	0.6	0.5	0.4	1.4	2.2	6.5	6.0	2.5	0.5	0.2	0.2	21.4	(1978)	(1991)		
Sardarshahar	44	a	5.6	6.2	6.3	4.8	11.9	37.6	120.4	98.1	40.7	7.5	3.1	2.6	344.8	189	33	226.1	09 Jul 1960
		b	0.4	0.7	0.7	0.5	1.2	2.4	5.4	5.4	2.3	0.4	0.2	0.2	19.8	(1975)	(1952)		
Sujangarh	44	a	5.3	5.8	4.8	4.9	19.9	44.6	150.3	119.2	53.0	6.6	2.6	2.8	419.8	201	38	209.6	23 Jul 1957
		b	0.4	0.6	0.6	0.5	1.7	2.9	6.3	6.4	2.8	0.4	0.2	0.2	23.0	(1975)	(1972)		
Taranagar/Reni	44	a	6.2	9.0	5.9	4.1	12.4	31.3	116.9	107.0	44.7	7.4	2.2	1.8	348.9	297	30	319.0	22 Jul 1978
		b	0.5	0.6	0.7	0.5	1.0	2.3	5.3	5.4	2.3	0.5	0.2	0.3	19.6	(1978)	(1951)		
Churu (District)		a	6.0	7.3	6.1	4.4	16.0	36.6	129.1	104.7	47.7	7.9	2.7	2.5	371.0	214	46		
		b	0.5	0.7	0.7	0.5	1.4	2.5	6.0	5.7	2.5	0.5	0.2	0.3	21.5	(1978)	(1952)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	3	501 – 600	4
201 – 300	15	601 – 700	4
301 – 400	14	701 – 800	1
401 – 500	6		

(Data available for 47 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(CHURU)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.7	4.4	33.4	2006 Jan 30	-4.6	1974 Jan 16	72	39
February	25.6	7.8	37.4	2006 Feb 20	-4.6	1974 Feb 07	65	33
March	31.7	13.7	42.5	1999 Mar 30	1.8	1979 Mar 10	56	28
April	37.7	19.9	46.2	2009 Apr 30	8.8	1974 Apr 01	46	25
May	41.2	24.8	49.9	1998 May 26	11.8	1969 May 02	44	24
June	41.3	27.9	49.0	2003 Jun 05	17.7	1974 Jun 10	54	32
July	37.4	27.0	46.0	2009 Jul 07	19.1	2003 Jul 11	71	54
August	35.8	25.6	43.1	2002 Aug 03	19.6	1976 Aug 17	77	58
September	36.1	23.4	44.1	2005 Sep 05	14.0	1972 Sep 23	70	48
October	35.3	17.3	42.3	1987 Oct 03	8.1	1964 Oct 09	57	32
November	30.1	10.3	38.4	2001 Nov 02	-1.0	1978 Nov 29	60	34
December	24.5	5.1	33.5	2003 Dec 09	-4.6	1973 Dec 28	69	39
Annual	33.3	17.3					62	37

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.3	4.8	6.0	6.4	8.2	10.7	9.4	7.6	6.1	4.1	2.9	2.9	6.0

TABLE - 5
Special Weather Phenomena
(CHURU)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.6	1.4	1.8	2.8	4.8	4.2	6.1	5.3	2.9	1.0	0.5	0.3	31.7
Hail	0.0	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Dust storm	0.0	0.2	0.5	1.1	1.9	2.1	1.1	0.5	0.3	0.1	0.0	0.0	7.8
Fog	1.6	0.7	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.0	3.6

GANGANAGAR DISTRICT

The district has a desert kind of climate with large variations of temperature, extreme dryness and scanty rainfall which are characteristics of a desert climate. The cold season from November to March is followed by the summer from April to June. July to mid September constitutes the southwest monsoon season. Mid September to October is the transitional post monsoon period.

RAINFALL

Records of rainfall in the district are available for twenty six raingauge stations, for period ranging from 10 to 49 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 243.4 mm. In general, the rainfall decreases from the north to south. The annual rainfall varies from 266.9 mm at Ganganagar in the northern border to 219.9 mm at Anupgarh towards south of the district. About 86% of the annual rainfall in the district is received during the period June to September. July and August are the rainiest months. The variation in the annual rainfall from year is year is not large. In the 50 year period from 1951 to 2000, the highest annual rainfall in the district amounting to 229% of the normal occurred in 1997, while the lowest rainfall which was only 46% of the normal in 1968. During the fifty year period, the rainfall less than 80% of the normal occurred in 10 years. There were two occasions, when the rainfall was less than 80% of the normal for two consecutive years. It will be seen from Table 2 that annual rainfall in the district was between 101 mm and 400 mm in 43 years out of 47.

On an average there are 14 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 08 at Karnisar to 20 at Sriganganagar observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 251.7 mm at Ganganagar on 31 August 1928.

TEMPERATURE

There are two meteorological observatories in the district, one at Anupgarh and the other at Sriganganagar. The data for Anupgarh observatory is not available for sufficient period. The record of Sriganganagar is available for a longer period and may be taken as representative of the climatological conditions prevailing in the district as a whole. Temperatures rise rapidly after March. May and June are the hottest months with the mean daily maximum temperature at 40.6°C and 41.7°C. The heat in the summer season with frequent scorching dust laden winds is intense and the day temperatures sometimes may go upto 49°C -50°C. Sriganganagar is one of the hottest parts in India in summer. With the advance of the southwest monsoon by about the middle of July temperatures decrease a little. The weather continues to be oppressive due to increased moisture in the air. With the withdrawal of the monsoon by about the latter half of September both day and night temperatures begin to decrease, the drop in night temperatures being more rapid. The diurnal range of temperature is very large, particularly in the winter months and drop in temperature after nightfall is rather sudden and trying. January is the coldest month with the mean daily minimum temperature at 5.4°C and the mean daily maximum temperature at 21.4°C. In the wake of western disturbances moving across north India during the winter season, cold waves affect the district and the minimum temperature sometimes drops to two or three degrees below the freezing point of water and frost occurs.

The highest maximum temperature recorded at Sriganganagar was 50°C on 14 June 1934 and the lowest minimum temperature was –2.8°C on 11 February 1950.

HUMIDITY

Except during the short rainy season, humidity is low and even during the rainy period the air is drier in between the rains. The summer months are the driest, especially in the afternoons during April and May when the relative humidity is of the order of 20% to 25%.

CLOUDINESS

Even during the southwest monsoon season skies are only moderately clouded on many days and overcast or heavily clouded skies prevailing only on a few days. In the rest of the year the skies are lightly clouded or clear except during the winter months, when in association with passing western disturbances, cloudy skies prevail for short spells of a day or two.

WINDS

Winds are generally light except in the early part of southwest monsoon months. During southwest monsoon season, winds blow from southwest direction. During post monsoon, winter and summer season, winds blow mostly from northwest direction in the afternoon. During March to May, northwesterly winds prevail in the morning also, whereas in the post monsoon and winter season, winds are light and variable in direction in the morning.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal in the southwest monsoon season and move in a westerly direction reach the district or its neighbourhood during the last stages of activity and cause widespread rain. An occasional post monsoon storm and depression may also affect the district. Frequent sand and dust storms occur in the hot season. Thunderstorms occur throughout the year with more frequency during the hot season and southwest monsoon season. During the cold season, occasional fog occurs in the wake of western disturbances.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
GANGANAGAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Anupgarh	45	a	4.6	6.4	8.3	5.1	14.3	18.9	62.3	66.9	26.3	1.2	1.7	3.9	219.9	194	24	220.0	07 May 1987
		b	0.5	0.6	0.6	0.6	0.8	1.1	3.3	3.1	1.3	0.1	0.1	0.3	12.4	(1976)	(1971)		
Baringan	12	a	2.3	8.6	0.3	3.4	8.2	1.1	49.6	50.7	16.4	0.0	0.0	3.2	143.8	140	58	115.0	26 Jul 1981
		b	0.3	0.3	0.1	0.4	0.5	0.1	2.5	2.9	1.1	0.0	0.0	0.3	8.5	(1981)	(1974)		
Bifarcation	13	a	3.6	6.6	3.2	4.6	3.8	25.7	83.0	73.9	19.7	0.3	0.8	0.7	225.9	226	32	97.0	12 Jul 1972
		b	0.5	1.1	0.5	0.5	0.3	1.7	3.9	3.7	1.3	0.0	0.2	0.2	13.9	(1976)	(1974)		
Chunabad	14	a	4.1	5.9	3.2	13.0	7.6	22.4	78.8	89.2	27.4	1.0	3.0	3.4	259.0	191	43	143.0	12 Aug 1982
		b	0.6	0.5	0.4	0.8	0.5	1.9	4.5	3.8	1.8	0.1	0.3	0.4	15.6	(1976)	(1971)		
Dubla	10	a	6.7	1.9	4.3	5.7	8.1	23.3	86.1	103.3	42.6	2.1	0.0	2.2	286.3	189	09	85.0	23 Jul 1978
		b	0.6	0.2	0.3	0.4	0.7	1.7	3.4	3.9	2.7	0.1	0.0	0.3	14.3	(1978)	(1971)		
Gajsinghpur	10	a	2.0	3.3	1.2	2.7	1.9	25.3	49.6	90.9	27.7	9.0	0.0	0.8	214.4	141	23	140.0	13 Aug 1982
		b	0.2	0.2	0.1	0.4	0.3	1.3	3.4	3.1	1.3	0.1	0.0	0.2	10.6	(1976)	(1974)		
Ganganagar	45	a	6.5	6.8	11.0	7.2	11.4	31.3	85.3	64.8	36.0	1.1	1.4	4.1	266.9	250	39	251.7	31 Aug 1928
		b	0.7	0.7	1.0	0.7	1.0	2.0	3.9	3.5	2.0	0.1	0.2	0.4	16.2	(1983)	(1969)		
Gudia	12	a	6.0	4.0	1.9	3.9	6.7	22.0	117.6	123.7	47.4	0.0	0.0	0.6	333.8	140	57	122.0	06 Aug 1985
		b	0.4	0.3	0.3	0.5	0.8	1.3	6.6	4.8	1.9	0.0	0.0	0.1	17.0	(1976)	(1974)		
Hindu-Malkot	14	a	6.0	9.9	8.4	5.6	4.4	20.8	61.6	80.6	29.5	0.0	1.0	0.7	228.5	205	44	76.0	27 Jun 1977
		b	0.4	0.7	0.9	0.6	0.4	1.4	3.7	3.5	1.4	0.0	0.1	0.1	13.2	(1976)	(1974)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
GANGANAGAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Karanpur	45	a	5.9	7.1	9.7	4.7	9.0	19.0	82.3	62.1	32.0	5.9	2.4	4.6	244.7	273	35	190.0	09 Oct 1985
		b	0.6	0.7	1.0	0.6	0.9	1.4	4.1	3.4	1.5	0.2	0.2	0.4	15.0	(1976)	(1991)		
Karnisar	11	a	0.5	1.6	2.8	9.8	0.0	7.5	52.4	54.9	6.6	0.0	0.0	0.0	136.1	253	18	77.0	20 Jul 1985
		b	0.1	0.2	0.4	0.3	0.0	0.8	2.9	3.3	0.3	0.0	0.0	0.0	8.3	(1982)	(1974)		
Kesarsinghpur	13	a	1.8	5.0	1.4	1.4	8.5	12.8	58.9	79.6	17.0	0.6	.1.7	4.4	193.1	179	65	82.0	26 Jul 1981
		b	0.2	0.6	0.2	0.2	0.5	0.9	3.1	4.0	1.1	0.1	0.2	0.3	11.4	(1973)	(1984)		
Netawali	12	a	1.6	3.3	2.9	2.8	6.7	17.4	54.9	76.1	11.3	0.4	0.0	2.8	180.2	181	21	110.0	29 Jul 1983
		b	0.3	0.4	0.2	0.4	0.7	1.5	3.4	3.3	0.8	0.1	0.0	0.2	11.3	(1976)	(1981)		
Nohar	45	a	7.6	7.1	7.3	4.7	12.5	35.6	118.9	107.0	38.5	6.2	3.9	2.6	351.9	193	32	200.0	16 Aug 1987
		b	0.7	0.7	0.7	0.4	1.0	2.0	5.5	5.0	2.3	0.3	0.3	0.2	19.1	(1975)	(1959)		
Padampur	45	a	5.3	7.8	8.8	6.1	6.7	21.1	83.2	67.5	32.2	1.6	2.8	4.4	247.5	217	31	232.0	18 Jul 1978
		b	0.6	0.7	0.6	0.5	0.7	1.1	3.5	2.9	1.4	0.1	0.1	0.3	12.5	(1976)	(1991)		
Phephana	14	a	0.0	1.1	1.8	5.5	3.8	38.4	111.3	121.6	27.7	0.0	0.9	1.4	313.5	163	28	192.0	02 Sep 1983
		b	0.0	0.1	0.3	0.5	0.4	1.6	5.1	5.0	0.8	0.0	0.1	0.1	14.0	(1983)	(1984)		
Phibangan	12	a	0.4	1.4	1.0	4.7	4.4	31.9	68.6	60.3	25.0	0.0	0.0	0.0	197.7	230	28	80.0	03 Jul 1983
		b	0.1	0.2	0.3	0.5	0.4	1.5	3.6	3.5	1.7	0.0	0.0	0.0	11.8	(1983)	(1972)		
Raisingnagar	44	a	5.4	5.6	7.3	6.1	11.0	24.9	72.5	54.6	23.4	2.5	1.3	5.5	220.1	190	17	148.0	18 Jul 1978
		b	0.5	0.6	0.6	0.6	0.7	1.3	3.8	2.9	1.4	0.3	0.1	0.5	13.3	(1978)	(1963)		
Sadal Shohar	28	a	6.1	12.1	6.9	8.3	11.6	37.1	98.0	80.8	35.1	1.0	2.1	2.9	302.0	226	42	187.0	06 Aug 1976
		b	0.6	1.0	0.6	0.7	0.8	1.7	4.0	3.3	1.7	0.1	0.2	0.3	15.0	(1976)	(1971)		

TABLE – 1 (Contd....)
NORMALS AND EXTREMES OF RAINFALL
GANGANAGAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Sangerya	28	a	9.5	8.5	3.8	5.4	14.9	33.8	96.6	64.9	35.7	1.9	3.2	3.3	281.5	181	30	103.0	03 Jul 1978
		b	0.7	0.8	0.6	0.5	1.1	1.8	4.5	3.6	2.0	0.1	0.2	0.2	16.1	(1983)	(1974)		
Sardarpura	10	a	0.1	1.2	3.3	4.7	4.6	17.8	104.4	59.1	25.8	0.0	1.0	0.0	222.0	171	26	200.0	18 Jul 1978
		b	0.0	0.2	0.2	0.5	0.5	1.0	4.8	3.7	1.0	0.0	0.1	0.0	12.0	(1983)	(1971)		
Shivpur	14	a	4.2	6.3	4.4	3.5	3.5	8.8	72.1	78.0	23.2	0.2	0.0	0.0	204.2	263	31	110.0	02 Aug 1983
		b	0.3	0.8	0.7	0.3	0.4	0.8	4.1	4.2	1.0	0.1	0.0	0.0	12.7	(1976)	(1971)		
Sriganganagar (Obsy)	49	a	9.8	10.6	13.9	10.8	15.6	30.9	86.4	73.6	51.7	4.4	3.7	6.1	317.5	187	37	242.5	18 Jul 1978
		b	1.0	1.0	1.3	1.2	1.5	2.1	4.5	3.8	2.5	0.4	0.3	0.6	20.2	(1958)	(1968)		
Suratgarh	45	a	4.0	7.1	7.7	5.3	9.6	19.2	73.3	51.7	26.2	0.5	3.1	4.7	212.4	241	13	141.7	11 Jul 1912
		b	0.3	0.8	0.8	0.4	0.8	1.4	3.6	2.9	1.5	0.1	0.2	0.3	13.1	(1976)	(1962)		
Surewalla	11	a	2.3	5.5	1.6	2.0	2.7	24.3	62.9	77.1	41.4	0.0	2.5	0.0	222.3	151	29	75.0	31 Aug 1975
		b	0.2	0.4	0.1	0.2	0.2	1.3	3.2	3.1	1.2	0.0	0.1	0.0	10.0	(1975)	(1974)		
Tibi	28	a	6.3	9.9	6.1	5.2	16.0	39.1	102.1	80.5	30.8	0.6	5.0	1.2	302.8	188	35	150.0	26 Sep 1988
		b	0.6	0.7	0.5	0.4	1.0	2.2	4.4	3.5	1.0	0.1	0.3	0.2	14.9	(1983)	(1991)		
Ganganagar (District)		a	4.3	5.9	5.1	5.5	8.0	23.5	79.7	76.7	29.1	1.6	1.6	2.4	243.4	229	46		
		b	0.4	0.6	0.5	0.5	0.7	1.4	4.0	3.6	1.5	0.1	0.1	0.2	13.6	(1997)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	10	401 – 500	3
201 – 300	25	501 – 600	1
301 – 400	8		

(Data available for 47 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(SRIGANGANAGAR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	21.4	5.4	36.1	1948 Jan 30	-2.2	1945 Jan 12	81	43
February	23.8	8.1	35.0	1953 Feb 28	-2.8	1950 Feb 11	75	37
March	29.4	13.4	41.1	1942 Mar 26	0.6	1945 Mar 26	65	33
April	36.4	19.2	46.6	1958 Apr 25	6.9	1994 Apr 07	48	23
May	40.6	23.9	49.4	1944 May 30	11.7	1945 May 04	39	21
June	41.7	28.0	50.0	1934 Jun 14	13.8	1970 Jun 06	48	27
July	38.2	27.3	46.8	1968 Jul 04	14.5	1970 Jul 21	68	49
August	37.0	26.4	44.4	1991 Aug 03	16.2	1970 Aug 16	72	53
September	36.7	23.7	43.8	2005 Sep 03	14.0	2001 Sep 18	68	45
October	35.0	17.6	41.1	1941 Oct 10 1952 Oct 04 2006 Oct 03 2008 Oct 05	1.9	2007 Oct 04	62	37
November	29.2	11.0	39.0	1975 Nov 01	1.7	1938 Nov 30	71	43
December	23.0	6.1	31.5	1998 Dec 07	-1.7	1950 Dec 28	81	48
Annual	32.7	17.5					65	38

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.3	3.0	4.0	4.6	4.9	6.4	5.9	4.7	3.5	2.6	1.8	1.6	3.8

TABLE - 5
Special Weather Phenomena
(SRIGANGANAGAR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	0.8	1.5	1.9	3.5	2.9	4.5	4.9	2.4	0.5	0.3	0.6	24.2
Hail	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.1	0.0	0.4	0.5	1.9	2.4	1.4	1.0	0.7	0.1	0.1	0.0	8.6
Fog	3.6	1.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.9	4.5	11.2

JAISALMER DISTRICT

The district has a desert climate characterized by the extreme dryness of the air, large extremes of temperature and the fitful and erratic nature of rainfall. The winter season from November to about the middle of March is followed by the hot season which extends upto the end of June. The southwest monsoon season is from July to the middle of September. The latter half of September and October constitute the post monsoon season.

RAINFALL

Records of rainfall in the district are available for eight raingauge stations, for period ranging from 15 to 49 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 172.9 mm. The rainfall is largely confined to the southwest monsoon season when 88% of the annual rainfall is received. July is generally the month with the maximum rainfall. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall in the district amounting to 280% of the normal occurred in 1973 whereas 1969 was the year with the least amount of rainfall, when the annual total was only 13% of the normal. Considering the district as a whole there were as many as 15 years in the fifty year period when the rainfall was less than 80% of the normal. Three and four consecutive years of such a low rainfall have occurred twice and once respectively. It will be seen from Table 2 that the annual rainfall in the district was between 001 mm and 300 mm in 41 years out of 48.

On an average there are 10 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 08 at Fatehgarh to 12 at Pokaran.

The heaviest rainfall in 24 hours recorded at any station in the district was 540.0 mm at Sam on 17 August 1973.

TEMPERATURE

There is only one meteorological observatory in the district and it is located at Jaisalmer. The records of this station may be taken as representative of the climatological conditions in the district as a whole. From about the middle of March temperatures begin to rise rapidly and attain the highest values in May or June. The mean daily maximum temperature is 41.6 ^{o}C and the mean daily minimum temperature is 25.2^{o}C in May. Day temperatures sometimes go upto about 49^{o}C. Throughout the summer the heat is intense and scorching winds prevail. With the advance of the southwest monsoon air over the district, the temperature decreases appreciably in July. By about the middle of September when the monsoon withdraws from the district, the day temperatures increase slightly. After September the day temperatures decrease gradually and from the next month onwards rather rapidly. The drop in night temperatures is more rapid. January is the coldest month when the mean daily maximum temperature is 23.8^{o}C and the mean daily minimum temperature is 6.9^{o}C. In association with western disturbances passing across north India in the cold season the district experiences cold waves when the minimum temperatures often go down to four to six degrees below the freezing point of water and frost occurs damaging vegetation. The diurnal variation of temperature is large in all the months. The drop in temperature after dusk especially in winter is very rapid and trying.

The highest maximum temperature recorded at Jaisalmer was 49.2^{o}C on 04 June1991 and the lowest minimum temperature recorded at Jaisalmer was –5.9^{o}C on 12 January 1967.

HUMIDITY

The air is generally very dry. Even during the brief monsoon season the air is dry in between the fitful rains. However, humidity is about 70% in the mornings in monsoon season.

CLOUDINESS

Skies are generally clear or lightly clouded except in the southwest monsoon season, when the cloudiness is moderate. Heavily clouded to overcast skies prevail only on a few days.

WINDS

In the summer and southwest monsoon season, southwesterly winds prevail. In the post monsoon and winter season, wind blows in the directions north, northeast. In the early summer season, northwesterly winds blow in the afternoon and afterwards, southwesterly winds start blowing.

SPECIAL WEATHER PHENOMENA

A few of the depressions in July and August which originate in the Bay of Bengal and move in a westerly direction, reach the district and its neighbourhood during their last stages causing gusty winds and heavy rain. Dust storms and thunderstorms occasionally accompanied by squalls occur in the winter, summer and even in the early monsoon period. In the cold season western disturbances affect the district causing cloudy skies. Fog occurs in winter occasionally.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JAISALMER

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Fatehgarh	43	a	0.5	1.4	0.9	1.3	3.3	18.9	53.4	47.2	23.0	1.8	0.5	0.3	152.5	417	0	189.2	26 Jun 1961
		b	0.1	0.2	0.1	0.1	0.2	0.8	2.5	2.1	1.5	0.1	0.0	0.1	7.8	(1961)	(1969)		
Jaisalmer	45	a	1.5	3.1	1.6	3.3	5.1	23.3	70.6	59.4	21.8	1.8	2.6	0.7	194.8	273	13	180.0	19 Jul 1993
		b	0.3	0.4	0.2	0.2	0.6	1.1	3.6	2.7	1.4	0.2	0.2	0.1	11.0	(1961)	(1969)		
Jaisalmer (Obsy)	49	a	2.0	3.4	3.1	5.1	9.1	18.8	68.3	65.1	22.0	2.3	2.5	1.9	203.6	224	10	204.0	16 Aug 1973
		b	0.3	0.5	0.4	0.3	0.6	1.1	3.3	3.0	1.4	0.2	0.2	0.1	11.4	(1975)	(1969)		
Nachna / Iathi	15	a	3.1	1.6	1.3	0.5	5.7	24.4	54.1	33.4	13.6	3.5	3.4	1.0	145.6	202	0	77.5	19 Aug 1940
		b	0.2	0.3	0.1	0.1	0.4	1.5	3.0	1.9	1.3	0.1	0.2	0.1	9.2	(1961)	(1953)		
Nokha	23	a	0.6	5.3	3.3	2.7	10.5	11.4	63.2	36.0	34.7	1.5	1.8	1.5	172.5	263	41	180.0	09 Sep 1992
		b	0.1	0.5	0.5	0.3	0.6	0.7	3.3	2.5	1.4	0.2	0.0	0.1	10.2	(1992)	(1969)		
Pokaran	39	a	1.7	2.6	1.8	5.6	6.6	22.0	68.2	43.1	23.0	3.2	1.4	1.8	181.0	254	16	142.2	26 Jun 1961
		b	0.2	0.3	0.2	0.5	0.7	1.4	3.9	2.8	1.6	0.2	0.2	0.2	12.2	(1994)	(1969)		
Ramgarh	40	a	1.7	2.3	2.2	2.4	5.9	15.8	43.2	40.8	21.4	0.9	0.8	0.5	137.9	237	1	177.8	12 Aug 1944
		b	0.2	0.3	0.2	0.3	0.3	0.9	2.6	2.4	1.3	0.1	0.1	0.1	8.8	(1994)	(1969)		
Sam	37	a	1.6	2.5	1.3	3.1	6.6	13.8	55.6	76.0	27.3	3.4	1.8	1.0	194.0	672	4	540.0	17 Aug 1973
		b	0.2	0.4	0.2	0.3	0.4	0.9	3.0	2.1	1.1	0.2	0.1	0.1	9.0	(1973)	(1969)		
Jaisalmer (District)		a	1.6	2.8	1.9	3.0	6.6	18.6	59.6	50.1	23.4	2.3	1.9	1.1	172.9	280	13		
		b	0.2	0.4	0.2	0.3	0.5	1.1	3.2	2.4	1.4	0.2	0.1	0.1	10.1	(1973)	(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 upto 2006.
** Years of occurrence given in brackets.

Frequency of Annual Rainfall in the District
(Data 1951 - 2000)
(JAISALMER)

Range in mm	No. of years	Range in mm	No. of years
001 – 100	10	301 – 400	6
101 – 200	23	401 – 500	1
201 – 300	08		

(Data available for 48 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(JAISALMER)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.8	6.9	35.8	1990 Jan 14	-5.9	1967 Jan 12	57	30
February	26.9	10.3	37.8	1953 Feb 27	-4.4	1972 Feb 08	52	26
March	32.7	15.9	42.0	2004 Mar 22	3.4	1979 Mar 09	45	22
April	38.2	21.9	45.8	2009 Apr 29	10.6	1953 Apr 01	43	21
May	41.6	25.2	47.8	1956 May 29	15.1	1967 May 14	55	21
June	40.6	26.8	49.2	1991 Jun 04	17.2	1974 Jun 30	65	29
July	37.5	26.3	47.1	1991 Jul 11	20.1	1999 Jul 11	73	44
August	35.9	25.3	43.3	1957 Aug 05 1958 Aug 20	19.1	1965 Aug 31	75	48
September	36.3	23.9	43.3	1949 Sep 10	12.9	1966 Sep 16	70	38
October	36.1	19.9	42.2	1951 Oct 04	8.3	1949 Oct 31	53	27
November	31.1	13.2	38.8	1990 Nov 12	2.0	1988 Nov 06	52	29
December	25.2	8.2	34.4	2003 Dec 09	-0.6	1950 Dec 27	57	32
Annual	33.8	18.6					58	31

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.3	7.1	8.4	10.2	14.7	20.5	18.4	15.8	12.2	6.8	5.5	5.7	11.0

TABLE - 5
Special Weather Phenomena
(JAISALMER)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	0.4	0.6	0.5	0.8	1.2	1.9	1.9	1.0	0.2	0.0	0.1	9.0
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	0.1	0.2	0.2	0.4	0.3	1.0	0.5	0.5	0.2	0.1	0.0	0.0	3.5
Fog	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.0

JALORE DISTRICT

In common with the adjoining districts of Rajasthan, the district is characterized by a dry climate with large extremes of temperature and low rainfall. The year may be divided into four seasons, the winter from November to March, the summer from April to June, the monsoon season from July to mid September and the post monsoon season from mid September to the end of October.

RAINFALL

Records of rainfall in the district are available for six raingauge stations, for period ranging from 31 to 45 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 433.9 mm. The rainfall over the district decreases from the southeast towards the northwest and varies from 502.7 mm at Jaswantpura to 403.7 mm at Bhinmal. About 92% of the annual rainfall occurs during the period June to September. July and August are the rainiest months. The variation in the rainfall from year to year is very large. During the fifty year period 1951 to 2000, the highest annual rainfall in the district amounting to 219% of the normal occurred in 1956 while the lowest annual rainfall which was only 21% of the normal was recorded in 1968. During the same fifty year period rainfall less than 80% of the normal occurred in 20 years. Out of these, there were five occasions when such a low rainfall occurred in two consecutive years. It will be seen from Table 2 that the annual rainfall in the district was between 201 mm and 600 mm in 29 years out of 44.

The average number of rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district is only 19 and this number varies from 17 at Sachor to 21 at Jalore and Jalore observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 511.8 mm at Sachor on 16 September 1893.

TEMPERATURE

There is a meteorological observatory in the district at Jalore. The description of the climate that follows is based upon the records of Jalore observatory. The diurnal range of temperature is large in all the months. The cold season starts in November when temperatures begin to decrease. January is the coldest month with the mean daily maximum temperature at about 25.6°C and the mean daily minimum at about 10.5°C. The rapid drop in temperatures after sunset is very trying. In association with passing western disturbances during the cold season, the district experiences cold waves when the minimum temperature sometimes goes down below one degree. Temperatures rise rapidly after mid February and reach the highest values in May. May is the hottest month with the mean daily maximum temperature at 41.1°C and the mean daily minimum temperature at 28.3°C. Throughout the summer the heat is intense and scorching winds prevail. The temperatures may go above 48°C on some days. With the onset of the southwest monsoon by about the first week of July day temperatures decrease appreciably. After the withdrawal of the monsoon by about the second week of September day temperatures again increase and a secondary maximum in day temperatures is reached in October. But night temperatures decrease progressively.

The highest maximum temperature ever recorded at Jalore was 48.8°C on 20 May 1998. The lowest minimum temperature ever recorded at Jalore was 0.4°C on 13 December 1994.

HUMIDITY

Except during the southwest monsoon season, the relative humidity is low throughout the year. Even during the rainy period, in between the rains the humidity is comparatively lower. Morning humidity is about75% during southwest monsoon season.

CLOUDINESS

The skies are heavily clouded and occasionally overcast during the southwest monsoon season. During the rest of the year, the skies are mostly clear or lightly clouded.

WINDS

Winds are generally light to moderate, with strengthening in force during April to September. In the monsoon season, wind blows from direction west-southwest. In the post monsoon and winter season, winds blow in the directions between northwest and northeast. In the summer season, northwesterly winds prevail and west-southwesterly winds start blowing in the afternoons.

SPECIAL WEATHER PHENOMENA

Some of the depressions during July and August, originating in the Bay of Bengal move in west or west-northwest direction and reach the district or its neighbourhood during the last stages of their travel. These affect the district and its neighbourhood causing widespread heavy rain and gusty winds. Dust storms occur in summer and its frequency of occurrence is more in later half of summer season. Dust storms are often preceded by thunderstorms. Thunderstorms occur in summer. Sometimes in the southwest monsoon season, the rainfall is also associated with thunder.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JALORE

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Ahore	38	a	2.4	1.1	4.4	1.9	8.4	38.0	140.0	127.8	62.4	9.3	6.4	1.7	403.8	196	26	236.0	26 Jul 1995
		b	0.3	0.2	0.2	0.2	0.7	2.3	6.0	6.0	3.0	0.4	0.4	0.2	19.9	(1992)	(1991)		
Bhinmal	44	a	1.9	0.8	3.0	0.9	7.2	27.5	152.3	129.0	67.6	5.4	7.7	0.4	403.7	260	0	284.0	14 Aug 1941
		b	0.2	0.1	0.1	0.1	0.5	1.5	5.8	5.6	3.0	0.3	0.3	0.1	17.6	(1990)	(1953)		
Jalore	45	a	3.5	2.1	3.4	1.8	10.1	29.6	172.6	134.6	63.3	8.4	5.5	1.1	436.0	238	21	279.4	11 Sep 1905
		b	0.4	0.3	0.2	0.2	0.6	2.1	6.1	6.5	3.1	0.5	0.4	0.1	20.5	(1990)	(1969)		
Jalore (Obsy)	31	a	1.7	3.4	0.6	2.8	16.2	37.2	174.8	131.8	50.1	12.6	7.4	0.8	439.4	211	23	268.0	05 Jul 1990
		b	0.2	0.3	0.1	0.2	0.9	2.5	6.1	6.1	3.0	0.6	0.5	0.1	20.6	(1990)	(1968)		
Jaswantpura	42	a	1.0	0.4	3.0	1.3	5.3	35.0	190.4	165.2	81.3	7.0	12.0	0.8	502.7	246	20	325.0	06 Aug 1990
		b	0.1	0.0	0.0	0.1	0.2	1.6	6.9	6.2	3.3	0.4	0.4	0.1	19.3	(1956)	(1987)		
Sachor	44	a	2.3	0.7	3.0	1.6	6.0	29.1	158.2	129.8	74.1	5.8	6.2	0.9	417.7	223	07	511.8	16 Sep 1893
		b	0.2	0.1	0.1	0.1	0.4	1.4	5.9	5.5	2.8	0.4	0.3	0.1	17.3	(1956)	(1987)		
Jalore (District)		a	2.1	1.4	2.9	1.7	8.9	32.7	164.7	136.4	66.5	8.1	7.5	1.0	433.9	219	21		
		b	0.2	0.2	0.1	0.2	0.6	1.9	6.1	6.0	3.0	0.4	0.4	0.1	19.2	(1956)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
001 – 100	3	501 – 600	6
101 – 200	3	601 – 700	4
201 – 300	6	701 – 800	2
301 – 400	12	801 – 900	2
401 – 500	5	901 – 1000	1

(Data available for 44 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(JALORE)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	25.6	10.5	35.4	2008 Jan 18	1.2	1973 Jan 28	55	33
February	27.8	13.7	41.8	2001 Feb 15	2.4	1993 Feb 21	52	32
March	34.0	19.4	42.4	1977 Mar 30 1984 Mar 31 2004 Mar 17	4.4	1984 Mar 30	44	27
April	39.1	25.4	45.7	1979 Apr 27	11.8	1993 Apr 02	42	26
May	41.1	28.3	48.8	1998 May 20	18.4	1985 May 19	55	29
June	39.7	28.8	47.4	1991 Jun 05	17.8	2009 Jun 05	65	39
July	35.4	27.0	45.4	2000 Jul 01	16.6	2000 Jul 22	75	56
August	33.2	25.8	42.2	1987 Aug 17	15.4	2000 Aug 14	79	61
September	35.2	25.9	43.4	2000 Sep 23	14.4	1994 Sep 30	69	48
October	36.6	23.0	44.0	2000 Oct 03	9.8	1994 Oct 21	54	34
November	31.8	16.5	40.0	1987 Nov 04	0.6	1995 Nov 26	52	36
December	26.4	11.2	35.0	2000 Dec 08	0.4	1994 Dec 13	56	37
Annual	33.8	21.3					58	38

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.5	4.6	6.6	9.0	13.1	12.7	11.2	10.0	8.2	4.8	2.7	2.8	7.4

TABLE - 5
Special Weather Phenomena
(JALORE)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.1	0.1	0.2	0.3	0.9	1.3	1.2	0.9	0.1	0.0	0.1	5.2
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	0.4	0.5	0.5	1.3	1.8	0.6	0.3	0.3	0.5	0.0	0.4	6.6
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

JODHPUR DISTRICT

The climate of this district, in common with the adjoining districts of Rajasthan, is characterized by extreme dryness, wide range and extremes of temperature and the fitful and uncertain rainfall. The winter season is from November to March and is followed by the summer from April to June. The period from July to mid September forms the southwest monsoon season and mid September to October is the post monsoon season.

RAINFALL

Records of rainfall in the district are available for eight raingauge stations, for period ranging from 12 to 50 years. Tables 1 and 2 give the statement of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 320.7 mm. The rainfall generally increases from the northwest to the southeast. The annual rainfall varies from about 20 cm in the extreme northwest to about 40 cm in the extreme southeast of the district. About 80% of the rainfall is received during the southwest monsoon season. The variation in the annual rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall in the district amounting to 207% of the normal occurred in 1975 whereas 1998 is the year of lowest annual rainfall amounting to 05% of the normal. In the same fifty year period rainfall less than 80% of the normal occurred in 21 years. In the district as a whole there were three occasions when such a low rainfall occurred in two consecutive years and on two occasions it occurred in four consecutive years. It will be seen from Table 2 that the annual rainfall in the district was between 101 mm and 500 mm in 43 years out of 49.

On an average there are 18 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 22 at Bilara to 12 at Phalodi (Obsy).

The heaviest rainfall in 24 hours recorded at any station in the district was 300.0 mm at Bilara on 31 July 1999.

TEMPERATURE

There are two meteorological observatories in the district, one at Jodhpur and another at Phalodi. The data of the Phalodi observatory may be taken to represent the weather conditions in the northwestern half of the district while data of Jodhpur as representative of the conditions in the southeastern half. At Phalodi, temperature is generally lower in the winter and higher in the summer than at Jodhpur. Temperature rises rapidly after March. May is the hottest month with the mean daily maximum temperature at 41.5°C at Jodhpur and 41.9°C at Phalodi. In June the day temperatures are slightly lower but the night temperatures are higher than in May. The summer months are intensely hot with scorching winds. The maximum temperature may occasionally exceed 47°C. With the advance of the monsoon air into the district after mid July temperature drops appreciably. A secondary maximum in day temperature is attained after mid September or October after the withdrawal of the southwest monsoon. Thereafter both day and night temperatures decrease rapidly. January is the coldest month when the mean daily minimum temperature at Jodhpur is 8.9°C while at Phalodi it is 6.5°C. During the winter season, cold waves affect the district in the wake of passing western disturbances and the minimum temperature sometimes drops to two or three degrees below the freezing point of water. The diurnal variation of temperature is very large and the drop in temperature after the sunset is very rapid, during the winter months.

The highest maximum temperature recorded at Jodhpur was 48.9°C on 25 May 1932 and 49.0°C on 07 June 1991 at Phalodi. The lowest minimum temperature recorded at Jodhpur was –2.2°C on 31 January 1905 and –3.3°C on 12 January 1942 at Phalodi.

HUMIDITY

Except during the short southwest monsoon season, humidity is very low. Even in that season low humidity prevails in between the fifful rains.

CLOUDINESS

In the monsoon season skies are heavily clouded to overcast on many days. In the rest of the year clear or lightly clouded skies are common.

WINDS

Except for moderate to strong winds during the period May to August, winds are generally light during the rest of the year. During the winter season, winds blow from northeasterly direction. By April, southwesterly winds begin and these become predominant in the summer and monsoon months. In October, winds are southwesterly and northeasterly winds begin to appear.

SPECIAL WEATHER PHENOMENA

Occasionally some of the depressions which originate in the Bay of Bengal during the southwest monsoon season move across the country in a westerly to northwesterly direction reach the district and its neighbourhood and cause strong gusty winds and widespread rain before dissipating. Dust storms and thunderstorms occur in the hot season and are sometimes accompanied by squalls. Thunderstorms occur in the southwest monsoon season also. Fog occurs in the winter season.

Tables 3, 4 and 5 and 3(a), 4(a) and 5(a) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Jodhpur and Phalodi observatories.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JODHPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bilara	45	a	3.7	3.6	2.9	1.9	13.1	37.2	166.0	131.6	64.3	6.5	4.8	2.6	438.2	243	37	300.0	31 Jul 1999
		b	0.3	0.4	0.3	0.3	1.0	2.3	7.0	6.2	3.3	0.5	0.2	0.3	22.1	(1975)	(1972)		
Jaswant Sagar	12	a	0.0	0.0	0.0	0.0	3.1	46.3	113.8	147.6	70.8	13.1	0.0	2.5	397.2	274	0	142.0	06 Aug 1976
		b	0.0	0.0	0.0	0.0	0.3	2.2	5.1	6.4	3.1	0.3	0.0	0.2	17.6	(1975)	(1974)		
Jodhpur	45	a	3.2	2.7	3.8	3.8	10.8	28.1	129.5	117.2	56.0	6.6	3.8	1.0	366.5	224	25	177.8	23 Aug 1881
		b	0.4	0.4	0.3	0.3	0.8	2.0	5.8	6.3	3.1	0.4	0.2	0.1	20.1	(1990)	(1969)		
Jodhpur (Obsy)	45	a	3.4	3.1	4.8	9.7	13.3	33.0	120.5	118.8	59.7	7.0	3.5	0.6	377.4	213	36	215.9	12 Sep 1924
		b	0.3	0.4	0.5	0.3	1.1	2.2	6.2	6.2	3.0	0.5	0.3	0.0	21.0	(1967)	(1960)		
Osian	39	a	3.9	3.5	1.6	3.7	10.7	25.8	114.3	79.0	42.0	2.2	0.9	1.3	288.9	213	34	115.2	19 Jul 1975
		b	0.4	0.4	0.2	0.3	0.9	1.9	5.7	5.0	2.4	0.2	0.1	0.1	17.6	(1975)	(1963)		
Phalodi	39	a	3.3	4.7	2.5	6.1	11.8	25.6	86.3	72.3	29.9	3.2	2.5	1.4	249.6	229	22	167.5	12 Jul 1964
		b	0.3	0.5	0.2	0.5	1.0	1.9	4.1	3.6	1.9	0.2	0.1	0.2	14.5	(1957)	(1991)		
Phalodi (Obsy)	50	a	1.7	3.3	3.4	5.5	9.4	19.5	72.0	62.3	22.8	2.5	2.4	1.0	205.8	251	05	225.0	12 Jul 1964
		b	0.2	0.3	0.3	0.4	0.8	1.6	3.6	3.3	1.4	0.2	0.2	0.1	12.4	(1964)	(1900)		
Shergarh	45	a	2.5	2.2	2.1	7.4	7.7	18.7	83.3	82.1	31.6	2.1	1.2	0.5	241.4	184	17	298.5	02 Sep 1908
		b	0.2	0.2	0.2	0.3	0.8	1.9	4.8	4.8	1.9	0.1	0.1	0.1	15.4	(1976)	(1974)		
Jodhpur (District)		a	2.7	2.9	2.6	4.8	10.0	29.3	110.7	101.4	47.1	5.4	2.4	1.4	320.7	207	05		
		b	0.3	0.3	0.3	0.3	0.8	2.0	5.3	5.2	2.5	0.3	0.2	0.1	17.6	(1975)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
001 – 100	4	401 – 500	7
101 – 200	8	501 – 600	1
201 – 300	12	601 – 700	1
301 – 400	16		

(Data available for 49 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(JODHPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	25.4	8.9	35.0	1991 Jan 28	-2.2	1905 Jan 31	54	26
February	28.1	11.4	38.3	1953 Feb 28	-0.7	1974 Feb 07	49	24
March	33.8	17.1	42.5	1984 Mar 30	4.7	1979 Mar 09	38	17
April	38.9	22.7	48.0	1958 Apr 25	9.4	1918 Apr 07	35	15
May	41.5	26.6	48.9	1932 May 25	17.0	1982 May 07	45	18
June	40.2	28.0	48.0	1991 Jun 04	18.8	1997 Jun 03	60	31
July	36.1	26.7	45.6	1901 Jul 05	16.2	2003 Jul 28	73	50
August	34.2	25.4	42.9	1957 Aug 05	19.4	1977 Aug 15	80	58
September	35.5	24.2	42.8	1915 Sep 11	15.4	1994 Sep 30	72	45
October	36.4	19.8	42.3	1968 Oct 02	10.0	1949 Oct 31	52	26
November	31.8	14.5	38.4	1986 Nov 01	4.8	1993 Nov 25	48	27
December	26.9	10.3	34.8	2008 Dec 04	0.6	1945 Dec 23	54	30
Annual	34.1	19.6					55	31

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.3	7.3	7.9	8.3	12.0	18.1	13.0	10.6	8.3	5.4	5.7	6.1	9.1

TABLE - 5
Special Weather Phenomena
(JODHPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	0.9	0.9	2.0	3.8	5.0	6.8	5.7	3.0	0.8	0.1	0.2	29.6
Hail	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.6
Dust storm	0.0	0.2	0.5	1.0	2.9	3.1	1.5	0.3	0.2	0.1	0.0	0.0	9.8
Squall	0.0	0.0	0.1	0.2	0.5	1.1	0.7	0.4	0.4	0.1	0.0	0.0	3.5
Fog	0.3	0.3	0.0	0.0	0.1	0.0	0.3	0.1	0.2	0.1	0.1	0.4	1.9

TABLE – 3(a)
Normals of Temperature and Relative Humidity
(PHALODI)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.2	6.5	33.6	1991 Jan 28	-3.3	1942 Jan 12	59	32
February	27.3	9.8	39.5	1988 Feb 29	0.0	1986 Feb 02 2008 Feb 07	55	29
March	33.2	15.8	43.0	1999 Mar 30	1.7	1945 Mar 05	48	27
April	38.7	21.8	47.0	1958 Apr 25 2009 Apr 28	11.4	1965 Apr 02	44	26
May	41.9	25.4	48.8	1998 May 22	13.5	1987 May 09	51	25
June	41.3	26.6	49.0	1991 Jun 07	15.5	2003 Jun 19	64	32
July	37.8	26.1	47.5	2009 Jul 07	18.0	2003 Jul 06	73	46
August	36.2	25.2	46.0	2002 Aug 04	18.8	1986 Aug 27	76	50
September	37.0	23.6	45.0	1988 Sep 13	17.0	1992 Sep 25	70	39
					17.0	1994 Sep 24		
October	36.8	19.5	43.0	2000 Oct 08 2002 Oct 10	8.9	1949 Oct 31	53	28
November	31.4	13.2	39.6	1994 Nov 06 1996 Nov 02	4.0	1990 Nov 26	50	31
December	25.7	7.5	34.0	1993 Dec 01 1994 Dec 01 2008 Dec 05	-2.5	1986 Dec 15	55	32
Annual	34.3	18.4					58	33

TABLE – 4(a)
Mean Wind Speed in km/hr.
(PHALODI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.0	7.6	9.1	10.3	13.0	16.4	12.8	12.2	10.4	7.4	5.7	5.6	9.7

TABLE – 5(a)
Special Weather Phenomena
(PHALODI)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.2	0.2	0.4	1.2	1.5	1.4	1.3	0.7	0.4	0.0	0.0	7.4
Hail	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dust storm	0.1	0.4	1.2	1.4	3.1	3.0	1.3	0.9	0.3	0.3	0.0	0.1	12.1
Fog	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.8

NAGAUR DISTRICT

The climate of this district, in common with adjoining districts of Rajasthan is characterized by highly variable rainfall, extreme dryness and large variations of temperature. The winter season from November to March is followed by the summer from April to June. The period from about the beginning of July to the middle of September constitutes the main rainy season. The latter half of September and October forms the transition period.

RAINFALL

Records of rainfall in the district are available for nine raingauge stations, for period ranging from 38 to 45 years. Table 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 391.2 mm. The rainfall generally increases from northwest towards the southeast in the district. The period from June to September is the rainy season. July and August are the rainiest months. The rainfall during the period June to September constitutes about 89% of the annual rainfall. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall which amounted to 289% of the normal occurred in 1975. 1951 was the year with the lowest annual rainfall which amounted to only 42% of the normal. In the same fifty year period the annual rainfall was less than 80% of the normal in 15 years. In the district as a whole, during this fifty year period, two and four consecutive years of rainfall less than 80% of the normal occurred once. It will be seen from Table 2 that the annual rainfall in the district was between 201 mm and 500 mm in 31 years out of 42.

On an average there are 22 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. The number of rainy days is more or less uniform over the district and is about 20 to 23 days.

The heaviest rainfall in 24 hours recorded at any station in the district was 780.3 mm at Parbatsar on 16 September1900.

TEMPERATURE

There is meteorological observatory in the district at Nagaur. The description of the climate that follows is based on the records of this observatory. Temperatures rise rapidly from March. May is the hottest month with the daily maximum temperature at 41.2°C and the mean daily minimum temperature at 25.1°C. Night temperatures continue to rise upto June when the mean minimum temperature reaches 27.3°C. The summer months are intensely hot and dust laden winds blow. The maximum temperature may sometimes go upto 48°C. With the advance of the southwest monsoon into the district by about the beginning of July, day temperatures drop appreciably but with the withdrawal of the monsoon after the first week of September, while the night temperatures continue to fall, the day temperatures show a rise and the secondary maximum in day temperatures is attained in October. Thereafter both day and night temperatures decrease rapidly. January is the coldest month with the mean daily maximum temperature at 23.8°C and the mean daily minimum temperature at 6.0°C. During the winter season, in the wake of passing western disturbances spells of colder weather are experienced in the district. The minimum temperature on such occasion may drop down to two to three degrees below the freezing point of water and frost may occur. The diurnal variation of temperature during winter months is of the order of 18°C and the drop in temperature after sunset is appreciable.

The highest maximum temperature recorded at Nagaur was 48.4°C on 31 May 1965 and the lowest minimum temperature was –2.9°C on 13 January 1967.

HUMIDITY

Except during the short southwest monsoon season, the relative humidity is very low. Even during the monsoon low humidity prevails in between the fitful rains. The summer months are the driest, when relative humidity is on an average between 20% and 30% in the afternoons.

CLOUDINESS

During the monsoon season skies are heavily clouded or overcast on some days. In the rest of the year the skies are clear or lightly clouded. In the winter season, in association with passing western disturbances, cloudy skies prevail for short spells of a day or two.

WINDS

Winds are generally light to moderate with some strengthening in force during April to September. During the later part of summer and southwest monsoon season, wind blows from directions between southwest and south. October is the transitional month and after October, in the post monsoon season wind blows in the direction north/northeasterly. Whereas in the winter season wind blows in the direction between northeast to northwest. During early summer, southwesterly winds start blowing in the morning and northwesterly winds prevail in the afternoon.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the southwest monsoon season move in a westerly to northwesterly direction and occasionally reach the district or its neighbourhood causing widespread rain and strong winds before dissipating. Dust storms and thunderstorms occur in the hot season and are sometimes accompanied by squalls. Thunderstorms occur in the monsoon season also. Occasional fog occurs in winter.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
NAGAUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Degana	39	a	4.9	4.3	2.1	3.7	12.4	42.1	163.0	126.8	46.4	4.2	4.0	3.9	417.8	395	28	281.0	09 Aug 1973
		b	0.4	0.5	0.3	0.4	1.1	2.4	7.3	6.8	3.1	0.3	0.2	0.2	23.0	(1975)	(1987)		
Didwana	45	a	5.6	6.8	2.5	2.7	14.7	30.3	125.1	100.5	45.5	5.9	2.5	3.2	345.3	266	39	171.5	11 Aug 1924
		b	0.5	0.7	0.4	0.4	1.4	2.5	6.5	6.5	2.6	0.5	0.3	0.3	22.6	(1975)	(1989)		
Jayal	39	a	5.2	4.5	1.6	4.2	13.5	33.4	135.5	111.3	53.8	5.6	2.1	1.7	372.4	332	19	193.0	17 Jul 1981
		b	0.4	0.4	0.2	0.4	1.0	2.3	6.2	6.5	3.1	0.5	0.2	0.2	21.4	(1975)	(1963)		
Ladnun	39	a	4.7	6.5	3.4	5.9	17.7	40.0	157.3	106.5	48.8	4.7	1.5	2.7	399.7	215	34	292.1	23 Jul 1957
		b	0.4	0.6	0.4	0.5	1.6	2.8	6.6	6.1	2.7	0.5	0.2	0.3	22.7	(1975)	(1972)		
Merta City	45	a	1.9	5.3	3.1	4.3	9.1	33.9	155.6	117.2	52.2	8.7	3.5	2.0	396.8	234	31	279.4	16 Jul 1943
		b	0.2	0.5	0.3	0.2	0.7	2.1	6.6	6.2	2.9	0.4	0.2	0.3	20.6	(1975)	(1987)		
Nagaur (Obsy)	38	a	2.6	4.9	3.3	3.6	17.8	35.1	120.4	116.0	33.5	3.9	2.1	4.7	347.9	322	37	310.6	23 Jun 1996
		b	0.1	0.3	0.3	0.4	1.1	1.9	5.2	5.9	2.1	0.3	0.2	0.4	18.2	(1975)	(1966)		
Nagaur (Nagore)	45	a	4.8	5.8	3.1	5.1	17.7	34.8	130.8	109.2	46.8	5.5	2.6	2.7	368.9	341	38	285.0	17 Jul 1975
		b	0.4	0.5	0.4	0.4	1.2	2.1	6.0	6.3	3.0	0.5	0.2	0.4	21.4	(1975)	(1963)		
Nawa	45	a	6.0	8.2	3.7	4.6	17.8	48.4	160.5	137.9	67.5	10.2	3.5	2.9	471.2	233	38	457.2	12 Jul 1968
		b	0.6	0.7	0.4	0.4	1.3	2.8	7.2	7.6	3.7	0.5	0.3	0.2	25.7	(1975)	(1972)		
Parbatsar	45	a	4.3	5.7	2.4	3.5	11.7	43.3	146.5	113.2	58.4	6.7	2.9	2.1	400.7	274	25	780.3	16 Sep 1900
		b	0.4	0.6	0.3	0.3	1.0	2.5	7.2	6.7	3.6	0.4	0.2	0.2	23.4	(1975)	(1987)		
Nagaur (District)		a	4.4	5.8	2.8	4.2	14.7	37.9	143.9	115.4	50.3	6.2	2.7	2.9	391.2	289	42		
		b	0.4	0.5	0.3	0.4	1.2	2.4	6.5	6.5	3.0	0.4	0.2	0.3	22.1	(1975)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	4	701 – 800	0
201 – 300	10	801 – 900	0
301 – 400	9	901 – 1000	0
401 – 500	12	1001 – 1100	0
501 – 600	4	1101 – 1200	1
601 – 700	2		

(Data available for 42 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(NAGAUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.8	6.0	31.9	1965 Jan 15	-2.9	1967 Jan 13	54	43
February	26.6	9.6	36.5	1993 Feb 11	-1.9	1974 Feb 07	49	36
March	32.7	15.2	41.4	1972 Mar 27	4.5	1972 Mar 01	42	32
April	38.0	20.9	45.4	1979 Apr 27	10.4	1993 Apr 02	39	28
May	41.2	25.1	48.4	1965 May 31	15.4	1969 May 02	42	23
June	40.5	27.3	48.0	1994 Jun 06	15.6	1997 Jun 03	57	36
July	36.4	25.9	45.0	1968 Jul 03	18.5	1996 Jul 01	72	55
August	34.8	24.8	42.4	1972 Aug 06	19.4	1995 Aug 05	75	60
September	35.5	23.3	42.2	1974 Sep 21	15.3	1972 Sep 24	65	47
October	36.2	18.4	41.6	1986 Oct 09	8.9	1995 Oct 30	48	36
November	30.6	12.1	38.2	1978 Nov 03	3.8	1978 Nov 27	48	44
December	25.3	7.2	34.1	1986 Dec 04	-0.8	1986 Dec 19	52	43
Annual	33.5	18.0					54	40

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.2	6.3	7.7	8.4	11.0	14.4	12.0	9.8	8.3	5.3	4.4	4.9	8.1

TABLE - 5
Special Weather Phenomena
(NAGAUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.2	0.2	0.3	1.2	0.8	0.5	0.3	0.4	0.1	0.1	0.0	4.2
Hail	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Dust storm	0.0	0.0	0.5	1.0	2.3	1.4	0.5	0.0	0.0	0.1	0.0	0.0	5.8
Fog	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.9

PALI DISTRICT

The climate of this district is on the whole dry with a hot season comparatively milder than in the adjoining districts to the north and northwest. The cold season from December to February is followed by the hot season which lasts till about the middle of June. The period from mid June to mid September is the southwest monsoon season. The period from mid September to end of November is the post monsoon season.

RAINFALL

Records of rainfall in the district are available for twelve raingauge stations, for period ranging from 10 to 46 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 498.9 mm. The rainfall generally decreases from the southeast to the northwest in the district. But the region around Jatiram gets lesser rain than even the northwestern parts of the district. The rainfall during the period June to September constitutes about 95% of the annual rainfall. July and August are the rainiest months. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 219% of the normal occurred in 1973 while the lowest annual rainfall which was only 32% of the normal occurred in 1969. During this fifty year period, the rainfall was less than 80% of the normal in 17 years. There were three occasions when such a low rainfall occurred in two consecutive years and one occasion each when it occurred for three and four consecutive years. It will be seen from Table 2 that the annual rainfall in the district was between 201 mm and 800 mm in 39 years out of 46.

On an average there are 22 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 16 at Bogol, Hemwas and Kharda to 27 at Desuri and Erinpura/Jawai Observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 381.0 mm at Desuri on 31 July 1952.

TEMPERATURE

The only meteorological observatory in the district is at Erinpura and records of this observatory are available for few years only. The description which follows is based on the records of this observatory and of the observatories in the neighbouring districts. From about November both day and night temperatures drop rapidly till January which is the coldest month. The drop in the temperature after nightfall is very rapid and trying during the cold season. During the coldest month of January the mean daily minimum temperature is 8°C to 9°C and the mean daily maximum is about 25°C-26°C. In the wake of western disturbances moving across north India during the cold season, cold waves affect the district and on such occasions the minimum temperature may go down to a degree or two below the freezing point of water and frost may occur. Temperatures rise rapidly after February. May is the hottest month of the year with the mean daily maximum temperature at about 40°C-41°C and the mean daily minimum at about 26°C-27°C. The summer months are intensely hot with scorching winds. The maximum temperatures may sometimes reach to about 48°C in May. With the onset of the southwest monsoon by about mid June the day temperatures drop appreciably. With the withdrawal of the southwest monsoon by about mid September the day temperatures increase slightly and a secondary maximum in the day temperature is reached in October. But night temperatures continue to decrease. Later temperatures begin to drop steadily.

The highest maximum temperature ever recorded at Erinpura was 48.1°C on 06 May 1966 and the lowest minimum was –3.1°C on 13 January 1994 and 17 January 2000.

HUMIDITY

During the brief southwest monsoon season the relative humidity is generally high. In the rest of the year, the air is dry. The summer months are the driest when humidity particularly in the afternoons is about 25% to 35% generally.

CLOUDINESS

Skies are generally heavily clouded to overcast during the southwest monsoon season. During the rest of the year the skies are mostly clear or lightly clouded. In the winter season which is generally marked by clear bright weather, brief spells of cloudy weather occur in association with the passage of western disturbances across north India.

WINDS

Winds are generally light with some strengthening in force during the southwest monsoon season. From May to September, the winds are predominantly from southwest. In the post monsoon, winter and summer months winds are mainly from directions between south and southwest. In northwestern parts adjacent to Jodhpur observatory, winds are northeasterly during the post and winter season.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions which originate in the Bay of Bengal and move in a westerly direction, reach the district or its neighbourhood and cause gusty winds and widespread rain before dissipating. Sand, dust storms and thunderstorms occur occasionally during the summer season. Thunderstorms also occur during the southwest monsoon season. Occasional fog occurs during monsoon, post monsoon and winter season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
PALI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bagol	10	a	0.0	0.0	0.0	0.0	0.0	35.8	67.2	169.0	156.5	0.0	0.0	0.0	428.5	333	36	245.0	03 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	2.0	3.8	6.8	3.7	0.0	0.0	0.0	16.3	(1973)	(1974)		
Bali	45	a	4.6	2.0	4.5	2.5	9.9	49.4	216.9	158.2	101.0	8.2	5.4	1.7	564.3	302	31	350.0	05 Jul 1990
		b	0.4	0.2	0.2	0.2	0.8	2.8	8.0	7.5	4.2	0.7	0.4	0.2	25.6	(1973)	(1987)		
Desuri	45	a	3.4	2.8	3.9	3.4	10.0	62.7	219.2	195.2	117.6	10.3	5.4	2.2	636.1	269	30	381.0	31 Jul 1952
		b	0.3	0.2	0.2	0.2	0.6	3.3	8.5	8.1	4.2	0.7	0.4	0.2	26.9	(1973)	(1987)		
Erinpura/Jawai (Obsy)	46	a	3.9	1.8	4.1	1.5	11.4	45.8	207.1	176.5	107.4	18.3	3.9	1.1	582.8	331	27	356.8	02 Sep 1973
		b	0.4	0.2	0.2	0.2	0.8	3.0	8.1	8.0	4.3	1.1	0.4	0.1	26.8	(1973)	(1969)		
Girinanda	10	a	0.0	0.0	0.0	0.0	0.0	84.6	220.7	193.2	61.0	1.5	0.0	0.0	561.0	170	41	250.0	27 Jun 1993
		b	0.0	0.0	0.0	0.0	0.0	2.6	8.0	8.1	4.7	0.2	0.0	0.0	23.6	(1976)	(1974)		
Hemwas	11	a	0.0	0.0	0.0	0.0	0.0	46.8	215.7	155.7	63.0	0.0	0.0	0.0	481.2	225	25	350.0	16 Jul 1979
		b	0.0	0.0	0.0	0.0	0.0	1.8	5.4	6.4	2.6	0.0	0.0	0.0	16.2	(1979)	(1981)		
Jatiram	44	a	4.4	2.9	2.3	2.3	6.8	28.1	155.1	133.9	54.3	8.3	5.5	1.7	405.6	215	37	226.0	17 Jul 1979
		b	0.4	0.4	0.2	0.3	0.8	2.2	7.4	7.2	3.2	0.4	0.3	0.2	23.0	(1979)	(1986)		
Kharchi	30	a	2.6	2.5	2.9	3.4	14.8	53.7	148.7	148.8	66.9	11.3	6.9	2.6	465.1	205	38	215.9	23 Aug 1957
		b	0.3	0.3	0.2	0.2	0.9	2.6	6.5	7.1	3.3	0.6	0.4	0.3	22.7	(1979)	(1974)		
Kharda	12	a	0.0	0.0	0.0	0.0	0.0	73.2	203.3	180.1	70.6	0.0	0.0	0.0	527.2	201	40	288.0	16 Jul 1979
		b	0.0	0.0	0.0	0.0	0.0	2.2	4.3	6.3	3.4	0.0	0.0	0.0	16.2	(1973)	(1974)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
PALI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Pali	44	a	2.5	2.2	1.6	1.2	6.3	41.6	159.1	147.2	63.4	10.3	3.7	1.1	440.2	238 (1990)	29 (1987)	304.8	16 Jul 1979
		b	0.4	0.3	0.1	0.1	0.7	2.4	6.3	6.8	3.2	0.5	0.3	0.1	21.2				
Raipur	39	a	3.8	3.1	2.3	3.4	9.8	42.8	173.3	160.6	68.9	9.4	4.2	1.2	482.8	201 (1983)	24 (1987)	226.0	02 Jul 1994
		b	0.4	0.3	0.2	0.3	0.8	3.0	7.3	8.1	3.6	0.7	0.3	0.1	25.1				
Sojat	45	a	3.5	2.6	2.8	4.1	10.4	35.4	145.6	129.0	64.3	7.1	4.8	1.7	411.3	214 (1994)	36 (1987)	304.8	06 Jul 1908
		b	0.4	0.3	0.2	0.3	0.7	2.5	6.5	7.3	3.2	0.5	0.3	0.2	22.4				
Pali (District)		a	2.4	1.7	2.0	1.8	6.6	50.0	177.7	162.3	82.9	7.1	3.3	1.1	498.9	219 (1973)	32 (1969)		
		b	0.3	0.2	0.1	0.2	0.5	2.5	6.7	7.3	3.6	0.5	0.2	0.1	22.2				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	2	601 – 700	5
201 – 300	5	701 – 800	5
301 – 400	10	801 – 900	3
401 – 500	8	901 – 1000	1
501 – 600	6	1001 – 1100	1

(Data available for 46 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(ERINPURA)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	26.3	8.0	33.5	2006 Jan 22	-3.1	1994 Jan 13 2000 Jan 17	75	44
February	28.8	10.8	38.1	1993 Feb 14	-0.5	2005 Feb 20	65	36
March	33.9	16.7	42.0	2004 Mar 23 1991 Mar 30	4.4	1975 Mar 12 1979 Mar 10	53	33
April	38.2	22.6	45.6	1958 Apr 27	8.0	2005 Apr 11	49	32
May	40.3	26.0	48.1	1966 May 06	12.6	2008 May 07	54	33
June	38.2	26.5	46.9	1980 Jun 12	7.6	2004 Jun 06	66	44
July	33.6	25.4	43.0	2009 Jul 07	15.0	2006 Jul 29	78	64
August	31.6	24.2	38.6	1965 Aug 20 1998 Aug 26	14.0	2006 Aug 07	83	71
September	33.7	23.7	41.0	2005 Sep 06	13.7	1996 Sep 13	76	60
October	35.2	20.3	40.6	1969 Oct 09 1985 Oct 04	8.2	2004 Oct 30	62	47
November	31.8	14.2	38.0	2004 Nov 05	2.1	1975 Nov 27	68	49
December	27.8	9.7	37.6	1999 Dec 05	0.0	2005 Dec 20	77	50
Annual	33.3	19.0					67	47

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.8	3.8	5.0	5.5	7.3	8.8	7.2	6.1	5.0	3.9	2.8	2.4	5.1

TABLE - 5
Special Weather Phenomena
(ERINPURA)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.1	0.1	0.4	0.6	1.6	2.0	1.6	1.3	0.4	0.0	0.0	8.2
Hail	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dust storm	0.0	0.1	0.0	0.2	1.0	0.3	0.0	0.1	0.0	0.0	0.0	0.0	1.7
Fog	0.2	0.2	0.0	0.2	0.1	0.0	0.1	0.5	0.0	0.0	0.2	0.1	1.6

DISTRICT CLIMATOLOGICAL SUMMARIES OF EAST RAJASTHAN

AJMER DISTRICT

The district has a hot dry summer and a cold bracing winter. December to February is the cold season after which the hot season commences and continues till about the last week of June when the southwest monsoon sets in. The southwest monsoon season is comparatively short in this region and lasts only till mid September. The period from the second half of September to the end of November is the post monsoon season.

RAINFALL

Records of rainfall in the district are available for twenty raingauge stations, for period ranging from 32 to 49 years. Tables 1 and 2 give the data of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 454.9 mm. About 93% of the annual rainfall is received during the period from June to September. July and August are the rainiest months. The variation in the annual rainfall from year to year is not large. In the fifty year period from 1951 to 2000 the highest annual rainfall which amounted to 199% of the annual normal occurred in 1975 whereas 1972 was the year of lowest annual rainfall amounting to only 47% of the normal. During this fifty year period, there were 13 years when annual rainfall was less than 80% of the normal rainfall. There is one occasion each when such a low rainfall occurred in two and three consecutive years, viz. 1962-63 and 1985-86-87 respectively. It is seen from Table 2 that in 33 years out of 47 years the annual rainfall in the district was between 301 mm and 600 mm.

On an average there are 21 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 14 at Mangliawas to 31 at Ajmer observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 500.0 mm at Nasirabad on 05 October 1989.

TEMPERATURE

The meteorological data of only observatory in the district at Ajmer may be taken as representative of the weather conditions in the district as a whole. The period from March to June is one of continuous rise in temperature, May and first half of June being the hottest part of the year. The mean daily maximum temperature in May is 40.4^{o}C and the mean daily minimum temperature is 26.4^{o}C. The night temperatures in June are a little higher than in May. In May maximum temperature may go upto about 47^{o}C. After the setting of southwest monsoon in second half of June, temperature decreases somewhat but the relief from the heat is not marked because of the added discomfort from the increase in humidity, brought in by southwest monsoon air. After the withdrawal of the monsoon by mid September, days become hotter in October and a secondary maximum in day temperatures is reached. However, nights become progressively cooler. After mid November, both day and night temperatures drop rapidly till January which is the coldest month with the mean daily maximum temperature at 23.8^{o}C and the mean daily minimum temperature at 7.2^{o}C. In association with cold waves which affects the district in the wake of western disturbances which pass across north India during the cold season, minimum temperature, particularly in January and February go down to a degree or two below the freezing point of water and frost may occur.

The highest maximum temperature ever recorded at Ajmer was 47.4^{o}C on 19 May 1977 and the lowest minimum temperature ever recorded was -2.8^{o}C on 16 January 1935.

HUMIDITY

The air is generally dry throughout the year except for the brief period of southwest monsoon season when the humidity is generally more than 70%. In the

summer season which is the driest part of the year. Afternoon values of humidity are as low as 20% to25%.

CLOUDINESS

During the southwest monsoon season skies are moderately to heavily clouded, generally overcast on some days. In the rest of the year clear or lightly clouded skies prevail. But on a few days in winter season skies become cloudy when district is affected by passing western disturbances.

WINDS

Except for moderate winds during summer and southwest monsoon season, winds are generally light. In the summer and southwest monsoon season, wind blows mainly from directions west/southwest. In the post monsoon season, wind blows from northeast direction, whereas in winter season, wind blows from northeast direction in the morning and in between northwest to southwest directions in the afternoon. March is the transitional month, after which the wind blows from southwesterly direction.

SPECIAL WEATHER PHENOMENA

Depressions which originate in the Bay of Bengal and move across the central parts of the country in the southwest monsoon season affect the district during the last stage causing widespread heavy rainfall. Thunderstorms occur practically in all the months of the year, but its frequency is more during May to September. In the hot season dust storms also occur. Occasional fog occurs in winter months.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
AJMER

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Ajmer	38	a	8.8	5.2	4.3	4.9	15.1	65.0	225.2	173.6	81.1	7.2	6.6	2.9	599.9	240	33	294.0	16 Jul 1979
		b	0.6	0.6	0.4	0.4	0.9	3.4	9.5	8.9	4.3	0.6	0.4	0.3	30.3	(1957)	(1987)		
Ajmer (Obsy)	49	a	5.3	6.1	2.9	6.1	17.1	57.1	222.3	157.3	87.9	18.1	5.5	1.8	587.5	205	42	412.3	10 Jun 2002
		b	0.5	0.7	0.4	0.5	1.4	3.2	9.5	8.3	4.6	0.9	0.4	0.2	30.6	(1975)	(1951)		
Arain	39	a	2.3	1.2	0.8	1.2	8.0	45.1	166.6	152.8	51.0	6.6	0.9	4.2	440.7	211	24	200.0	11 Jul 1993
		b	0.1	0.2	0.1	0.1	0.4	1.9	7.2	7.3	2.5	0.4	0.1	0.2	20.5	(1973)	(1972)		
Bhinai	43	a	3.5	1.2	0.1	3.1	5.7	40.4	153.1	168.0	51.0	11.7	1.4	0.0	439.2	199	23	177.0	04 Aug 1966
		b	0.2	0.1	0.0	0.1	0.3	2.1	6.4	7.5	2.8	0.5	0.1	0.0	20.1	(1990)	(1986)		
Bijai Nagar	35	a	2.9	1.5	2.3	1.1	7.1	38.3	135.2	149.3	43.6	3.9	0.5	2.0	387.7	173	18	190.0	05 Aug 1990
		b	0.2	0.1	0.1	0.1	0.4	1.7	6.3	6.1	2.4	0.2	0.1	0.1	18.0	(1970)	(1993)		
Gagel	44	a	2.0	0.7	0.6	0.2	5.0	25.8	159.9	120.9	38.4	9.1	0.0	0.6	363.2	222	0	197.0	27 Jul 1983
		b	0.2	0.1	0.1	0.0	0.2	1.0	5.7	5.1	1.9	0.2	0.0	0.0	14.5	(1975)	(1970)		
Goela	38	a	2.2	1.2	2.4	0.4	1.6	25.9	123.0	133.1	45.4	8.0	0.4	0.9	344.5	207	0	190.5	12 Sep 1911
		b	0.2	0.1	0.1	0.0	0.2	1.5	5.5	6.1	2.4	0.4	0.0	0.1	16.6	(1955)	(1991)		
Jawaja	42	a	3.0	1.5	2.7	0.8	8.5	42.8	174.9	168.3	55.6	9.1	1.6	0.2	469.0	206	28	221.0	08 Aug 1932
		b	0.3	0.1	0.2	0.1	0.5	2.4	6.8	6.9	2.4	0.4	0.1	0.1	20.3	(1976)	(1993)		
Kekri	44	a	6.2	4.1	2.3	2.0	8.2	54.9	177.0	194.0	63.5	10.3	3.4	3.9	530.0	245	49	313.7	18 Jul 1931
		b	0.3	0.3	0.2	0.2	0.6	3.2	8.4	9.4	3.3	0.5	0.3	0.3	27.2	(1951)	(1965)		
Kishangarh	39	a	5.2	6.0	3.5	3.5	14.4	52.4	186.2	152.9	72.2	7.4	4.9	2.1	510.7	209	35	196.0	27 Jul 1983
		b	0.6	0.5	0.4	0.4	1.0	2.5	7.8	7.8	3.5	0.4	0.2	0.2	25.3	(1975)	(1980)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
AJMER

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Mangliawas	38	a	1.2	0.0	1.1	0.0	4.5	20.8	118.2	98.2	29.4	2.4	1.3	0.3	277.4	264 (1975)	14 (1991)	237.0	01 Aug 1976
		b	0.1	0.0	0.1	0.0	0.3	1.1	5.3	5.1	1.8	0.1	0.1	0.0	14.0				
Masuda	32	a	4.0	1.2	3.1	0.7	14.9	46.6	189.1	154.8	55.3	4.7	0.8	1.4	476.6	213 (1975)	25 (1987)	215.0	26 Jul 1994
		b	0.2	0.1	0.1	0.1	0.8	2.3	7.3	6.3	2.6	0.3	0.1	0.1	20.3				
Nasirabad	43	a	5.0	3.0	0.9	2.5	9.6	43.0	152.9	137.2	56.7	8.7	0.8	0.4	420.7	195 (1958)	18 (1963)	500.0	05 Oct 1998
		b	0.3	0.3	0.1	0.0	0.6	2.3	7.4	7.2	3.0	0.5	0.0	0.0	21.7				
Nayanagar/ Beawar	45	a	8.6	3.8	4.6	3.3	13.9	58.0	184.8	161.4	69.2	9.5	4.1	5.6	526.8	187 (1976)	40 (1987)	292.1	02 Sep 1908
		b	0.6	0.5	0.5	0.4	1.0	3.2	7.5	7.6	3.8	0.5	0.3	0.3	26.2				
Pisangan	45	a	3.4	1.3	2.2	3.0	6.0	29.3	153.0	128.2	44.8	5.2	0.4	2.5	379.0	244 (1983)	0 (1972)	177.8	17 Jun 1917
		b	0.2	0.1	0.2	0.2	0.4	1.6	6.0	6.4	2.5	0.3	0.0	0.1	18.0				
Pushkar	44	a	2.5	1.0	0.6	0.0	6.9	32.9	160.8	141.6	51.2	6.6	0.1	0.5	404.7	221 (1983)	07 (1991)	200.0	26 Jul 1988
		b	0.2	0.1	0.1	0.0	0.5	1.6	6.7	6.6	2.5	0.2	0.0	0.1	18.6				
Sarwar	39	a	6.5	3.9	4.6	3.6	10.4	47.3	173.8	180.7	73.2	7.4	2.8	2.8	516.9	173 (1973)	47 (1972)	203.8	16 Aug 1973
		b	0.6	0.3	0.3	0.3	0.8	3.1	8.6	9.2	3.8	0.5	0.2	0.2	37.9				
Sawar	43	a	6.0	2.7	3.1	3.9	4.5	36.6	158.9	160.0	67.8	5.3	5.9	1.8	456.5	185 (1973)	24 (1959)	330.2	01 Jul 1896
		b	0.4	0.2	0.2	0.2	0.2	1.9	7.0	7.1	3.2	0.2	0.3	0.2	21.1				
Srinagar	42	a	2.3	0.8	1.5	2.4	5.1	37.1	179.5	174.3	48.6	10.2	2.7	1.7	466.2	337 (1976)	37 (1972)	260.0	12 Jul 1976
		b	0.1	0.1	0.1	0.2	0.3	1.6	6.8	6.6	2.1	0.3	0.2	0.1	18.5				
Todgarh	43	a	2.9	1.2	2.2	1.8	11.1	46.4	184.9	162.3	76.1	7.6	1.7	1.3	499.5	184 (1955)	08 (1959)	328.9	30 Jul 1943
		b	0.2	0.1	0.1	0.1	0.6	2.6	7.2	7.0	3.2	0.3	0.1	0.1	21.6				
Ajmer (District)		a	4.2	2.4	2.1	2.2	8.9	42.3	169.0	153.4	58.1	8.0	2.3	1.8	454.9	199 (1975)	47 (1972)		
		b	0.3	0.2	0.2	0.2	0.6	2.2	7.1	7.1	2.9	0.4	0.2	0.1	21.5				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
201 – 300	5	601 – 700	4
301 – 400	11	701 – 800	1
401 – 500	13	801 – 900	3
501 – 600	9	901 – 1000	1

(Data available for 47 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(AJMER)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.8	7.2	32.6	1979 Jan 04	-2.8	1935 Jan 16	65	34
February	26.5	10.2	36.8	1985 Feb 28	-1.1	1905 Feb 01	56	28
March	32.0	15.7	42.3	1984 Mar 31	2.2	1898 Mar 04	41	21
April	37.5	21.9	44.6	1958 Apr 26	9.4	1970 Apr 01	35	22
May	40.4	26.4	47.4	1977 May 19	14.3	1974 May 27	38	22
June	39.1	26.9	46.4	1987 Jun 07	14.7	1972 Jun 28	57	36
July	34.3	25.3	44.4	1901 Jul 05	14.4	1972 Jul 11	75	58
August	32.0	24.3	42.3	1987 Aug 19	18.9	1973 Aug 19	80	67
September	33.6	23.6	42.0	1987 Sep 26	14.6	1972 Sep 27	69	53
October	34.6	18.8	42.0	1987 Oct 03	7.8	1889 Oct 25	54	34
November	29.8	12.8	37.5	1994 Nov 10	2.8	1926 Nov 18	56	37
December	25.2	8.2	39.0	2002 Dec 09	-0.6	1945 Dec 24	64	40
Annual	32.4	18.4					58	38

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.5	4.3	5.8	7.3	10.3	12.1	10.2	8.9	7.2	4.1	3.3	3.2	6.7

TABLE - 5
Special Weather Phenomena
(AJMER)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.4	0.5	0.6	1.9	2.4	3.1	3.1	1.2	0.5	0.2	0.4	14.5
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	0.2	0.3	0.7	1.3	1.3	0.2	0.2	0.1	0.0	0.0	0.0	4.3
Fog	0.2	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0

ALWAR DISTRICT

The district has a dry climate with a hot summer, a cold winter and a short monsoon season. The cold season starts by about the middle of November and continues to about the beginning of March. The hot season follows thereafter and extends to the end of June. The southwest monsoon season is from July to mid September. The period from mid September to mid November may be termed as the post monsoon season.

RAINFALL

Records of rainfall in the district are available for eighteen raingauge stations, for periods ranging from 16 to 45 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 618.6 mm. The rainfall during the southwest monsoon season constitutes nearly 88% of the annual rainfall. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual which amounted to 175% of the normal occurred in 1995 while the lowest annual rainfall in the same period which was only 46% of the normal occurred in 1987. The rainfall was less than 80% of the normal in 10 years out of which two consecutive years of rainfall less than 80% of the normal occurred once in the district. It will be seen from Table 2 that the annual rainfall in the district was between 401 mm and 800 mm in 34 years out of 44.

On an average there are 31 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 26 at Nimarana to 39 at Alwar observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 350.5 mm at Mandawar 03 October 1891.

TEMPERATURE

The only meteorological observatory in the district is at Alwar. The description which follows is based on the records of this observatory. The period from March to June is one of continuous increase in temperatures, May and June being the hottest part of the year. The mean daily maximum temperature in May and June is 40.6°C and the mean daily minimum temperature is 27.0°C and 29.3°C respectively for May and June. In May and June, the maximum temperatures sometimes go upto 49 or 50°C. The setting in of the southwest monsoon after the middle of June lowers the temperature somewhat, but the relief from the heat is not marked because of the added discomfort from the increase in humidity, which is a characteristic of monsoon air. After the withdrawal of the monsoon by mid September, days become hotter and in October day temperatures are somewhat same as in the previous month. The nights become progressively cooler. After mid November both day and night temperatures drop rapidly till January, which is the coldest month. The mean daily maximum temperature in this month is 21.8°C and the mean daily minimum is 7.6°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which move across north India during the cold season, minimum temperatures particularly in December to February may go down to a degree below the freezing point of water occasionally.

HUMIDITY

During the brief southwest monsoon season the relative humidity is generally over 70%. In the rest of the year, the air is generally dry. In the summer season which is the driest part of the year, afternoon relative humidity may be as low as 30% to 40%.

CLOUDINESS

During the southwest monsoon season skies are moderately to heavily clouded and overcast on some days. In the rest of the year the skies are mostly clear or lightly clouded. But on a few days in the winter season, the skies become cloudy, when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate. But in summer and early southwest monsoon season, winds strengthen slightly on some days and blows from northwest. Northwesterly to southwesterly winds prevail during the southwest monsoon season. In the post monsoon and winter months winds are mostly from directions between northwest to northeast.

SPECIAL WEATHER PHENOMENA

Depressions originating in the Bay of Bengal in the southwest monsoon season move across the central parts of the country and during their last stages, sometimes affect the district causing heavy rain. In the hot season, dust or thunderstorms occur frequently, some of them accompanied by squalls and occasionally by hail. Thunderstorms occur mostly in the monsoon season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
ALWAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Alwar	45	a	11.2	11.5	7.8	6.0	16.1	46.7	187.1	214.2	117.0	25.6	3.3	4.5	651.0	163	34	289.3	24 Aug 1904
		b	1.1	1.1	0.6	0.8	1.3	3.5	9.8	11.2	5.2	1.4	0.3	0.5	37.0	(1969)	(1987)		
Alwar (Obsy)	36	a	11.7	9.1	8.1	6.8	24.0	46.7	203.3	249.9	128.3	29.3	5.9	9.4	732.5	159	46	219.6	10 Sep 1969
		b	1.0	1.1	0.9	0.8	1.9	3.6	9.8	11.9	5.5	1.7	0.5	0.8	39.5	(1969)	(1986)		
Bansur	39	a	10.9	11.7	5.7	5.2	22.6	46.7	214.5	231.5	108.0	14.8	4.1	4.7	680.4	219	49	183.2	16 Jul 1981
		b	0.6	1.1	0.6	0.6	1.5	3.0	9.2	8.6	4.0	0.7	0.4	0.4	30.9	(1983)	(1979)		
Behroo	39	a	10.4	10.8	5.9	4.7	18.6	38.7	195.5	187.3	81.2	11.9	4.5	5.8	575.3	201	38	267.0	12 Aug 1972
		b	1.0	1.0	0.8	0.5	1.5	2.6	8.8	8.6	3.9	0.8	0.4	0.5	30.4	(1980)	(1987)		
Govindgarh	45	a	8.4	8.2	4.8	5.4	11.4	34.4	171.8	211.3	98.4	24.0	2.7	3.6	584.4	185	36	201.9	04 Sep 1942
		b	0.6	0.8	0.5	0.4	0.9	1.9	8.2	9.0	4.0	1.0	0.3	0.3	27.9	(1995)	(1979)		
Kathumer	39	a	7.7	8.0	4.1	2.6	9.3	29.5	193.0	206.1	95.9	18.3	3.7	3.1	581.3	189	27	260.0	25 Jun 1996
		b	0.6	0.8	0.4	0.3	0.8	1.9	8.3	9.2	4.5	0.8	0.3	0.3	26.2	(1995)	(1987)		
Kishangarh	45	a	10.0	12.3	7.2	5.3	15.9	41.0	182.3	209.3	105.7	29.4	3.8	4.7	626.9	174	38	201.2	09 Jul 1893
		b	0.9	1.0	0.8	0.5	1.1	2.4	9.0	9.6	4.7	1.1	0.3	0.4	31.8	(1993)	(1986)		
Kotkasim	44	a	9.3	10.3	5.2	5.0	12.8	38.0	170.8	207.8	90.2	13.0	5.5	3.9	571.8	174	36	297.2	11 Sep 1941
		b	0.5	0.9	0.5	0.5	1.1	2.2	8.5	8.3	3.7	0.6	0.4	0.4	27.9	(1995)	(1987)		
Lachmangarh	45	a	8.7	5.9	4.2	2.3	9.7	32.6	168.9	181.7	97.2	21.8	3.5	4.9	541.4	182	44	314.2	09 Sep 1924
		b	0.8	0.7	0.5	0.2	1.0	2.0	8.8	9.3	4.6	0.9	0.3	0.4	29.5	(1967)	(1989)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
ALWAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Malakhera	38	a	8.1	9.9	3.4	5.7	18.9	39.4	193.8	203.9	96.5	18.9	4.5	3.0	606.0	146	22	121.9	13 Aug 1963
		b	0.7	0.9	0.4	0.4	1.3	2.3	8.3	9.0	4.6	0.9	0.4	0.2	29.4	(1958)	(1986)		
Mandawar	45	a	12.1	10.6	6.6	7.2	16.4	48.4	197.0	221.2	97.0	25.1	3.6	3.6	648.8	266	24	350.5	03 Oct 1891
		b	1.0	1.0	0.7	0.5	1.3	2.5	8.3	9.4	3.9	1.1	0.3	0.4	30.4	(1995)	(1987)		
Nimarana	45	a	8.9	10.4	6.1	4.0	14.4	55.6	191.5	207.0	82.0	17.0	1.9	2.4	601.2	228	37	225.0	06 Aug 1969
		b	0.6	0.9	0.5	0.4	0.9	2.6	7.3	8.0	3.2	1.0	0.1	0.3	25.8	(1995)	(1962)		
Rajgarh	39	a	9.3	8.5	4.8	5.1	10.8	37.5	202.4	224.9	109.1	16.6	3.5	5.6	638.1	168	37	185.4	04 Sep 1965
		b	0.8	0.9	0.6	0.5	0.8	2.7	10.5	11.3	4.9	0.9	0.3	0.4	34.6	(1995)	(1986)		
Ramgarh	45	a	9.9	9.7	4.5	4.7	14.4	44.9	186.6	208.7	95.6	16.6	4.5	4.6	604.7	182	42	204.0	30 Aug 1919
		b	0.8	1.0	0.6	0.5	1.1	2.6	8.9	9.5	4.2	0.9	0.3	0.4	30.8	(1955)	(1986)		
Tapukara Tapukra	39	a	8.7	15.1	5.8	4.7	7.4	44.9	207.8	229.5	88.3	12.7	4.5	5.4	644.8	222	40	225.0	30 Jun 1981
		b	0.6	1.1	0.5	0.5	1.1	2.2	8.9	8.6	3.7	0.6	0.3	0.4	28.5	(1983)	(1959)		
Thanagazi	39	a	10.3	9.7	4.8	6.3	23.0	51.7	235.8	218.0	110.7	11.6	3.7	4.3	689.9	160	33	193.0	29 Aug 1960
		b	0.8	9.7	0.6	0.6	1.5	3.1	10.6	10.1	5.1	0.8	0.3	0.4	34.8	(1995)	(1986		
Tijara	45	a	10.7	11.8	7.2	6.0	13.4	39.8	192.0	221.4	101.9	20.6	4.2	6.8	635.8	165	31	189.2	09 Jul 1893
		b	0.9	1.2	0.8	0.7	1.2	2.6	9.3	9.5	4.6	1.0	0.3	0.6	32.7	(1964)	(1987)		
Tijara (Hydro)	16	a	7.5	5.9	7.4	10.5	17.1	44.1	149.2	180.3	81.4	9.5	1.3	4.5	518.7	205	69	221.7	05 Sep 1994
		b	0.8	0.7	0.9	1.3	1.2	3.2	7.8	8.5	3.2	0.8	0.2	0.4	29.0	(1995)	(1982)		
Alwar (District)		a	9.7	10.0	5.8	5.4	15.9	42.3	91.3	211.9	99.1	18.7	3.8	4.7	618.6	175	46		
		b	0.8	1.0	0.6	0.6	1.2	2.6	8.9	9.4	4.3	0.9	0.3	0.4	31.0	(1995)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
201 – 300	1	701 – 800	9
301 – 400	4	801 – 900	3
401 – 500	5	901 – 1000	1
501 – 600	11	1001 – 1100	1
601 – 700	9		

(Data available for 44 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(ALWAR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	21.8	7.6	29.1	1977 Jan 12	-0.8	1967 Jan 12	80	49
February	24.8	10.6	35.0	1985 Feb 28	2.4	1974 Feb 07	71	43
March	31.6	16.4	39.9	1984 Mar 30	7.3	1979 Mar 09	58	38
April	37.3	22.8	46.4	1958 Apr 26	11.2	1965 Apr 02	47	32
May	40.6	27.0	50.6	1956 May 10	15.7	1969 May 02	44	32
June	40.6	29.3	48.8	1957 Jun 18	20.0	1976 Jun 19	53	40
July	35.3	27.0	43.8	1968 Jul 04	20.6	1983 Jul 10	73	63
August	33.1	25.8	41.2	1972 Aug 03	20.1	1985 Aug 23	79	71
September	33.9	24.5	40.1	1974 Sep 16	16.8	1972 Sep 26	71	61
October	33.7	19.2	40.6	1957 Oct 08	12.0	1960 Oct 26	66	48
November	28.9	13.2	36.0	1977 Nov 05	6.1	1970 Nov 29	68	48
December	23.3	8.9	29.7	1982 Dec 08	1.4	1961 Dec 24	78	53
Annual	32.1	19.4					66	48

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

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.1	2.8	3.4	4.2	6.1	6.3	4.6	3.4	3.2	2.0	1.8	1.6	3.5

TABLE - 5
Special Weather Phenomena
(ALWAR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.5	0.8	0.7	1.0	3.3	2.9	3.5	2.6	2.0	1.0	0.1	0.3	18.7
Hail	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.0	0.2	0.3	1.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	2.1
Fog	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7

BANSWARA DISTRICT

This district which is on the southern border of Rajasthan has a climate which is very much milder than that in the desert regions further north and northwest. The cold season is from December to February and is followed by the hot season which lasts till about the middle of June. Thereafter the southwest monsoon season starts and continues till the middle of September. The period from mid September to November constitutes the post monsoon season.

RAINFALL

Records of rainfall in the district are available for eighteen raingauge stations, for period ranging from 11 to 45 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district as a whole is 882.2 mm. The rainfall during the southwest monsoon period from June to September is nearly 94% of the annual total of rainfall. The variations in the annual rainfall from year to year are large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 185% of the normal occurred in 1973 while in 1966 the rainfall was the lowest and was only 44% of the normal. In the same fifty years period the rainfall was less than 80% of the normal in 10 years. Three consecutive years of rainfall less than 80% of the normal occurred on one occasion. It will be evident from Table 2 that in 30 years out of 44 the annual rainfall was between 701 mm and 1200 mm.

On an average there are 36 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 31 at Loharia to 42 at Banswara, Danpura and Kushalgarh.

The heaviest rainfall in 24 hours recorded at any station in the district was 558.8 mm at Banswara on 23 July 1959.

TEMPERATURE

There is a meteorological observatory in the district at Banswara. The hot season commences by March and the temperatures rise with the advance of the season. May is generally the hottest month with the mean daily maximum temperature at 40.8°C and the mean daily minimum temperature at 26.4°C. In Banswara district the maximum temperature may sometimes go beyond 46°C-47°C. The weather becomes cool when the southwest monsoon sets in the district by the middle of June. After the withdrawal of the southwest monsoon by about the middle of September the day temperatures show a slight increase. From about the middle of November, both the day and night temperatures drop and January is generally the coldest month with the mean daily maximum temperature at 27.9°C and the mean daily minimum temperature at 12.3°C. In these months in the wake of some of the western disturbances passing across north India, cold waves affect the district and the night temperatures may go down upto 2-3 °C.

The highest maximum temperature ever recorded at Banswara was 47.5°C on 03 June 1991 and the lowest minimum temperature ever recorded was 2.8°C on 29 January 1973.

HUMIDITY

Relative humidity is high, more than 70% during the southwest monsoon season. But in summer and winter months, the air is dry.

CLOUDINESS

Skies are heavily clouded to overcast in the southwest monsoon season. In the rest of the year skies are generally clear or lightly clouded.

WINDS

Winds are generally light in the post monsoon and winter months. Winds are moderate and sometimes strong during the period May to August. In summer and southwest monsoon season, winds are predominantly from the southwest. Light southeasterly winds in the mornings and northwesterly in the afternoons begin to blow from October and these continue in the post monsoon and winter season.

SPECIAL WEATHER PHENOMENA

In October and to a lesser extent in the monsoon months, the district and its neighbourhood are affected by depressions and cyclonic storms, causing widespread rain. Thunderstorms occur in the summer months and the rain in the southwest monsoon months is sometimes associated with thunder.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BANSWARA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Arthuna	45	a	2.6	0.4	0.8	1.4	4.1	80.2	261.5	270.5	128.7	20.6	13.1	2.7	786.6	217	38	363.0	26 Aug 1987
		b	0.2	0.0	0.0	0.1	0.2	3.5	10.8	12.0	5.0	0.9	0.5	0.1	33.3	(1973)	(1966)		
Bagidora	28	a	6.2	0.9	1.9	2.9	5.8	109.2	276.7	330.4	116.2	37.1	17.4	3.2	907.9	164	55	231.0	25 Jul 1986
		b	0.4	0.1	0.1	0.2	0.3	4.8	12.1	13.4	4.8	1.0	0.8	0.3	38.3	(1981)	(1989)		
Banswara	45	a	4.5	1.1	1.8	1.1	5.4	117.8	350.6	360.8	179.9	30.5	14.6	4.3	1072.4	184	48	558.8	23 Jul 1959
		b	0.3	0.1	0.2	0.1	0.4	5.1	13.0	13.9	6.9	1.3	0.7	0.2	42.2	(1959)	(1966)		
Banswara (Obsy)	32	a	3.0	1.3	2.6	2.2	5.6	125.6	315.1	279.4	160.8	18.8	11.3	7.0	932.7	180	50	311.0	12 Aug 2004
		b	0.4	0.1	0.1	0.1	0.4	5.1	12.7	12.8	6.7	1.0	0.6	0.4	40.4	(1973)	(1966)		
Bhungra	41	a	1.3	0.2	1.7	0.0	1.1	89.8	286.2	308.8	151.3	21.5	12.7	2.3	876.9	203	20	287.8	11 Aug 1941
		b	0.1	0.0	0.1	0.0	0.1	3.6	11.4	13.1	5.4	0.7	0.5	0.1	35.1	(1973)	(1951)		
Danpur/ Danpura	43	a	2.8	0.0	1.0	0.9	4.6	105.1	346.8	400.2	197.4	34.9	13.1	1.1	1107.9	205	37	350.4	17 Aug 1981
		b	0.1	0.0	0.1	0.1	0.2	4.7	13.1	14.7	7.2	1.3	0.6	0.1	42.2	(1994)	(1951)		
Garhi	44	a	3.7	1.1	2.2	1.3	7.4	84.7	248.6	279.9	132.1	22.6	13.8	4.1	801.5	181	31	286.0	26 Aug 1987
		b	0.3	0.1	0.1	0.1	0.5	4.0	10.7	11.9	5.4	1.1	0.6	0.2	35.0	(1973)	(1966)		
Ghatol	39	a	4.5	0.7	2.9	1.3	5.9	109.9	293.7	312.9	150.9	23.6	15.2	5.2	926.7	169	40	339.0	26 Aug 1987
		b	0.4	0.1	0.2	0.1	0.4	4.5	13.0	13.4	6.3	1.1	0.7	0.3	40.5	(1973)	(1957)		
Jagpura	45	a	1.4	0,5	0.2	0.3	1.5	77.2	263.2	278.9	148.6	18.0	13.3	1.6	804.7	197	26	287.0	29 Jun 1937
		b	0.1	0.0	0.0	0.0	0.1	3.3	10.6	12.0	6.0	0.7	0.4	0.1	33.3	(1973)	(1957)		
Kalinjra	11	a	2.2	0.0	0.1	2.0	3.3	89.6	315.5	209.7	213.2	19.3	8.8	8.0	871.7	181	47	184.4	15 Sep 1959
		b	0.2	0.0	0.0	0.1	0.2	3.8	10.8	10.4	6.9	0.8	0.5	0.2	33.9	(1959)	(1989)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
BANSWARA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Khamera	17	a	0.7	0.2	9.9	0.5	0.7	66.1	279.5	206.6	209.8	26.2	2.4	1.6	804.2	155	23	297.2	11 Aug 1941
		b	0.1	0.1	0.1	0.1	0.1	3.6	11.3	10.4	7.0	0.9	0.1	0.1	33.9	(1961)	(1957)		
Khandu	37	a	1.3	0.6	0.8	1.0	5.6	87.4	260.7	306.0	169.8	27.6	11.2	4.6	876.6	190	48	419.1	30 Jun 1937
		b	0.1	0.1	0.1	0.1	0.2	4.0	10.3	12.6	6.4	0.9	0.6	0.1	35.5	(1973)	(1966)		
Kushalgarh	44	a	3.4	0.4	2.3	1.1	6.9	123.8	296.9	351.6	183.4	35.6	14.2	4.0	1023.6	174	49	408.9	26 Jul 1913
		b	0.3	0.1	0.2	0.1	0.5	5.1	12.5	13.7	7.5	1.3	0.8	0.2	42.3	(1973)	(1985)		
Loharia	45	a	2.2	0.3	2.4	0.2	6.1	81.5	229.5	232/4	120.5	20.4	12.0	2.4	709.9	168	28	320.0	23 Sep 1954
		b	0.1	0.0	0.1	0.0	0.2	3.4	10.2	10.6	5.2	0.8	0.4	0.1	31.1	(1990)	(1966)		
Piplekhet	27	a	2.3	0.2	0.0	0.6	3.7	126.7	280.9	333.9	116.8	26.7	15.1	3.3	910.2	180	55	225.0	02 Aug 1994
		b	0.2	0.0	0.0	0.0	0.1	4.4	11.1	13.0	5.4	0.9	0.6	0.2	35.9	(1973)	(1992)		
Sajjangarh	40	a	1.5	0.0	2.1	0.0	3.9	86.1	261.2	267.3	138.6	22.4	8.4	1.0	792.5	225	40	292.1	28 Jul 1950
		b	0.2	0.0	0.1	0.0	0.2	3.6	10.6	11.1	5.7	0.8	0.6	0.1	33.0	(1973)	(1960)		
Sallopat	42	a	2.3	0.0	0.0	0.5	4.1	89.5	290.3	319.6	131.9	17.7	10.3	2.0	868.1	217	46	339.0	29 Aug 1976
		b	0.1	0.0	0.0	0.0	0.1	3.6	11.5	12.2	4.7	0.6	0.4	0.1	33.3	(1994)	(1991)		
Shergarh	44	a	1.5	0.2	1.3	0.3	2.5	80.7	254.0	298.5	131.5	22.2	10.5	3.2	806.4	220	34	280.0	21 Aug 1974
		b	0.1	0.0	0.1	0.0	0.2	3.6	10.7	11.5	4.7	0.7	0.4	0.2	32.2	(1973)	(1960)		
Banswara (District)		a	2.6	0.4	1.9	1.0	4.3	96.2	283.9	297.1	154.5	24.8	12.1	3.4	882.2	185	44		
		b	0.2	0.0	0.1	0.1	0.2	4.1	11.5	12.4	6.0	0.9	0.5	0.2	36.2	(1973)	(1966)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	1	1001 – 1100	3
401 – 500	4	1101 – 1200	7
501 – 600	2	1201 – 1300	2
601 – 700	3	1301 – 1400	0
701 – 800	5	1401 – 1500	1
801 – 900	12	1501 – 1600	0
901 – 1000	3	1601 – 1700	1

(Data available for 44 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(BANSWARA)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	27.9	12.3	34.2	2000 Jan 12	2.8	1973 Jan 29	48	31
February	30.4	14.6	39.6	1967 Feb 04	5.4	1972 Feb 14	44	27
March	35.0	18.9	44.1	1966 Mar 18	7.4	1965 Mar 20	38	23
April	39.5	23.8	45.5	1970 Apr 25	15.9	1997 Apr 03	38	21
May	40.8	26.4	46.4	1970 May 11 2002 May 05 1998 May 17	16.4	1973 May 31	53	24
June	37.4	25.7	47.5	1991 Jun 03	18.1	1972 Jun 10	68	42
July	32.2	24.1	42.0	2009 Jul 05	17.9	1973 Jul 16	80	64
August	30.2	23.2	39.8	1987 Aug 08	18.4	1972 Aug 25	83	70
September	32.8	22.7	40.0	1989 Sep 28	14.3	1972 Sep 24	76	55
October	34.9	20.3	40.0	2000 Oct 21	12.7	1973 Oct 05	56	35
November	32.6	16.8	37.5	2001 Nov 03	8.9	1972 Oct 30	51	34
December	28.7	13.1	35.0	1995 Dec 11	4.5	1990 Dec 31	54	36
Annual	33.5	20.2					57	39

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.7	5.6	6.0	6.2	9.4	9.8	7.7	6.4	4.3	4.0	4.5	4.9	6.1

TABLE - 5
Special Weather Phenomena
(BANSWARA)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.1	0.0	0.0	0.1	0.3	0.4	0.8	0.2	0.0	0.2	0.0	2.2
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	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0,O	O,1

BARAN DISTRICT

The district enjoys a dry climate except in the monsoon season. The year may broadly be divided into four seasons. The cold season from mid-November to February is followed by the hot season which extends to about the middle of June. The period from about the middle of June to September is the southwest monsoon season and the two months October and November constitute the post monsoon season.

RAINFALL

Records of rainfall are available for eight stations in the district for period ranging from 44 to 45 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 859.0 mm. The rainfall increases from the northwest region of the district to the southeast. About 93% of the annual rainfall is received during the southwest monsoon season. More than 50% of the frequencies are grouped in the range 701 mm to 1000 mm. During the fifty year period from 1951 to 2000, the rainfall in the district as a whole was highest in 1975 and amounted to 153% of the normal. The lowest annual rainfall of 44% of the normal was received in 1965.

During the fifty year period, the rainfall less than 80% of the normal occurred in 10 years. Consecutive years of rainfall less than 80% of the normal occurred on two occasions in the years 1953-54 and 1965-66. It will be seen from Table 2 that in 33 years out of 44 years, the rainfall in the district ranged between 501 mm and 1000 mm.

On an average there are 39 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. The number of rainy days increases from the west to the east. This number varies from 37 at Antah to 41 at Shahabad.

The heaviest rainfall in 24 hours recorded at any station in the district was 413.2 at Baran on 13 August 1967.

TEMPERATURE

This district has been formed from earlier Kota district. Since there is no meteorological observatory in this district, data of nearby Kota observatory has been considered for describing the weather conditions of the district. The cold season starts from about the middle of November and continues till the end of February. January is the coldest month with the mean daily maximum temperature at about 24.0^{o}C and the mean daily minimum temperature at about 10^{o}C. In association with the cold waves in the wake of western disturbances passing across north India, the minimum temperature sometimes drop to one or two degrees above the freezing point of water. Both day and night temperatures increase rapidly from March to May which is the hottest month, with the mean daily maximum temperature at about 42.0^{o}C while the mean daily minimum temperature is at about 28.0^{o}C. In May temperature may sometimes exceed 48^{o}C. There is an appreciable drop in temperature with the advance of the southwest monsoon into the district. After the withdrawal of the southwest monsoon by the end of September, day temperatures increase slightly with a secondary maximum in October.

HUMIDITY

The air is generally dry except in the southwest monsoon season. In the summer months, the relative humidity is very low, often being less than 20% in the afternoons.

CLOUDINESS

The cold season witnesses generally clear bright weather with brief spells of cloudy weather caused by occasional western disturbances which pass across north India. In the summer and the post monsoon months, skies are clear or lightly clouded. Moderate to heavily clouded skies are common in the southwest monsoon season.

WINDS

Generally light to moderate winds prevail throughout the year with a slight strengthening in the early monsoon period. In the post monsoon and winter season, winds blow from directions between northwest to northeast. During summer and southwest monsoon season, winds blow from directions between west-northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the monsoon season and move across central parts of the country in a westerly or west-northwesterly direction affect the district and its neighbourhood and cause widespread heavy rain and strong winds. Dust storms occur in the summer months. Thunderstorms occur throughout the year, more frequently in southwest monsoon season . Occasional fog occurs during winter.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BARAN

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Antah	44	a	8.1	3.1	2.1	1.4	6.0	84.7	273.5	285.3	121.4	28.1	9.0	2.9	823.6	175	38	310.1	23 Jul 1948
		b	0.6	0.3	0.3	0.1	0.6	4.3	11.1	12.6	5.5	0.9	0.4	0.2	36.9	(1986)	(1968)		
Atru	45	a	6.1	1.4	2.1	1.2	5.0	71.1	312.0	325.0	128.6	20.0	13.7	4.3	890.5	182	48	336.0	21 Jul 1908
		b	0.5	0.2	0.2	0.1	0.4	3.7	11.3	13.4	5.8	0.9	0.8	0.3	37.6	(1961)	(1965)		
Baran	45	a	5.8	3.4	4.1	1.4	8.8	72.5	283.0	322.3	114.2	33.0	10.1	3.3	861.9	178	52	413.2	13 Aug 1967
		b	0.5	0.4	0.4	0.2	0.7	4.4	11.3	13.5	5.6	1.0	0.5	0.4	38.9	(1975)	(1965)		
Chabra/Disp	45	a	7.8	2.7	4.4	0.4	8.5	72.7	310.8	354.6	143.3	20.4	8.1	3.8	937.5	155	49	285.2	26 Jul 1958
		b	0.7	0.2	0.4	0.1	0.6	4.3	11.2	13.5	6.1	0.9	0.6	0.4	39.0	(1973)	(1979)		
Chhipabarod	45	a	7.2	3.7	2.3	0.9	5.3	70.5	292.6	344.9	132.6	23.5	5.3	4.3	893.1	158	20	351.8	02 Jul 1906
		b	0.7	0.3	0.3	0.1	0.4	4.3	11.3	13.9	6.6	1.2	0.4	0.5	40.0	(1985)	(1965)		
Kishanganj	45	a	7.0	3.8	2.0	1.8	5.1	63.6	278.4	292.2	103.1	28.6	10.1	2.6	798.3	185	20	339.1	30 Jul 1923
		b	0.7	0.4	0.3	0.2	0.5	3.9	11.2	13.0	5.4	1.1	0.5	0.4	37.6	(1956)	(1972)		
Mangrol	45	a	7.4	4.1	3.4	2.0	6.1	73.6	273.4	269.8	102.0	26.1	7.9	4.5	780.3	208	45	391.7	25 Jun 1933
		b	0.6	0.4	0.4	0.2	0.6	4.0	11.0	13.0	5.9	1.0	0.4	0.4	37.9	(1975)	(1965)		
Shahabad	45	a	10.2	3.4	3.1	3.3	5.2	78.9	314.5	295.2	135.7	23.0	7.4	5.2	885.1	206	49	328.9	10 Jul 1968
		b	0.8	0.3	0.4	0.2	0.4	4.3	12.4	13.4	6.2	1.0	0.5	0.6	40.5	(1971)	(1951)		
Baran (District)		a	7.2	3.2	2.9	1.6	6.3	73.5	292.3	311.2	122.6	25.3	9.0	3.9	859.0	153	44		
		b	0.6	0.3	0.3	0.2	0.5	4.2	11.4	13.3	5.9	1.0	0.5	0.4	38.6	(1975)	(1965)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	1	901 – 1000	9
401 – 500	2	1001 – 1100	3
501 – 600	4	1101 – 1200	2
601 – 700	4	1201 – 1300	2
701 – 800	5	1301 – 1400	1
801 – 900	11		

(Data available for 44 years only)

BHARATPUR DISTRICT

The district has a dry climate with a hot summer, a cold winter and a short monsoon season. The cold season starts by about the middle of November and continues to about the beginning of March. The hot season follows thereafter and extends to the end of June. The southwest monsoon season is from July to mid September. The period from mid September to mid November may be termed as the post monsoon season.

RAINFALL

Records of rainfall in the district are available for thirteen raingauge stations, for period ranging from 11 to 45 years. Table 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 622.4 mm. The annual rainfall in the district decreases from the south towards the north. The annual rainfall at Bayana in south is 691.8 mm and that at Kamen in north is 638.5 mm. The rainfall during the southwest monsoon season constitutes about 83% of the annual rainfall. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall which amounted to 169% of the normal occurred in 1958 while the lowest annual rainfall in the same period which was only 32% of the normal occurred in 1979. In 7 years out of 50 years, the rainfall was less than 80% of the normal, and of these, two years were consecutive years of such a low rainfall. It will be seen from Table 2 that the annual rainfall in the district was between 501 mm and 900 mm in 38 out of 49 years.

On an average there are 32 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 26 at Angai to 38 at Bharatpur (observatory).

The heaviest rainfall in 24 hours recorded at any station in the district was 630.0 mm at Bharatpur on 25 August 1996.

TEMPERATURE

The only meteorological observatory in the district is at Bharatpur and the records for this observatory may be taken as representative of the climatological conditions in the district. The period from March to June is one of continuous increase in temperatures, May and June being the hottest part of the year. The mean daily maximum temperature in May is at about 42.1^{o}C and the mean daily minimum is at about 25.7^{o}C. In the summer season, the heat is intense and the scorching dust laden winds add to the discomfort. The maximum temperatures sometimes reach 48^{o}C and above in this season. The setting in of the southwest monsoon by about the end of June lowers the temperature appreciably, but the relief from the heat is not marked due to the increased dampness of the monsoon air. After the withdrawal of the monsoon by mid September, days become a little hotter, but the nights become progressively cooler. From November both day and night temperatures decrease rapidly till January, the coldest month, with the mean daily maximum temperature at about 22.4^{o}C and the mean daily minimum temperature at about 7.2^{o}C. In association with cold waves which affect the district in the wake of western disturbances which move across north India during the cold season, minimum temperature may at times fall to one or two degree above the freezing point of water.

The highest maximum temperature ever recorded at Bharatpur was 48.5^{o}C on 26 May 1998 and the lowest minimum temperature was 1.7^{o}C on 03 February 1975.

HUMIDITY

During the brief southwest monsoon season the relative humidity is generally over 70%. In the rest of the year, the air is generally dry. In the summer season

which is the driest part of the year, afternoon relative humidity goes down to 30% or less.

CLOUDINESS

Skies are moderately to heavily clouded and overcast on some days during the southwest monsoon season. In the rest of the year the skies are mostly clear or lightly clouded. On a few days in the cold season, the skies become cloudy, when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate, but in summer and early part of the southwest monsoon season, winds strengthen slightly on some days. During the later part of summer and early southwest monsoon season, westerly/southwesterly winds prevail in the morning and blow from northwesterly direction in the afternoon. In the later part of southwest monsoon season, wind blows from west and southwest direction. In the post monsoon, winter season and early part of summer season, westerly wind blows in the morning and north/northwesterly wind blows in the afternoon.

SPECIAL WEATHER PHENOMENA

Depressions originating in the Bay of Bengal in the southwest monsoon season move across the central parts of the country and during their last stages, sometimes affect the district causing heavy rain. In the hot season, dust storms occur frequently. Thunderstorms occur mostly throughout the year. Fog occurs in winter.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BHARATPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Angai	11	a	0.0	0.0	0.0	0.0	0.0	51.2	226.0	201.3	81.8	1.2	0.0	0.0	561.5	140	63	189.0	21 Jul 1975
		b	0.0	0.0	0.0	0.0	0.0	3.2	10.4	8.9	3.2	0.2	0.0	0.0	25.9	(1976)	(1973)		
Bayana Biana	45	a	11.0	7.0	5.4	2.9	9.9	45.9	211.7	257.6	110.1	21.0	2.4	6.9	691.8	190	56	246.4	09 Sep 1891
		b	0.7	0.8	0.6	0.2	0.7	2.8	10.2	11.2	5.2	1.0	0.3	0.4	34.1	(1995)	(1991)		
Bharatpur	45	a	9.9	8.0	6.5	3.5	9.8	38.8	191.5	238.1	98.5	16.7	3.2	3.1	627.6	158	57	630.0	25 Aug 1996
		b	1.0	0.8	0.8	0.4	0.7	2.5	9.1	10.7	4.5	0.9	0.3	0.3	32.0	(1958)	(1981)		
Bharatpur (Obsy)	23	a	8.8	9.2	8.3	7.2	16.6	79.2	181.1	218.5	94.1	20.7	4.3	4.9	652.9	153	68	269.4	11 Jul 2003
		b	0.9	0.8	1.1	0.9	1.7	4.1	10.8	9.7	5.2	1.3	0.6	0.6	37.7	(1998)	(1986)		
Deeg	37	a	7.1	9.7	2.8	2.3	11.6	35.2	169.2	207.5	98.8	9.2	3.4	1.9	558.7	171	18	266.7	04 Sep 1965
		b	0.6	0.8	0.4	0.3	0.9	2.3	8.6	9.3	5.1	0.7	0.2	0.3	29.5	(1961)	(1986)		
Hingota	15	a	14.9	8.4	7.0	7.0	21.7	78.2	241.5	225.4	89.8	13.3	3.1	1.5	711.8	142	59	141.6	01 Sep 1978
		b	0.9	0.8	0.7	0.5	1.8	4.2	11.5	11.6	4.4	0.6	0.4	0.1	37.5	(1975)	(1994)		
Kamen	45	a	11.6	10.5	9.2	5.4	10.8	36.2	187.6	234.8	100.5	21.5	4.5	5.9	638.5	153	32	299.0	01 Oct 1910
		b	0.9	1.0	0.7	0.6	1.0	2.5	9.4	10.4	4.5	0.9	0.4	0.5	32.8	(1961)	(1987)		
Kumbher	36	a	7.9	6.3	3.8	3.8	10.4	32.9	171.5	220.7	95.6	21.4	2.8	3.4	580.5	187	51	162.6	04 Sep 1965
		b	0.8	0.6	0.5	0.4	0.9	2.1	8.7	9.8	4.9	0.8	0.2	0.3	30.0	(1958)	(1981)		
Nadhai	42	a	9.7	12.8	6.4	5.2	17.0	49.1	228.7	277.2	110.8	29.6	5.0	3.7	755.2	182	60	320.8	02 Aug 1966
		b	0.8	1.0	0.8	0.4	1.0	2.5	9.4	10.5	4.7	1.2	0.2	0.4	32.9	(1958)	(1951)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
BHARATPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Nagar	37	a	11.5	11.6	6.1	6.1	13.9	37.1	187.4	215.5	110.0	13.9	5.5	3.6	622.2	168	36	176.8	27 Aug 1962
		b	0.9	1.0	0.7	0.5	1.2	2.6	9.5	10.5	5.4	0.7	0.4	0.4	33.8	(1958)	(1991)		
Pahari	37	a	8.3	6.7	3.2	3.3	9.3	33.4	143.4	175.6	77.4	13.4	3.0	4.0	481.0	163	41	139.7	05 Sep 1965
		b	0.7	0.9	0.3	0.4	0.9	2.2	7.8	9.1	3.6	0.6	0.2	0.4	27.1	(1971)	(1987)		
Rupbas	39	a	9.3	8.8	4.3	2.0	6.5	35.6	182.5	242.2	105.4	14.1	2.5	4.4	617.6	191	37	236.0	17 Aug 1976
		b	0.9	0.8	0.4	0.3	0.6	2.6	9.5	10.6	5.1	0.8	0.2	0.4	32.2	(1958)	(1989)		
Weir	37	a	4.6	7.4	5.0	1.1	6.0	30.1	196.3	223.1	99.4	13.5	3.0	3.3	592.8	174	31	204.5	04 Sep 1965
		b	0.5	0.5	0.4	0.1	0.6	2.0	9.0	10.0	4.8	0.6	0.3	0.2	29.0	(1958)	(1986)		
Bharatpur (District)		a	8.8	8.2	5.2	3.8	11.0	44.8	193.7	226.0	97.9	16.1	3.3	3.6	622.4	169	32		
		b	0.7	0.8	0.6	0.4	0.9	2.7	9.5	10.2	4.7	0.8	0.3	0.3	31.9	(1958)	(1979)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	1	601 – 700	10
201 – 300	0	701 – 800	8
301 – 400	2	801 – 900	6
401 – 500	4	901 – 1000	3
501 – 600	14	1001 – 1100	1

(Data available for 49 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(BHARATPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.4	7.2	31.6	1994 Jan 24	1.9	1978 Jan 19	80	52
February	25.5	9.2	38.6	1991 Feb 26	1.7	1975 Feb 03	73	43
March	32.4	14.3	41.9	1984 Mar 31	6.8	1979 Mar 10	62	35
April	38.7	20.6	47.0	1979 Apr 29	11.4	1976 Apr 01	47	31
May	42.1	25.7	48.5	1998 May 26	17.8	1982 May 14	43	26
June	41.7	28.0	47.8	1981 Jun 17	18.0	1983 Jun 29	53	39
July	34.9	26.4	46.7	1982 Jul 07	19.2	1978 Jul 20	79	68
August	33.7	25.6	40.9	2002 Aug 02	22.2	1981 Aug 31	82	70
September	35.0	23.9	41.6	1981 Sep 15	19.0	1982 Sep 26	76	58
October	34.4	19.0	40.5	2002 Oct 05	12.2	1974 Oct 28	65	43
November	29.6	12.7	39.6	1977 Nov 18	5.2	1974 Nov 24	68	48
December	24.5	8.1	36.4	1993 Dec 02	2.8	1974 Dec 24 1986 Dec 16	77	56
Annual	32.9	18.4					67	47

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.0	3.6	4.2	4.6	5.2	6.3	4.8	3.7	3.7	3.0	2.1	2.3	3.9

TABLE - 5
Special Weather Phenomena
(BHARATPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.8	0.5	0.8	1.1	2.4	3.1	3.9	3.2	1.9	0.2	0.0	0.5	18.4
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	0.8	1.9	1.0	0.0	0.0	0.1	0.1	0.0	0.1	4.0
Fog	3.5	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	4.9	10.1

BHILWARA DISTRICT

The district has a hot dry summer, a bracing cold season. The cold season is from December to February and is followed by the hot season from March to about the last week of June. The southwest monsoon season which follows, lasts till about mid September. The period from mid September to about the end of November constitutes the post monsoon season.

RAINFALL

Records of rainfall in the district are available for twenty raingauge stations, for period ranging from 10 to 45 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 592.8 mm. About 82% of the annual rainfall is received during the southwest monsoon season. July and August are the rainiest months. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall which amounted to 163% of the normal occurred in 1994. The lowest annual rainfall which was only 47% of the normal occurred in 1951. The rainfall in the district as a whole was less than 80% of the normal in 6 years. Such a low rainfall occurred in the district for two consecutive years on one occasion in the fifty year period. It will be seen from Table 2 that the annual rainfall in the district was between 401 mm and 800 mm in 35 years out of 44.

On an average there are 29 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 19 at Khari Dam to 34 at Mandalgarh and Arwar (Dam).

The heaviest rainfall in 24 hours recorded at any station in the district was 440.0 mm at Sahara on 08 July 1984.

TEMPERATURE

There is a meteorological observatory in the district at Bhilwara. The description of the climate which follows is based on the records of this observatory. The period from March to May is one of continuous rise in temperatures. May is the hottest month of the year. The mean daily maximum temperature in this month is at about 40.9°C and the mean daily minimum temperature is at about 25.7°C. The maximum temperature on some days may go above 47°C. The southwest monsoon sets in by about the last week of June and lowers the temperature somewhat but the relief from the heat is not marked because of the added discomfort from the increase in humidity brought in by the monsoon air. After the withdrawal of the monsoon by about mid-September days become hotter and a secondary maximum is reached in October. But night temperatures continue to decrease steadily after the withdrawal of the monsoon. After mid November both day and night temperatures drop rapidly till January which is the coldest month with the mean daily maximum temperature at about 23.9°C and the mean daily minimum temperature at about 7.5°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which move across north India during the cold season, the minimum temperatures, particularly in January and February may go down slightly below the freezing point of water and frost may occur.

The highest maximum temperature ever recorded at Bhilwara was 47.8°C on 16 May 1976 and the lowest minimum temperature was –0.3°C on 11 January 1967.

HUMIDITY

The relative humidity is generally over 60% in the brief southwest monsoon season. In the rest of the year the air is dry. In the summer season which is the driest part of the year, the afternoon humidity may be as low as below 20%.

CLOUDINESS

The skies are moderately to heavily clouded and overcast on some days during the southwest monsoon season. In the rest of the year the skies are mostly clear or lightly clouded. On a few days in the cold season, the skies become cloudy, when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate with some strengthening in force in the later half of summer and the early southwest monsoon season. Southwesterly winds prevail during summer and southwest monsoon months. In the post monsoon and winter season the winds are mainly from northeast.

SPECIAL WEATHER PHENOMENA

During the southwest monsoon season, depressions which originate in the Bay of Bengal and move across the country in a westerly to northwesterly direction affect the district and its neighbourhood during the last stages and cause widespread heavy rain and gusty winds. Thunderstorms occur practically in all the months of the year but they are comparatively more frequent in the period May to September. Dust storms occur during the hot season and early part of the southwest monsoon season. Occasional fog occurs during the winter.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BHILWARA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Arwar	10	a	4.2	0.6	0.0	0.3	12.2	80.2	177.6	195.7	79.3	13.0	14.2	11.6	588.9	140	72	102.0	14 Aug 1973
Dam		b	0.3	0.1	0.0	0.1	1.2	5.4	10.8	9.6	4.7	0.6	0.6	0.4	33.8	(1973)	(1980)		
Asind	38	a	4.0	4.3	3.7	1.8	13.0	55.2	158.4	141.4	64.9	8.2	5.3	3.7	463.9	174	35	170.0	02 Jul 1994
		b	0.4	0.3	0.3	0.3	0.9	3.4	7.8	7.8	3.6	0.7	0.4	0.4	26.3	(1976)	(1987)		
Banera	39	a	4.8	4.5	3.5	2.2	9.3	53.0	212.4	221.2	90.6	18.2	7.7	3.4	630.8	180	52	187.0	21 Aug 1983
		b	0.4	0.3	0.2	0.3	0.8	3.2	9.4	10.3	4.3	0.7	0.4	0.2	30.5	(1961)	(1960)		
Bhilwara	45	a	6.6	2.8	5.1	3.0	6.4	59.3	228.8	243.5	97.2	17.7	7.6	4.1	682.1	191	47	295.0	02 Jul 1994
		b	0.5	0.3	0.3	0.3	0.8	3.9	9.6	10.8	4.7	0.9	0.5	0.3	32.9	(1956)	(1959)		
Bhilwara	34	a	6.1	3.5	5.7	4.4	9.1	51.6	211.7	239.6	89.0	10.9	10.3	3.6	645.5	182	45	259.1	07 Sep 1966
(Obsy)		b	0.4	0.3	0.3	0.3	0.8	3.3	9.1	10.6	4.4	0.8	0.7	0.3	31.3	(1994)	(1993)		
Bijolia	23	a	6.6	6.5	0.2	4.0	13.7	81.3	266.6	302.2	96.0	18.5	22.5	5.4	823.5	149	54	288.0	05 Aug 1990
		b	0.4	0.6	0.0	0.3	0.7	3.8	9.5	11.1	4.2	0.8	0.8	0.2	32.4	(1990)	(1980)		
Gangapur	24	a	5.9	0.2	6.9	1.2	8.5	53.7	166.0	192.4	108.6	27.4	3.5	2.2	576.5	213	42	228.6	23 Aug 1957
Sahara		b	0.4	0.0	0.4	0.2	0.8	3.1	8.1	9.3	5.1	1.0	0.4	0.2	29.0	(1973)	(1951)		
Hurda	39	a	4.5	4.1	2.6	4.5	12.4	60.8	179.2	199.2	72.0	8.8	3.6	3.8	555.5	191	49	278.0	05 Aug 1990
		b	0.4	0.3	0.3	0.4	1.1	3.1	7.9	8.3	3.5	0.5	0.4	0.3	26.5	(1990)	(1968)		
Jahazpur	45	a	5.3	4.9	5.2	3.5	8.8	64.7	267.8	242.7	113.1	13.9	8.6	4.9	743.4	150	41	237.0	21 Jul 2000
		b	0.5	0.3	0.4	0.2	0.7	3.5	10.2	10.6	5.2	0.7	0.5	0.3	33.1	(1973)	(1951)		
Khari	11	a	1.0	3.3	0.0	0.0	0.0	55.1	92.1	121.0	43.5	2.0	0.0	0.4	318.4	127	48	83.0	25 Sep 1981
Dam		b	0.1	0.1	0.0	0.0	0.0	2.7	5.9	7.3	2.2	0.1	0.0	0.1	18.5	(1978)	(1974)		
Kotari	38	a	5.5	3.0	4.9	3.0	16.2	66.6	227.2	267.0	105.8	9.7	9.5	4.6	723.0	161	37	241.0	02 Jul 1994
		b	0.3	0.3	0.4	0.3	0.9	3.6	9.5	11.2	4.2	0.6	0.6	0.2	32.1	(1961)	(1965)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
BHILWARA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Mandal	39	a	3.4	2.8	3.5	1.5	9.3	56.2	187.7	197.2	82.8	5.0	8.3	4.0	561.7	175	59	240.0	02 Jul 1994
		b	0.3	0.3	0.2	0.1	1.0	3.6	9.7	9.7	4.5	0.6	0.6	0.2	30.8	(1994)	(1965)		
Mandalgarh	39	a	4.5	4.2	1.7	3.1	9.5	62.7	247.4	272.8	111.0	9.3	11.9	3.2	741.3	191	67	295.0	02 Jul 1994
		b	0.4	0.4	0.3	0.3	0.7	4.0	9.8	11.6	4.7	0.6	0.5	0.3	33.6	(1994)	(1981)		
Meja Dam	10	a	0.0	0.0	0.0	0.0	4.9	61.1	149.9	185.1	103.1	2.0	0.0	0.0	506.1	185	70	84.5	27 Sep 1971
		b	0.0	0.0	0.0	0.0	0.5	3.2	8.8	8.4	4.8	0.3	0.0	0.0	26.0	(1973)	(1975)		
Nahar Sagar	10	a	0.0	0.0	0.0	0.0	5.3	96.2	183.5	189.1	63.7	0.0	0.0	0.0	537.8	170	49	120.0	16 Aug 1976
		b	0.0	0.0	0.0	0.0	0.2	3.7	9.2	8.8	4.1	0.0	0.0	0.0	26.0	(1973)	(1981)		
Raipur	39	a	4.6	2.9	4.7	2.4	7.8	67.7	201.2	172.1	71.0	8.9	9.8	2.8	555.9	206	30	191.5	01 Aug 1968
		b	0.4	0.3	0.3	0.2	0.6	3.9	8.3	8.5	3.8	0.6	0.6	0.2	27.7	(1973)	(1963)		
Sahara	23	a	5.6	3.2	5.4	5.1	12.7	63.2	238.3	200.7	65.8	10.1	10.5	4.6	625.2	159	45	440.0	08 Jul 1984
		b	0.5	0.3	0.4	0.4	1.0	3.8	10.2	9.9	3.7	0.6	0.7	0.3	31.8	(1984)	(1993)		
Sakeri Dam	11	a	3.6	6.8	0.7	1.6	4.1	66.8	126.3	157.9	60.0	8.4	4.9	2.4	443.5	154	72	129.4	21 Aug 1974
		b	0.5	0.4	0.1	0.2	0.4	4.2	7.7	7.6	3.0	0.3	0.5	0.1	25.0	(1976)	(1975)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
BHILWARA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Shahpura	44	a	6.5	3.6	3.9	2.9	9.8	61.3	204.3	208.7	81.2	15.1	8.4	6.3	612.0	150	38	254.0	04 Jul 1906
		b	0.4	0.4	0.3	0.3	0.7	3.8	9.7	10.1	4.2	0.8	0.5	0.4	31.6	(1973)	(1951)		
Umed Sagar	11	a	0.0	0.0	0.0	0.0	7.3	78.8	171.1	192.3	66.7	1.9	0.0	0.0	518.1	146	55	91.0	30 Jun 1975
		b	0.0	0.0	0.0	0.0	0.5	4.4	9.1	9.2	4.4	0.2	0.0	0.0	27.8	(1973)	(1981)		
Bhilwara (District)		a	4.1	3.1	2.9	2.2	9.0	64.8	194.9	207.1	83.3	10.5	7.3	3.6	592.8	163	47		
		b	0.3	0.3	0.2	0.2	0.7	3.7	9.0	9.5	4.2	0.6	0.4	0.2	29.3	((1994)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1951 - 2000)
(BHILWARA`)

Range in mm	No. of years	Range in mm	No. of years
201 – 300	1	601 – 700	6
301 – 400	1	701 – 800	8
401 – 500	9	801 – 900	5
501 – 600	12	901 – 1000	2

(Data available for 44 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(BHILWARA)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.9	7.5	32.0	1994 Jan 28	-0.3	1967 Jan 11	61	29
February	27.0	10.2	36.7	1985 Feb 28	1.7	1984 Feb 22	52	23
March	32.7	15.5	41.2	1984 Mar 31	6.3	1972 Mar 01	40	17
April	37.8	21.6	44.8	1996 Apr 28	11.8	1965 Apr 02	32	15
May	40.9	25.7	47.8	1976 May 16	16.9	1964 May 28	35	18
June	39.1	26.3	47.0	2003 Jun 04	16.5	1997 Jun 03	55	35
July	33.5	24.6	42.5	1968 Jul 03	15.0	2003 Jul 07	77	61
August	31.4	23.4	39.2	1965 Aug 20	16.0	2003 Aug 02	82	71
September	33.1	22.2	40.5	2002 Sep 30	15.5	1967 Sep 28	74	55
October	34.0	18.1	41.5	2002 Oct 03	10.0	1983 Oct 30	54	32
November	30.0	12.9	36.0	1996 Nov 01	5.0	1975 Nov 30	55	33
December	25.4	8.8	33.3	1963 Dec 12	0.9	1966 Dec 11	62	34
Annual	32.4	18.1					57	35

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.9	4.8	5.3	6.4	8.8	11.4	9.9	7.8	6.0	4.4	3.3	3.5	6.3

TABLE - 5
Special Weather Phenomena
(BHILWARA)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.3	0.6	0.4	0.7	1.8	2.2	1.4	1.2	0.4	0.1	0.2	9.4
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	0.1	0.1	0.4	0.8	0.3	0.2	0.0	0.0	0.0	0.0	0.0	1.9
Fog	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.3

BUNDI DISTRICT

The climate of this district is generally dry except in the southwest monsoon season. The year may broadly be divided into four seasons. The period from December to February is the cold season and is followed by the hot season which extends to about the third week of June when the southwest monsoon season starts. This season continues till the middle of September. The period from mid September to November is the post monsoon season.

RAINFALL

Records of rainfall are available for seven stations in the district for period ranging from 12 to 45 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 698.9 mm. The rainfall generally decreases from the southeast to northwest. About 93% of the annual rainfall is received during the period June to September. There is not much variation in the rainfall from year to year. In the fifty year period 1951 to 2000, the rainfall in the district was the highest in 1956 when it was 168% of the normal. 1972 was the year with the lowest annual rainfall which amounted to only 54% of the normal. In 13 years out of 50, the rainfall was less than 80% of the normal. On two occasions two consecutive years and on one occasion three consecutive years had rainfall less than 80% of the normal. It will be seen from Table 2, that in 38 years out of 50, the annual rainfall was between 401 mm and 1000 mm.

On an average there are 33 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number is nearly the same throughout the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 413.3 mm at Hindoli on 22 August 1942.

TEMPERATURE

There is a meteorological observatory in the district at Bundi. But it has started very recently. However, the meteorological data recorded at Kota observatory in the neighbouring district gives a fair idea of temperature and other weather phenomena in this district. After about the middle of November both day and night temperatures begin to drop steadily till Janruary which is generally the coldest month of the year. The mean daily maximum temperature in that month may be about 24^{o}C while the mean daily minimum temperature may be of the order of 9^{o}C. In association with cold waves in the wake of western disturbances passing across north India, the minimum temperatures may sometimes be as low as two or three degrees above the freezing point of water. In February the temperatures are slightly higher than in January, but from March temperature rises rapidly. May is usually the hottest month when the maximum temperature may sometimes be as high as 47^{o}C to 48^{o}C. With the advance of the southwest monsoon over the district the temperatures drop appreciably. After about the middle of September, day temperatures increase slightly and usually there is a secondary maximum of temperature in October.

HUMIDITY

Dry air prevails over the district except in the southwest monsoon season. In the summer months, particularly in the afternoons the relative humidity is very low.

CLOUDINESS

Except for brief spells of cloudy weather caused by occasional western disturbances passing across north India, clear bright weather prevails during the cold season. In the summer and post monsoon season skies are clear or lightly clouded while moderately to heavily clouded skies are common in the southwest monsoon months.

WINDS

Generally light to moderate winds prevail throughout the year with a slight strengthening in the early monsoon period. In the post monsoon and winter season, winds blow from directions between northwest and northeast. During summer and southwest monsoon season, winds blow from directions west-northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the monsoon season and move across the central parts of the country in a westerly or west-northwesterly direction affect the district and its neighbourhood and cause widespread heavy rain and strong winds. Dust storms occur in the summer months. Thunderstorms occur throughout the year, more frequently in southwest monsoon season. Occasional fog occurs during winter.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
BUNDI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bundi	45	a	5.2	2.1	3.6	2.8	6.6	65.1	274.9	253.2	115.9	18.5	9.6	2.8	760.3	227	49	370.3	06 Sep 1947
		b	0.5	0.3	0.4	0.4	0.7	3.9	10.4	11.5	5.6	0.7	0.5	0.2	35.1	(1969)	(1980)		
Guda Dam	12	a	0.0	0.0	0.0	0.0	17.1	47.1	290.8	194.0	84.1	4.8	0.0	0.0	638.5	175	47	217.0	24 Jul 1973
		b	0.0	0.0	0.0	0.0	1.2	2.6	12.1	10.1	2.6	0.1	0.0	0.0	28.7	(1973)	(1988)		
Hindoli	45	a	6.3	3.7	4.8	2.3	5.0	59.7	235.3	213.4	101.6	19.3	9.9	3.0	664.3	203	42	413.3	22 Aug 1942
		b	0.6	0.4	0.4	0.3	0.5	3.4	9.8	10.5	5.0	0.7	0.4	0.2	32.2	(1956)	(1985)		
Indergarh	40	a	4.6	4.2	2.0	1.0	6.7	71.0	324.9	261.9	94.5	14.9	7.0	1.7	794.4	183	32	357.0	27 Jul 1986
		b	0.6	0.3	0.2	0.1	0.5	3.3	11.5	11.4	5.1	0.6	0.3	0.2	34.1	(1975)	(1972)		
Nainwa	39	a	4.9	5.6	3.4	1.5	7.0	55.0	215.6	228.0	69.3	12.8	8.4	5.3	616.8	176	30	300.0	22 Aug 1984
		b	0.4	0.3	0.3	0.2	0.7	3.1	9.6	9.9	4.1	0.6	0.4	0.2	29.8	(1973)	(1989)		
Patan	45	a	6.5	3.9	3.8	5.2	5.5	70.6	255.1	250.4	124.2	25.6	10.2	3.6	764.6	187	15	340.1	12 Jul 1945
		b	0.7	0.3	0.4	0.4	0.6	4.2	11.3	11.9	5.8	1.1	0.5	0.3	37.5	(1971)	(1972)		
Talera	38	a	5.2	2.3	3.9	1.4	5.1	54.7	232.6	229.7	99.8	8.9	7.1	1.6	652.3	202	23	186.7	21 Jul 1957
		b	0.3	0.2	0.4	0.1	0.6	3.4	9.6	10.3	4.4	0.6	0.2	0.1	30.2	(1990)	(1991)		
Bundi (District)		a	4.7	3.1	3.1	2.0	7.7	60.5	261.3	232.9	98.5	15.0	7.5	2.6	698.9	168	54		
		b	0.4	0.3	0.3	0.2	0.7	3.4	10.6	10.8	4.7	0.6	0.3	0.2	32.5	(1956)	(1972)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	1	801 – 900	8
401 – 500	8	901 – 1000	5
501 – 600	7	1001 – 1100	2
601 – 700	6	1101 – 1200	3
701 – 800	4		

(Data available for 44 years only)

CHITTORGARH DISTRICT

The climate of this district is generally dry except during the southwest monsoon season. The period from December to February is the cold season. The hot season is from March to about the third week of June. The southwest monsoon season, which follows, thereafter lasts till about the middle of September. The period from mid September to November constitutes the post monsoon season.

RAINFALL

Records of rainfall in the district are available for twenty raingauge stations, for period ranging from 11 to 45 years. Tables1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 793.9 mm. The rainfall in the district generally decreases from the southeast towards the northwest. The region around Chittor gets more rainfall than in the rest of the district. The annual rainfall varies from 591.0 mm at Badgaon to 1033.6 mm at Chittor. About 93% of the annual rainfall is received during the period June to September. August is the rainiest month. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the annual rainfall was the highest in 1973, when it amounted to 178% of the normal. The lowest annual rainfall which occurred in 1951 was only 36% of the normal. During the same fifty year period the annual rainfall in the district was less than 80% of the normal in 8 years and there is one occasion of such a low rainfall occurred in two consecutive years. It will be seen from Table 2 that the annual rainfall in the district was between 501 mm and 1100 mm in 43 years out of 48 years.

On an average there are 34 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 27 at Bhopal Sagar to 41 at Partabgarh.

The heaviest rainfall in 24 hours recorded at any station in the district was 802.9 mm at Chittor on 14 July 1982.

TEMPERATURE

There are two meteorological observatories in the district, one is at Rawat Bhata Dam and another at Chittorgarh. The records of Rawat Bhata Dam and Chittorgarh observatories may be taken as representative of the conditions in the eastern and western part of the district. After the middle of November both day and night temperatures begin to drop steadily till January which is the coldest month. The mean daily maximum temperature during this month is 24.5°C at Chittorgarh and 24.7°C at Rawat Bhata Dam site and the mean daily minimum temperature is 6.7°C and 9.6°C at Chittorgarh and Rawat Bhata Dam respectively. In association with western disturbances which move across north India during the cold season, cold waves affect the district and the minimum temperature may go below the freezing point of water and frost may occur. From March temperatures rise rapidly. May is usually the hottest month with the mean daily maximum temperature at 40.7°C and 41.0°C at Chittorgarh and Rawat Bhata Dam respectively and the mean daily minimum temperature is 24.6°C and 26.8°C at Chittorgarh and Rawat Bhata Dam respectively. The heat in the summer season is intense and the dry hot winds which are usual in this season make the weather unpleasant. The day temperatures may go up above 46°C-47°C on some occasions. With the advance of the southwest monsoon over the district by about the third week of June, there is an appreciable drop in temperature. After the withdrawal of the monsoon by about mid September, day temperatures increase slightly and secondary maximum is reached in October. But the nights become progressively cooler. After October both day and night temperatures begin to drop steadily. The highest maximum temperature ever recorded at Rawat Bhata Dam was 47.6°C on 16 May 1985 and that at Chittorgarh was 46.0°C on 06 May 2002. The lowest minimum temperature was –0.1°C on 15

January 2003 and –1.1°C on 25 December 1955 at Chittorgarh and Rawat Bhata Dam respectively.

HUMIDITY

Except during the southwest monsoon season when the humidity is about 80% or more, the air is generally dry. The driest part of the year is the hot season, when the humidity is about 20% only in the afternoons.

CLOUDINESS

Skies are moderately to heavily clouded and overcast on some days during the southwest monsoon season. In the rest of the year the skies are mostly clear or lightly clouded. But on a few days in the cold season, when the district is affected by passing western disturbances, spells of cloudy weather occur on a day or two.

WINDS

Winds are generally moderate with some strengthening in force in the summer and the early southwest monsoon season. Southwesterly winds prevail during the monsoon months and from October to February northeasterly winds appear. From March to June wind blows from west-southwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the southwest monsoon season move across the country in a westerly to northwesterly direction. These affect the district and its neighbourhood during the last stages before dissipating, causing widespread heavy rain. Thunderstorms occur practically in all the months of the year but they are comparatively more frequent in the period May to September. Dust storms occur occasionally during the hot season. Fog occurs in winter and early summer months.

Tables 3, 4 and 5 and 3(a), 4(a) and 5(a) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Chittorgarh and Rawat Bhata Dam observatories.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
CHITTORGARH

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Arnooh	18	a	4.9	2.9	0.2	0.9	1.2	78.6	309.4	463.6	103.4	25.0	11.3	2.7	1004.1	198	53	500.1	21 Aug 1985
		b	0.2	0.2	0.1	0.1	0.2	3.5	11.8	15.2	5.1	0.7	0.6	0.2	37.9	(1985)	(1981)		
Badgaon	12	a	0.0	0.0	0.0	0.0	0.0	87.3	160.6	216.8	95.3	17.8	11.1	2.1	591.0	215	62	115.0	08 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	4.0	7.4	10.2	4.8	0.9	0.6	0.1	28.0	(1973)	(1972)		
Bangu/Bagan	39	a	5.0	2.5	3.7	1.6	10.2	71.7	236.2	284.9	120.7	14.4	17.1	3.3	771.3	176	51	295.0	25 Jul 1986
		b	0.4	0.2	0.2	0.2	0.9	4.0	9.9	11.1	5.5	0.9	0.7	0.2	34.2	(1986)	(1965)		
Bari-Sadri	37	a	3.3	2.5	0.7	2.8	11.6	85.5	249.3	290.2	136.6	17.0	20.8	2.7	823.0	175	46	199.6	09 Jul 1958
		b	0.2	0.3	0.1	0.2	0.8	4.1	10.1	11.3	5.8	0.9	0.6	0.1	34.5	(1973)	(1966)		
Bhadesar	39	a	2.4	1.1	4.0	1.5	6.6	67.7	217.5	244.6	122.3	16.1	13.4	2.8	700.0	176	51	169.7	01 Aug 1968
		b	0.3	0.1	0.2	0.1	0.6	3.3	9.6	10.2	4.9	0.8	0.5	0.1	30.7	(1973)	(1995)		
Bhensrodgarh	27	a	4.5	1.7	2.3	3.2	7.5	61.1	286.4	289.9	130.6	14.7	20.5	2.3	824.7	170	47	351.4	29 Jul 1982
		b	0.3	0.2	0.2	0.1	0.5	3.0	8.9	11.4	4.6	0.7	0.7	0.1	30.7	(1961)	(1989)		
Bhopal Sagar	25	a	4.2	0.2	0.0	3.8	6.6	59.9	215.8	244.6	77.3	11.7	11.5	0.4	636.0	209	41	250.0	21 Aug 1982
		b	0.4	0.0	0.0	0.2	0.5	2.9	8.8	9.7	3.5	0.7	0.5	0.1	27.3	(1973)	(1987)		
Chambal/ R.B. Dam (Obsy)	43	a	4.1	3.0	3.6	4.6	10.1	76.6	291.4	281.0	140.8	20.6	12.1	3.2	851.1	180	57	303.0	30 Jul 1982
		b	0.4	0.4	0.4	0.5	1.0	4.6	10.8	12.2	6.4	1.4	0.6	0.3	39.0	(1956)	(1998)		
Chhoti Sadri	37	a	4.4	1.3	1.6	1.5	9.4	98.1	287.9	324.4	146.2	22.5	18.2	2.5	918.0	177	47	220.0	23 Jun 1980
		b	0.3	0.1	0.2	0.2	0.6	4.3	11.1	12.2	6.5	1.2	0.8	0.1	37.6	(1973)	(1966)		
Chittor	11	a	1.3	0.2	0.2	2.6	6.3	68.0	425.3	354.0	133.7	17.9	22.8	1.3	1033.6	286	42	802.9	14 Jul 1982
		b	0.2	0.0	0.0	0.3	0.7	4.3	9.5	13.1	6.1	1.0	1.1	0.1	36.4	(1982)	(1981)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
CHITTORGARH

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Chittorgarh	44	a	5.8	2.6	3.9	3.1	13.2	70.3	248.9	281.7	122.5	18.4	7.9	3.7	782.0	170	37	274.3	20 Jul 1943
		b	0.4	0.3	0.3	0.3	1.0	4.4	10.4	11.0	5.6	1.0	0.5	0.3	35.5	(1973)	(1951)		
Chittorgarh (Obsy)	27	a	5.6	3.9	1.5	6.6	11.9	78.5	320.3	288.8	114.1	19.3	13.7	3.8	868.0	253	60	700.0	28 Jul 1995
		b	0.4	0.5	0.2	0.7	1.1	4.7	10.9	11.4	5.4	1.0	0.7	0.2	37.2	(1995)	(1998)		
Dungla	39	a	3.5	1.5	3.7	2.0	8.2	71.0	253.3	283.8	122.8	16.9	13.2	4.0	783.9	209	51	181.0	20 Aug 1984
		b	0.3	0.2	0.1	0.3	0.7	3.5	9.7	10.6	5.2	0.9	0.5	0.2	32.2	(1973)	(1995)		
Gambhiri Dam	11	a	0.0	0.0	0.0	0.0	1.9	72.2	190.3	325.8	111.1	14.0	17.0	0.0	732.3	175	63	196.0	30 Aug 1973
		b	0.0	0.0	0.0	0.0	0.2	4.1	8.3	12.2	5.2	0.5	0.2	0.0	30.7	(1973)	(1981)		
Gangrar	39	a	5.4	2.3	3.1	3.5	17.0	68.8	216.8	257.0	99.3	12.8	9.3	3.2	698.5	160	59	263.0	30 Jul 1999
		b	0.3	0.2	0.3	0.3	1.1	3.5	9.3	10.3	4.6	0.7	0.6	0.2	31.4	(1994)	(1963)		
Kapasam	45	a	4.7	1.5	3.6	5.2	9.1	65.0	218.0	235.1	97.4	19.1	9.9	3.3	671.9	198	39	254.0	21 Aug 1944
		b	0.3	0.2	0.3	0.2	0.7	3.6	9.7	10.0	5.2	0.9	0.5	0.3	31.9	(1956)	(1951)		
Nimbahera	45	a	6.9	2.3	4.2	1.6	8.1	76.8	275.4	298.2	152.6	25.5	17.8	3.4	872.8	259	45	362.0	28 Jul 1992
		b	0.4	0.3	0.2	0.1	0.8	3.8	9.9	10.7	5.9	1.1	0.8	0.2	34.2	(1973)	(1951)		
Orai Dam	12	a	0.0	0.5	0.0	0.0	4.4	87.2	178.6	291.0	124.8	20.1	23.3	1.5	731.4	158	52	187.0	22 Aug 1974
		b	0.0	0.1	0.0	0.0	0.2	4.9	8.9	11.3	5.3	0.8	0.8	0.2	32.5	(1973)	(1981)		
Partabgarh	45	a	4.0	1.4	3.7	2.6	5.2	103.7	280.9	298.1	162.6	32.2	16.7	2.8	913.9	183	23	787.4	07 Jul 1890
		b	0.3	0.2	0.2	0.3	0.4	5.0	12.3	13.3	7.0	1.2	0.7	0.3	41.2	(1973)	(1951)		
Rashmi	39	a	5.9	0.8	4.0	3.7	10.9	64.4	222.5	246.5	85.7	17.2	9.0	1.9	672.5	218	45	185.0	16 Jul 1973
		b	0.4	0.2	0.2	0.2	1.0	3.4	9.6	10.2	4.6	0.9	0.6	0.3	31.6	(1973)	(1993)		
Chittorgarh (District)		a	3.8	1.6	2.2	2.5	8.0	75.6	254.2	290.0	120.0	18.7	14.8	2.5	793.9	178	36		
		b	0.3	0.2	0.2	0.2	0.7	3.9	9.8	11.4	5.4	0.9	0.6	0.2	33.8	(1973)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
201 – 300	1	901 – 1000	3
301 – 400	0	1001 – 1100	5
401 – 500	1	1101 – 1200	1
501 – 600	5	1201 – 1300	1
601 - 700	6	1301 – 1400	0
701 – 800	17	1401 – 1500	1
801 – 900	7		

(Data available for 48 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(CHITTORGARH)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.5	6.7	32.7	1991 Jan 27	-0.1	2003 Jan 15	73	38
February	26.7	8.6	37.4	2006 Feb 23	0.3	1981 Feb 02	61	30
March	33.0	14.3	41.4	1999 Mar 31	3.8	1979 Mar 09	46	23
April	38.2	20.4	45.1	2009 Apr 29	12.1	1975 Apr 09	36	19
May	40.7	24.6	46.0	2002 May 06	16.2	1983 May 22	44	21
June	38.5	25.3	45.6	1994 Jun 06	17.2	1997 Jun 03	62	39
July	32.5	23.6	41.5	2009 Jul 07	18.5	1974 Jul 14	81	65
August	30.6	22.5	36.9	1979 Aug 31	18.8	1986 Aug 27	86	72
September	32.9	21.2	39.9	2009 Sep 23	12.4	2002 Sep 17	78	55
October	33.9	16.8	40.0	2002 Oct 08	6.4	1983 Oct 29	62	35
November	29.7	11.6	38.0	2002 Nov 20	3.5	1983 Nov 30	64	37
December	25.8	7.5	34.5	2002 Dec 14	0.2	1980 Dec 08	72	41
Annual	32.3	16.9					64	40

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.9	4.2	4.7	5.4	7.0	9.3	7.8	6.3	4.5	3.2	3.2	3.4	5.2

TABLE - 5
Special Weather Phenomena
(CHITTORGARH)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.6	0.4	0.3	1.9	2.1	2.6	3.9	0.7	0.5	0.1	0.1	13.2
Hail	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Dust storm	0.1	0.1	0.2	0.2	0.8	0.5	0.1	0.1	0.0	0.0	0.0	0.0	2.1
Fog	1.7	1.8	1.5	1.9	1.8	0.3	0.1	0.1	0.7	2.5	0.4	3.1	15.9

TABLE – 3(a)
Normals of Temperature and Relative Humidity
CHAMBAL (RAWAT BHATA DAM)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum Ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.7	9.6	34.6	2006 Jan 17	0.0	1956 Jan 22	67	37
February	27.5	12.1	38.2	2005 Feb 12	0.5	1957 Feb 11	57	29
March	33.2	17.4	41.3	2004 Mar 19	5.5	1956 Mar 01	43	24
April	38.1	22.8	46.0	1958 Apr 27	12.9	1987 Apr 02	35	22
May	41.0	26.8	47.6	1985 May 16	15.6	1957 May 09	39	23
June	38.7	27.0	46.1	1995 Jun 05 1979 Jun 10	16.3	1957 Jun 06	60	41
July	33.2	24.8	46.1	1962 Jul 02	17.4	2006 Jul 21	79	68
August	31.0	23.7	41.3	1987 Aug 06	15.6	1957 Aug 13	86	77
September	32.8	22.7	40.6	1979 Sep 28	14.4	1957 Sep 30	78	61
October	34.0	18.9	40.6	1984 Oct 04	8.3	1955 Oct 31	63	37
November	29.9	14.2	37.2	1957 Nov 06	3.3	1958 Nov 23 1956 Nov 29	65	37
December	25.7	10.6	32.6	1968 Dec 12 1963 Dec 12	-1.1	1955 Dec 25	70	40
Annual	32.5	19.2					62	41

TABLE – 4(a)
Mean Wind Speed in km/hr.
CHAMBAL (RAWAT BHATA DAM)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.1	3.7	4.3	5.1	6.8	9.1	7.3	5.5	4.2	2.8	2.6	2.7	4.8

TABLE – 5(a)
Special Weather Phenomena
CHAMBAL (RAWAT BHATA DAM)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.3	0.8	0.9	3.3	5.4	5.1	2.4	1.8	0.8	0.6	0.3	22.0
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	0.2	0.4	1.2	1.4	0.1	0.0	0.0	0.0	0.0	0.0	3.3
Fog	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	1.0

DAUSA DISTRICT

The district has a dry climate except during the southwest monsoon season. December to February is the cold season after which the hot season commences and continues till about the third week of June when the southwest monsoon sets in. The southwest monsoon season is comparatively short in this region and lasts only till mid September. The period from about the second half of September to the end of November constitutes the post monsoon or the retreating monsoon season.

RAINFALL

Records of rainfall in the district are available for four raingauge stations, for period ranging from 36 to 43 years. Tables1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 679.8 mm. Rainfall in general is uniform throughout the district. The rainfall during the period June to September constitutes nearly 91% of the annual normal rainfall. The variation of the annual rainfall from year to year is not very large. In the fifty year period from 1951 to 2000 the highest annual rainfall amounting to 170% of the normal occurred in 1995, while the lowest annual rainfall which was only 53% of the normal occurred in 1951. During this period, there were 11 years when the annual rainfall was less than 80% of the annual normal rainfall. There is only one occasion when such a low rainfall occurred in three consecutive years in the district. It will be seen from Table 2 that the annual rainfall was between 501mm to 800 mm in 22 years out of 39.

On an average there are 34 rainy days (with rain of 2.5 mm or more) in a year in the district. This number varies from 32 at Lalsot to 36 at Sikrai.

The heaviest rainfall in 24 hours recorded at any station in the district was 550.0 mm at Dausa on 19 July 1981.

TEMPERATURE

There is no meteorological observatory in the district. So the description which follows is based on data of observatory in the neighbouring Jaipur district, where similar climatic conditions prevail. The period from March to June is of continuous rise of temperature, May and first half of June being the hottest part of the year with the mean daily maximum temperature at about 40°C and the mean daily minimum temperature at about 26°C. On individual days, during May and June, maximum temperature may go upto about 49°C. With the arrival of the southwest monsoon season by about the third week of June, the day temperatures decrease, but the nights in June are little hotter than May and the relief from heat is not marked because of the added discomfort from the increase in humidity brought in by the southwest monsoon. After the withdrawal of the moonsoon by about the third week of September, though night temperatures drop a little, the day temperatures increase and a secondary maxima in day temperature is recorded in October. Both day and night temperatures drop rapidly after mid November till January which is the coldest month, with the mean daily maximum temperature at about 22°C-23°C and the mean daily minimum temperature at about 7°C-8°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which pass across north India during the cold season, minimum temperature particularly in January and February may go down to a degree or two below the freezing point of water.

HUMIDITY

The values of relative humidity are generally about 60% in southwest monsoon season. In the rest of the year, the air is generally dry. In the summer

season which is also the driest part of the year, the afternoon values of relative humidity may be as low as 15%-20%.

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CLOUDINESS

During the southwest monsoon season, the skies are moderately to heavily clouded and generally overcast on some days. In the rest of the year clear or lightly clouded skies prevail except in winter season. On a few days in winter, the skies become cloudy when the district is affected by western disturbances.

WINDS

Winds are generally light to moderate, but in summer and the early southwest monsoon season, winds may strengthen on some days. Westerly to northwesterly winds prevail in the southwest monsoon season. In the period from October to March winds are mostly from direction east in morning, while in the afternoon, they are mainly from northwest. Northwesterly winds prevail during the summer season.

SPECIAL WEATHER PHENOMENA

During the southwest monsoon season the district is sometimes affected by the depressions which originate in the Bay of Bengal and move across the central parts of the country and reach the districts or its neighbourhood causing widespread heavy rainfall. Thunderstorms occur practically in all the months of the year, but their frequency is more during the later part of summer and southwest monsoon season and are sometimes associated with squall. Alongwith thunderstorms, hail may also occur occasionally. In the hot season dust storms also occur. In winter months fog occurs occasionally.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
DAUSA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Baswa	43	a	9.7	7.3	4.1	4.6	15.2	49.9	229.6	227.7	110.2	19.1	4.0	3.8	685.2	176	43	207.0	01 Sep 1978
		b	0.8	0.8	0.5	0.3	1.3	3.5	11.1	10.5	5.0	0.9	0.4	0.4	35.5	(1960)	(1951)		
Dausa	43	a	9.3	7.6	5.2	3.7	11.8	58.3	240.7	219.4	71.9	18.3	5.6	3.7	655.5	206	51	550.0	19 Jul 1981
		b	0.8	0.7	0.7	0.3	0.8	3.3	10.3	10.7	4.3	0.8	0.4	0.2	33.3	(1983)	(1963)		
Lalsot	43	a	4.8	5.9	1.2	3.9	11.7	56.1	249.4	231.8	68.2	13.2	4.2	3.6	654.0	166	55	301.0	19 Jul 1981
		b	0.4	0.5	0.2	0.3	1.0	2.8	10.3	10.7	4.8	0.6	0.3	0.3	32.2	(1981)	(1953)		
Sikrai	36	a	13.0	6.8	4.8	1.8	14.6	50.7	219.9	267.6	123.0	14.4	4.0	3.6	724.2	228	29	289.2	11 Aug 1972
		b	0.9	0.8	0.6	0.3	1.3	3.0	10.7	11.2	6.0	0.9	0.4	0.2	36.3	(1995)	(1983)		
Dausa (District)		a	9.2	6.9	3.8	3.5	13.3	53.8	234.9	236.6	93.3	16.3	4.5	3.7	679.8	170	53		
		b	0.7	0.7	0.5	0.3	1.1	3.2	10.6	10.8	5.0	0.8	0.4	0.3	34.4	(1995)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	2	801 – 900	5
401 – 500	4	901 – 1000	5
501 – 600	9	1001 – 1100	0
601 – 700	6	1101 – 1200	1
701 – 800	7		

(Data available for 39 years only)

DHOLPUR DISTRICT

The district has a dry climate with a hot summer, a cold winter and a short monsoon season. The cold season starts by about the middle of November and continues to about the beginning of March. The hot season follows thereafter and extends to about the end of June. The southwest monsoon season is from July to mid-September. The period from mid-September to mid-November may be termed as the post monsoon season.

RAINFALL

Records of rainfall in the district are available for seven raingauge stations for period ranging from 38 to 45 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 677.1 mm. The rainfall during the southwest monsoon season constitutes about 91% of the annual rainfall. The variation in the annual rainfall from year to year is not very large. In the fifty years period 1951-2000, the highest annual rainfall which amounted to 177% of the normal, occurred in 1977, while the lowest annual rainfall in the same period was only 55% of the normal, which occurred the very next year in 1978. In 11 years out the 44 years, the rainfall was less than 80% of the normal, and 2 consecutive years of such a low rainfall occurred thrice during the same period. It will be seen from Table 2, that in 28 years out of 44, the annual rainfall in the district was between 501 mm and 800 mm.

On an average there are 32 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 26 at Sepao to 39 at Dholpur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 400.0 mm at Rajakhera on 21 July 1972.

TEMPERATURE

There is only one meteorological observatory in the district at Dholpur and records for this observatory may be taken as representative of climatic conditions prevailing in the district. The period from March to May is one of continuous increase in temperatures, May and June being the hottest part of the year. The mean daily maximum temperature in May is 42.4°C and the mean daily minimum temperature is 26.1°C. In the summer season, the heat is intense and the scorching dust laden winds add to the discomfort. The maximum temperature sometimes reaches 50°C in this season. The setting in of the southwest monsoon by about the end of June lowers the temperature appreciably, but the relief from the heat is not marked due to the increased dampness of the monsoon air. After the withdrawal of the monsoon by mid-September, days become a little hotter, but the night becomes progressively cooler. From November both day and night temperatures decrease rapidly till January the coldest month, with the mean daily maximum temperature at 23.3°C and the mean daily minimum temperature at 6.3°C. In association with cold waves which affect the district in the wake of western disturbances which pass across north India during the cold season, minimum temperature may at times fall to about 3 °C-4°C below the freezing point of water.

The highest maximum temperature ever recorded at Dholpur was 50.0°C on 03 June 1995 and the lowest minimum temperature ever recorded was –4.3°C on 03 January 1990.

HUMIDITY

During the southwest monsoon season the values of relative humidity are generally about 70%. In the rest of the year, the air is generally dry. In the summer monsoon season, which is the driest part of the year, the afternoon relative humidity goes down to below 30%.

CLOUDINESS

During the southwest monsoon season, skies are moderately to heavily clouded generally and overcast on some days. In the rest of the year, clear or lightly clouded skies prevail. But on few days, in the winter season, skies become cloudy when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate, but in summer and the early part of the southwest monsoon season winds strengthen slightly on some days. In summer, winds generally blow from west direction. Westerly winds prevail during the monsoon months. In the post monsoon and winter months, winds are westerly but more frequently calm wind prevails.

SPECIAL WEATHER PHENOMENA

Depressions originating in the Bay of Bengal in the southwest monsoon season move across the central parts of the country and during their last stages, sometimes affect the district causing heavy rain. In the hot season, dust storms occur frequently, some of them are accompanied occasionally by hail. Thunderstorms occur throughout the year. Occasional fog occurs during the winter season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
DHOLPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Bari	45	a	8.3	9.0	6.2	3.4	7.5	52.2	221.0	281.9	123.2	21.7	4.5	5.4	744.3	165	35	248.0	10 Aug 1972
		b	0.7	0.8	0.5	0.3	0.8	2.5	10.4	11.3	5.0	1.1	0.3	0.4	34.1	(1958)	(1978)		
Baseri	45	a	8.1	9.7	7.4	0.9	4.6	36.8	180.1	223.4	101.1	14.9	3.2	2.5	592.7	216	30	230.1	02 Oct 1910
		b	0.7	0.7	0.6	0.2	0.6	2.3	9.5	10.6	4.3	0.8	0.3	0.3	30.9	(1958)	(1989)		
Dholpur	45	a	8.5	7.7	6.0	2.2	7.0	51.5	195.2	272.2	105.7	22.4	2.4	3.4	684.2	188	34	215.6	16 Jul 1908
		b	0.7	0.7	0.6	0.3	0.7	2.6	10.3	11.3	4.8	1.2	0.3	0.3	33.8	(1967)	(1978)		
Dholpur (Obsy)	38	a	8.6	9.2	7.1	2.7	11.1	52.1	208.0	294.9	123.9	30.0	4.2	6.8	758.6	180	46	158.4	17 Aug 1976
		b	1.1	0.7	0.6	0.5	1.1	2.9	11.0	12.7	5.6	1.6	0.3	0.5	38.6	(1967)	(1979)		
Rajakhera	45	a	9.2	10.2	8.5	2.5	7.0	47.6	200.8	241.1	111.3	275	4.2	3.7	673.6	224	40	400.0	21 Jul 1972
		b	0.8	0.8	0.7	0.4	0.6	2.6	9.5	11.2	5.2	1.4	0.3	0.4	33.9	(1992)	(1987)		
Sepao	44	a	4.6	8.2	2.5	0.9	3.2	42.2	186.9	260.2	105.7	17.7	2.6	1.8	636.5	186	39	202.0	08 Aug 1995
		b	0.5	0.5	0.3	0.1	0.2	1.9	8.4	8.8	4.7	0.7	0.2	0.1	26.4	(1958)	(1966)		
Sirmuthra	45	a	6.9	5.8	4.2	1.1	4.5	41.1	210.7	252.1	96.6	20.2	3.4	4.0	650.6	165	52	318.0	11 Aug 1972
		b	0.6	0.5	0.3	0.1	0.4	2.1	8.9	10.5	4.9	0.8	0.2	0.3	29.5	(1961)	(1987)		
Dholpur (District)		a	7.7	8.5	6.0	2.0	6.4	46.2	200.4	260.8	109.6	22.1	3.5	3.9	677.1	177	55		
		b	0.7	0.7	0.5	0.3	0.6	2.4	9.7	10.9	4.9	1.1	0.3	0.3	32.4	(1977)	(1978)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	4	801 – 900	2
401 – 500	4	901 – 1000	2
501 – 600	12	1001 – 1100	2
601 – 700	5	1101 – 1200	2
701 – 800	11		

(Data available for 44 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(DHOLPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.3	6.3	32.6	1990 Jan 29 1991 Jan 29	-4.3	1990 Jan 03	64	45
February	26.7	9.4	36.8	1966 Feb 27	0.2	1974 Feb 08	56	38
March	32.9	14.2	42.8	1994 Mar 31	4.0	1990 Mar 02	45	27
April	39.5	21.2	47.3	1999 Apr 30	11.0	1989 Apr 04	33	22
May	42.4	26.1	49.8	1998 May 28	16.7	1969 May 02	33	23
June	41.7	28.6	50.0	1995 Jun 03	18.4	1999 Jun 25	47	35
July	35.5	26.5	46.0	1995 Jul 08	16.4	1996 Jul 10	74	65
August	33.5	25.2	43.5	1993 Aug 02	17.4	1989 Aug 14	79	72
September	34.4	23.7	41.7	1979 Sep 01	14.9	1989 Sep 28	72	62
October	34.9	18.3	41.8	1980 Oct 07	8.9	1989 Oct 22	54	44
November	30.3	12.0	37.7	1987 Nov 01	3.1	1989 Nov 30	52	43
December	24.7	7.0	32.7	1994 Dec 07	-3.3	1989 Dec 28	60	47
Annual	33.3	18.2					56	44

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.4	4.3	5.2	5.9	7.3	8.6	7.0	5.4	4.6	3.0	2.5	2.7	5.0

TABLE - 5
Special Weather Phenomena
(DHOLPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.5	0.8	0.8	1.0	2.4	2.8	4.3	3.8	1.9	0.6	0.1	0.3	19.3
Hail	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.1	0.4	0.4	1.6	1.4	0.4	0.0	0.1	0.3	0.0	0.0	4.7
Fog	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	1.4

DUNGARPUR DISTRICT

The district has on the whole a dry climate with the hot season milder than in the desert regions of Rajasthan. The cold season is from December to February followed by the hot season which lasts till about the middle of June. Thereafter, the southwest monsoon commences and continues till about the middle of September. The post monsoon season is from mid-September to November.

RAINFALL

Records of rainfall in the district are available for fourteen raingauge stations, for period ranging from 19 to 44 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall in the district is 699.6 mm. The southwest monsoon period is the main rainy season, July and August being the rainiest months. The rainfall during this period constitutes about 94% of the annual rainfall. The annual rainfall varies from 537.6 mm at Dewal to 851.5 mm at Dungarpur observatory. The variation in the rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 186% of the normal, occurred in 1977, while 1966 was the year with the lowest annual rainfall which was only 45% of the normal. In the same fifty years period the annual rainfall was less than 80% of the normal in 14 years. Three consecutive years of rainfall less than 80% of the normal occurred once during 1964 to 1966 and two consecutive years of such a low rainfall occurred thrice during the same fifty year period in the district. It will be seen from Table 2 that the annual rainfall in the district was between 501mm and 900 mm in 32 years out of 48.

On an average there are 29 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 25 at Dewal, Ganeshpur, Nithawa and Sahla to 37 at Dungarpur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 512.0 mm at Poeroi (Hydro) on 26 August 1987.

TEMPERATURE

There is a meteorological observatory in the district at Dungarpur. The description that follows is mainly based on the records of this observatory. The hot season commences by March and the temperatures rise rapidly with the advance of the season. May is generally the hottest month. The mean daily maximum temperature in May is about 40°C and the mean daily minimum temperature is about 25°C.On some days in May and the early part of June the day temperatures may reach upto 45°C. With the onset of the monsoon by about the middle of June the day temperatures drop appreciably. After the withdrawal of the monsoon by about the middle of September the day temperatures increase slightly and a secondary maximum in day temperatures is reached in October. Thereafter, the day temperatures steadily decrease. But the night temperatures decrease progressively after the withdrawal of the southwest monsoon. From November onwards the day temperatures also decrease. The decrease in night temperatures from November is more rapid. January is the coldest month with the mean daily maximum temperature at 26.2°C and the mean daily minimum at about 8.7°C. During the cold season, in association with passing western disturbances spells of cold weather affect the district. The minimum temperature on such occasions may sometimes go down to about the freezing point of water and frost may occur.

The highest maximum temperature ever recorded at Dungarpur was 45.4°C on 12 May 1970 and the lowest minimum temperature ever recorded was 0.0°C on 15 January 1967 and 06 February 1984.

HUMIDITY

Except during the brief southwest monsoon season when the values of relative humidity are generally high, the air is generally dry. The summer season is the driest part of the year when the afternoon relative humidity may be as low as 25% to 30%.

CLOUDINESS

Except during the southwest monsoon season when the skies are heavily clouded or overcast the skies are generally clear or lightly clouded during the year. But in the cold season which is generally marked by clear bright weather, brief spells of cloudy weather may occur for a day or two in association with passing western disturbances.

WINDS

Winds are generally light to moderate with slight strengthening in force during May to July. Winds blow mainly from directions west and southwest during the period from May to September. During the post monsoon and winter months winds blow from direction between southwest to northeast. By the beginning of summer, southwesterly wind appears and become predominant as the season advances.

SPECIAL WEATHER PHENOMENA

Depressions and cyclonic storms originating in the Bay of Bengal in July and August affect the district or its neighbourhood towards the later stages of their movement causing widespread heavy rain and gusty winds. Thunderstorms occur during the period May to October. Dust storms occur occasionally during the hot season. Fog generally occurs during winter.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
DUNGARPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Aspur	38	a	2.9	0.9	2.8	0.8	6.6	74.5	195.6	240.8	125.2	15.4	14.7	3.3	683.5	202	41	303.0	26 Aug 1987
		b	0.3	0.1	0.1	0.1	0.3	3.6	9.2	10.2	5.1	0.6	0.5	0.1	30.2	(1994)	(1966)		
Badgama	23	a	0.0	0.0	0.0	0.0	2.1	75.8	209.7	230.4	144.9	4.0	13.2	0.7	680.8	223	46	179.2	11 Jul 1968
		b	0.0	0.0	0.0	0.0	0.1	2.8	9.0	8.8	4.3	0.4	0.5	0.0	25.9	(1973)	(1966)		
Dewal	38	a	1.0	0.6	1.7	0.3	4.1	65.0	184.9	174.4	81.2	11.1	11.2	2.1	537.6	161	38	165.1	01 Aug 1968
		b	0.1	0.1	0.0	0.0	0.1	3.1	8.6	7.5	4.0	0.6	0.4	0.1	24.6	(1976)	(1987)		
Dhambola	44	a	2.8	0.8	1.5	0.8	2.1	75.3	271.3	244.8	99.0	13.9	10.2	3.5	726.0	174	44	234.3	05 Aug 1988
		b	0.3	0.1	0.1	0.1	0.1	3.1	10.6	10.4	3.9	0.6	0.4	0.1	29.8	(1976)	(1974)		
Dungarpur	44	a	3.3	0.7	2.1	1.5	6.7	94.2	258.1	231.9	126.1	19.5	13.9	2.3	760.3	170	50	486.4	30 Jun 1937
		b	0.3	0.1	0.0	0.1	0.3	4.3	11.0	11.0	5.4	0.9	0.5	0.1	34.0	(1978)	(1965)		
Dungapur (Obsy)	21	a	2.0	2.1	0.1	3.5	14.9	130.3	246.0	300.3	99.0	17.9	33.3	2.1	851.5	153	48	172.5	18 Aug 1972
		b	0.2	0.2	0.0	0.1	0.5	5.3	11.2	12.4	5.1	1.1	1.1	0.1	37.3	(1977)	(1985)		
Galiakot	38	a	0.6	0.3	2.0	1.7	3.4	91.2	241.7	278.7	126.7	15.9	14.3	2.6	779.1	227	43	302.0	26 Aug 1987
		b	0.1	0.0	0.2	0.1	0.1	3.7	10.2	10.7	4.9	0.7	0.5	0.1	31.3	(1973)	(1964)		
Ganeshpur	37	a	1.6	0.6	1.3	0.7	8.6	69.2	187.9	184.6	108.3	14.6	14.6	0.9	592.9	184	20	235.0	02 Aug 1994
		b	0.2	0.1	0.1	0.0	0.3	2.9	8.4	7.3	4.2	0.5	0.5	0.1	24.6	(1994)	(1971)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
DUNGARPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Kanba	38	a	0.9	1.3	2.7	1.1	2.1	72.2	250.6	199.0	103.3	11.6	10.6	3.7	659.1	232	04	167.0	11 Jul 1968
		b	0.1	0.1	0.1	0.1	0.1	3.0	10.5	8.6	3.9	0.4	0.3	0.2	27.4	(1994)	(1974)		
Nithawa/Natau	44	a	2.5	0.4	2.3	0.6	2.9	72.3	219.7	220.0	109.7	15.9	14.1	2.3	662.7	198	38	262.6	01 Sep 1958
		b	0.2	0.0	0.1	0.0	0.1	3.1	8.1	8.5	3.8	0.6	0.4	0.1	25.0	(1994)	(1966)		
Poeroi (Hydro)	19	a	2.4	0.6	1.0	2.5	9.5	91.4	268.0	328.7	88.9	38.9	15.8	2.0	849.7	185	46	512.0	26 Aug 1987
		b	0.2	0.1	0.1	0.2	0.4	3.2	11.3	11.6	5.5	1.4	0.5	0.2	34.7	(1994)	(1985)		
Sagwara	44	a	3.2	0.8	1.8	0.9	4.8	96.1	234.6	257.6	124.3	16.8	13.6	4.9	759.4	166	41	384.0	26 Aug 1987
		b	0.3	0.0	0.1	0.1	0.3	4.3	10.7	11.3	5.3	0.8	0.5	0.2	33.9	(1979)	(1985)		
Sahla/Saela	38	a	1.1	0.2	2.2	1.1	2.8	70.2	191.8	221.2	100.6	9.9	17.0	1.1	619.2	187	37	250.0	26 Aug 1987
		b	0.1	0.0	0.1	0.1	0.1	3.1	8.7	8.3	3.9	0.5	0.5	0.1	25.5	(1994)	(1966)		
Veejan	38	a	0.3	0.1	1.2	0.9	3.5	63.8	235.0	210.4	95.1	5.3	13.9	2.4	631.9	182	44	175.0	25 Jul 1986
		b	0.0	0.0	0.0	0.1	0.1	3.0	9.6	9.3	3.5	0.2	0.4	0.2	26.4	(1973)	(1962)		
Dungarpur (District)		a	1.8	0.7	1.6	1.2	5.3	81.5	228.2	237.3	109.5	15.1	15.0	2.4	699.6	186	45		
		b	0.2	0.1	0.1	0.1	0.2	3.5	9.8	9.7	4.5	0.7	0.5	0.1	29.5	(1977)	(1966)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	4	901 – 1000	1
401 – 500	5	1001 – 1100	3
501 – 600	8	1101 – 1200	1
601 – 700	9	1201 – 1300	1
701 – 800	6	1301 – 1400	1
801 – 900	9		

(Data available for 48 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(DUNGARPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	26.2	8.7	35.0	1967 Jan 12	0.0	1967 Jan 15	67	37
February	28.9	11.1	36.0	1981 Feb 24	0.0	1984 Feb 06	57	31
March	34.4	15.8	42.1	1984 Mar 31	7.5	1971 Mar 01	43	25
April	38.6	21.5	44.6	1970 Apr 26	12.0	1967 Apr 07	46	26
May	40.0	25.3	45.4	1980 May 03	17.4	1967 May 05	62	30
June	37.6	25.7	44.2	1979 Jun 18 1973 Jun 04 1983 Jun 16	19.2	1972 Jun 09	75	46
July	32.0	24.1	41.0	1969 Jul 07	20.0	1972 Jul 09	88	70
August	30.1	23.4	38.2	1974 Aug 18	20.5	1970 Aug 31	90	78
September	32.5	22.5	38.6	1974 Sep 18	14.8	1972 Sep 26	82	65
October	34.4	18.9	38.6	1935 Oct 01	12.4	1975 Oct 28	68	45
November	31.1	14.8	35.6	1976 Nov 13	5.8	1975 Nov 28	65	41
December	27.6	10.3	32.8	1984 Dec 11	4.0	1971 Dec 19	69	41
Annual	32.8	18.5					68	45

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.7	2.5	3.3	4.2	7.3	9.4	7.6	5.4	3.6	1.7	1.5	1.5	4.1

TABLE - 5
Special Weather Phenomena
(DUNGARPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.1	0.1	0.0	0.1	0.3	0.1	0.2	0.1	0.1	0.0	0.0	1.1
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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Fog	2.6	1.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.6	5.9

HANUMANGARH DISTRICT

The district has a desert kind of climate with large variations of temperature, extreme dryness and scanty rainfall which are characteristic of a desert climate. The cold season from November to March is followed by the summer from April to June. July to mid September constitutes the southwest monsoon season. Mid September to October is the transitional post monsoon season.

RAINFALL

Records of rainfall in the district are available for two raingauge stations, for 45 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the plains of the district is 292.6 mm. About 83% of the annual rainfall in the district is received during the period June to September. July is the rainiest month. The variation in the annual rainfall from year to year is not very large. In the fifty year period from 1951 to 2000, the highest annual rainfall in the district amounting to 205% of the normal occurred in 1978 while 1969 was the year with the lowest annual rainfall amounting to only 34% of the normal. During the same fifty year period rainfall less than 80% of the normal occurred in 11 years. In the district as a whole there is one occasion of two consecutive years and one occasion of four consecutive years when the rainfall was less than 80% of the normal. It will be seen from Table 2 that the annual rainfall was between 101 mm to 500 mm in 36 years out of 39.

On an average there are 16 rainy days (with rain of 2.5 mm or more) in a year in the district. This number varies from 13 at Hanumangarh to 17 at Bhadra.

The heaviest rainfall in 24 hours recorded at any station in the district was 160.0 mm at Hanumangarah on 10 July 1968.

TEMPERATURE

There is no meterological observatory in the district. So description which follows is based on data of observatories in the neighbouring district Ganganagar. Temperatures rise rapidly after March. May and June are the hottest months with the mean daily maximum temperature at about 40.6°C and 41.7°C. The heat in the summer season with the frequent, scorching dust laden winds is intense and the day temperatures sometimes may go upto about 49°C - 50°C. Neighbouring district of Hanumangarh is Sri Ganganagar which is one of the hottest parts in India in summer. With the advance of the southwest monsoon by about the middle of July temperatures decrease a little. The weather continues to be oppressive due to the increased moisture in the air. With the withdrawal of the monsoon by about the latter half of September both day and night temperatures begin to decrease, the drop in night temperatures being more rapid. The diurnal range of temperature is very large, particularly in the winter months and drop in temperature after nightfall is rather sudden and trying. January is the coldest month with the mean daily minimum temperature at about 5.4°C and the mean daily maximum temperature is at about 21.4°C. In the wake of western disturbances moving across north India during the winter season, cold waves affect the district and minimum temperature sometimes drops to two or three degrees below the freezing point of water and frost occurs.

HUMIDITY

Except during the short rainy season humidity is low and even during the rainy period the air is drier in between the rains. The summer months are the driest, especially in the afternoons during April and May when the relative humidity is of the order or 20% to 25%,

CLOUDINESS

Even during the southwest monsoon season, the skies are only moderately clouded on many days, overcast or heavily clouded skies prevailing only on a few days. In the rest of the year skies are lightly clouded or clear except during the winter months when, in association with passing western disturbances, cloudy skies prevail for short spells of a day or two.

WINDS

Winds are generally light except in the early part of southwest monsoon months. During southwest monsoon season, winds blow from southwest direction. During post monsoon, winter and summer season, winds blow mostly from northwest direction in the afternoon. During March to May, northwesterly winds prevail in the morning also, whereas in the post monsoon and winter season, winds are light and variable in direction in the morning.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal in the southwest monsoon season and move in a westerly direction reach the district or its neighbourhood during the last stages of activity and cause widespread rain. An occasional post monsoon storm and depression may also affect the district. Frequent sand and dust storms occur in the hot season. Thunderstorms occur throughout the year with more frequency during the hot season and southwest monsoon season. During the cold season, occasional fog occurs in the wake of western disturbances.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
HANUMANGARH

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bhadra	45	a	10.0	9.2	6.7	4.4	11.3	33.5	127.9	91.6	38.2	7.0	4.2	4.1	348.1	255	32	122.0	07 Jul 1990
		b	0.7	0.6	0.7	0.4	0.9	2.0	4.8	4.3	2.0	0.4	0.2	0.4	17.4	(1978)	(1961)		
Hanumangarh	45	a	4.8	7.9	5.9	4.1	9.6	20.2	78.0	74.8	23.5	3.0	2.0	2.6	236.4	210	32	160.0	10 Jul 1968
		b	0.5	0.8	0.5	0.4	0.7	1.3	3.9	3.5	1.4	0.1	0.1	0.2	13.4	(1976)	(1974)		
Hanumangarh (District)		a	7.4	8.6	6.3	4.3	10.5	26.9	103.0	83.2	30.9	5.0	3.1	3.4	292.6	205	34		
		b	0.6	0.7	0.6	0.4	0.8	1.7	4.4	3.9	1.7	0.3	0.2	0.3	15.6	(1976)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
001 – 100	1	401 – 500	5
101 – 200	6	501 – 600	1
201 – 300	16	601 – 700	1
301 – 400	9		

(Data available for 39 years only)

JAIPUR DISTRICT

The district has a dry climate except during the southwest monsoon season. December to February is the cold season after which the hot season commences and continues till about the third week of June when the southwest monsoon sets in. The southwest monsoon season is comparatively short in this region and lasts only till mid September. The period from the second half of September to the end of November is the post monsoon season or retreating monsoon season.

RAINFALL

Records of rainfall in the district are available for twentyone raingauge stations, for period ranging from 11 to 50 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 596.8 mm. The rainfall generally increases from northwest to southeast. The rainfall during the period June to September constitutes nearly 90% of the annual rainfall. The variation in the rainfall from year to year is not very large. In the fifty year period 1951 to 2000, the highest annual rainfall in the district which amounted to 211% of the normal occurred in 1977 while the lowest annual rainfall in the same period which was only 52% of the normal occurred in 1987. The rainfall was less than 80% of the normal in 16 years out of which three years 1951-1953 were consecutive and there were four occasions of two consecutive years having such a low rainfall. It will be seen from Table 2 that the annual rainfall in the district was between 301 mm and 800 mm in 41 years out of 48.

On an average there are 31 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 23 at Phulera to 36 at Vairath/Bairath Hydro.

The heaviest rainfall in 24 hours recorded at any station in the district was 589.2 mm at Kanota on 19 July 1981.

TEMPERATURE

The only meteorological observatory in the district is located at Jaipur city. The data of this station may be taken as representative of the weather conditions in the district as a whole. The period from March to June is one of continuous increase in temperatures, May and the first half of June being the hottest part of the year. The mean daily maximum temperature in May is 40.1°C and the mean daily minimum temperature is 25.3°C. The night temperatures in June are a little higher than in May. In May, the maximum temperature sometimes goes upto 49°C. The setting in of the southwest monsoon after the middle of June, lowers the temperature somewhat, but the relief from the heat is not marked because of the added discomfort from the increase in humidity, brought in by the southwest monsoon air. After the withdrawal of the monsoon by mid September, days become hotter and in October a secondary maximum in day temperature is reached. The nights become progressively cooler. After mid November both day and night temperatures drop rapidly till January, which is the coldest month with the mean daily maximum temperature at 22.6°C and the mean daily minimum temperature at 7.9°C. In association with cold waves which sometimes affect the district in the wake of passing western disturbances across north India during the cold season, minimum temperatures particularly in January and February may go down to a degree or two below the freezing point of water.

The highest maximum temperature recorded at Jaipur was 49.0°C on 23 May 1994 and the lowest minimum temperature was –2.2°C on two consecutive days on 31 January and 01 February 1905.

HUMIDITY

During the brief southwest monsoon season the relative humidity is generally over 60%. In the rest of the year, the air is dry. In the summer season which is also the driest part of the year, afternoon relative humidity may be as low as 15% to 20%.

CLOUDINESS

During the southwest monsoon season skies are moderately to heavily clouded generally and overcast on some days. In the rest of the year clear or lightly clouded skies prevail. But on a few days in the winter season, the skies become cloudy, when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate, but in summer and early southwest monsoon season, winds may strengthen slightly on some days. Westerly to northwesterly winds prevail in the southwest monsoon season. In the period from October to March winds are mostly from direction east in the morning, while in the afternoon, they are mainly from northwest. Northwesterly winds prevail during summer season.

SPECIAL WEATHER PHENOMENA

During the southwest monsoon season the district is sometimes affected by depressions which originate in the Bay of Bengal and move across the central parts of the country and during their last stages, sometimes affect the district causing heavy rainfall. Thunderstorms occur practically in all the months of the year, but they are more frequent during the period May to September and are sometimes associated with squall. Along with thunderstorms, hail may also occur occasionally. In the hot season dust storms also occur. Occasional fog occurs during winter season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JAIPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Amber	43	a	7.1	10.4	5.1	5.3	14.3	54.9	241.8	236.7	65.0	16.8	3.8	3.1	664.3	152	46	250.0	19 Jul 1981
		b	0.6	0.6	0.4	0.3	0.9	2.7	9.8	10.5	3.9	0.7	0.3	0.3	31.0	(1995)	(1953)		
Bairath	38	a	9.7	7.9	3.6	5.9	18.1	56.5	203.7	201.0	77.5	15.6	3.3	2.5	605.3	158	48	200.0	23 Jul 1992
		b	0.7	0.7	0.4	0.6	1.4	3.2	10.3	9.8	4.5	1.0	0.2	0.2	33.0	(1995)	(1951)		
Bassi	35	a	6.1	7.8	2.3	3.3	13.8	65.2	239.9	186.8	76.3	7.0	2.4	2.6	613.5	209	19	556.0	19 Jul 1981
		b	0.5	0.6	0.3	0.3	1.2	2.8	9.7	9.5	4.2	0.6	0.2	0.2	30.1	(1992)	(1987)		
Chatsu	43	a	8.0	7.9	3.4	4.7	15.0	45.6	227.7	207.5	82.7	12.2	4.0	3.0	621.7	203	22	290.0	19 Jul 1981
		b	0.7	0.7	0.5	0.3	0.9	2.5	9.3	9.5	4.2	0.6	0.3	0.2	29.7	(1961)	(1984)		
Chomu	37	a	5.9	5.6	3.0	2.4	17.5	35.5	217.3	198.7	72.3	7.6	1.2	2.2	569.2	173	52	203.2	27 Jul 1920
		b	0.5	0.5	0.3	0.2	1.3	2.3	9.6	9.5	3.9	0.4	0.1	0.2	28.8	(1985)	(1988)		
Dudu/ Mozamabad	37	a	5.7	7.4	1.3	5.5	14.9	57.6	187.5	176.0	64.8	5.8	2.4	1.8	530.7	204	34	352.0	29 Jun 1971
		b	0.5	0.5	0.2	0.5	1.1	2.8	8.2	8.4	3.7	0.4	0.3	0.1	26.7	(1971)	(1972)		
Jaipur	36	a	7.1	9.7	2.2	4.2	19.6	51.9	225.1	220.5	68.9	11.0	3.5	3.1	626.8	172	47	200.7	16 Aug 1959
		b	0.7	0.8	0.3	0.4	1.3	3.0	10.0	10.6	4.7	0.7	0.4	0.2	33.1	(1975)	(1972)		
Jaipur (Obsy)	26	a	5.8	14.5	4.5	9.8	23.5	60.7	259.6	205.9	62.1	16.9	3.4	5.0	671.7	204	45	287.0	19 Jul 1981
		b	0.7	1.2	0.6	0.7	1.6	3.2	10.1	10.2	4.1	1.1	0.3	0.6	34.4	(1977)	(1965)		
Jaipur (A) (Obsy)	50	a	7.8	10.8	5.0	6.7	16.7	53.8	226.3	219.8	74.8	25.2	3.7	3.6	654.2	180	48	326.0	19 Jul 1981
		b	0.7	0.9	0.6	0.6	1.2	3.4	10.7	10.7	4.6	1.3	0.4	0.4	35.5	(1981)	(1999)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
JAIPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST / LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **		HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Jamwa Ramgarh	42	a	5.7	7.2	2.9	3.1	14.3	53.3	216.3	191.6	66.5	15.1	3.4	2.2	581.6	202 (1975)	49 (1987)	408.0	19 Jul 1981
		b	0.6	0.7	0.3	0.3	1.0	3.2	9.9	10.6	4.2	0.7	0.3	0.2	32.0				
Kanota	11	a	5.2	4.3	5.1	3.1	12.8	88.5	339.3	198.4	76.3	12.3	3.7	3.7	752.7	166 (1981)	68 (1984)	589.2	19 Jul 1981
		b	0.5	0.5	0.7	0.3	0.8	4.5	12.2	10.4	4.3	0.6	0.3	0.3	35.4				
Kotputli	43	a	10.1	7.4	2.7	3.2	17.1	45.5	181.5	186.9	73.3	14.6	2.2	2.3	546.8	216 (1988)	32 (1951)	167.6	29 Aug 1960
		b	0.7	0.8	0.4	0.4	1.2	2.7	8.5	8.6	4.0	0.9	0.2	0.2	28.6				
Kotputli (Hydro)	19	a	14.4	8.9	5.5	11.2	35.1	70.6	242.3	219.1	80.2	29.3	5.4	3.1	725.1	139 (1996)	55 (1982)	140.0	24 Jun 1996
		b	0.9	0.9	0.8	1.1	2.1	3.0	10.2	9.6	4.1	1.8	0.5	0.3	35.3				
Naraina	34	a	5.0	5.3	1.1	6.3	11.3	54.7	170.5	144.2	71.2	4.7	1.7	2.3	478.3	200 (1975)	20 (1960)	244.0	19 Jul 1974
		b	0.4	0.4	0.2	0.3	0.9	2.5	8.1	7.1	3.8	0.2	0.1	0.2	24.2				
Pawata Paota	36	a	7.1	7.3	2.5	5.6	16.3	55.5	208.3	229.8	79.0	10.6	2.3	4.5	628.8	172 (1983)	23 (1974)	226.0	12 Aug 1972
		b	0.7	0.6	0.3	0.4	1.1	2.6	8.3	9.3	4.0	0.6	0.2	0.4	28.5				
Phagi	37	a	6.6	8.6	1.3	3.9	11.7	52.2	203.4	177.5	68.0	9.2	1.9	2.7	547.0	194 (1971)	49 (1984)	354.0	19 Jul 1981
		b	0.6	0.6	0.2	0.4	1.0	2.9	9.3	8.9	4.4	0.6	0.3	0.3	29.5				
Phulera	37	a	4.5	6.5	0.7	4.4	12.3	46.1	158.2	153.2	56.5	5.6	1.7	1.8	451.5	168 (1995)	43 (1966)	177.0	30 Jun 1971
		b	0.4	0.4	0.1	0.4	1.0	2.1	7.7	7.2	3.3	0.3	0.2	0.2	23.3				
Sambhar	34	a	4.4	5.7	2.4	7.9	14.7	66.7	182.3	159.5	60.9	10.4	0.9	2.3	518.1	221 (1975)	39 (1972)	237.5	27 Jul 1983
		b	0.5	0.6	0.3	0.5	1.1	2.8	8.4	8.3	3.6	0.5	0.1	0.2	26.9				
Samod	34	a	6.3	10.3	2.7	3.5	12.9	50.4	212.1	164.7	62.4	4.2	0.6	3.1	533.2	211 (1995)	29 (1974)	325.1	10 Sep 1924
		b	0.6	0.6	0.3	0.4	0.9	2.9	8.8	8.6	4.0	0.4	0.1	0.3	27.9				

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
JAIPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Sanganer	43	a	5.4	6.7	1.5	1.7	10.6	46.2	202.5	218.9	70.4	11.5	2.7	0.9	579.0	195 (1959)	35 (1954)	388.0	19 Jul 1981
		b	0.6	0.5	0.3	0.2	0.8	2.9	9.8	10.3	4.2	0.7	0.3	0.1	30.7				
Vairath/Bairath (Hydro)	19	a	11.4	6.6	5.6	8.2	21.7	76.4	217.1	169.7	83.2	18.8	6.2	7.4	632.3	136 (1995)	56 (1986)	200.0	23 Jul 1992
		b	0.9	0.8	0.7	0.8	1.5	4.4	10.9	9.4	4.2	1.6	0.3	0.6	36.1				
Jaipur (District)		a	7.1	7.9	3.1	5.2	16.4	56.6	217.3	193.6	71.1	12.6	2.9	3.0	596.8	211 (1977)	52 (1987)		
		b	0.6	0.7	0.4	0.4	1.2	3.0	9.5	9.4	4.1	0.7	0.3	0.3	30.6				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	7	801 – 900	4
401 – 500	12	901 – 1000	2
501 – 600	8	1001 – 1100	0
601 – 700	7	1101 – 1200	0
701 – 800	7	1201 – 1300	1

(Data available for 48 years only)

TABLE – 3
Normals of Temperature and Relative Humidity
(JAIPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.6	7.9	31.7	1932 Jan 31	-2.2	1905 Jan 31	63	33
February	25.2	10.6	36.7	1953 Feb 28	-2.2	1905 Feb 01	56	27
March	31.2	15.7	42.8	1892 Mar 27	3.3	1898 Mar 04	43	18
April	37.0	21.4	44.9	1958 Apr 27	9.4	1905 Apr 01	30	14
May	40.1	25.3	49.0	1994 May 23	15.6	1920 May 17	33	17
June	39.3	27.2	47.2	1897 Jun 10	19.7	1976 Jun 18	51	31
July	34.2	25.7	46.7	1901 Jul 05	20.6	1931 Jul 05 2005 Jul 06	74	60
August	32.3	24.5	41.7	1911 Aug 01	18.9	1953 Aug 23	81	68
September	33.7	23.0	41.7	1899 Sep 11	15.0	1972 Sep 23	69	50
October	33.9	18.9	40.0	1899 Oct 04	11.1	1934 Oct 30	48	28
November	29.1	13.5	36.4	2001 Nov 03 1999 Nov 01	3.3	1938 Nov 30	50	31
December	24.2	8.9	34.6	2007 Dec 03	0.0	1964 Dec 13	60	37
Annual	31.9	18.5					55	35

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.0	4.6	6.0	7.3	9.8	9.4	8.1	7.7	6.7	5.1	3.6	3.5	6.3

TABLE - 5
Special Weather Phenomena
(JAIPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.5	1.6	1.7	2.2	4.5	6.1	9.2	8.0	4.0	1.3	0.5	0.6	40.2
Hail	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Dust storm	0.0	0.2	0.6	1.2	3.5	2.6	0.8	0.0	0.1	0.0	0.1	0.0	9.1
Squall	0.0	0.0	0.2	0.2	0.6	0.4	0.4	0.2	0.1	0.0	0.0	0.0	2.1
Fog	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.8	2.2

JHALAWAR DISTRICT

The climate is on the whole fairly dry (though not by Rajasthan's standards) and healthy. The year may be divided into four seasons, the cold season from December to February, the hot season from March to the middle of June, the monsoon from mid-June to September and the post monsoon from October and November.

RAINFALL

Records of rainfall in the district are available for twelve raingauge stations, for period ranging from 32 to 45 years. Statements relating to rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall for the district is 921.2 mm. The southwest monsoon advances into the district in the latter half of June and as much as 93% of the annual rainfall is received during this season. The variation in the rainfall from year to year is appreciable which is evident from Table 2. During the fifty year period 1951 to 2000, 1951 was the year with the lowest rainfall, amounting to 51% of the normal, while 1961 was the year with the maximum rain, amounting to 157% of the normal. During the same period there were 13 years when the rainfall was less than 80% of the normal. Three consecutive years of such a low rainfall occurred twice during this period. The three consecutive years of low rainfall are 1964-66 and 1979-81. The annual rainfall in the district ranges between 501 mm and 1100 mm in 37 years out of 46.

On an average on 39 days in a year the district gets rain of 2.5 mm or more. This number varies from 36 days at Pachaahar to 42 days at Iklera/Aklera.

The heaviest rainfall in 24 hours recorded at any station in the district was 410.7 mm at Jhalara Patan on 17 August 1969.

TEMPERATURE

Meteorological data are available for the observatory at Jhalawar and may be taken as representative of the conditions in the district. The cold season starts by middle of November and lasts upto February, January being the coldest month with the mean daily minimum temperature at 8.7°C. In association with cold waves in the wake of passing western disturbances, the minimum temperature sometimes drops down considerably. On rare occasions, the minimum temperature can drop to about a degree below the freezing point of water. Both the day and night temperatures begin to rise rapidly from February onwards, reaching their highest values in late May or early June. The mean daily maximum temperature in May is 42.0°C and the mean daily minimum temperature is 26.4°C. During the summer months the maximum temperature sometimes goes above 48°C. With the onset of the monsoon there is an appreciable drop in temperature. After the withdrawal of the monsoon day temperatures register slight increase with a secondary maximum in October. The highest maximum temperature recorded at Jhalawar was 49.3°C on 29 May 1994 and the lowest minimum was –0.6°C on 16 January 1935.

HUMIDITY

The atmosphere is generally dry except in the monsoon period when the relative humidity is of the order of 70%-80%. In the summer months, the relative humidity is low, often going down to 15% to 20% percent in the afternoons.

CLOUDINESS

The winter season is one of clear bright weather interspersed with brief spells of cloudy weather caused by the occasional western disturbances which traverse north India. In the summer and post monsoon months the skies are generally clear or lightly clouded. During the monsoon months, the skies are moderately to heavily clouded.

WINDS

Winds are generally light to moderate with some strengthening in force during the summer season and southwest monsoon season. In the period from May to September, winds blow from directions between west and southwest in the morning, while in the afternoons they are predominantly from northwest. During the post monsoon, winter and early summer months, winds are mainly from north or northeast.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions which originate in the Bay of Bengal and move in west-northwesterly direction, pass through the district or its neighbourhood, causing widespread heavy rain and strong winds. Dust storms and thunderstorms occur in the summer months. Even during the monsoon season rainfall is often associated with thunder. Occasional fog occurs during winter.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JHALAWAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **	HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Asnawar	32	a	3.7	1.7	5.3	1.2	8.1	81.6	262.9	367.1	153.0	15.2	3.7	5.6	909.1	195	38	301.0	23 Aug 1987
		b	0.4	0.1	0.5	0.1	0.5	3.6	10.9	13.5	6.0	0.8	0.4	0.3	37.1	(1961)	(1972)		
Bakani/ Ballai	45	a	7.1	2.4	3.1	2.0	6.0	86.9	301.3	356.5	149.9	22.8	9.5	4.5	952.0	163	51	292.1	21 Jul 1943
		b	0.8	0.2	0.4	0.2	0.5	4.7	11.7	13.2	6.2	1.0	0.6	0.4	39.9	(1969)	(1981)		
Dug/Dag	44	a	6.3	1.5	2.2	1.6	5.0	70.1	277.2	308.5	167.5	20.0	10.7	4.0	874.6	256	35	392.4	21 Aug 1916
		b	0.6	0.1	0.2	0.2	0.4	4.4	10.6	11.9	6.4	0.9	0.8	0.3	36.8	(1973)	(1988)		
Gangdhar	39	a	7.6	1.3	4.4	1.9	6.3	83.8	257.9	311.8	152.0	25.5	12.7	5.0	870.2	196	49	335.8	20 Aug 1983
		b	0.7	0.2	0.3	0.2	0.6	4.2	10.8	11.6	6.2	0.9	0.8	0.3	36.8	(1973)	(1965)		
Iklera/Aklera	45	a	10.1	3.6	3.3	1.5	7.1	81.7	268.2	351.0	143.0	24.0	9.6	5.4	908.5	170	40	281.2	08 Sep 1910
		b	0.8	0.4	0.3	0.1	0.7	4.7	11.6	13.8	6.9	1.2	0.8	0.4	41.7	(1961)	(1951)		
Jhalara Patan	39	a	7.0	2.8	4.3	1.7	8.2	83.3	273.9	377.4	151.6	26.0	13.5	5.2	954.9	193	48	410.7	17 Aug 1969
		b	0.6	0.2	0.5	0.3	1.0	4.3	11.1	13.3	6.4	1.0	0.7	0.4	39.8	(1986)	(1980)		
Jhalawar	38	a	8.8	2.0	3.6	1.9	5.3	85.6	264.7	358.8	145.7	20.4	13.6	4.0	914.4	166	40	350.2	17 Aug 1969
		b	0.7	0.3	0.4	0.2	0.5	4.2	10.9	13.1	5.9	0.8	0.6	0.4	38.0	(1971)	(1968)		
Jhalawar (Obsy)	45	a	8.0	1.4	3.6	0.8	5.1	80.3	290.0	328.8	138.0	39.9	13.6	5.1	914,6	168	41	350.2	17 Aug 1969
		b	0.6	0.2	0.4	0.1	0.5	4.6	11.4	12.4	6.2	1.2	0.5	0.3	38.4	(1997)	(1968)		
Khanpur	45	a	6.8	1.4	2.1	1.2	5.3	76.9	273.6	300.2	133.6	26.1	11.6	3.7	842.5	174	44	396.2	13 Jul 1914
		b	0.6	0.2	0.3	0.1	0.6	4.3	10.9	12.8	6.4	1.3	0.6	0.3	38.4	(1952)	(1965)		
Manohar Thana	45	a	8.9	5.5	4.3	1.4	8.3	104.6	340.1	357.5	157.0	33.5	10.2	5.4	1036.9	165	40	361.6	09 Oct 1985
		b	0.8	0.3	0.4	0.1	0.7	4.6	12.4	13.2	6.7	1.3	0.6	0.4	41.5	(1985)	(1951)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
JHALAWAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Pachaahar	39	a	6.1	1.8	4.2	1.9	6.0	88.9	239.6	312.5	139.2	35.2	16.1	6.1	857.6	155 (1969)	57 (1968)	176.6	27 Jul 1992
		b	0.5	0.1	0.4	0.3	0.6	4.2	10.4	11.2	5.9	1.1	0.8	0.4	35.9				
Pirawa	45	a	7.3	2.4	4.4	1.9	8.9	95.5	300.7	370.6	168.0	32.6	21.0	4.6	1017.9	165 (1973)	49 (1965)	320.0	20 Aug 1974
		b	0.7	0.3	0.4	0.1	0.7	4.6	11.1	11.9	6.6	1.2	0.7	0.4	38.7				
Jhalawar (District)		a	7.3	2.3	3.8	1.6	6.6	84.9	279.2	341.7	149.9	26.8	12.2	4.9	921.2	157 (1961)	51 (1951)		
		b	0.7	0.2	0.4	0.2	0.6	4.4	11.2	12.7	6.3	1.1	0.7	0.4	38.9				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
401 – 500	1	1001 – 1100	9
501 – 600	5	1101 – 1200	2
601 – 700	5	1201 – 1300	1
701 – 800	4	1301 – 1400	4
801 – 900	8	1401 – 1500	1
901 – 1000	6		

(Data available for 46 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(JHALAWAR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	25.4	8.7	33.7	1991 Jan 26	-0.6	1935 Jan 16	63	33
February	28.1	11.4	38.6	1976 Feb 22 2006 Feb 21	1.7	1934 Feb 02	52	27
March	34.0	16.7	43.2	2004 Mar 23	5.0	1943 Mar 05	35	19
April	39.0	22.3	46.3	1958 Apr 27	12.6	1996 Apr 04	29	16
May	42.0	26.4	49.3	1994 May 29	18.4	1960 May 09	34	17
June	39.3	26.8	49.1	1995 Jun 05	17.5	1965 Jun 05	58	36
July	33.5	24.4	43.9	1966 Jul 12	18.6	1986 Jul 28	78	62
August	31.3	23.6	40.2	1972 Aug 03	17.0	1984 Aug 06	85	74
September	32.9	22.7	39.4	1974 Sep 18 1968 Sep 23	14.2	1968 Sep 18	78	59
October	34.3	18.7	40.0	1951 Oct 05	10.0	1984 Oct 28	59	34
November	30.7	13.9	38.0	1976 Nov 16	5.4	1995 Nov 27	58	32
December	26.5	9.6	33.6	2002 Dec 17	1.2	1994 Dec 12	65	35
Annual	33.1	18.8					58	37

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.6	4.4	5.3	6.4	9.8	13.0	10.5	7.5	5.4	3.2	2.5	3.0	6.2

TABLE - 5
Special Weather Phenomena
(JHALAWAR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.0	0.2	0.3	0.6	0.8	1.3	1.2	0.7	0.3	0.1	0.1	5.9
Hail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dust storm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3

JHUNJHUNU DISTRICT

The district has a dry climate with a hot summer, a cold winter and a short monsoon season. The cold season starts by about the middle of November and continues to about the beginning of March. The hot season follows thereafter and extends o about the end of June. The southwest monsoon season is from July to mid-September. The period from mid-September to mid-November constitutes the post monsoon season.

RAINFALL

Records of rainfall in the district are available for five raingauge stations, for sufficiently long periods. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 476.2 mm. The rainfall increases from the northwest towards the southeast. The rainfall varies from 427.0 mm at Jhunjhunu and Chirawa to 545.5 mm at Khetri. During the southwest monsoon season the total rainfall constitutes about 76% of the annual rainfall. July and August are the rainiest months. The variation in the annual rainfall from year to year is not large. In the fifty years period 1951-2000, the highest annual rainfall which amounted to 177% of the normal, occurred in 1978, while the lowest annual rainfall in the same period which was only 40% of the normal, occurred in 1951. In 15 years out the 50 years, the rainfall was less than 80% of the normal. Two and three consecutive years of such a low rainfall occurred once during the period in the district. It will be seen from Table 2, that in 37 years out of 48, the annual rainfall in the district was between 301 mm and 700 mm.

On an average there are 27 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 23 at Chirawa to 32 at Khetri.

The heaviest rainfall in 24 hours recorded at any station in the district was 281.4 mm at Khetri on 13 July 1908.

TEMPERATURE

The only meteorological observatory in the district is at Pilani. The account of the climate, which follows, is therefore based on the records of this observatory. The period from March to June is one of continuous increase in temperatures, June being the hottest month of the year. The mean daily maximum temperature in the month is 40.6°C and the mean daily minimum temperature is 27.3°C. In May and June, the heat is intense, and on some days the maximum temperatures may rise upto about 48°C. The arrival of the southwest monsoon in the district by about the beginning of July, lowers the temperature appreciably, but relief from the oppressive heat is not marked because of the added discomfort from the increase in humidity. After the withdrawal of the southwest monsoon by mid-September, the day temperatures increase slightly. Nights however become progressively cooler. After mid-November both day and night temperatures decrease rapidly till January, which is the coldest month with the mean daily maximum temperature at 22.4°C and the mean daily minimum temperature at 4.5°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which pass across north India during the cold season, the minimum temperatures sometimes drop to 3°C to 4°C below the freezing point of water.

The highest maximum temperature ever recorded at Pilani was 48.6°C on 02 May 1999 and the lowest minimum temperature ever recorded was –4.0°C on 09 February 1974.

HUMIDITY

Except during the brief southwest monsoon season when the values of relative humidity are generally high, the air is generally dry. In the summer season,

which is the driest part of the year, afternoon relative humidity may be as low as 20% to 25%.

CLOUDINESS

During the southwest monsoon season, skies are moderately to heavily clouded and overcast on few days. In the rest of the year, the skies are mainly clear or lightly clouded. In the winter season, the skies become cloudy when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate, but in summer and the early part of the southwest monsoon season, winds strengthen slightly on some days. During summer and southwest monsoon season, wind blows from west to southwest in the morning and northwest to west in the afternoon. In the post monsoon and winter season, southwesterly winds predominate in the morning and northwest-westerly winds prevail in the afternoon.

SPECIAL WEATHER PHENOMENA

Depressions originating in the Bay of Bengal in the southwest monsoon season move across the central parts of the country and some of them during their last stages affect the district causing heavy rain. In the hot season dust storms or thunderstorms occur frequently. They also occur in the monsoon season. Fog occurs in winter season.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
JHUNJHUNU

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Chirawa	45	a	8.5	9.3	4.7	5.3	15.2	42.2	137.0	129.7	58.6	7.7	3.2	5.6	427.0	203	41	203.2	14 Jul 1908
		b	0.8	0.8	0.5	0.5	1.0	2.5	6.4	6.1	2.8	0.6	0.3	0.4	22.7	(1971)	(1989)		
Jhunjhunu	45	a	7.3	10.1	4.9	3.9	16.9	38.3	137.3	130.0	58.8	11.8	3.2	4.5	427.0	182	42	182.0	23 Jun 1996
		b	0.7	0.8	0.5	0.4	1.3	3.0	7.1	6.8	3.1	0.8	0.3	0.4	25.2	(1956)	(1965)		
Khetri	45	a	10.8	9.4	6.6	5.6	23.7	54.6	175.6	167.5	64.3	17.7	2.9	6.8	545.5	156	36	281.4	13 Jul 1908
		b	1.0	0.9	0.9	0.8	2.0	3.2	8.2	8.8	3.9	1.1	0.4	0.5	31.7	(1964)	(1951)		
Pilani (Obsy)	42	a	7.8	11.2	9.4	6.2	23.0	43.9	140.0	128.5	56.1	10.2	4.0	4.5	444.8	215	44	223.2	21 Jul 1978
		b	0.9	1.1	0.9	0.8	1.9	2.9	7.6	7.1	3.6	0.8	0.4	0.4	28.4	(1978)	(1999)		
Udaipur/ Shekha	38	a	6.8	7.6	5.6	3.3	21.5	49.1	186.2	172.1	63.9	10.7	3.9	6.5	537.2	188	51	279.0	13 Jul 1968
		b	0.6	0.7	0.5	0.5	1.4	3.1	8.6	8.2	3.5	0.8	0.3	0.4	28.6	(1995)	(1972)		
Jhunjhunu (District)		a	8.2	9.5	6.2	4.9	20.1	45.6	155.2	145.6	60.3	11.6	3.4	5.6	476.2	177	40		
		b	0.8	0.9	0.7	0.6	1.5	2.9	7.6	7.4	3.4	0.8	0.3	0.4	27.3	(1978)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	2	501 – 600	9
201 – 300	6	601 – 700	8
301 – 400	11	701 – 800	2
401 – 500	9	801 – 900	1

(Data available for 48 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(PILANI)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.4	4.5	31.8	1991 Jan 29	-3.9	1964 Jan 25	69	35
February	25.2	7.7	35.1	2008 Feb 29	-4.0	1974 Feb 09	63	29
March	31.3	13.6	44.8	25 Mar 1985	3.8	1979 Mar 09	54	23
April	36.9	19.2	47.1	2009 Apr 30	8.5	1967 Apr 06	43	20
May	40.2	23.9	48.6	1999 May 02	13,5	1969 May 02	43	22
June	40.6	27.3	46.9	1963 Jun 20	17.4	1996 Jun 06	56	33
July	36.6	26.2	44.5	1968 Jul 03	18.3	1959 Jul 14	75	57
August	34.8	25.1	42.6	1991 Aug 08	19.0	1967 Aug 28	82	64
September	35.5	23.0	41.5	2005 Sep 06	13.7	1972 Sep 23	75	51
October	35.0	17.5	40.4	2005 Oct 27	9.0	1967 Oct 30	58	33
				2006 Oct 04				
November	29.9	11.1	37.8	1977 Nov 02	1.8	1996 Nov 29	58	31
December	24.2	5.4	31.9	2001 Dec 10	2.7	1973 Dec 30	66	34
Annual	32.7	17.0					62	36

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.4	6.3	7.0	7.6	9.6	12.0	9.4	7.8	7.1	5.3	4.6	4.6	7.2

TABLE - 5
Special Weather Phenomena
(PILANI)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.3	0.4-	0.7	1.5	1.1	0.4	0.5	0.2	0.2	0.0	0.0	5.6
Hail	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Dust storm	0.0	0.1	0.6	1.2	2.0	3.2	0.5	0.1	0.1	0.0	0.0	0.0	7.8
Fog	1.6	0.6	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.1	3.6

KAROLI DISTRICT

The district has a dry climate with a hot summer, cold winter and short rainy season. December to February is the cold season. The hot season is from March to about the third week of June. The rainy season which follows, lasts till about the third week of September. The period from about the third week of September to the end of November constitutes the post monsoon or the transition season.

RAINFALL

Records of rainfall in the district are available for five raingauge stations, for period ranging from 37 to 43 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 686.6 mm. Rainfall in general increases from the northeast towards the southwest in the district, and varies from 611.2 mm at Nadoti to 789.5 mm at Sapotra. The rainfall during the period June to September constitutes about 92% of the annual normal rainfall. The variation of the annual rainfall from year to year is large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 169% of the normal occurred in 1961, while the lowest annual rainfall which was only 46% of the normal occurred in 1989. During the same period there are 12 years when the annual rainfall was less than 80% of the annual normal rainfall. There are three occasions when such a low rainfall occurred in two consecutive years in the district. It will be seen from Table 2 that the annual rainfall was between 401 to 900 mm in 34 years out of 42.

On an average there are 33 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 30 at Nadoti to 36 at Sapotra.

The heaviest rainfall in 24 hours recorded at any station in the district was 360.0 mm at Karoli on 11 August 1972.

TEMPERATURE

There is no meteorological observatory in the district. So the description which follows is based on data of observatories in the neighbouring districts Sawai Madhopur and Dholpur, where similar climatic conditions prevail. March to June is period of continuous rise in temperature, May and first half of June being the hottest part of the year with the mean daily maximum temperature at about 42°C and the mean daily minimum temperature at about 25.5°C. The nights in June are a little hotter than in May. During May and June, on individual days, maximum temperature may go upto about 48°C-49°C. With the arrival of the southwest monsoon season by about the third week of June, the day temperatures lowers somewhat, but the relief from the heat is not marked because of the added discomfort from the increase in humidity brought in by the southwest monsoon air. After the withdrawal of the monsoon by about the third week of September, though night temperatures drop appreciably, the day temperatures increase and a secondary maxima in day temperature is recorded in October. Both day and night temperatures drop rapidly after mid November till January which is the coldest month, with the mean daily maximum temperature at about 23°-24°C and the mean daily minimum temperature at about 6.3°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which pass across north India during the cold season, minimum temperature particularly in January and February may go down to a degree or two below the freezing point of water.

HUMIDITY

The values of relative humidity are generally about 60%-70% in southwest monsoon season. In the rest of the year, the air is generally dry except during

January and December, when values of relative humidity are about 60%-70% in mornings. The driest part of the year is summer season, when the afternoon values of relative humidity may be as low as 20%.

CLOUDINESS

During the southwest monsoon season, the skies are moderately to heavily clouded, being overcast on some days. In the rest of the year skies are generally clear. During the cold season however, on a few days, the skies become cloudy when district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate with some strengthening in force in the summer and southwest monsoon season. Westerly to southwesterly wind prevails in southwest monsoon season. In the post monsoon, winter and summer months, winds are light on some days. Winds blow mostly from directions southwest in the morning and from north-northwest in the afternoons. In the summer season the winds blow from directions between southwest and northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions originate in the Bay of Bengal in the southwest monsoon season and move across the central parts of the country and reach the district or its neighbourhood causing widespread heavy rain and gusty winds. Thunderstorms occur practically in all the months of the year, but its frequency is more during the later part of summer and southwest monsoon season. Thunderstorms are sometimes accompanied with hail during early summer season. In hot season, dust storms occur occasionally. In winter low pressure waves moving from the west affect the weather over the district. Fog occurs in the winter months.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
KAROLI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Hindaun	42	a	7.9	6.3	3.8	1.3	8.5	38.3	181.6	249.2	90.1	14.0	3.6	3.0	607.6	230	38	191.8	10 Aug 1961
		b	0.7	0.7	0.5	0.2	0.7	2.5	9.4	10.2	4.6	0.9	0.3	0.3	31.0	(1961)	(1986)		
Karoli	43	a	9.8	8.8	4.0	1.9	12.6	53.2	238.4	298.7	102.7	22.0	5.6	3.8	761.5	175	53	360.0	11 Aug 1972
		b	0.8	0.8	0.3	0.1	0.8	2.9	10.7	11.9	4.7	0.9	0.4	0.3	34.6	(1975)	(1991)		
Nadoti	37	a	7.3	6.7	3.1	3.0	8.7	39.7	200.0	233.3	84.9	16.8	4.0	3.7	611.2	166	33	354.0	11 Aug 1972
		b	0.5	0.6	0.2	0.3	0.7	2.6	9.6	9.9	4.1	0.8	0.4	0.3	30.0	(1995)	(1989)		
Sapotra	43	a	10.9	7.5	2.0	2.7	9.8	75.3	259.9	295.6	99.2	15.1	7.6	3.9	789.5	192	44	272.0	07 Aug 1995
		b	0.8	0.7	0.3	0.3	0.8	3.4	10.5	12.4	5.6	0.8	0.4	0.3	36.3	(1995)	(1989)		
Todabhim	43	a	7.7	4.0	4.9	2.9	10.8	37.9	209.5	251.7	109.5	16.1	3.4	4.0	662.4	163	49	308.0	20 Jul 1981
		b	0.6	0.4	0.5	0.3	0.6	2.0	10.1	11.1	5.2	0.8	0.2	0.3	32.1	(1961)	(1952)		
Karoli (District)		a	8.7	6.7	3.6	2.4	10.1	48.9	217.9	265.7	97.3	16.8	4.8	3.7	686.6	169	46		
		b	0.7	0.6	0.4	0.2	0.7	2.7	10.1	11.1	4.8	0.8	0.3	0.3	32.7	(1961)	(1989)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	3	801 – 900	10
401 – 500	9	901 – 1000	1
501 – 600	7	1001 – 1100	2
601 – 700	4	1101 – 1200	2
701 – 800	4		

(Data available for 42 years only)

KOTA DISTRICT

The district enjoys a dry climate except in the monsoon season. The year may broadly be divided into four seasons. The cold season from mid-November to February is followed by the hot season which extends to about the middle of June. The period from about the middle of June to September is the southwest monsoon season and the two months October and November constitute the post monsoon or the retreating monsoon season.

RAINFALL

Records of rainfall are available for thirteen raingauge stations in the district for the period ranging from 10 to 45 years. Tables 1 and 2 give the data of rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 758.7 mm. The rainfall increases from northwest to the southeast. About 93% of the annual rainfall is received during the southwest monsoon season. The frequencies of rainfall are more concentrated in the range 701 mm to 900 mm. During the fifty year period from 1951 to 2000, the rainfall in the district as a whole was the highest in 1971 and amounted to 168% of the normal. 1965 was the year with the lowest annual rainfall which was as low as 51% of the normal. In the same fifty year period rainfall less than 80% of the normal occurred in 11 years. Consecutive years of rainfall less than 80% of the normal occurred in 1965-1966 and 1998 -1999. It will be seen from Table 2 that in 37 years out of 48, the annual rainfall in the district was between 501 mm and 1000 mm.

On an average there are 35 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. As in case of the amount of rainfall, the number of rainy days increases from northwest to the southeast. This number varies from 35 at Kota observatory to 37 at Sangod.

The heaviest rainfall in 24 hours recorded at any station in the district was 383.3 mm at Chechat on 29 June 1945.

TEMPERATURE

There are three meteorological observatories in the district, at Kota, Kota (PBO) and Kota (A) and the data of these stations may be taken to represent the weather conditions in the district. The cold season starts from about the middle of November and continues till the end of February. January is the coldest month with the mean daily maximum temperature at about 23.9°C and the mean daily minimum temperature at about 9.9°C. In association with the cold waves in the wake of western disturbances passing across north India, the minimum temperature sometimes drops to one or two degrees above the freezing point of water. Both day and night temperatures increase rapidly from March to May which is the hottest month with the mean daily maximum temperature at about 42.0°C while the mean daily minimum at about 28.5°C. In May temperature may sometimes exceed 48°C. There is an appreciable drop in temperature with the advance of the southwest monsoon into the district. After the withdrawal of the southwest monsoon by the end of September, day temperatures increase slightly with a secondary maximum in October.

The highest maximum temperatures recorded at Kota, Kota (PBO) and Kota (A) were 48.5°C in May 1962, 47.4°C on 27 May 1998 and 48.5°C on 28 April 1984 respectively. The lowest minimum temperatures were 1.7°C on 31 January 1929, 2.1°C on 25 January 1997 and 1.8°C on 11 January 1967 respectively.

HUMIDITY

The air is generally dry except in the southwest monsoon season. In the summer months, the relative humidity is very low, often being less than 20% in the afternoons.

CLOUDINESS

The cold season is one of generally clear bright weather with brief spells of cloudy weather caused by occasional western disturbances which pass across north India. In the summer and the post monsoon months, skies are clear or lightly clouded. Moderate to heavily clouded skies are common in the southwest monsoon season.

WINDS

Generally light to moderate winds prevail throughout the year with a light strengthening in the early monsoon period. In the post monsoon and winter season, winds blow from directions between northwest and northeast. During summer and southwest monsoon season, winds blow from directions west-northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the monsoon season and move across the central parts of the country in a westerly or west-northwesterly direction affect the district and its neighbourhood and cause widespread heavy rain and strong winds. Dust storms occur in the summer months. Thunderstorms occur throughout the year, more frequently in southwest monsoon season. Occasional fog occurs during winter.

Tables 3, 4, 5 and 3(a), 4(a), 5(a) and 3(b), 4(b), 5(b) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Kota, Kota (PBO) and Kota (A) observatories.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
KOTA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Barod	10	a	5.6	0.0	0.4	0.2	9.6	34.0	274.0	344.2	161.0	10.6	3.2	0.1	842.9	167	83	157.0	01 Sep 1957
		b	0.5	0.0	0.1	0.0	0.4	2.4	10.6	13.0	6.1	0.8	0.2	0.0	34.1	(1959)	(1962)		
Chechat	15	a	6.6	1.6	1.1	0.3	0.4	53.5	301.3	255.5	170.6	34.4	1.6	0.3	827.2	179	31	383.3	29 Jun 1945
		b	0.7	0.1	0.3	0.1	0.1	3.5	11.3	11.2	7.1	1.3	0.1	0.1	35.9	(1961)	(1965)		
Digod	39	a	9.3	2.6	3.3	1.8	4.6	68.4	273.0	258.9	133.8	24.5	7.9	3.0	791.1	196	42	217.1	30 Aug 1970
		b	0.6	0.2	0.4	0.2	0.5	3.7	10.4	11.4	5.5	0.9	0.5	0.4	34.7	(1971)	(1965)		
Itawah	35	a	5.3	1.3	1.6	1.1	3.2	37.2	228.0	218.7	84.6	16.4	8.3	2.0	607.7	162	50	225.8	10 Jul 1904
		b	0.5	0.2	0.2	0.1	0.3	2.5	9.6	10.5	4.6	0.9	0.4	0.2	30.0	(1975)	(1951)		
Kanwas	12	a	5.5	0.0	4.4	0.8	4.8	41.3	208.4	254.9	204.1	21.5	0.7	0.0	746.4	198	76	228.6	05 Sep 1961
		b	0.7	0.0	0.6	0.1	0.6	2.6	8.2	10.0	6.8	1.1	0.2	0.0	30.9	(1961)	(1958)		
Kota	12	a	4.6	0.1	1.4	1.0	8.5	51.0	253.9	240.5	118.6	5.4	4.1	0.3	689.4	164	0	160.0	26 Aug 1995
		b	0.5	0.0	0.2	0.2	0.8	2.9	10.8	10.5	5.1	0.3	0.3	0.1	31.7	(1961)	(1969)		
Kota (Obsy)	29	a	5.7	2.5	4.1	0.8	7.3	56.9	304.2	233.9	100.9	23.2	7.9	3.7	751.1	173	45	249.2	13 Jul 1945
		b	0.5	0.3	0.5	0.1	0.7	3.8	10.6	10.7	5.7	1.0	0.5	0.3	34.7	(1971)	(1951)		
Kota P.B.O	14	a	4.5	2.7	4.3	4.5	12.8	65.5	211.8	205.2	69.0	20.7	0.5	9.6	611.1	125	81	203.3	21 Jul 2000
		b	0.4	0.4	0.4	0.6	1.1	4.3	10.8	10.4	5.1	1.1	0.1	0.6	35.3	(1988)	(1998)		
Kota (A) (Obsy)	40	a	5.2	5.3	3.8	4.8	11.6	71.0	272.5	255.7	108.2	19.6	11.3	4.0	773.0	189	54	240.0	02 Jul 2001
		b	0.6	0.5	0.5	0.4	1.1	4.4	11.2	11.7	5.7	1.2	0.5	0.3	38.1	(1971)	(1965)		
Ladpura	38	a	6.5	4.4	3.1	3.5	9.0	71.8	252.7	253.1	100.7	19.1	10.9	4.5	739.3	200	44	251.7	02 Jul 2001
		b	0.6	0.4	0.4	0.2	1.0	4.5	10.3	11.3	5.2	0.9	0.5	0.3	35.6	(1971)	(1965)		

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
KOTA

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Pipalda	39	a	8.3	4.4	3.2	2.1	6.9	62.6	288.4	273.7	98.5	20.6	8.1	4.2	781.0	167	46	260.0	15 Jul 1979
		b	0.8	0.4	0.4	0.2	0.8	3.4	11.1	12.1	4.8	0.7	0.5	0.4	35.6	(1971)	(1989)		
Ramganj Mandi	39	a	6.7	1.5	3.1	3.0	7.5	80.2	260.1	309.5	155.3	34.3	14.5	4.7	880.4	156	28	213.0	18 Oct 1987
		b	0.5	0.2	0.3	0.2	0.6	4.0	9.8	12.8	6.2	0.7	0.7	0.4	36.4	(1986)	(1965)		
Sangod	45	a	5.1	2.2	3.6	0.6	3.9	69.3	272.6	294.2	126.0	28.4	13.3	3.1	822.3	188	50	287.0	21 Jul 1908
		b	0.5	0.3	0.4	0.1	0.4	4.2	10.5	12.6	5.6	1.0	0.6	0.3	36.5	(1961)	(1961)		
Kota (District)		a	6.1	2.2	2.9	1.9	6.9	58.7	261.6	261.4	125.5	21.4	7.1	3.0	758.7	168	51		
		b	0.6	0.2	0.4	0.2	0.6	3.6	10.4	11.4	5.7	0.9	0.4	0.3	34.7	(1971)	(1965)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

Frequency of Annual Rainfall in the District
(Data 1951 - 2000)
(KOTA)

Range in mm	No. of years	Range in mm	No. of years
301 – 400	2	801 – 900	11
401 – 500	3	901 – 1000	5
501 – 600	6	1001 – 1100	3
601 – 700	4	1101 – 1200	1
701 – 800	11	1201 – 1300	2

(Data available for 48 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(KOTA)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.5	9.3	33.9	1912 Jan 30	1.7	1929 Jan 31	63	38
February	27.8	12.4	38.3	1943 Feb 28	2.2	1929 Feb 01	51	30
March	33.8	18.0	42.8	1945 Mar 31	8.9	1945 Mar 07	37	22
April	38.9	24.3	47.5	1958 Apr 27	14.0	1976 Apr 01	29	18
May	41.8	28.1	48.5	1962 May –	17.5	1977 May 02	31	20
June	40.2	28.1	47.8	1945 Jun 13	21.0	1974 Jun 09	52	38
July	34.6	25.3	47.2	1923 Jul 02	16.4	1965 Jul 31	72	62
August	32.0	24.4	42.0	1975 Aug 17	18.0	1965 Aug 01	80	74
September	33.4	23.9	40.6	1951 Sep 28	18.2	1967 Sep 03	72	60
October	34.7	20.6	41.1	1930 Oct 30	13.0	1961 Oct 30 1962 Oct 29	56	37
November	31.0	14.9	37.5	1977 Nov 05	7.2	1970 Nov 29	56	36
December	26.0	10.7	33.9	1941 Dec 10	2.6	1961 Dec 27	63	42
Annual	33.2	20.0					55	40

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.0	3.7	5.1	5.5	9.3	13.5	10.9	9.3	7.6	4.1	2.9	2.8	6.5

TABLE - 5
Special Weather Phenomena
(KOTA)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.5	0.7	1.0	1.5	4.2	6.0	6.8	6.9	3.9	0.8	0.3	0.4	33.0
Hail	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.1	0.6	1.0	3.9	2.2	0.4	0.1	0.1	0.0	0.0	0.0	8.4
Fog	0.4	0.1	0.0	0.2	1.1	0.2	0.0	0.0	0.0	0.0	0.0	0.4	2.4
Squall	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

TABLE – 3(a)
Normals of Temperature and Relative Humidity
(KOTA PBO)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.6	9.8	32.3	2004 Jan 18	2.1	1997 Jan 25	67	43
February	26.2	11.9	37.2	1985 Feb 28	3.0	1984 Feb 25	58	36
March	32.5	17.1	41.9	2004 Mar 22	8.1	1982 Mar 02	44	25
April	39.0	23.6	45.5	2000 Apr 28	13.7	1981 Apr 06	30	16
May	42.4	28.3	47.4	1998 May 27	19.4	2001 May 19	33	18
June	40.3	28.5	47.1	2003 Jun 05	20.0	2005 Jun 02	52	34
July	34.3	25.9	42.2	1984 Jul 01	20.0	1986 Jul 28	75	61
August	32.0	24.8	41.1	1987 Aug 02	21.4	1981 Aug 28 1983 Aug 01	80	70
September	34.3	24.6	40.1	1987 Sep 27	20.5	1990 Sep 17	66	50
October	34.6	20.8	39.8	1986 Oct 16	13.7	1978 Oct 16	51	34
November	29.8	15.2	38.0	2001 Nov 02	6.1	1978 Nov 28	54	36
December	25.1	10.9	33.4	2002 Dec 17	3.5	1978 Dec 30	64	42
Annual	32.8	20.1					56	39

TABLE – 4(a)
Mean Wind Speed in km/hr.
(KOTA PBO)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.5	5.1	6.1	7.2	9.6	12.5	12.6	9.9	8.1	5.2	4.0	4.1	7.4

TABLE – 5(a)
Special Weather Phenomena
(KOTA PBO)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.5	0.4	0.4	2.0	2.5	2.3	3.8	1.3	0.1	0.1	0.2	13.8
Hail	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.0	0.4	0.3	1.9	1.5	0.2	0.2	0.1	0.0	0.0	0.1	4.7
Fog	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.8

TABLE – 3(b)
Normals of Temperature and Relative Humidity
(KOTA (A))

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.7	10.6	33.4	1966 Jan 14	1.8	1967 Jan 11	57	32
February	27.0	13.5	37.0	1973 Feb 26	4.5	1971 Feb 02	47	26
March	33.0	18.9	42.7	2003 Mar 30	8.6	1979 Mar 01	33	17
April	38.8	25.0	48.5	1984 Apr 28	14.0	1976 Apr 01	23	12
May	42.0	29.1	47.7	1998 May 23	20.0	1971 May 17	28	14
June	39.9	29.0	47.3	1979 Jun 10	18.8	1979 Jun 21	51	32
July	34.1	26.4	44.9	1995 Jul 02	17.1	2004 Jul 08	73	59
August	32.0	25.2	41.0	1987 Aug 03	18.4	2006 Aug 15	80	68
September	33.9	24.9	41.0	2009 Sep 22	16.4	1966 Sep 08	67	50
October	34.5	21.6	46.8	2003 Oct 12	14.3	1964 Oct 26	47	28
November	30.0	16.1	38.0	2001 Nov 02	7.1	1970 Nov 29	48	30
December	25.2	11.8	33.2	1963 Dec 13	3.8	1964 Dec 14	58	34
Annual	32.8	21.0					51	34

TABLE – 4(b)
Mean Wind Speed in km/hr.
(KOTA (A))

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.5	6.4	7.7	9.9	13.1	15.8	13.6	11.7	10.3	6.5	4.5	4.5	9.1

TABLE – 5(b)
Special Weather Phenomena
(KOTA (A))

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.1	0.6	0.4	1.4	1.8	2.9	2.7	1.4	0.2	0.4	0.1	12.3
Hail	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Dust storm	0.0	0.0	0.1	0.1	0.4	0.2	0.0	0.1	0.0	0.1	0.0	0.	1.0
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2

RAJSAMAND DISTRICT

The district has on the whole a dry climate with hot season milder than in the Rajasthan desert areas to the northwest of the district. The cold season is from December to February and is followed by the hot season which lasts till about the middle of June. Mid June to mid September constitutes the southwest monsoon season. The post monsoon season from the middle of September to the end of November is one of transition from monsoon to winter conditions.

RAINFALL

Records of rainfall in the district are available for seven raingauge stations and 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 556.5 mm. The rainfall during the months June to September constitutes to about 92% of the annual rainfall. July and August are the rainiest months with the maximum rains. The variation in the annual rainfall from year to year is not very large. In the fifty year period from 1951 to 2000, the highest annual rainfall amounting to 200% of the normal occurred in 1973 in the district. 1987 was the year with the lowest annual rainfall which was only 56% of the normal. In the same fifty year period the rainfall was less than 80% of the normal in 13 years. Two consecutive years of such a low rainfall less than 80% of the normal occurred thrice in fifty year period. It will be seen from Table 2 that in 41 years out of 42, the annual rainfall in the district was between 301 mm and 800 mm.

On an average there are 28 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. As in case of the amount of rainfall, the number of rainy days increases from the north to the south. This number varies from 25 at Bhim/Dawer to 33 at Khumbalgarh.

The heaviest rainfall in 24 hours recorded at any station in the district was 261.6 at Bhim/Dawer on 22August 1944.

TEMPERATURE

There is no meteorological observatory in the district. So the description which follows is based on data of meteorological observatory in the neighbouring district Udaipur from which this district has been formed. The winter season sets in after the middle of November, when both the day and night temperatures begin to drop steadily. January is generally the coldest month with the mean daily maximum temperature at about 24^{o}C and the mean daily minimum temperature at about 7^{o}C. The minimum temperature sometimes reaches the freezing point of water and frost may occur occasionally. The diurnal range of temperature is large particularly in the winter and summer months. Both the day and night temperatures rise rather rapidly after the end of February till May which is generally the hottest month of the year Nights are warmer in June also. The mean daily maximum temperature in that month is at about 39^{o}C and the mean daily minimum temperature is at about 25^{o}C. The summer is milder than in the desert regions of Rajasthan. By the third or fourth week of June when the southwest monsoon reaches the district, temperatures drop appreciably. After the withdrawal of the southwest monsoon by about the middle of September, there is a slight increase in day temperatures although the night temperatures begin to drop. From November onwards the day temperatures also decrease.

HUMIDITY

Except in the brief southwest monsoon season when the relative humidity is generally about 70% or more, the air is very dry. The summer months are the driest

part of the year when the relative humidity goes down to 20% to 25% particularly in the afternoons.

CLOUDINESS

In the southwest monsoon season especially in July and August skies are often heavily clouded to overcast. During the rest of the year skies are generally clear or lightly clouded. But in the winter season which is generally marked by clear bright weather, brief spells of cloudy weather, occur in association with the passage of western disturbances across north India.

WINDS

Winds are generally light to moderate with some strengthening in force in the latter half of summer and the southwest monsoon season. In the period from May to September winds blow from directions southwest and west. In the post monsoon season and winter season the winds are predominantly from directions northwest and northeast. Thereafter northwesterly and westerly predominate in late winter and early summer.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions in July and August which form at the head of the Bay of Bengal and move in a westerly or west northwesterly direction, reach the district and its neighbourhood towards the later stages of their movement and cause gusty winds and widespread heavy rainfall. Thunderstorms occur throughout the year, mainly during southwest monsoon season. Duststorms occur early summer season. Fog occurs during post monsoon and winter months.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
RAJSAMAND

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Amet	39	a	3.9	2.6	4.9	2.4	10.5	61.3	158.4	161.3	99.0	13.7	7.1	3.3	528.4	172	39	204.0	07 Sep 1967
		b	0.3	0.3	0.1	0.2	0.7	3.6	8.1	7.9	4.5	0.9	0.6	0.2	27.4	(1967)	(1987)		
Bhim/Dawer	45	a	4.5	2.0	3.0	2.2	10.0	54.6	179.5	144.8	70.0	17.7	5.4	2.5	496.2	190	30	261.6	22 Aug 1944
		b	0.4	0.2	0.2	0.2	0.8	3.2	7.5	7.5	3.7	0.8	0.5	0.2	25.2	(1976)	(1987)		
Deogarh	39	a	4.3	3.0	2.6	1.6	12.1	71.8	163.7	176.6	84.3	10.7	5.8	2.4	538.9	240	27	240.0	18 Aug 1982
		b	0.4	0.3	0.2	0.2	0.9	3.9	7.9	8.2	4.1	0.6	0.7	0.2	27.6	(1973)	(1987)		
Khumbalgarh	39	a	3.2	2.7	4.6	4.5	18.9	94.6	229.2	219.5	97.5	13.7	5.2	3.9	697.5	220	51	233.0	07 Sep 1967
		b	0.2	0.2	0.2	0.3	0.9	4.9	10.2	9.4	4.7	0.9	0.3	0.4	32.6	(1973)	(1993)		
Nathowana	39	a	3.5	1.8	3.6	2.2	8.4	63.3	157.9	172.2	82.4	10.3	10.8	2.0	518.4	194	49	224.8	24 Aug 1957
		b	0.3	0.1	0.1	0.2	0.7	3.6	8.0	8.9	4.2	0.7	0.6	0.1	27.5	(1973)	(1974)		
Railmagra	39	a	4.1	2.4	5.6	3.7	10.1	64.1	186.1	196.0	79.3	8.8	7.6	3.9	571.7	248	44	228.6	23 Aug 1957
		b	0.3	0.2	0.4	0.3	0.7	3.3	8.5	9.1	4.1	0.6	0.5	0.3	28.3	(1973)	(1993)		
Rajsamand	45	a	4.0	1.4	4.4	2.6	9.0	65.7	180.6	178.1	75.1	14.7	6.3	2.7	544.6	184	39	217.7	23 Aug 1957
		b	0.4	0.2	0.2	0.3	0.6	3.3	8.8	9.1	4.3	1.0	0.5	0.2	28.9	(1973)	(1974)		
Rajsamand (District)		a	3.9	2.3	4.1	2.7	11.3	67.9	179.3	178.4	83.9	12.8	6.9	3.0	556.5	200	56		
		b	0.3	0.2	0.2	0.2	0.8	3.7	8.4	8.6	4.2	0.8	0.5	0.2	28.1	(1973)	(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 upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	7	801 – 900	0
401 – 500	10	901 – 1000	0
501 – 600	10	1001 – 1100	0
601 – 700	9	1101 – 1200	1
701 – 800	5		

(Data available for 42 years only)

SAWAI MADHOPUR DISTRICT

The district has a dry climate except during the short rainy season. December to February is the cold season. The hot season is from March to about the third week of June. The rainy season which follows, lasts till about the third week of September. The period from about the third week of September to the end of November constitute the transition period.

RAINFALL

Records of rainfall in the district are available for seven raingauge stations for period ranging from 24 to 44 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 728.7 mm. The rainfall during the southwest monsoon season constitutes about 91% of the annual rainfall. The variation in the annual rainfall from year to year is large. It varies from 598.9 mm at Mahwa/Mahawar to 872.6 mm at Sawai Madhopur (Obsy). In the 50 year period 1951-2000, the highest annual rainfall which amounted to 154% of the normal, occurred in 1956, while the lowest annual rainfall in the same period which was only 53% of the normal, which occurred in the year in 1987. In the fifty years period the annual rainfall of the district was less than 80% of the normal during 13 years. There was one occasion each of two, three and four consecutive years of such low rainfall in the district as a whole. It will be seen from Table 2 that the annual rainfall in the district was between 501 mm and 1100 mm in 41 years out of 48.

On an average there are 34 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 29 at Bonli to 41 at Sawai Madhopur observatory.

The heaviest rainfall in 24 hours recorded at any station in the district was 505.0 mm at Bamanwas on 19 July 1981.

TEMPERATURE

There is only one meteorological observatory in the district at Sawai Madhopur. Hence, in the following description, the meteorological records of this observatory may be taken as representative of the climatic conditions in the district. The period from March to June is one of continuous rise in temperature, May and first half of June being the hottest part of the year. The mean daily maximum temperature in May is about 42°C and the mean daily minimum temperature is about 25°C. The night temperatures in June are litlle higher than in May. The maximum temperature in May and June may go on individual days go upto about 48°C. The setting in of the southwest monsoon by about the third week of June lowers the temperature somewhat but the relief from the heat is not marked because of the added discomfort from the increase in humidity brought in by the southwest monsoon air. After the withdrawal of the monsoon by about the third week of September days become hotter and in October a secondary maximum in day temperature is recorded. The nights become progressively cooler. Both day and night temperatures drop rapidly after mid-November till January which is the coldest month with the mean daily maximum temperature at about 24°C and the mean daily minimum temperature at about 6°C. In association with cold waves which sometimes affect the district in the wake of western disturbances which pass across north India during the cold season, minimum temperatures particularly in January and February may go down to a degree below the freezing point of water.

The highest maximum temperature ever recorded at Sawai Madhopur observatory was 48.0°C on 29 May 1994 and 04 June 1995 and the lowest minimum temperature ever recorded was –1.2°C on 03 February 1983.

HUMIDITY

The relative humidity is generally over 60% during the southwest monsoon season. During the rest of the year, the air is dry. The driest part of the year is the summer season, when the afternoon relative humidity may be as low as about 20%.

CLOUDINESS

During the southwest monsoon season, skies are moderately to heavily clouded being overcast on some days. In the rest of the year, skies are generally clear. During the cold season however, on a few days, the skies become cloudy when the district is affected by passing western disturbances.

WINDS

Winds are mostly light with some strengthening in the force during summer and early southwest monsoon season. Winds blow mainly from westerly and southwesterly directions during the southwest monsoon season. In the post monsoon, winter and early summer months, winds blow from direction southwesterly in morning and northerly to northwesterly in the afternoon.

SPECIAL WEATHER PHENOMENA

Some of the depressions originating in the Bay of Bengal during the southwest monsoon season (particularly during the month of July and August) move across the central parts of the country and reach the district or its neighbourhood causing widespread heavy rain and gusty winds. Thunderstorms occur during the period from February to August. In association with the thunderstorms hail may sometimes occur during the months February and March. Dust storms occur occasionally during the hot season. During the period January to March low pressure waves moving across from the west affect the weather over the district. Fog sometimes, occur in winter months.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
SAWAI MADHOPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Bamanwas	37	a	8.0	8.4	3.2	3.3	12.1	54.2	249.7	261.8	99.0	16.7	3.1	5.0	724.5	238	49	505.0	19 Jul 1981
		b	0.5	0.7	0.3	0.2	0.8	2.7	10.2	11.3	5.4	0.9	0.3	0.4	33.7	(1981)	(1989)		
Bonli	34	a	4.6	6.2	2.0	4.2	7.6	46.5	272.4	252.0	77.5	19.9	3.6	5.3	701.8	213	37	264.0	19 Jul 1981
		b	0.3	0.4	0.1	0.1	0.5	2.6	9.1	10.4	4.3	0.8	0.2	0.3	29.1	(1983)	(1965)		
Gangapur	43	a	8.5	6.9	3.8	2.7	12.9	52.3	238.1	263.8	92.3	20.2	3.9	3.2	708.6	174	29	280.0	07 Aug 1995
		b	0.7	0.7	0.3	0.2	0.7	3.2	10.1	11.4	4.2	0.8	0.3	0.3	32.9	(1956)	(1989)		
Khandar	43	a	8.5	5.6	2.1	2.1	6.9	57.4	239.8	248.6	87.9	17.1	7.2	3.5	686.7	173	35	225.0	12 Aug 1994
		b	0.7	0.4	0.3	0.1	0.5	3.5	10.8	11.5	5.0	0.9	0.4	0.2	34.3	(1983)	(1989)		
Mahwa/Mahwar	34	a	6.6	8.3	4.0	3.1	10.3	45.1	164.4	216.3	116.3	18.2	3.0	3.3	598.9	177	53	304.7	03 Sep 1965
		b	0.6	0.8	0.4	0.3	1.0	2.6	8.8	10.3	4.1	0.9	0.3	0.3	30.4	(1983)	(1987)		
Sawai Madhopur	44	a	7.8	5.4	4.3	2.5	9.3	63.7	284.0	300.7	104.4	18.8	5.6	2.1	808.6	185	37	356.2	11 Jul 1968
		b	0.7	0.5	0.5	0.3	0.9	3.5	11.4	12.4	5.8	1.0	0.3	0.2	37.5	(1956)	(1984)		
Sawai Madhopur (Obsy)	24	a	10.7	9.7	6.1	8.3	12.8	65.1	299.1	303.6	109.0	32.5	10.2	5.5	872.6	150	57	260.2	17 Aug 1986
		b	0.9	0.8	0.8	0.8	1.3	4.2	12.0	12.7	5.0	1.4	0.4	0.5	40.8	(1994)	(1984)		
Sawai Madhopur (District)		a	7.8	7.2	3.6	3.7	10.3	54.9	249.6	263.8	98.1	20.5	5.2	4.0	728.7	154	53		
		b	0.6	0.6	0.4	0.3	0.8	3.2	10.3	11.4	4.8	1.0	0.3	0.3	34.0	(1956)	(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 upto 2006.
** Years of occurrence given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1951 - 2000)
(SAWAI MADHOPUR)

Range in mm	No. of years	Range in mm	No. of years
301 – 400	3	801 – 900	5
401 – 500	3	901 – 1000	9
501 – 600	9	1001 – 1100	5
601 – 700	8	1101 – 1200	1
701 – 800	5		

(Data available for 48 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(SAWAI MADHOPUR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.3	6.2	32.9	1991 Jan 28	-1.0	1983 Jan 20	75	41
February	26.5	8.2	36.0	1985 Feb 28 2006 Feb 24	-1.2	1983 Feb 03	63	32
March	32.8	13.8	42.0	2004 Mar 23	3.5	1983 Mar 06	47	23
April	38.8	20.4	46.3	2009 Apr 29	9.3	1983 Apr 01	34	20
May	42.3	25.1	48.0	1994 May 29	14.6	1983 Mar 24	34	19
June	41.2	26.5	48.0	1995 Jun 04	14.3	1994 Jun 13	50	34
July	34.3	24.1	46.3	1982 Jul 04	11.5	2005 Jul 29	76	62
August	32.3	22.9	40.0	2002 Aug 04	16.4	1983 Aug 02	83	71
September	34.3	21.9	40.9	2009 Sep 22	14.0	1982 Sep 27	73	54
October	34.7	17.2	41.0	2002 Oct 07	6.8	1983 Oct 30	57	37
November	30.6	12.4	39.9	1991 Nov 04	2.5	1982 Nov 28	62	41
December	25.5	7.9	32.0	1994 Dec 14	1.0	1982 Dec 30	73	44
Annual	33.1	17.2					61	40

TABLE - 4
Mean Wind Speed in km/hr.
(SAWAI MADHOPUR)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.2	3.0	3.1	4.3	5.4	5.7	5.7	4.4	4.3	2.6	2.6	1.9	3.8

TABLE - 5
Special Weather Phenomena
(SAWAI MADHOPUR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.4	0.6	0.7	0.7	1.7	1.8	1.3	0.0	0.0	0.0	0.0	7.2
Hail	0.0	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.7
Dust storm	0.0	0.0	0.2	0.2	1.8	0.8	0.3	0.0	0.0	0.1	0.0	0.0	3.4
Fog	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	1.1

SIKAR DISTRICT

The climate of this district is characterized by a hot summer, scanty rainfall, a cool winter season and general dryness of air except in the brief monsoon season. The period from about the middle of November to the end of February is the cold season, after which the hot season commences and lasts till about the end of June. The southwest monsoon season which follows, continues till about the middle of September. The next one and half month may be termed as the post monsoon or retreating monsoon season.

RAINFALL

Records of rainfall in the district are available for eight raingauge stations for period ranging from 34 to 49 years. . Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The average annual rainfall in the district is 459.6 mm. The rainfall in general is uniform in the district. The rainfall during the southwest monsoon season constitutes about 87% of the annual rainfall. The variation in the annual rainfall from year to year is not very large. In the fifty year period from 1951 to 2000, the highest annual rainfall which amounted to 225% of the normal occurred in 1977, while the lowest annual rainfall which amounted to 47% of the normal, occurred in 1972. The annual rainfall was less than 80% of the annual normal rainfall occurred in 11 years out of 48 years. During the same period, there is only one occasion when such a low rainfall occurred in two consecutive years in the district. It is seen from Table 2 that in 45 years out of 48, the annual rainfall in the district was between 201 mm to 700 mm.

On an average there are 25 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 20 at Ramgarh to 29 at Neemkathana..

The heaviest rainfall in 24 hours recorded at any station in the district was 388.6 mm at Srimadhopur on 24 August 1894.

TEMPERATURE

There is only one meteorological observatory in the district at Sikar. The data of this station may be taken as brief representative of the climatic condition in the district as a whole. The period from March to June is one of continuous increase in temperature. May and June constitutes the hottest part of the year. The mean daily maximum temperature in May is 39.7°C and the mean daily minimum temperature is 22.9°C. The night temperatures in June are higher than in May. In the summer season heat is intense and scorching dust rising winds add to the discomfort. During May and June on some days, maximum temperature may go upto 49°C. The arrival of the southwest monsoon by about the end of June lowers the temperature somewhat but the relief from heat is not marked because of the added discomfort from the increase in humidity. After the withdrawal of the southwest monsoon by about mid September, days become hotter and secondary maximum is reached in October but the nights become progressively cooler. After the mid November both day and night temperatures drop rapidly till January which is the coldest month, with the mean daily maximum temperature at about 22.7°C and the mean daily minimum temperature at about 4.3°C. In association with cold waves which affect the district in the wake of western disturbances which pass across north India during the cold season, minimum temperature may go down to three to four degrees below the freezing point of water.

The highest maximum temperature and lowest minimum temperature ever recorded at Sikar observatory was 49.7°C on 12 June 1993 and –4.9°C on 19 December 1986 respectively.

HUMIDITY

During the brief southwest monsoon season the value of relative humidity are generally high. In the rest of the year the air is dry. In summer season, which is the driest part of the year, the afternoon values of humidity are below 30%.

CLOUDINESS

During the southwest monsoon season, skies are moderately to heavily clouded generally and overcast on some days. In the rest of the year, skies are clear or lightly clouded, but on a few days in the winter season, skies become cloudy when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate with little strengthening in force in latter half of summer and early southwest monsoon season. Westerly and southwesterly winds prevail in the southwest monsoon season. In post monsoon months, winds are generally calm or light and mostly from direction between west and northwest. In winter months winds are light and mostly from direction between east and southeast in the morning and west and northwest in the evening. In summer season, winds blow mostly from west direction.

SPECIAL WEATHER PHENOMENA

During the southwest monsoon season, the district is affected by depressions which originate in the Bay of Bengal and move across the central parts of the country, causing widespread heavy rainfall. Thunderstorms occur in later half of summer and early part of southwest monsoon season. In hot season dust storms and dust raising winds occur occasionally.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
SIKAR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Danta Ramgarh	43	a	7.2	9.1	3.9	4.8	16.1	45.3	163.2	151.9	55.4	10.7	2.7	2.3	472.6	188	27	197.0	18 Jul 1974
		b	0.8	0.8	0.4	0.5	1.3	2.9	8.1	8.0	3.2	0.5	0.3	0.2	27.0	(1975)	(1972)		
Fetehpur	37	a	5.4	5.8	3.0	2.5	22.4	36.3	148.1	126.0	44.8	3.3	3.3	1.9	402.8	213	27	258.0	21 Jul 1978
		b	0.5	0.5	0.2	0.3	1.2	2.6	6.7	5.9	2.6	0.2	0.3	0.2	21.2	(1978)	(1972)		
Lachmangarh	37	a	7.1	8.9	3.1	4.5	21.4	46.2	157.8	121.6	59.3	3.0	4.8	2.1	439.8	178	35	215.0	21 Jul 1978
		b	0.8	0.6	0.5	0.4	1.3	3.0	6.9	5.9	2.9	0.4	0.3	0.2	23.2	(1978)	(1989)		
Neemkathana	43	a	9.1	10.0	3.7	4.5	17.5	53.9	180.9	160.3	59.0	14.7	3.3	3.9	520.8	152	48	184.0	04 Aug 1979
		b	0.8	0.8	0.6	0.6	1.1	3.3	8.3	8.6	3.3	0.8	0.3	0.3	28.8	(1957)	(1987)		
Ramgarh	34	a	5.1	6.4	3.7	4.4	16.2	37.4	133.3	93.5	52.2	1.7	2.9	1.3	358.1	189	23	196.0	19 Jul 1978
		b	0.4	0.6	0.4	0.5	1.1	2.5	6.1	5.1	2.8	0.2	0.2	0.2	20.1	(1983)	(1987)		
Sikar	45	a	10.4	7.4	5.4	3.3	21.8	47.7	189.8	137.6	51.9	10.3	5.7	4.6	495.9	198	39	292.0	21 Jul 1978
		b	0.7	0.6	0.6	0.4	1.4	2.8	8.0	7.0	3.3	0.6	0.4	0.4	26.2	(1978)	(1987)		
Sikar (Obsy)	49	a	6.1	10.3	4.7	5.1	21.6	48.0	190.0	125.8	49.6	10.8	4.0	2.6	478.6	216	41	236.0	13 Jul 1968
		b	0.6	0.9	0.6	0.6	1.5	2.6	7.5	6.5	3.2	0.6	0.4	0.3	25.3	(1977)	(1984)		
Srimadhopur	40	a	8.7	7.5	3.6	3.8	12.8	48.2	183.2	166.2	53.3	11.5	3.7	4.2	506.7	167	41	388.6	24 Aug 1894
		b	0.8	0.8	0.4	0.4	0.9	3.0	9.0	7.9	3.1	0.6	0.2	0.4	27.5	(1983)	(1968)		
Sikar (District)		a	7.4	8.2	3.9	4.1	18.7	45.4	168.3	135.4	53.2	8.3	3.8	2.9	459.6	225	47		
		b	0.7	0.7	0.5	0.5	1.2	2.8	7.6	6.9	3.1	0.5	0.3	0.3	25.1	(1977)	(1972)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
201 – 300	9	701 – 800	2
301 – 400	10	801 – 900	0
401 – 500	11	901 – 1000	0
501 – 600	8	1001 – 1100	1
601 – 700	7		

(Data available for 48 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(SIKAR)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	22.7	4.3	31.4	1991 Jan 30	-0.9	1991 Jan 01	61	37
February	25.5	7.1	37.4	1973 Feb 27	-4.2	1974 Feb 07	53	34
March	31.3	12.6	40.4	1996 Mar 29	1.3	1982 Mar 02	47	30
April	36.8	18.5	45.5	1993 Apr 29	7.0	1982 Apr 01	41	26
May	39.7	22.9	49.0	1994 May 26	10.1	1982 May 20	47	31
June	39.6	25.7	49.7	1993 Jun 12	15.6	1999 Jun 05	56	37
July	35.3	24.9	44.4	1947 Jul 15	15.1	1982 Jul 12	73	59
August	33.6	24.1	41.1	1965 Aug 20	16.9	1992 Aug 20	77	63
September	34.2	22.2	39.4	1954 Sep 02 1981 Sep 17	13.1	1963 Sep 28	68	51
October	34.2	16.7	41.0	1995 Oct 21	5.4	1964 Oct 31	54	34
November	29.3	10.0	37.8	1972 Nov 17	0.0	1962 Nov 30	53	35
December	23.8	5.1	32.5	1993 Dec 02	-4.9	1986 Dec 19	56	38
Annual	32.2	16.2					57	40

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.0	4.4	4.5	4.8	5.5	6.7	6.6	4.3	4.4	4.6	3.2	3.1	4.7

TABLE - 5
Special Weather Phenomena
(SIKAR)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3
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	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
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

SIROHI DISTRICT

The district on the whole has a dry climate with the hot season somewhat milder than in the adjoining districts to the north and northwest. The cold season is from October to February. This is followed by the hot season which lasts till about the middle of June. The period from mid June to mid September is the southwest monsoon season. Mid September to the end of November constitute the post monsoon season.

RAINFALL

Records of rainfall in the district are available for eighteen raingauge stations, for period ranging from 10 to 47 years. Tables 1 and 2 give the details of the rainfall at these stations and for the district as a whole. The rainfall at Mount Abu which is a hill station is much higher than at stations in the plains. The average annual rainfall in the plains of the district is 556.7 mm. The average annual rainfall at Mount Abu is 1677.0 mm. The rainfall during the period from June to September constitutes 97% of the annual rainfall. July and August are the rainiest months when 66% of the annual rainfall is received. The variations in the annual rainfall from year to year are large. During the 49 year period 1951 to 1999 the highest annual rainfall which amounted to 274% of the normal was received in 1973 while the lowest rainfall which was only 32% of the normal occurred in 1987. In the same 49 year period the rainfall was less than 80% of the normal in 15 years. Three consecutive years of rainfall less than 80% of the normal occurred once during 1985 to 1987and two consecutive

years of such a low rainfall occurred on four occasions. It will be seen from Table 2 that the annual rainfall was between 301 to 700 mm in 29 years out of 44.

On an average the number of rainy days (i.e. days with rainfall of 2.5 mm or more) in the plains of the district is 24 in a year out of which 22 are in the period June to September. At Mount Abu the number of rainy days in a year is 53.

The heaviest rainfall in 24 hours recorded at any station in the plains of the district was 635.0 mm at Pindwara on 01 September 1973.The heaviest rainfall in 24 hours at Mount Abu was 700.0 mm on 08 September 1992.

TEMPERATURE

There is only one meteorological observatory in the district at Mount Abu. Being a hill station the data of temperature and other meteorological elements at this station will not be representative of the conditions in the district as a whole. However, the meteorological data are available for Erinpura observatory outside the northern border of the district. The condition of this station may be taken to be fairly representative of those in the plains of the district. The following account is therefore, based on the meteorological records of Erinpura.

From about November both day and night temperatures drop rapidly till January which is generally the coldest month. The drop in temperature after nightfall is very rapid and trying during the cold season. The mean daily maximum temperature in this month in the plains is of the order of 26°C and the mean daily minimum about 0.8°C. At Mount Abu the mean daily maximum temperature in January is 20.0°C and the mean daily minimum is 5.7°C. In the wake of western disturbances which move across north India in the winter months, cold waves affect the district and the temperatures may go down to a degree or two below the freezing point of water and frost may occur. Both the day and night temperatures rise rapidly after February till May which is usually the hottest month of the year. The mean daily maximum temperature in May is 31.9°C at Mount Abu and is of the order of 40°C in the plains. The mean daily minimum temperature in May is 19.8°C at Mount Abu and

that about 26°C in the plains. With the onset of the southwest monsoon in the second half of June, the temperatures drop appreciably and weather becomes more pleasant. With the withdrawal of the southwest monsoon by mid September the day temperatures increase slightly and there is a secondary maximum temperature in October. Afterwards, day temperatures start decreasing till January. However, nights are progressively cooler. At Mount Abu the highest maximum temperature recorded was 39.2°C on 15 May 1985. The lowest minimum temperature recorded was –7.4°C on 12 December 1994. At Erinpura Road Observatory which is just outside the northern border of the district, the highest maximum temperature was 48.1°C on 06 May 1966. The lowest minimum temperature was –3.1°C on 13 January 1994.

HUMIDITY

Humidity is generally high in the brief southwest monsoon season. During the rest of the year the air is dry. The summer months form the driest part of the year when humidity is low particularly in the afternoons about 25%.

CLOUDINESS

During the southwest monsoon season, skies are generally heavily clouded to overcast. During the rest of the year, skies are mostly clear or lightly clouded. In the winter season, which is generally marked by clear or bright weather, brief spells of cloudy weather occur in association with the passage of western disturbances across north India.

WINDS

Winds are generally light with some strengthening in force during the southwest monsoon season. From May to September, the winds are predominantly from southwest. In the post monsoon, winter and summer months, winds are mainly from directions betwe
en south and southwest.

SPECIAL WEATHER PHENOMENA

A few of the monsoon depressions particularly in July and August which form at the head of the Bay of Bengal and move across the country in a westerly or west-northwesterly direction reach the district and the neighbourhood towards the later stage and cause gusty winds and widespread rainfall. Occasional dust storms and thunderstorms occur in the summer months, while rainfall in the monsoon months is also associated often with thunder. Fog occurs during monsoon and winter months.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
SIROHI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Abu Road	43	a	3.0	2.1	2.1	3.7	6.2	55.1	252.8	207.7	113.6	8.6	6.6	2.4	663.9	249 (1973)	28 (1966)	303.0	08 Sep 1992
		b	0.2	0.2	0.1	0.2	0.5	3.3	11.6	10.7	4.5	0.6	0.5	0.2	32.6				
Akhelao	10	a	0.0	0.0	0.0	0.0	0.0	78.3	175.8	192.9	153.4	25.4	0.0	0.0	625.8	229 (1973)	43 (1981)	280.0	02 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	3.9	5.7	7.5	3.7	0.5	0.0	0.0	21.3				
Bhula	10	a	0.0	0.0	0.0	0.0	0.0	45.6	81.4	127.4	57.0	3.9	0.0	0.0	315.3	201 (1973)	33 (1972)	80.0	05 Aug 1984
		b	0.0	0.0	0.0	0.0	0.0	2.6	5.5	7.0	3.7	0.7	0.0	0.0	19.5				
Butri	10	a	0.0	0.0	0.0	0.0	0.0	57.0	152.0	243.7	124.2	2.0	0.0	0.0	578.9	267 (1973)	12 (1974)	253.6	01 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	2.0	5.6	7.1	3.1	0.2	0.0	0.0	18.0				
Danta	12	a	0.0	0.0	0.0	0.0	0.0	69.8	150.6	153.7	112.9	16.2	0.0	0.0	503.2	249 (1973)	36 (1981)	197.0	01 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	2.6	6.4	6.8	3.9	0.6	0.0	0.0	20.3				
Kadambari	12	a	0.0	0.0	0.0	0.0	0.0	64.3	197.0	206.7	192.7	6.7	0.0	0.0	667.4	308 (1973)	33 (1974)	620.0	01 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	3.8	8.8	10.0	3.6	0.4	0.0	0.0	26.6				
Ora	11	a	0.0	0.0	0.0	0.0	0.0	68.7	114.8	181.8	148.9	17.0	0.0	0.0	531.2	293 (1973)	37 (1974)	268.0	01 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	2.3	5.0	6.2	4.0	0.5	0.0	0.0	18.0				
Pindwara	38	a	4.5	1.1	4.0	2.8	11.8	60.6	228.0	225.7	142.0	9.4	5.6	2.0	697.5	303 (1973)	31 (1987)	635.0	01 Sep 1973
		b	0.3	0.1	0.1	0.2	0.8	3.7	10.3	10.8	5.0	0.8	0.5	0.1	32.7				

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
SIROHI

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Poidra	11	a	0.0	0.0	0.0	0.0	0.0	76.9	109.6	144.1	112.0	7.6	0.0	0.0	450.2	249	44	164.0	02 Sep 1972
		b	0.0	0.0	0.0	0.0	0.0	2.6	5.3	6.2	3.1	0.3	0.0	0.0	17.5	(1973)	(1974)		
Reodar	39	a	2.7	1.4	1.9	2.1	6.9	52.6	211.1	223.0	108.4	11.5	10.5	1.3	633.4	236	09	317.0	08 Sep 1992
		b	0.3	0.2	0.1	0.1	0.4	2.9	9.2	8.9	4.1	0.7	0.5	0.1	27.5	(1973)	(1987)		
Sainwara (Hydro)	15	a	2.3	3.5	1.0	0.0	3.9	63.0	208.4	170.0	86.0	1.9	1.3	0.4	541.7	200	27	144.2	01 Aug 1968
		b	0.1	0.1	0.3	0.0	0.2	2.5	9.9	8.7	4.8	0.2	0.2	0.1	27.1	(1961)	(1962)		
Sarup Sagar	12	a	0.0	0.0	0.0	0.0	0.0	39.4	171.9	159.6	36.5	6.7	0.0	0.0	414.1	209	36	107.0	15 Aug 1973
		b	0.0	0.0	0.0	0.0	0.0	2.8	8.1	7.4	2.3	0.4	0.0	0.0	21.0	(1973)	(1974)		
Sheoganj	45	a	3.4	0.8	4.2	2.1	7.0	45.0	227.1	174.4	97.0	9.2	5.4	2.2	577.8	291	32	315.4	02 Sep 1973
		b	0.4	0.1	0.1	0.2	0.6	2.8	7.7	7.9	4.4	0.6	0.4	0.2	25.4	(1973)	(1969)		
Sirohi	44	a	3.4	1.7	5.1	2.0	13.5	59.7	216.3	188.8	114.0	12.0	6.9	1.4	624.8	252	31	362.7	14 Aug 1941
		b	0.3	0.2	0.1	0.2	0.5	3.1	7.8	7.7	4.3	0.8	0.5	0.2	25.7	(1973)	(1987)		
Takra	11	a	0.0	0.0	0.0	0.0	0.0	40.9	174.2	205.8	59.5	0.0	0.0	0.0	480.4	177	27	200.0	30 Jul 1971
		b	0.0	0.0	0.0	0.0	0.0	2.3	5.0	6.5	2.9	0.0	0.0	0.0	16.7	(1975)	(1974)		
West Banas	12	a	0.0	0.0	0.0	0.0	0.0	70.8	170.9	203.7	145.3	10.5	0.0	0.0	601.2	239	41	419.0	01 Sep 1973
		b	0.0	0.0	0.0	0.0	0.0	3.5	8.1	8.6	4.3	0.6	0.0	0.0	25.1	(1973)	(1974)		
Sirohi (District)		a	1.2	0.7	1.1	0.8	3.1	59.2	177.6	188.1	112.7	9.3	2.3	0.6	556.7	274	32		
		b	0.1	0.1	0.1	0.1	0.2	2.9	7.5	8.0	3.9	0.5	0.2	0.1	23.7	(1973)	(1987)		
HILL STATIONS																			
Abu (Obsy)	47	a	5.4	1.9	4.2	4.0	9.9	88.7	621.9	574.8	244.0	16.9	16.3	2.4	1590.4	210	26	635.0	01 Sep 1973
		b	0.3	0.2	0.2	0.2	0.6	4.6	16.0	17.3	6.9	1.0	0.7	0.3	48.3	(1973)	(1974)		
Mount Abu	35	a	6.7	3.2	3.7	4.4	15.0	116.0	393.5	659.2	242.7	15.5	14.1	3.0	1677.0	216	22	700.0	08 Sep 1992
		b	0.4	0.4	0.1	0.2	1.0	5.7	16.8	18.8	7.2	0.9	0.8	0.3	52.6	(1973)	(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 up to 2006.
** Years of occurrence given in brackets.
Hill stations not considered for sub-divisional mean.

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

Range in mm	No. of years	Range in mm	No. of years
101 – 200	1	901 – 1000	2
201 – 300	1	1001 – 1100	3
301 – 400	7	1101 – 1200	0
401 – 500	12	1201 – 1300	0
501 – 600	5	1301 – 1400	1
601 – 700	5	1401 – 1500	0
701 – 800	2	1501 – 1600	1
801 – 900	4		

(Data available for 44 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(MOUNT ABU)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	20.0	5.7	29.0	2006 Jan 30	-5.7	1991 Jan 03	54	38
February	21.7	8.0	33.5	1991 Feb 27	-5.8	2005 Feb 20	47	31
March	25.9	12.8	34.6	1991 Mar 30	0.6	1990 Mar 03	40	27
April	30.0	17.4	38.8	1999 Apr 06	4.4	1994 Apr 08	33	22
May	31.9	19.8	39.2	1985 May 15	10.0	1986 May 30	35	28
June	29.3	19.0	38.4	1991 Jun 07	10.0	1994 Jun 12	74	52
July	24.8	18.3	33.8	1976 Jul 06	10.0	2006 Jul 06	93	80
August	23.1	17.6	31.6	2002 Aug 03	10.0	2001 Aug 31	95	87
September	25.4	16.9	33.0	1971 Sep 27	6.4	1994 Sep 30	81	71
October	27.5	14.4	33.6	2002 Oct 09	3.4	1994 Oct 21	56	42
November	24.4	10.2	30.0	1977 Nov 01 2007 Nov 06 2008 Nov 09	-0.4	1992 Nov 26	57	41
December	21.6	6.6	31.4	1978 Dec 13	-7.4	1994 Dec 12	61	44
Annual	25.5	13.9					61	47

TABLE - 4
Mean Wind Speed in km/hr.
(MOUNT ABU)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.6	5.0	5.6	7.0	8.0	9.1	8.8	7.5	5.4	3.9	3.5	3.2	5.9

TABLE - 5
Special Weather Phenomena
(MOUNT ABU)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.1	0.2	0.2	0.9	1.2	1.3	1.2	0.6	0.2	0.0	0.1	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	0.1	0.0	0.1	0.1	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	1.2
Fog	0.3	0.3	0.2	0.0	0.3	3.5	5.5	6.0	2.3	0.2	0.0	0.1	18.7

TONK DISTRICT

The climate of this district is generally dry except in the short southwest monsoon season. The year may be divided into four seasons. The period from December to February is the cold season. The hot season which commences in March extends to about the third week of June, when the southwest monsoon starts. This season continues till the middle of September. The period from mid-September to November is the post monsoon season.

RAINFALL

Records of rainfall in the district are available for nine raingauge stations, for period ranging from 15 to 45 years. The details of rainfall at these stations and for the district as a whole are given in Tables 1 and 2. The average annual rainfall for the district is 609.9 mm. The rainfall is generally uniform throughout the district. About 93% of the annual rainfall is received during the period June to September, July and August being the rainiest months. There is not large variation in the rainfall from year to year. In the fifty year period from 1951 to 2000 the annual rainfall in the district was the highest in 1971 when it amounted to 155% of the normal, whereas 1951 was the year with the lowest rainfall which amounted to only 49% of the normal. Considering the district as a whole, there were 12 years out of the fifty, for which the rainfall was less than 80% of the normal wherein two consecutive years of such a low rainfall occurred on two occasions. It will be seen from Table 2 that in 38 years out of 45, the annual rainfall was between 301 mm and 800 mm.

On an average there are 30 rainy days (i.e. days with rainfall of 2,5 mm or more) in a year the district. There is not much variation in the number of rainy days in the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 312.0 mm at Mashi Tank on 29 June 1971.

TEMPERATURE

There is one meteorological observatory at Tonk in the district. The meteorological data of this station may be taken as quite representative of the climatic condition in the district as a whole. The description of climate which follows is based on the data of this observatory. The period from March to May is one of steady increase in temperature. The months May and June constitute the hottest part of the year, when the mean daily maximum temperature is at about 41°C and the mean daily minimum is at about 27°C. With the advance of the southwest monsoon over the district after the middle of June, the temperatures decrease but the relief from the heat is not marked because of the added discomfort from increase in humidity brought in by southwest monsoon air. After the withdrawal of the monsoon by mid September, day temperature increases and in October a secondary maxima is reached. However the nights become progressively cooler. After October there is an appreciable fall in both day and night temperatures till January, which is the coldest month of the year with the mean daily maximum temperature at about 23.6°C and the mean daily minimum temperature at about 6.9°C. In association with cold waves in the wake of western disturbances, temperatures may sometimes go down to a degree below the freezing point of water, especially in January and February and frost may occur.

The highest maximum temperature ever recorded at Tonk was 49.7°C on 31 May 1969. The lowest minimum temperature ever recorded at Tonk was –0.8°C on 14 January 1967.

HUMIDITY

Dry air prevails over the district except in the southwest monsoon months July and August when it is about 75%. In summer months, particularly in the afternoons the relative humiditiy is very low about 35%.

CLOUDINESS

During the southwest monsoon season skies are moderately to heavily clouded generally and overcast on some days. In the rest of the year clear or lightly clouded skies prevail. But on a few days in the winter season skies become cloudy when the district is affected by passing western disturbances.

WINDS

Winds are generally light to moderate with some strengthening in force in the later part of summer and early monsoon period. Westerly winds prevail in the summer and southwest monsoon season. In the post monsoon and winter months winds are mostly from direction between west and northwest.

SPECIAL WEATHER PHENOMENA

Some of the depressions which originate in the Bay of Bengal during the southwest monsoon season and move across the central parts of the country reach the district during their later stages and cause heavy rain and strong winds. Thunderstorms occur throughout the year, but they are more frequent during the summer and monsoon months. Dust storms occur in the summer months. Occasional fog occurs in winter months.

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

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
TONK

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Deoli/Doni	37	a	5.5	4.8	2.9	2.4	5.8	55.8	209.0	211.1	79.1	9.0	6.9	3.8	596.1	171	58	182.0	14 Aug 1973
		b	0.5	0.3	0.3	0.2	0.6	3.0	9.8	10.3	4.5	0.5	0.4	0.2	30.6	(1973)	(1987)		
Malpura	44	a	6.2	5.3	3.3	3.4	7.2	51.3	180.6	197.0	79.8	16.6	2.9	2.4	556.0	173	31	233.4	04 Aug 1985
		b	0.6	0.5	0.4	0.3	0.9	2.8	9.0	9.2	4.3	0.8	0.3	0.3	29.4	(1971)	(1960)		
Mashi Tank	15	a	0.0	4.9	0.0	0.0	9.7	80.6	245.0	207.7	58.9	11.5	2.3	0.0	620.6	166	49	312.0	29 Jun 1971
		b	0.0	0.3	0.0	0.0	0.3	2.8	10.5	8.8	2.6	0.3	0.1	0.0	25.7	(1971)	(1993)		
Niwai	44	a	5.9	6.8	2.7	4.1	7.8	50.7	238.5	222.5	81.4	12.3	2.5	2.7	637.9	179	42	204.0	29 Jun 1971
		b	0.4	0.7	0.3	0.3	0.6	2.8	9.8	10.6	4.4	0.6	0.2	0.2	30.9	(1956)	(1965)		
Todaraising	43	a	5.3	5.4	1.7	2.7	10.5	54.1	209.3	217.4	70.3	16.4	5.2	1.9	600.2	146	47	212.2	22 Jul 1991
		b	0.4	0.5	0.2	0.3	0.8	3.2	9.7	9.8	4.2	0.8	0.4	0.2	30.5	(1976)	(1987)		
Tonk	45	a	5.2	5.8	3.3	2.7	10.8	59.4	221.3	221.6	86.8	14.4	5.5	3.9	640.7	166	40	246.4	18 Aug 1945
		b	0.5	0.6	0.3	0.2	0.8	3.5	9.5	10.4	4.6	0.8	0.4	0.4	32.0	(1956)	(1987)		
Tonk (Obsy)	38	a	3.1	5.8	2.9	2.1	15.9	62.4	251.7	217.2	78.0	10.1	6.7	2.8	658.7	155	53	267.2	20 Jul 1981
		b	0.4	0.5	0.4	0.3	1.2	3.3	10.2	10.6	4.1	0.7	0.4	0.4	32.5	(1971)	(1972)		
Tordi Sagar	15	a	0.0	2.4	0.0	0.0	2.0	92.2	186.3	183.1	89.8	12.7	0.0	0.0	568.5	171	47	214.0	15 Jul 1979
		b	0.0	0.1	0.0	0.0	0.2	4.2	8.7	9.0	3.7	0.5	0.0	0.0	26.4	(1971)	(1972)		
Uniara/Aligarh	31	a	6.1	4.5	1.9	2.8	6.3	61.5	228.9	219.5	60.9	10.8	5.3	2.8	611.3	190	41	279.4	14 Sep 1943
		b	0.6	0.4	0.3	0.2	0.7	3.3	9.6	10.5	3.6	0.6	0.3	0.1	30.2	(1975)	(1984)		
Tonk (District)		a	4.1	5.1	2.1	2.2	8.4	63.1	219.0	210.8	76.1	12.6	4.1	2.3	609.9	155	49		
		b	0.4	0.4	0.2	0.2	0.7	3.2	9.6	9.9	4.0	0.6	0.3	0.2	29.7	(1971)	(1951)		

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	6	701 – 800	8
401 – 500	7	801 – 900	3
501 – 600	4	901 – 1000	4
601 – 700	13		

(Data available for 45 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(TONK)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	23.6	6.9	32.0	1995 Jan 28	-0.8	1967 Jan 14	73	51
February	26.5	9.7	35.8	2003 Feb 28	-0.7	1974 Feb 07	66	43
March	32.8	15.5	43.6	1999 Mar 30	5.2	1972 Mar 01	54	38
April	38.3	22.3	45.1	1973 Apr 28	10.2	1997 Apr 03	45	34
May	41.4	26.5	49.7	1969 May 31	16.3	1979 May 04	47	32
June	40.4	28.5	46.1	1966 Jun 08	18.0	1996 Jun 04	60	43
July	35.2	26.5	44.4	1995 Jul 03	15.2	2001 Jul 06	77	66
August	32.9	25.4	42.1	1972 Aug 04	17.0	1996 Aug 04	84	74
September	34.2	24.1	40.9	1974 Sep 17	14.4	1972 Sep 24	77	61
October	34.9	19.3	40.7	1972 Oct 14	9.8	1964 Oct 26	64	48
November	30.0	13.0	38.4	2003 Nov 17	3.3	1970 Nov 29	66	52
December	25.1	8.0	32.0	2000 Dec 05	0.3	1968 Dec 27	74	56
Annual	32.9	18.8					66	50

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.5	5.6	6.4	7.5	9.9	11.7	10.1	8.5	7.5	4.8	3.9	4.4	7.1

TABLE - 5
Special Weather Phenomena
(TONK)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.9	0.6	0.4	1.8	3.2	4.5	4.4	2.9	0.4	0.0	0.1	19.4
Hail	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.0	0.0	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Fog	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3

UDAIPUR DISTRICT

The district has on the whole a dry climate, with the hot season milder than in the Rajasthan desert areas to the northwest of the district. The cold season is from December to February and is followed by the hot season which lasts till about the middle of June. Mid June to mid September constitutes the southwest monsoon season. The post monsoon season from the middle of September to the end of November is one of transition from monsoon to winter conditions.

RAINFALL

The district has a network of twenty raingauge stations, for period ranging from 10 to 45 years. Tables 1 and 2 give the details of rainfall at these stations and for the district as a whole. The average annual rainfall in the district as a whole is 697.2 mm. Naglia gets annual rainfall of 929.6 mm, while the annual rainfall at Sarara/Salara is only 550.6 mm. The rainfall during the months June to September constitutes about 93% of the annual rainfall. July and August are the months with the maximum rainfall which is about one third of the annual rainfall. The variation in the annual rainfall from year to year is not large. In the fifty year period 1951 to 2000, the highest annual rainfall amounting to 206% of the normal occurred in 1973 in the district. 1987 was the year with the lowest rainfall which was only 50% of the normal. In the same fifty year period the rainfall was less than 80% of the normal in 14 years. Occasions of two consecutive years of rainfall less than 80% of the normal occurred twice in the fifty year period. It will be seen from Table 2 that in 35 years out of 49, the annual rainfall in the district was between 501 mm and 900 mm.

On an average there are 33 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 27 at Sarara/Salara to 43 at Bikrani Hydro.

The heaviest rainfall in 24 hours recorded at any station in the district was 322.6 mm at Bikrani Hydro on 01 September 1973.

TEMPERATURE

There are two meteorological observatories in the district, one at Udaipur and other at Udaipur City. The data of these stations can be taken as representative of the conditions in the district as a whole. The winter season sets in after the middle of November, when both day and night temperatures begin to drop steadily. January is generally the coldest month with the mean daily maximum temperature at about 24.2°C and the mean daily minimum temperature at about 7.1°C. The minimum temperature sometimes reaches the freezing point of water and frost may occur occasionally. The diurnal range of temperature is large particularly in winter and summer months. Both day and night temperatures rise rather rapidly after the end of February till May which is the hottest month of the year. Night temperatures are warmer in June also. The mean daily maximum temperature in that month is at about 39°C and the mean daily minimum temperature is at about 25°C. The summer is milder than in the desert regions of Rajasthan. By the third or fourth week of June when the southwest monsoon reaches the district, temperatures drop appreciably. After the withdrawal of the southwest monsoon by about middle of September, there is a slight increase in day temperatures although the night temperatures begin to drop. From November onwards the day temperatures also decrease. The highest maximum temperature ever recorded at Udaipur Dabok (A) and Udaipur City was 46.4°C on 31 May 1983 and 44.6°C on 27 May 1973 respectively and the lowest minimum was –1.3°C on 01 January 1991 and 22 February 1984 and 0.4°C on 07 February 1974 at Udaipur Dabok (A) and Udaipur City respectively.

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HUMIDITY

Except in the brief southwest monsoon season when the relative humidity is about 70% or more, the air is very dry. The summer months are the driest part of the year when the relative humidity goes down to 20%-25% particularly in the afternoons at Udaipur Dabok (A) and upto 25%-35% at Udaipur City.

CLOUDINESS

In the southwest monsoon season especially in July and August skies are often heavily clouded to overcast. During the rest of the year skies are generally clear or lightly clouded. But in the winter season which is generally marked by clear bright weather, brief spells of cloudy weather, occur in association with the passage of western disturbances across north India.

WINDS

Winds are generally light to moderate with some strengthening in force in the latter half of summer and the southwest monsoon season. In the period from May to September winds blow from directions southwest and west. In the post monsoon season and winter season the winds are predominantly from directions northwest and northeast. Thereafter northwesterly and westerly predominate in late winter and early summer.

SPECIAL WEATHER PHENOMENA

Some of the monsoon depressions in July and August which form at the head of the Bay of Bengal and move in a westerly or west northwesterly direction, reach the district and its neighbourhood towards the later stages of their movement and cause gusty winds and widespread heavy rainfall. Thunderstorms occur throughout the year, mainly during southwest monsoon season. Duststorms occur early summer season. Fog occurs during post monsoon and winter months.

Tables 3, 4, 5 and 3(a), 4(a) and 5(a) give the temperature and relative humidity, mean wind speed and special weather phenomena respectively for Udaipur Dabok (A) and Udaipur City observatories.

TABLE – 1
NORMALS AND EXTREMES OF RAINFALL
UDAIPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST / LOWEST ANNUAL RAINFALL AS % OF NORMAL & YEARS **		HEAVIEST RAINFALL in 24 HOURS * Amount (mm)	HEAVIEST RAINFALL in 24 HOURS * Date
Bikrani (Hydro)	36	a	4.2	1.9	3.0	6.3	8.0	98.4	317.3	283.6	161.5	15.2	4.1	2.8	906.3	216 (1973)	43 (1966)	322.6	01 Sep 1973
		b	0.5	0.2	0.3	0.3	0.6	4.6	13.7	13.1	7.9	1.1	0.4	0.2	42.9				
Dhariawad	28	a	3.5	2.5	1.1	2.9	5.5	118.7	258.2	324.7	119.3	22.4	20.2	1.7	880.7	236 (1973)	56 (1995)	308.8	06 Sep 1973
		b	0.3	0.3	0.1	0.2	0.4	5.2	12.1	12.9	5.2	1.3	0.8	0.1	38.9				
Jaisamand	14	a	2.7	3.9	0.0	0.0	7.4	81.9	226.2	264.8	121.3	10.8	6.9	0.0	725.9	236 (1973)	47 (1981)	206.8	07 Sep 1973
		b	0.2	0.3	0.0	0.0	0.4	3.8	9.2	10.7	4.8	0.8	0.2	0.0	30.4				
Jhadol (Hydro)	27	a	1.5	1.2	7.5	0.7	6.4	75.0	237.5	189.2	126.0	18.0	1.1	1.3	665.4	233 (1973)	52 (1951)	284.0	01 Sep 1973
		b	0.1	0.2	0.3	0.1	0.6	4.0	10.4	9.8	4.8	1.2	0.1	0.1	31.7				
Kherwara	45	a	1.9	0.6	3.8	2.7	5.3	68.3	212.8	195.2	113.1	13.7	9.8	1.2	628.4	178 (1953)	41 (1987)	221.2	05 Jul 1930
		b	0.2	0.0	0.2	0.2	0.3	3.3	9.9	9.1	4.9	0.8	0.4	0.1	29.4				
Kotra	38	a	2.6	1.5	2.7	1.2	7.3	77.1	298.0	272.5	124.2	13.0	9.3	1.3	810.7	248 (1973)	24 (1987)	252.0	01 Sep 1973
		b	0.2	0.1	0.1	0.1	0.5	3.7	11.9	12.2	5.8	1.1	0.6	0.1	36.4				
Kotra Can-tonment (Hydro)	18	a	1.8	1.4	1.2	0.4	3.9	52.4	301.4	232.9	100.3	13.3	2.2	1.2	712.4	213 (1959)	09 (1966)	239.8	17 Jul 1959
		b	0.2	0.1	0.2	0.1	0.4	3.5	11.9	12.8	5.6	0.9	0.2	0.1	36.0				
Lasadiya	10	a	1.9	0.2	0.8	0.2	6.6	41.1	256.4	224.7	189.0	16.4	2.3	0.0	739.6	148 (1961)	56 (1957)	222.5	10 Jul 1958
		b	0.2	0.0	0.1	0.0	0.4	2.6	10.9	9.2	6.2	1.1	0.2	0.0	30.9				
Maholi/ Mavli	38	a	3.2	2.6	3.1	2.3	6.7	68.9	199.2	194.5	71.8	13.4	14.1	4.0	583.8	204 (1973)	49 (1972)	228.0	30 Jun 1983
		b	0.4	0.3	0.1	0.2	0.6	4.1	8.9	9.6	4.6	1.0	0.8	0.2	30.8				
Naglia	12	a	0.0	0.8	0.0	0.0	0.9	115.5	289.4	330.2	150.8	19.2	22.2	0.6	929.6	173 (1973)	37 (1981)	234.6	30 Jul 1971
		b	0.0	0.2	0.0	0.0	0.1	4.7	12.3	12.1	5.8	1.1	0.7	0.1	37.1				

TABLE – 1 (Contd….)
NORMALS AND EXTREMES OF RAINFALL
UDAIPUR

STATION	No. of Years of Data		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	HIGHEST	LOWEST	HEAVIEST RAINFALL in 24 HOURS *	
																ANNUAL RAINFALL AS % OF NORMAL & YEARS **		Amount (mm)	Date
Phalasiya/ Jhadol	35	a	3.2	1.1	4.3	1.5	8.1	67.4	247.6	193.9	103.5	10.9	4.8	1.2	647.5	228 (1973)	49 (1987)	282.0	01 Sep 1973
		b	0.3	0.1	0.1	0.1	0.5	4.0	11.2	9.6	4.9	0.7	0.3	0.1	31.9				
Saidam (Hydro)	18	a	1.4	2.8	0.0	7.6	10.1	69.0	196.4	187.2	76.2	27.3	0.0	1.6	579.6	176 (1990)	67 (1999)	132.6	25 Jul 1986
		b	0.2	0.2	0.0	1.0	0.8	3.9	9.3	10.3	4.7	1.4	0.0	0.2	32.0				
Saira/Gogunda	37	a	6.2	1.9	4.5	2.9	10.1	71.5	218.9	205.8	94.4	12.3	10.4	3.3	642.2	245 (1973)	41 (1960)	188.0	01 Aug 1968
		b	0.5	0.2	0.2	0.2	0.9	3.8	10.4	10.6	5.1	0.8	0.7	0.2	33.6				
Salumber	39	a	2.3	2.4	4.0	1.2	6.5	81.5	215.2	241.0	130.7	11.9	13.8	2.8	713.3	218 (1973)	49 (1965)	229.6	08 Sep 1973
		b	0.2	0.2	0.2	0.2	0.4	3.9	9.6	10.8	5.2	0.8	0.6	0.1	32.2				
Sarara/Salara	45	a	2.7	1.4	2.2	0.7	6.2	60.1	165.6	175.9	108.1	16.8	9.0	1.9	550.6	190 (1973)	42 (1951)	214.1	24 Aug 1946
		b	0.2	0.2	0.1	0.1	0.4	3.4	8.3	8.3	4.8	0.9	0.4	0.2	27.3				
Tarfal (Hydro)	22	a	3.2	1.1	8.7	1.0	8.3	82.6	240.5	242.4	158.2	23.5	4.3	2.5	776.3	217 (1973)	23 (1965)	210.0	02 Sep 1973
		b	0.2	0.1	0.4	0.1	0.8	3.8	9.6	10.6	6.2	1.9	0.4	0.2	34.3				
Udaipur	36	a	4.4	1.7	6.5	3.2	9.0	79.0	190.6	196.2	98.5	15.3	12.5	2.5	619.4	180 (1973)	33 (1987)	170.0	30 Jun 1983
		b	0.3	0.2	0.2	0.3	0.9	4.3	9.3	9.8	5.6	0.8	0.8	0.2	32.7				
Udaipur City (Obsy)	39	a	5.8	2.1	7.5	3.4	10.0	87.3	186.0	165.1	100.2	20.1	10.7	2.8	601.0	188 (1983)	09 (1986)	292.0	30 Jun 1983
		b	0.4	0.3	0.3	0.3	0.9	4.2	8.8	8.7	5.3	1.1	0.6	0.3	31.2				
Udaipur Dabok (A) (Obsy)	36	a	3.0	2.5	6.2	5.6	15.9	84.9	186.6	202.5	96.4	16.3	14.3	3.7	637.9	196 (1973)	47 (1972)	225.8	30 Jun 1983
		b	0.2	0.4	0.3	0.5	1.2	4.6	9.1	10.0	5.5	1.3	0.8	0.3	34.2				
Vallabhgarh	34	a	2.9	1.8	5.1	1.3	8.2	66.1	182.0	206.1	96.6	10.8	11.0	1.8	593.7	238 (1973)	50 (1972)	185.0	30 Jun 1983
		b	0.3	0.1	0.2	0.2	0.7	3.4	8.7	9.4	4.8	0.7	0.6	0.1	29.2				
Udaipur (District)		a	2.9	1.8	3.6	2.3	7.5	77.3	231.3	226.4	117.0	16.0	9.2	1.9	697.2	206 (1973)	50 (1987)		
		b	0.3	0.2	0.2	0.2	0.6	3.9	10.3	10.5	5.4	1.0	0.5	0.1	33.2				

a: Normal rainfall in mm.
b: Average number of rainy days (i.e. days with rainfall of 2.5 mm or more)
* Based on all available data upto 2006.
** Years of occurrence given in brackets.

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

Range in mm	No. of years	Range in mm	No. of years
301 – 400	4	901 – 1000	3
401 – 500	5	1001 – 1100	1
501 – 600	10	1101 – 1200	0
601 – 700	10	1201 – 1300	0
701 – 800	8	1301 – 1400	0
801 – 900	7	1401 – 1500	1

(Data available for 49 years only)

TABLE - 3
Normals of Temperature and Relative Humidity
(UDAIPUR/DABOK (A))

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.2	7.1	33.3	1991 Jan 29	-1.3	1991 Jan 01	65	33
February	26.9	9.3	39.2	1993 Feb 15	-1.3	1984 Feb 22	55	28
March	32.3	14.3	42.0	1996 Mar 28	5.1	1982 Mar 02	41	20
April	37.2	20.3	44.0	1996 Apr 29	10.0	1989 Apr 05	34	19
May	39.5	25.0	46.4	1983 May 31	15.2	1979 May 03	41	24
June	37.1	26.0	46.2	1995 Jun 01	19.0	1997 Jun 04 2009 Jun 16	64	44
July	31.9	24.5	41.4	2009 Jul 07	20.0	2009 Jul 10	79	68
August	30.0	23.1	38.4	1987 Aug 18	19.0	1968 Aug 29	84	75
September	32.3	21.4	38.8	1987 Sep 26	13.4	1972 Sep 26	76	58
October	33.6	16.9	39.4	2000 Oct 21	9.4	1983 Oct 30	59	34
November	29.4	11.8	36.6	2001 Nov 02	3.4	1988 Nov 30	60	35
December	25.3	7.9	34.0	2003 Dec 09	-0.9	1990 Dec 31	67	37
Annual	31.6	17.3					60	40

TABLE - 4
Mean Wind Speed in km/hr.
(UDAIPUR/DABOK (A))

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.6	6.4	7.3	8.2	10.7	12.9	11.0	9.0	6.8	5.2	4.5	4.7	7.7

TABLE - 5
Special Weather Phenomena
(UDAIPUR/DABOK (A))

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.5	0.7	0.7	2.7	4.9	5.1	5.2	3.2	1.3	0.3	0.1	24.8
Hail	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3
Dust storm	0.0	0.0	0.0	0.1	0.5	0.6	0.4	0.0	0.0	0.1	0.0	0.0	1.7
Fog	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.7

TABLE – 3(a)
Normals of Temperature and Relative Humidity
(UDAIPUR CITY)

MONTH	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity (%)	
	^{0}C	^{0}C	^{0}C	Date	^{0}C	Date	0830 IST	1730 IST
January	24.2	7.1	30.8	1965 Jan 13	0.9	1962 Jan 22	66	41
February	27.1	9.6	36.7	1953,Feb 28	0.4	1974 Feb 07	59	34
March	32.2	15.0	39.1	1984 Mar 31	5.2	1983 Mar 02	46	28
April	36.4	20.4	44.4	1958 Apr 27	10.6	1955 Apr 15	41	29
May	38.4	23.9	44.6	1973 May 27	16.3	1960 May 09	45	33
June	36.1	24.6	43.4	1973 Jun 05	16.7	1974 Jun 09	66	51
July	31.1	23.0	40.0	1968 Jul 03	18.6	1983 Jul 28	79	70
August	29.5	22.1	35.6	1970 Aug 05	15.2	1978 Aug 05	82	75
September	31.5	20.6	37.8	1974 Sep 21	11.8	1976 Sep 21	74	63
October	33.1	16.4	37.7	1980 Oct 29 1982 Oct 13	8.6	1983 Oct 29	62	43
November	29.6	11.7	36.0	2006 Nov 18	3.8	1974 Nov 29	62	45
December	25.9	8.1	33.8	1980 Dec 03	0.6	1950 Dec 29	67	45
Annual	31.3	16.9					62	46

TABLE – 4(a)
Mean Wind Speed in km/hr.
(UDAIPUR CITY)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.6	2.2	2.9	3.8	5.0	6.4	5.0	3.9	2.9	1.5	1.1	1.3	3.1

TABLE – 5(a)
Special Weather Phenomena
(UDAIPUR CITY)

Mean No. of Days With	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.0	0.2	0.8	0.5	2.2	3.8	4.6	3.0	3.0	0.6	0.1	0.2	19.0
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	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Fog	0.0	0.2	0..0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.5