



Copy No 5

CLIMATE OF UTTAR PRADESH



GOVERNMENT OF INDIA
INDIA METEOROLOGICAL DEPARTMENT

1989

©



PDGM. 123 (N)

300-1989 (DSK.II)

CLIMATE
OF
UTTAR PRADESH

Copy No 5



PUBLISHER: Controller of Publication, Civil Lines, DELHI-110054.

PRINTER: Office of the Additional Director General of Meteorology (Research).

PUNE-411005

GOVERNMENT OF INDIA
INDIA METEOROLOGICAL DEPARTMENT

1989

Price: Rs. 317.00 (In land) or
£37.00 or \$114.00 (Foreign)

PHYSICAL FEATURES

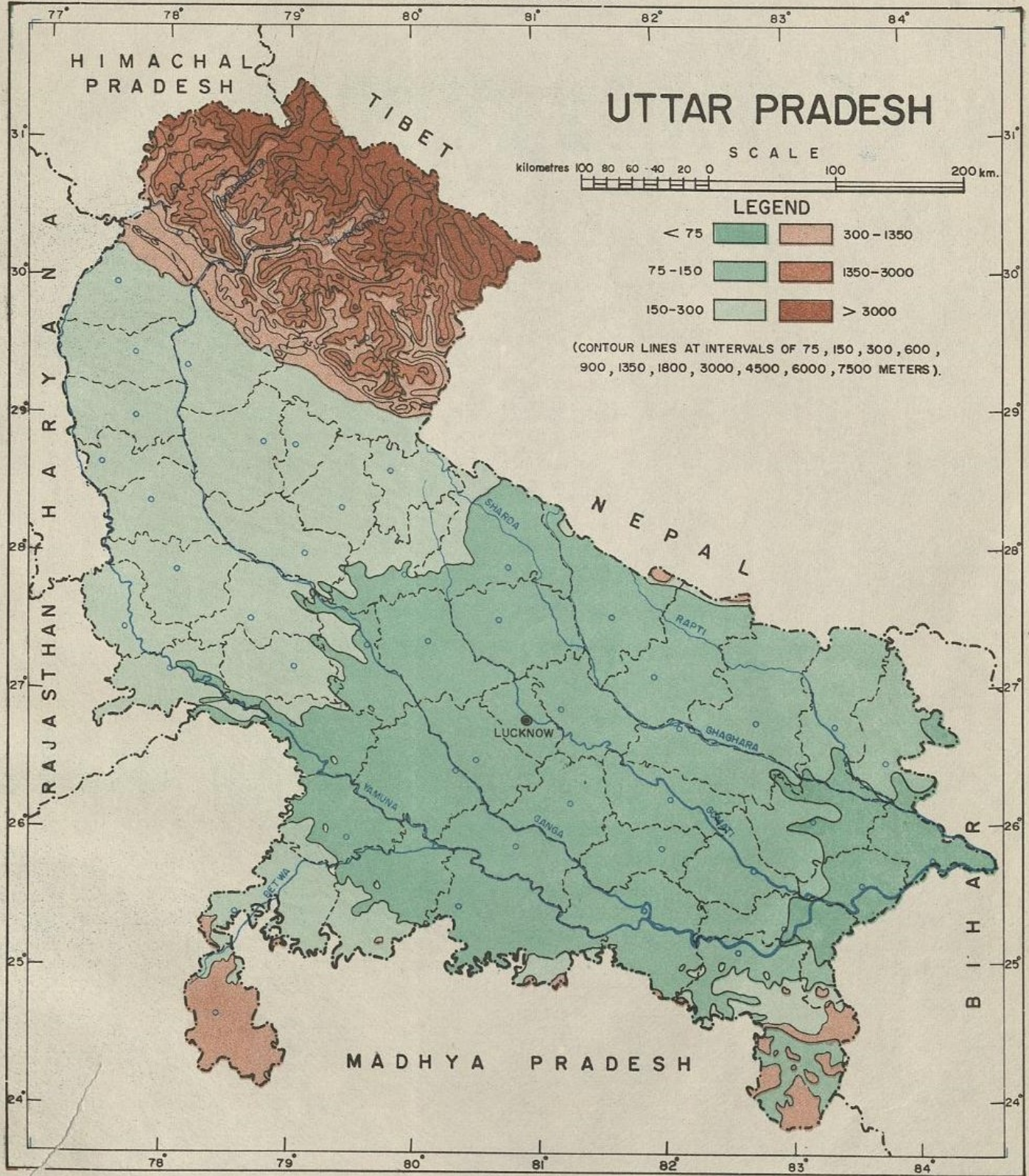


FIG. I (a)

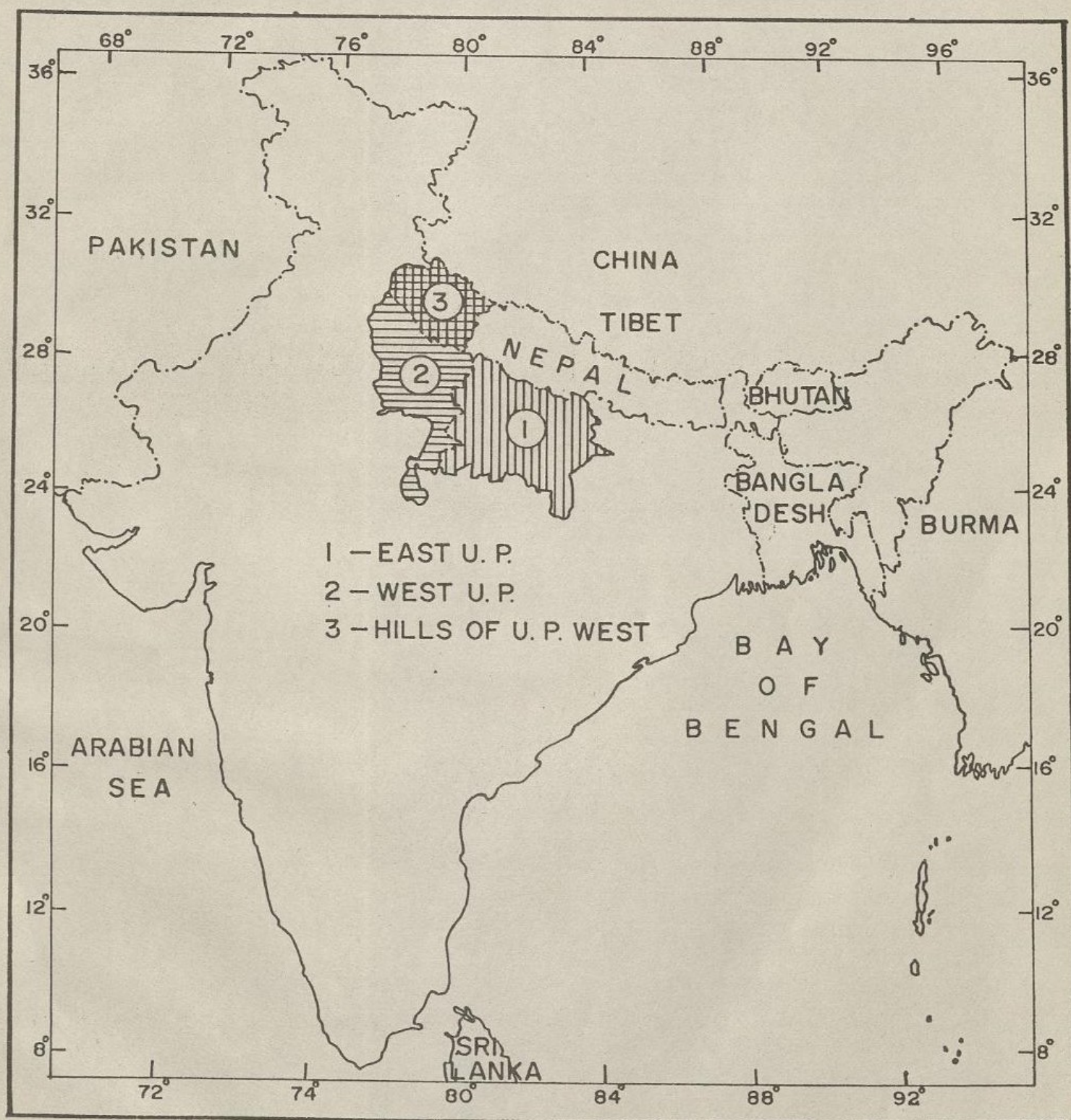


FIG.-1(b)

F O R E W O R D

The importance of Meteorology for the economic and social benefits of man is being increasingly realised all over the world. In recent years the various multipurpose projects undertaken by the Central and State Governments as well as Agriculture, Aviation, Shipping, Industrial, Ecological and other interests very often ask this Department for climatological information pertaining to different regions of the country for planning and executing various projects with a view to derive maximum advantage of favourable meteorological conditions. Keeping these requirements in view, it was decided to publish Climatological Summaries for each State. The seventh issue in the series 'State Climatological Summaries' is the "Climate of Uttar Pradesh".

The preparation of the Summary and maps was done in the Section dealing with Revision of Climatological Publications under the charge of Shri M.R. Das, Director and under the overall supervision of Shri Nootan Das, Deputy Director General of Meteorology looking after the duties of Additional Director General of Meteorology (Research), Pune.

New Delhi

July, 1989

(S.M.KULSHRESTHA)

Director General of Meteorology

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

The meteorological conditions of the plains of Uttar Pradesh State as a whole are described in the first chapter followed, by detailed description of climate of each district. In the second chapter, the above conditions for the "Hills of Uttar Pradesh-West" has been dealt separately due to hilly nature of the complete subdivision followed by detailed description of climate of each district. However, climatological aspects of cyclonic storms and depressions and other weather phenomena affecting the state as a whole have also been discussed in the third chapter. The district summaries as they are existent on 1.1.1980 are grouped under the respective meteorological subdivisions and arranged alphabetically.

The normals of meteorological elements used for describing the climate are generally based on data for the period 1931 to 1960 except in the case of rainfall and for all the elements in case of some stations where data of recent years were only available. For rainfall, normals using all available data from 1901 to 1950 have been used and for the stations which are not having such rainfall normals, normals prepared using recent rainfall data have been utilised. The extreme values of temperature and rainfall presented in the summary are based on data upto 1985 and 1980 respectively.

.....

TABLE OF CONTENTS

	<u>Page No.</u>
General Description for Climate of Uttar Pradesh	1
A. I. <u>CLIMATE OF PLAINS OF UTTAR PRADESH</u>	
Climate	7
Atmospheric Sea Level Pressure and Winds	7
Temperature	8
Humidity	9
Cloudiness	9
Rainfall	10
Rainfall Variability	11
Droughts and Excessive Rainfall	11
Consolidated Tables (1 to 7)	27
II. <u>DISTRICT CLIMATOLOGICAL SUMMARIES</u>	
Meteorological Subdivisions:-	
<u>PLAINS OF U.P. WEST</u>	
<u>Districts</u>	
1. Agra	55
2. Aligarh	61
3. Bareilly	67
4. Bijnor	74
5. Budaun	80
6. Bulandshahr	84
7. Etah	89
8. Etawah	94
9. Farrukhabad	99
10. Jalaun	103
11. Jhansi	109
12. Mainpuri	116
13. Mathura	122
14. Meerut	127
15. Moradabad	133

PLAINS OF U.P. WEST (Contd)Page No.

16. Muzaffarnagar	...	...	...	137
17. Pilibhit	...	...	...	142
18. Rampur	...	...	...	146
19. Saharanpur	...	...	...	148
20. Shahjahanpur	...	...	...	155

PLAINS OF U.P. EASTDistricts

1. Allahabad	...	...	...	161
2. Azamgarh	...	...	...	168
3. Bahraich	...	...	...	173
4. Ballia	...	...	...	179
5. Banda	...	...	...	185
6. Barabanki	...	...	...	192
7. Basti	...	...	...	196
8. Deoria	...	...	...	200
9. Faizabad	...	...	...	205
10. Fatehpur	...	...	...	210
11. Gazipur	...	...	...	216
12. Gonda	...	...	...	221
13. Gorakhpur	...	...	...	227
14. Hamirpur	...	...	...	233
15. Hardoi	...	...	...	238
16. Jaunpur	...	...	...	244
17. Kanpur	...	...	...	249
18. Kheri Lakhimpur	...	...	...	255
19. Lucknow	...	...	...	261
20. Mirzapur	...	...	...	269
21. Pratapgarh	...	...	...	274
22. Raibareilly	...	...	...	279
23. Sitapur	...	...	...	284
24. Sultanpur	...	...	...	288
25. Unnao	...	...	...	294
26. Varanasi	...	...	...	298

B.	I. <u>CLIMATE OF HILLS OF U.P. WEST</u>			<u>Page No.</u>
	General Description	...	...	309
	Climate	...	...	309
	Atmospheric Pressure and Wind	...	...	310
	Temperature	...	...	310
	Humidity	...	...	311
	Cloudiness	...	...	311
	Rainfall	...	...	311
	Consolidated Tables for Hills of U.P. West	...	...	315
	II. <u>DISTRICT CLIMATOLOGICAL SUMMARIES</u>			
	Meteorological Subdivisions:-			
	<u>Hills of U.P. West</u>			
	1. Almora	...	...	327
	2. Chamoli	...	...	331
	3. Dehradun	...	...	340
	4. Nainital	...	...	347
	5. Pauri Garhwal	...	...	356
	6. Pithorgarh	...	...	361
	7. Tehri Garhwal	...	...	365
	8. Uttar Kashi	...	...	372
C.	CYCLONIC STORMS, DEPRESSIONS AND OTHER WEATHER PHENOMENA	...	...	379

LIST OF ILLUSTRATIONS

Page No.

Fig. 1(a)	Physical Features	iii
Fig. 1(b)	Inset showing position of State in India	iv
Fig. 2	Climatic Classification	XI

TEMPERATURE

Fig. 2(a)	Mean Maximum Temperature - January	XII
Fig. 2(b)	Mean Maximum Temperature - May	XIII
Fig. 2(c)	Mean Maximum Temperature - July	XIV
Fig. 2(d)	Mean Maximum Temperature - October	XV
Fig. 3(a)	Mean Minimum Temperature - January	XVI
Fig. 3(b)	Mean Minimum Temperature - April	XVII
Fig. 3(c)	Mean Minimum Temperature - July	XVIII
Fig. 3(d)	Mean Minimum Temperature - October	XIX
Fig. 4	Highest Maximum Temperature	XX
Fig. 5	Lowest Minimum Temperature	XXI

RAINFALL

Fig. 6	Annual Normal Rainfall	XXII
Fig. 6(a)	Cold Weather Season - December - February	XXIII
Fig. 6(b)	Premonsoon (Hot Weather Season) - March-May	XXIV
Fig. 6(c)	Monsoon Season - June - September	XXV
Fig. 6(d)	Post Monsoon Season - October - November	XXVI

GRAPHS

Fig. 7(a)	Districtwise Normal, Annual, Monsoon, and Winter Rainfall for U.P. West	XXVII
Fig. 7(b)	Districtwise Normal, Annual, Monsoon, and Winter Rainfall for U.P. East	XXVIII

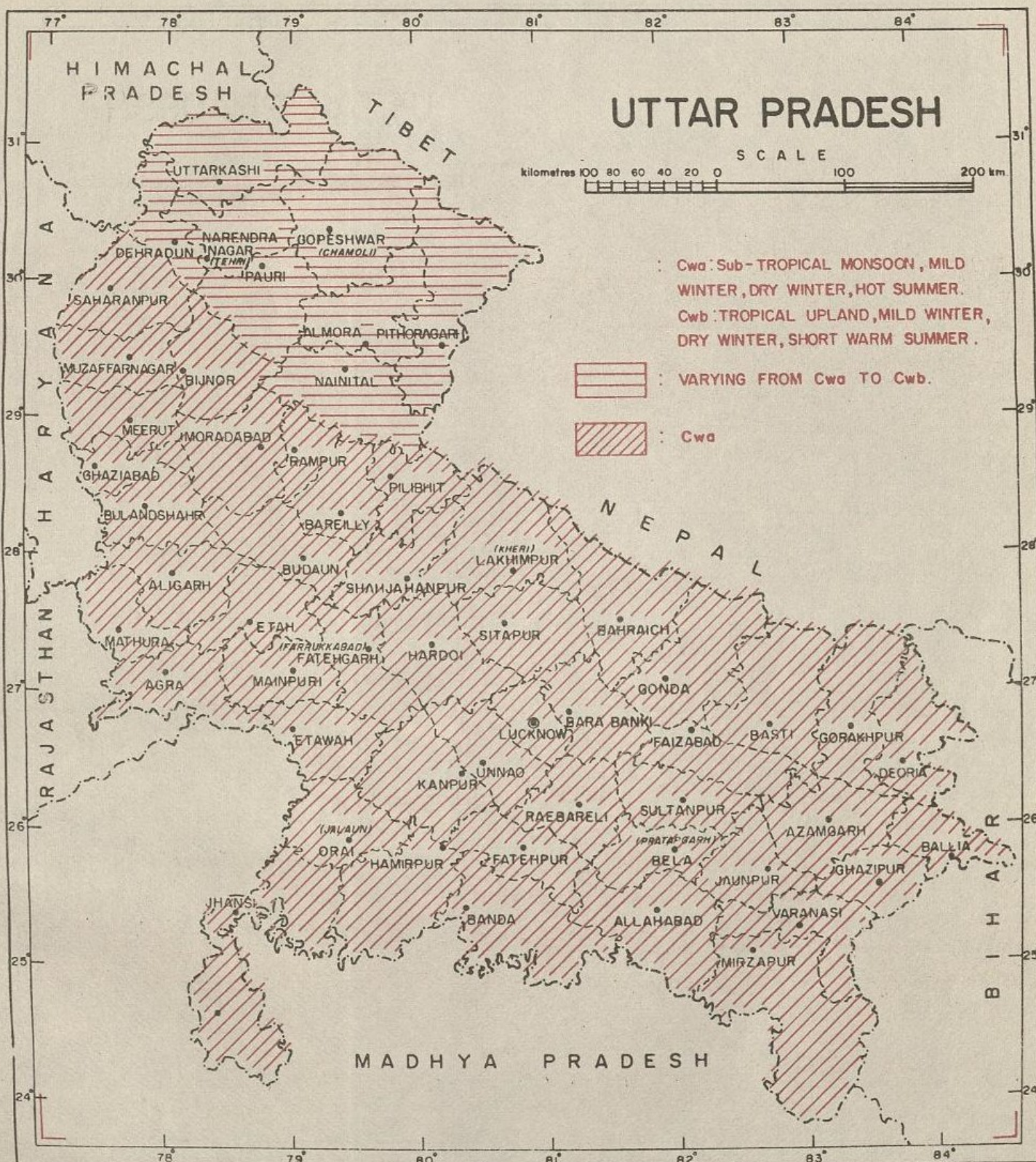


FIG.2 : CLIMATIC CLASSIFICATION

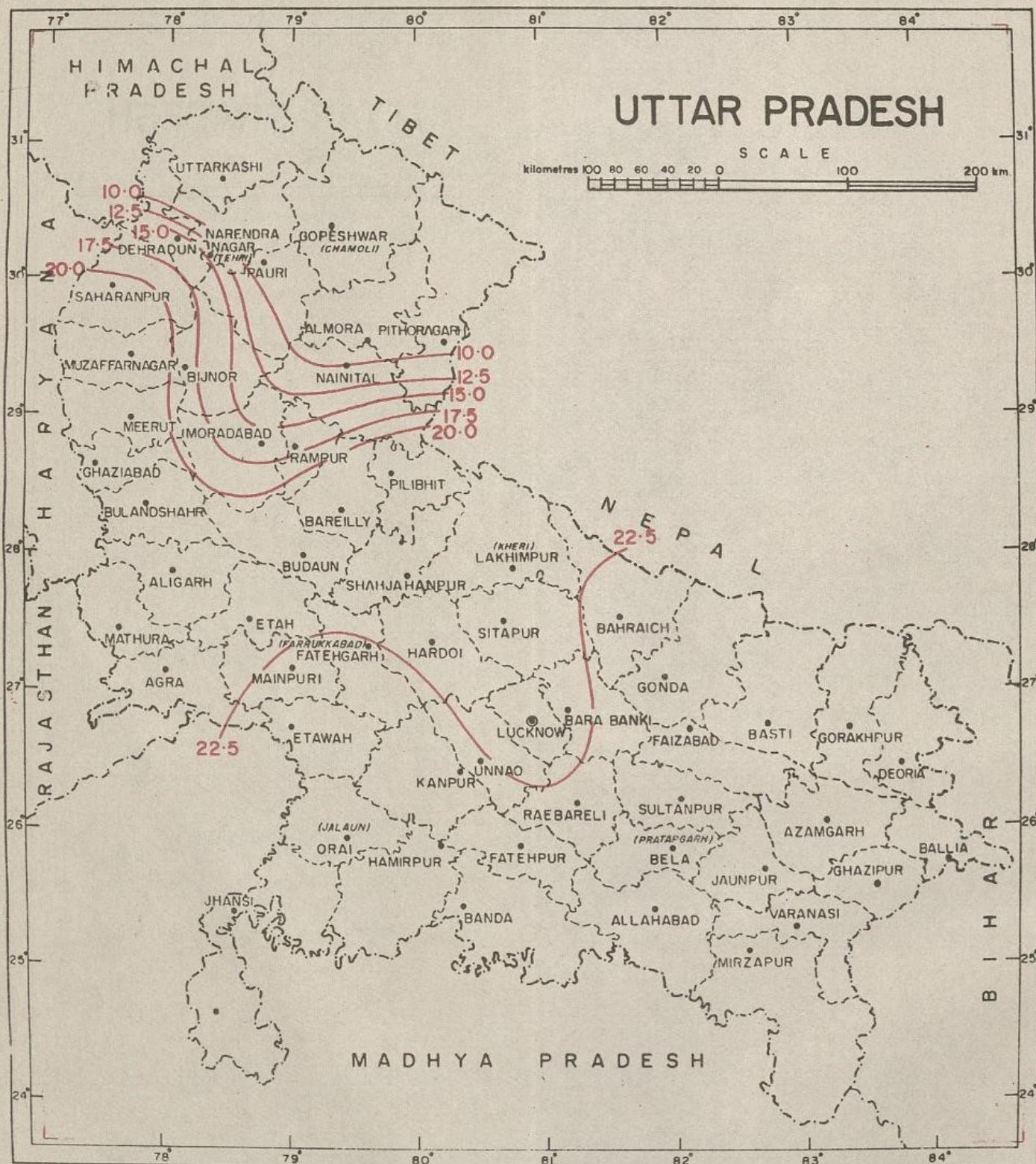


FIG.2(a) : MEAN MAXIMUM TEMPERATURE °C JANUARY.

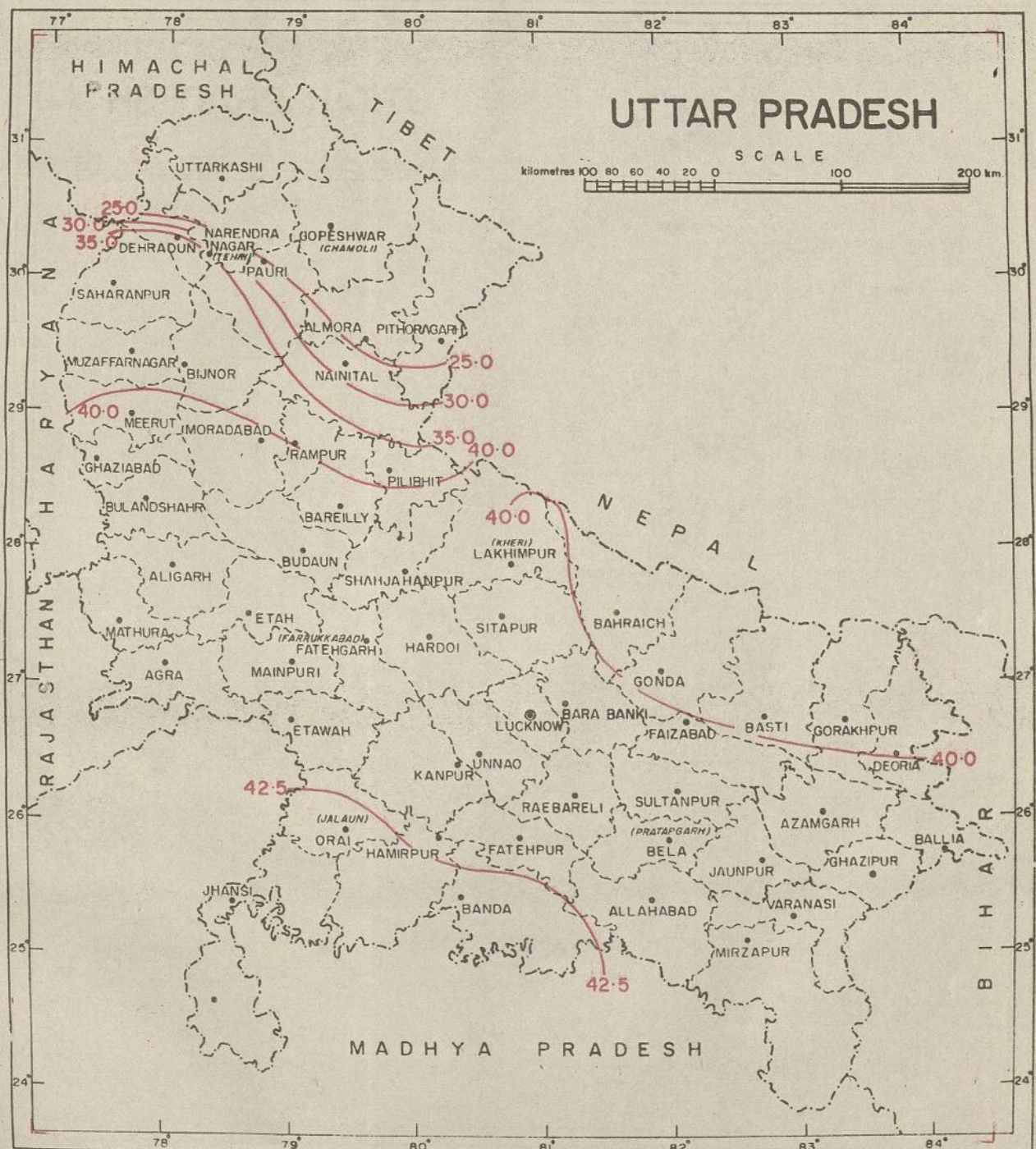


FIG.2(b). MEAN MAXIMUM TEMPERATURE °C MAY.

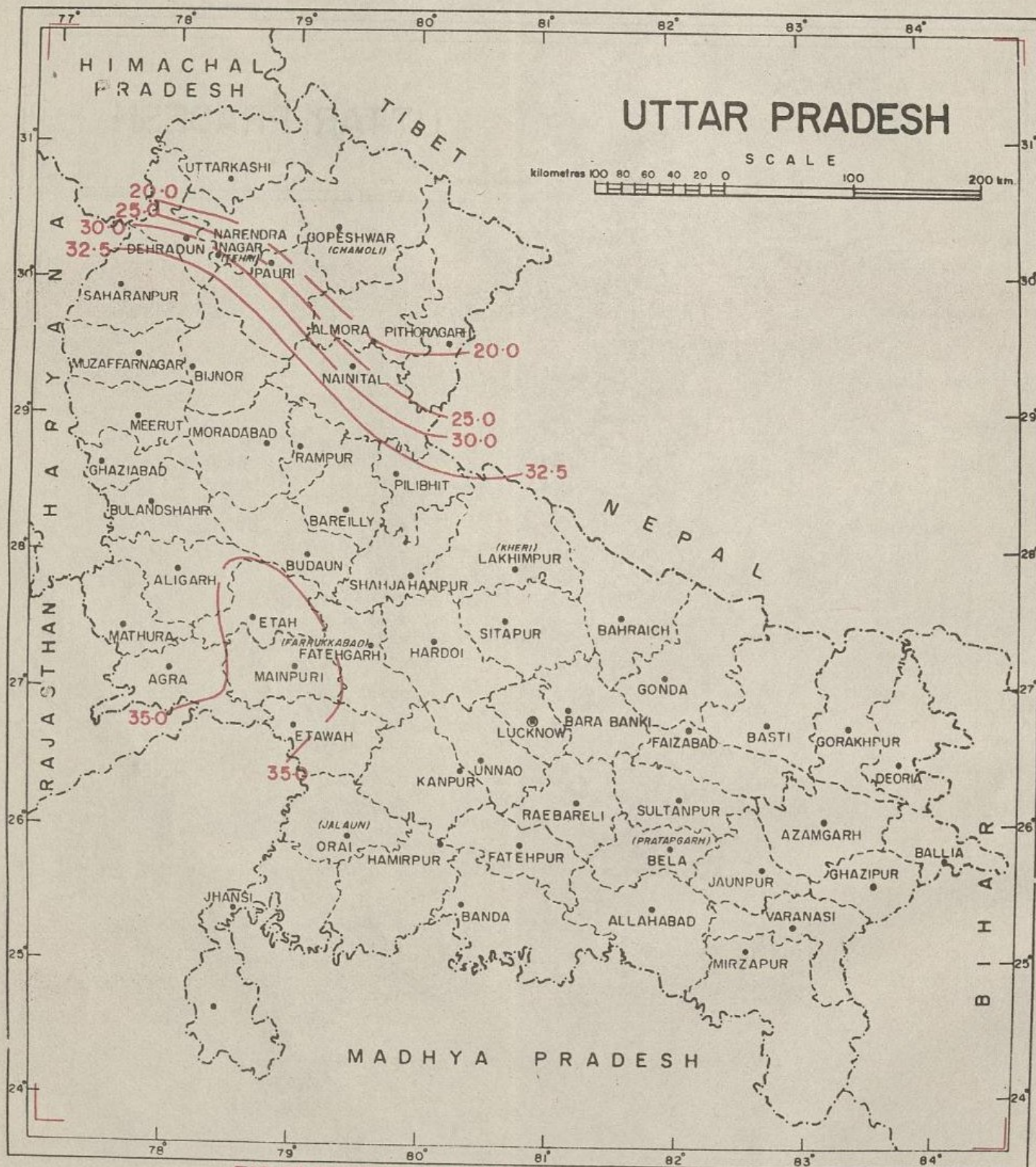


FIG.2(c): MEAN MAXIMUM TEMPERATURE °C JULY.

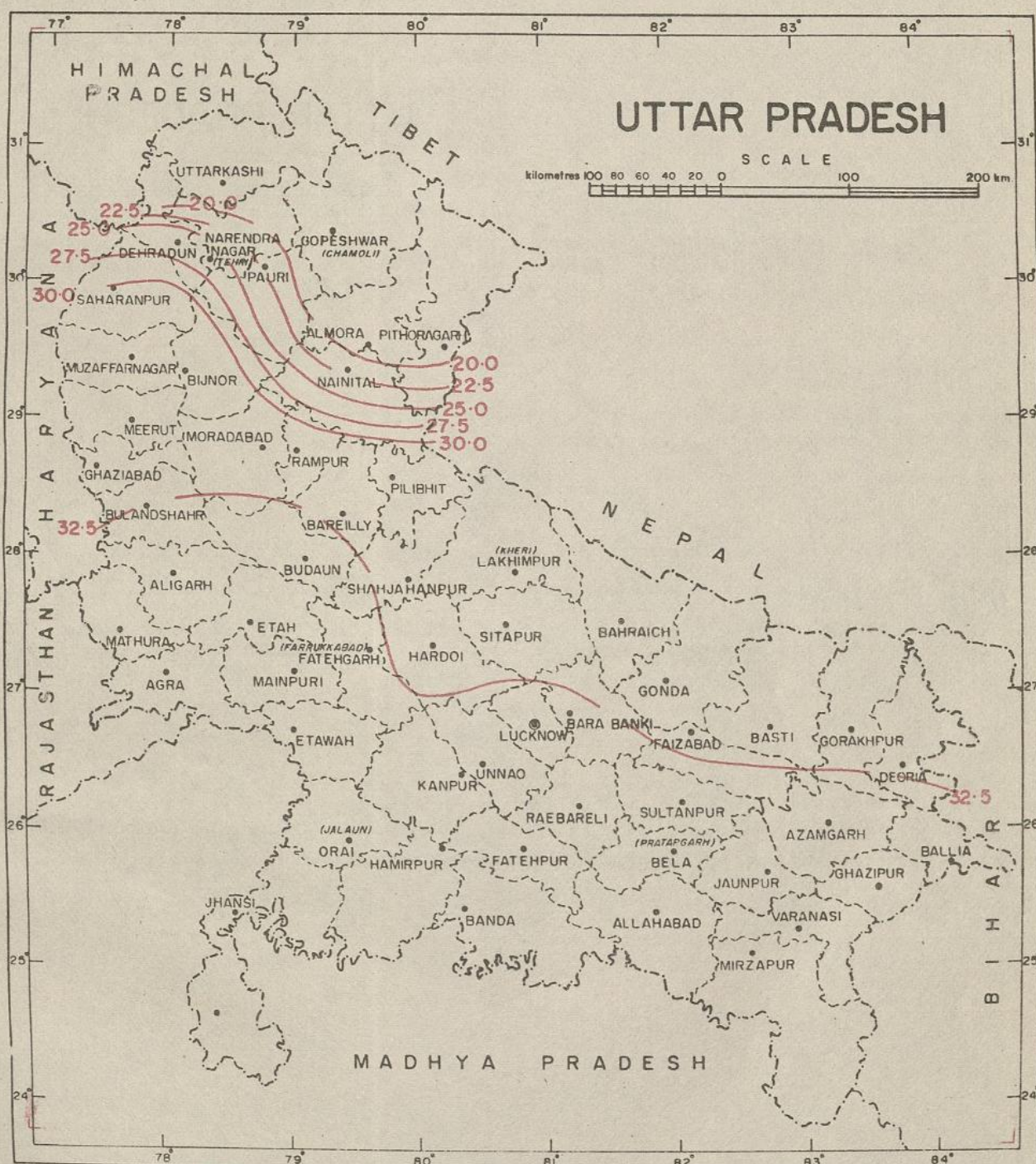


FIG. 2(d) : MEAN MAXIMUM TEMPERATURE °C OCTOBER

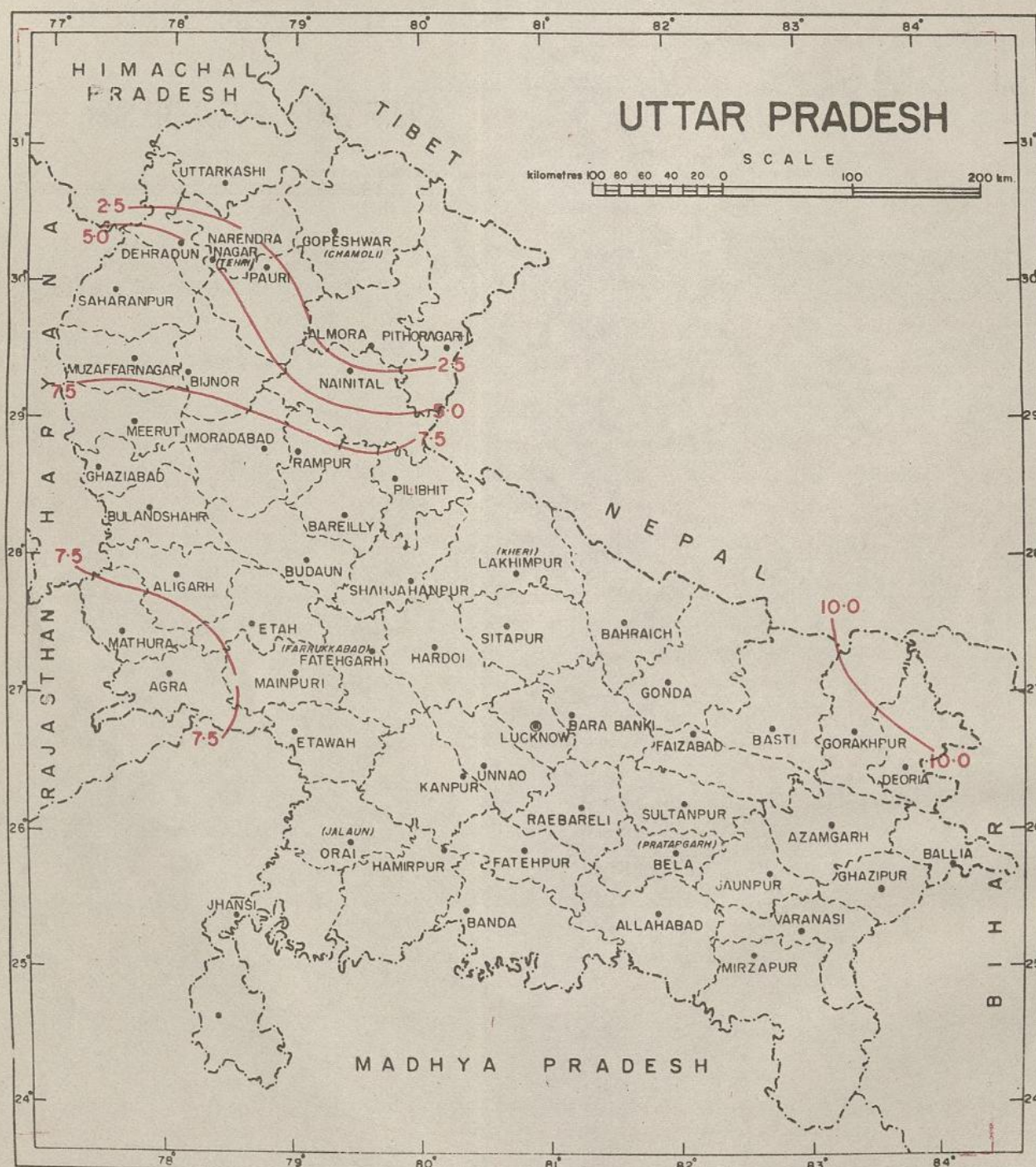


FIG.3(a): MEAN MINIMUM TEMPERATURE °C JANUARY

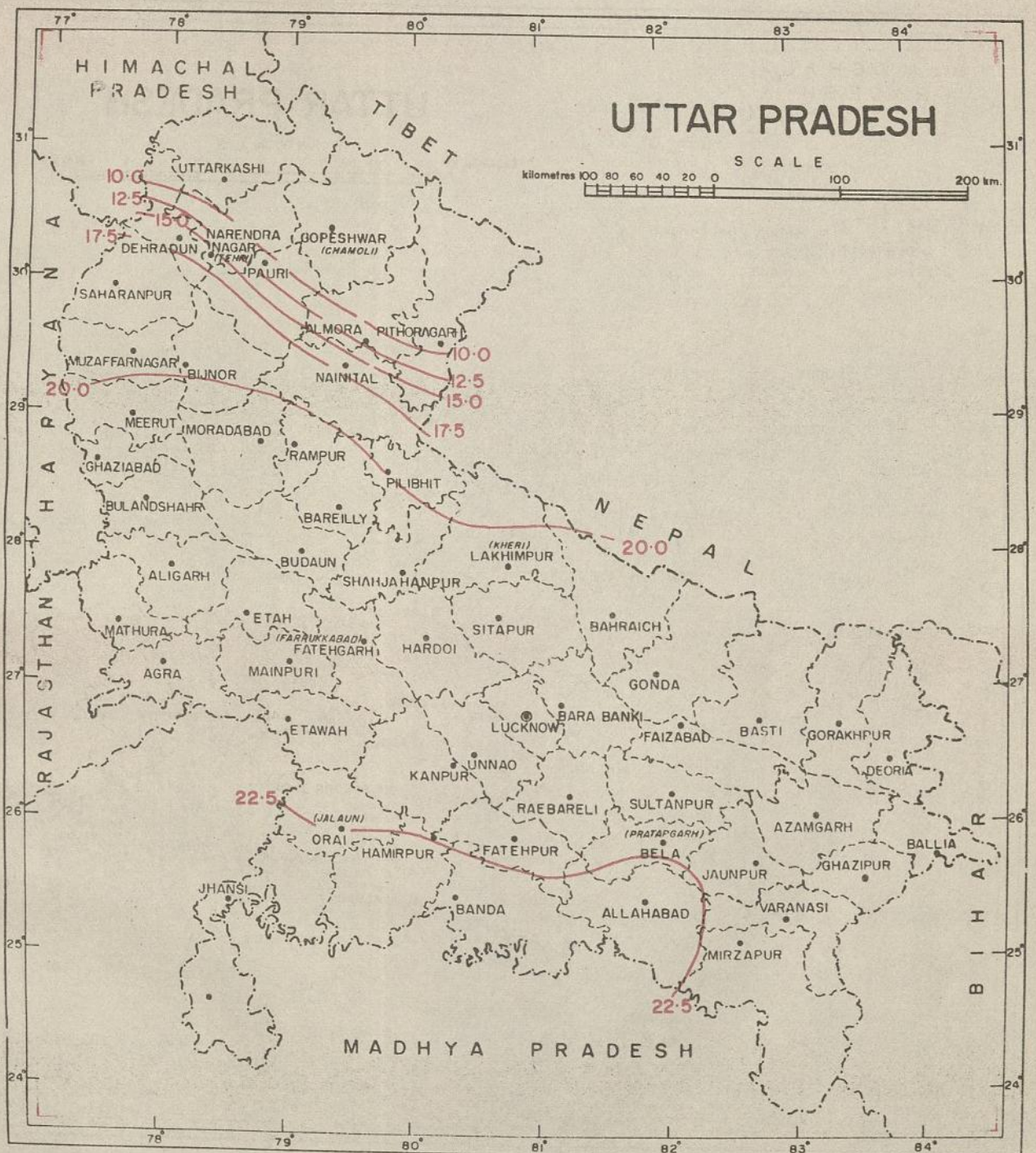


FIG.3(b) MEAN MINIMUM TEMPERATURE °C APRIL

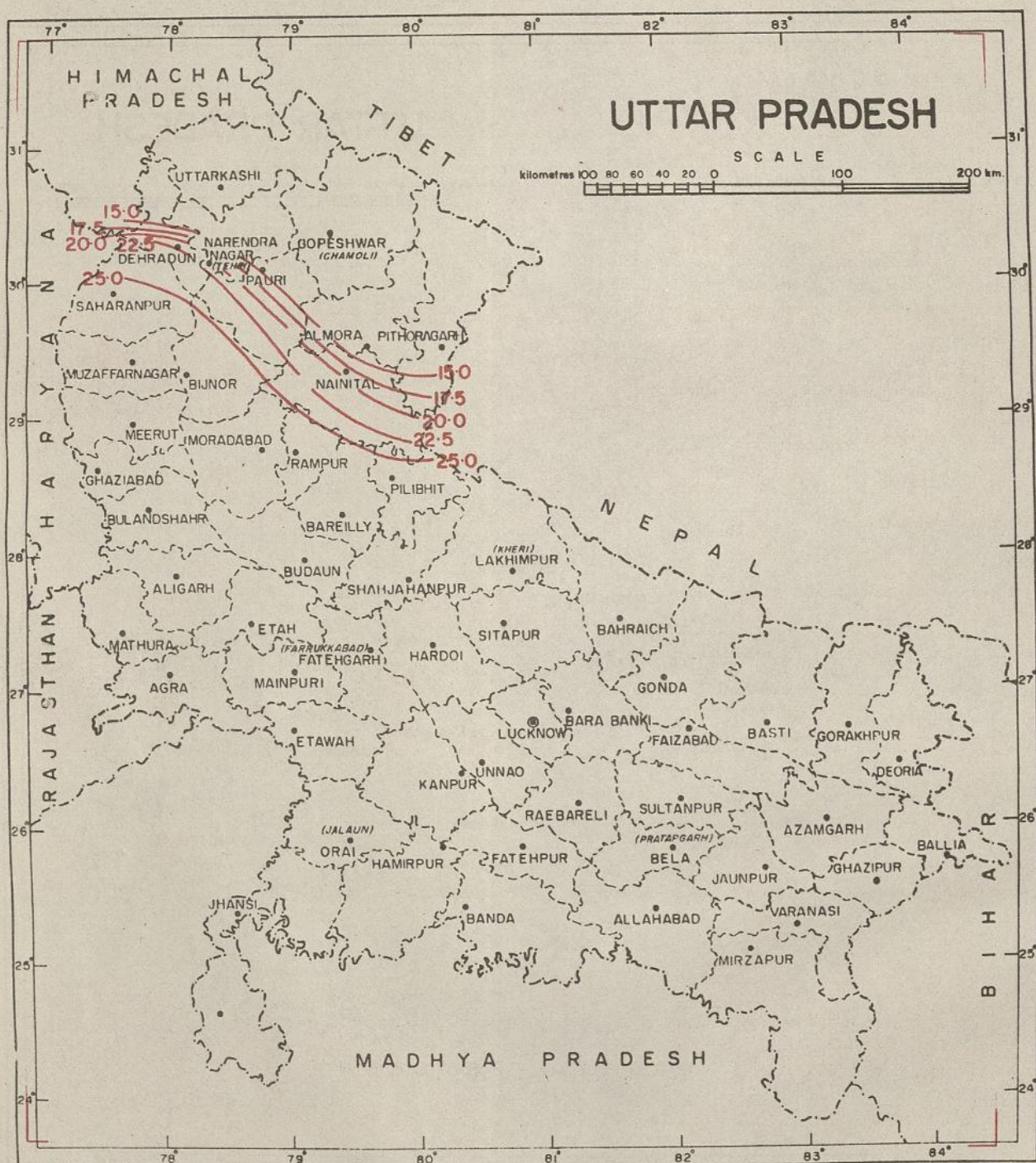


FIG.3(c) : MEAN MINIMUM TEMPERATURE °C JULY

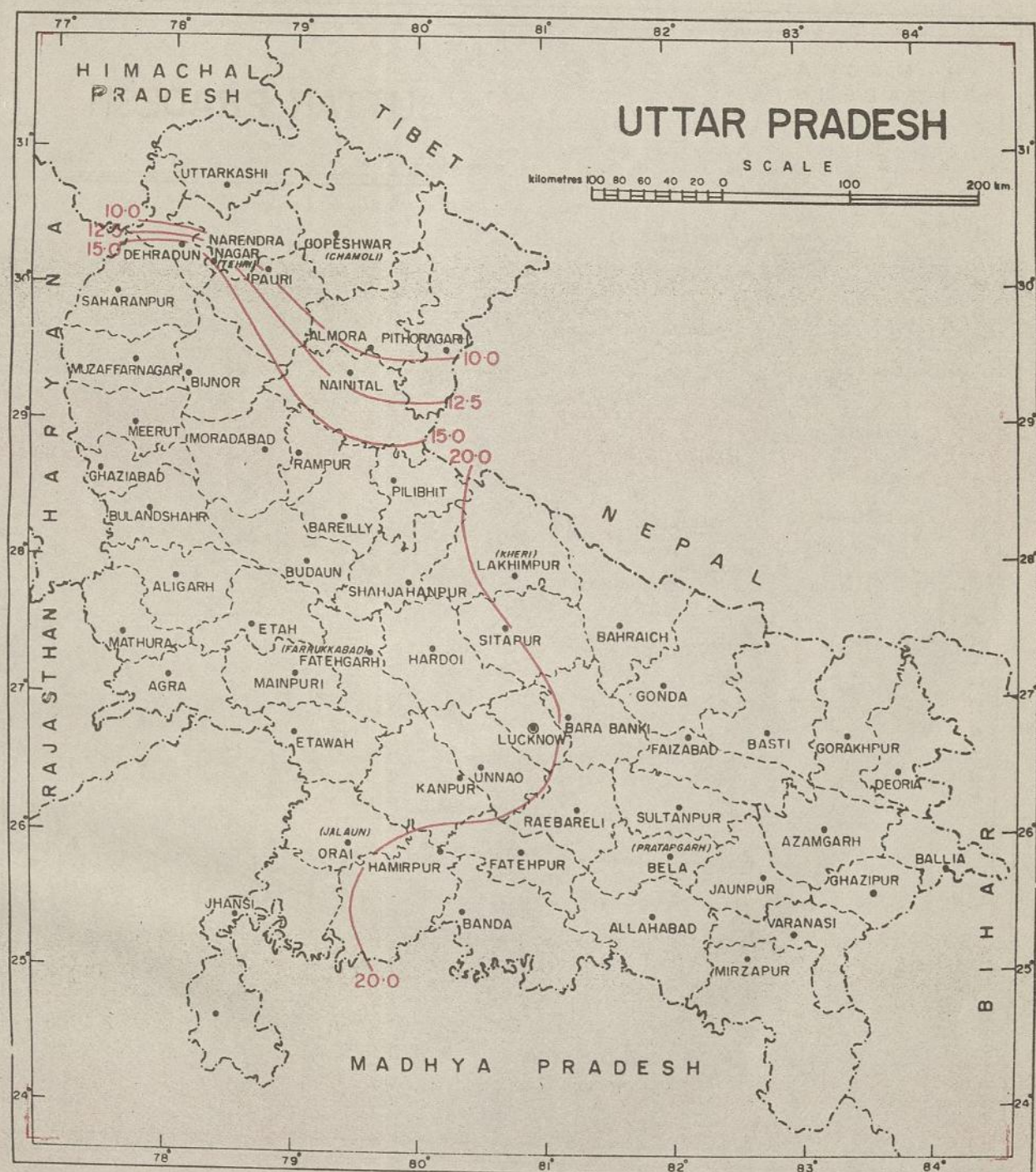


FIG. 3(d): MEAN MINIMUM TEMPERATURE °C OCTOBER

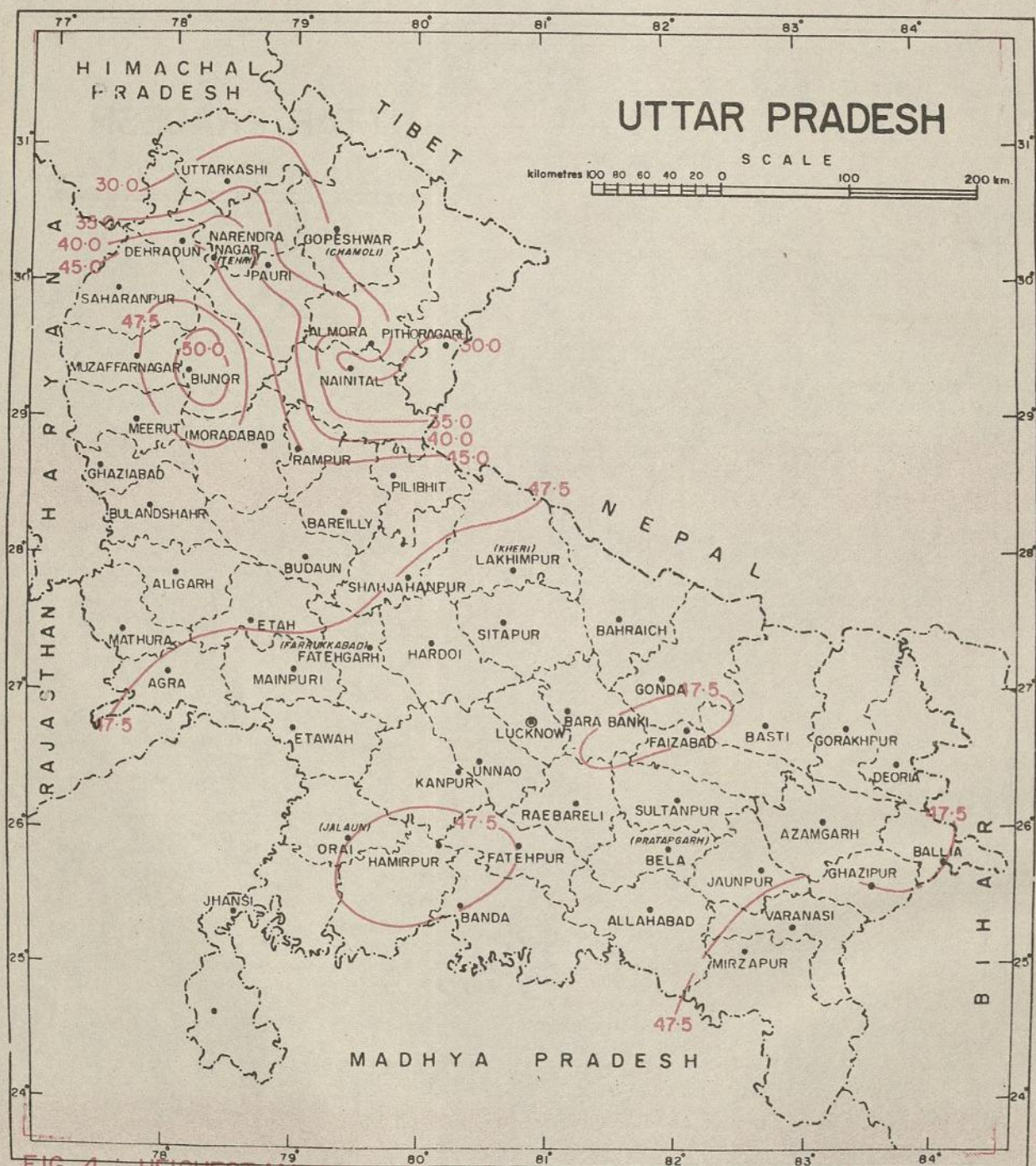


FIG. 4 : HIGHEST MAXIMUM TEMPERATURE °C EVER RECORDED.

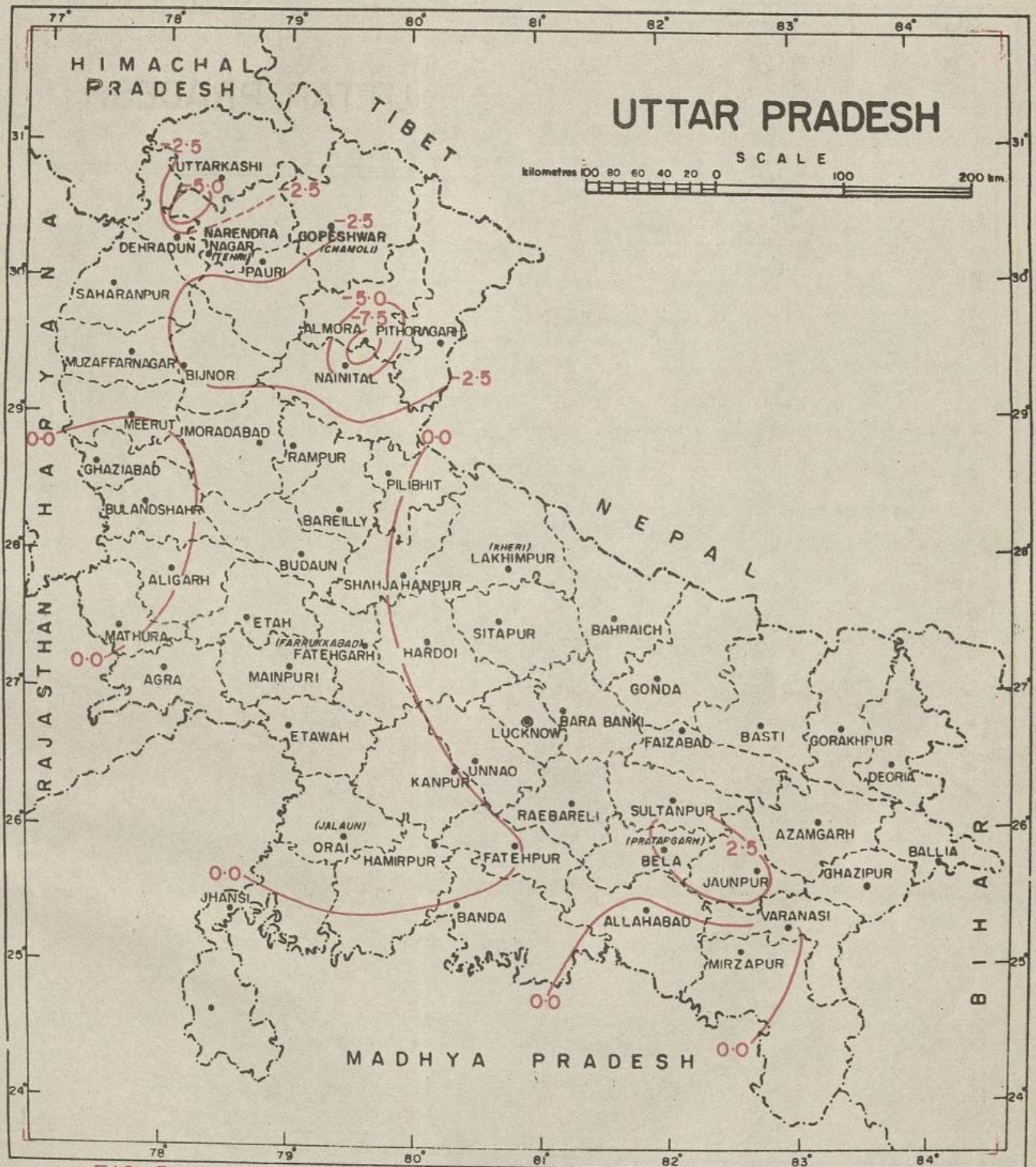


FIG. 5 : LOWEST MINIMUM TEMPERATURE °C EVER RECORDED

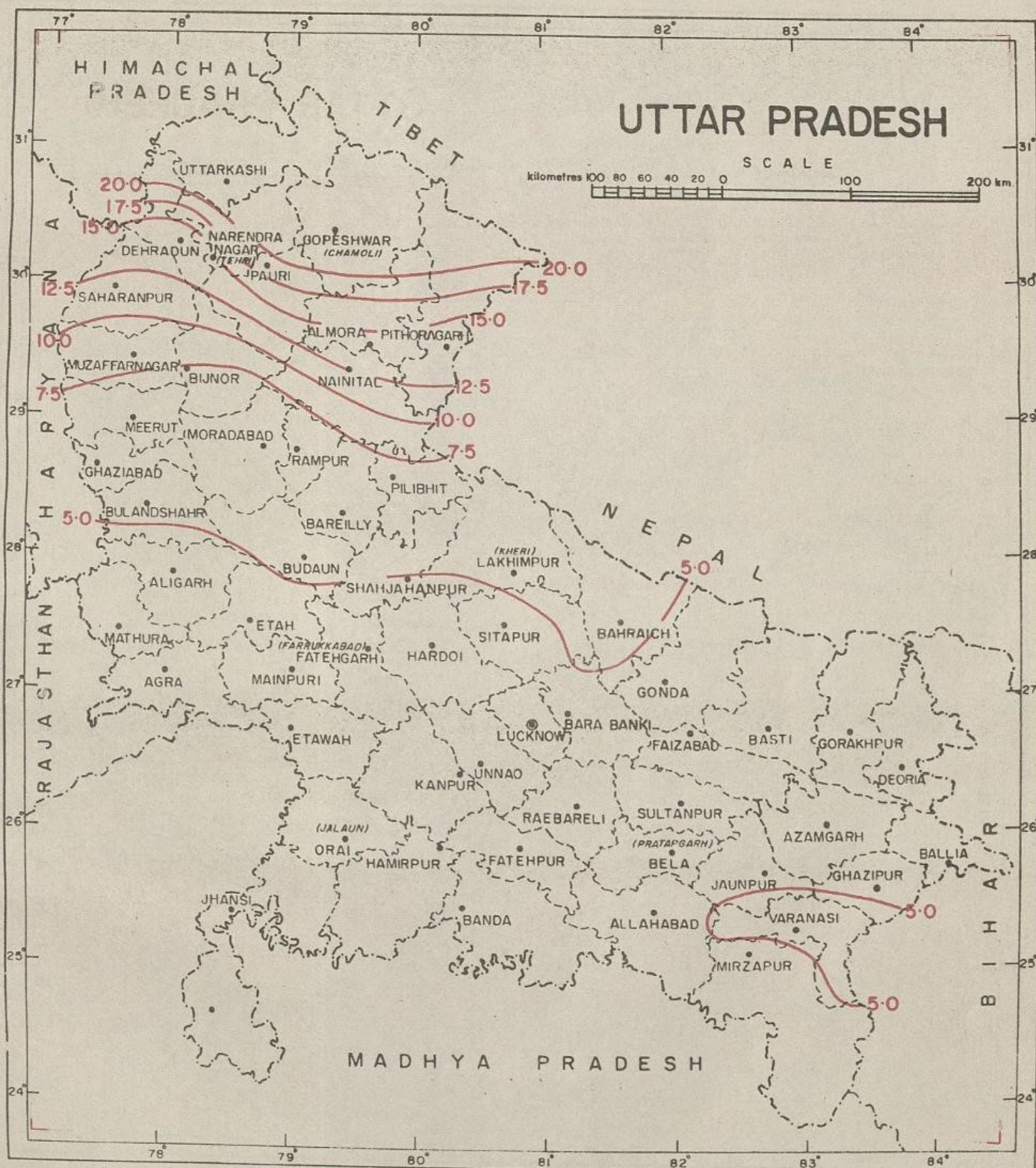


FIG. 6(a): RAINFALL (cm) DECEMBER-FEBRUARY

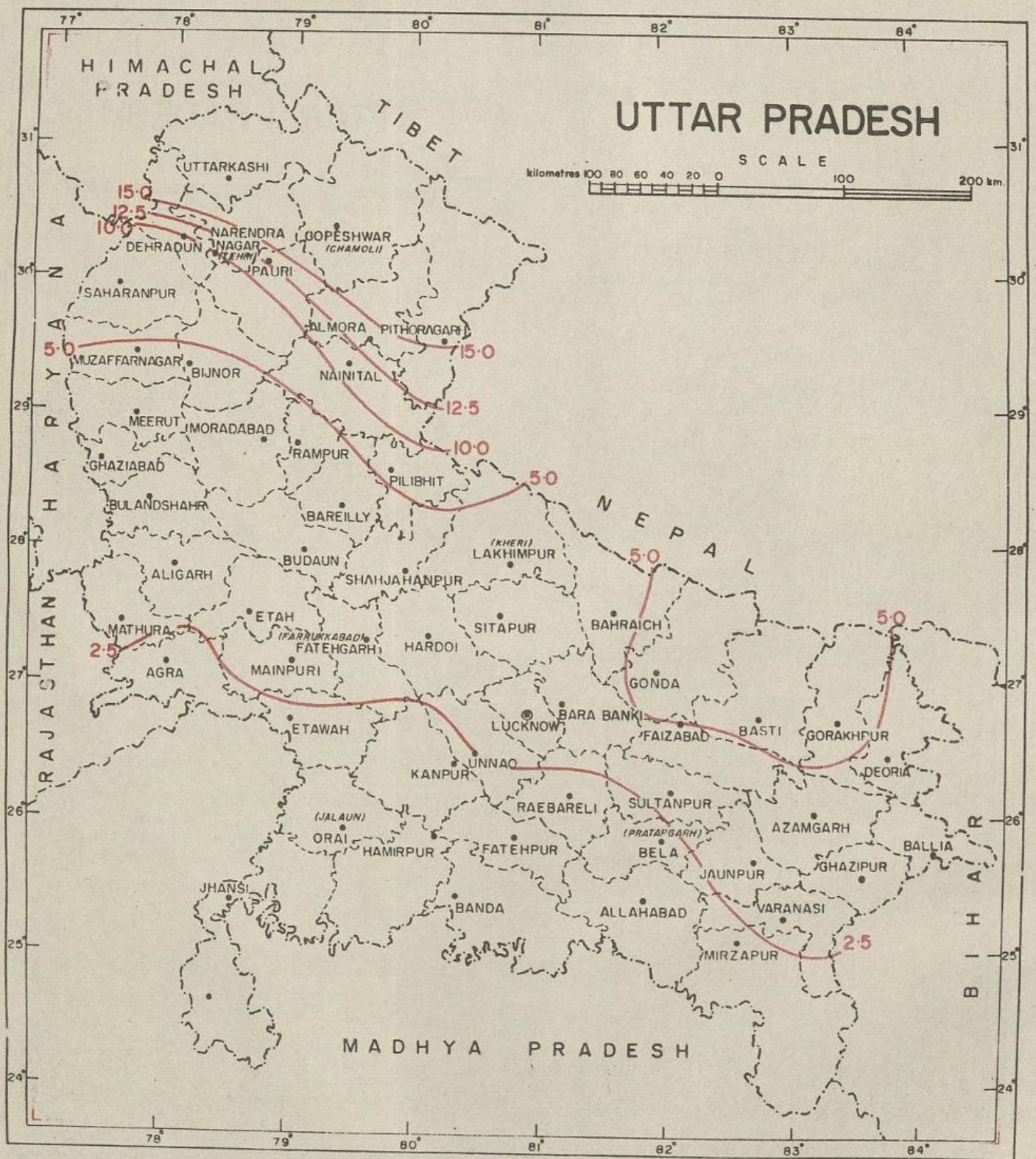


FIG. 6 (b) : RAINFALL (cm) MARCH-MAY

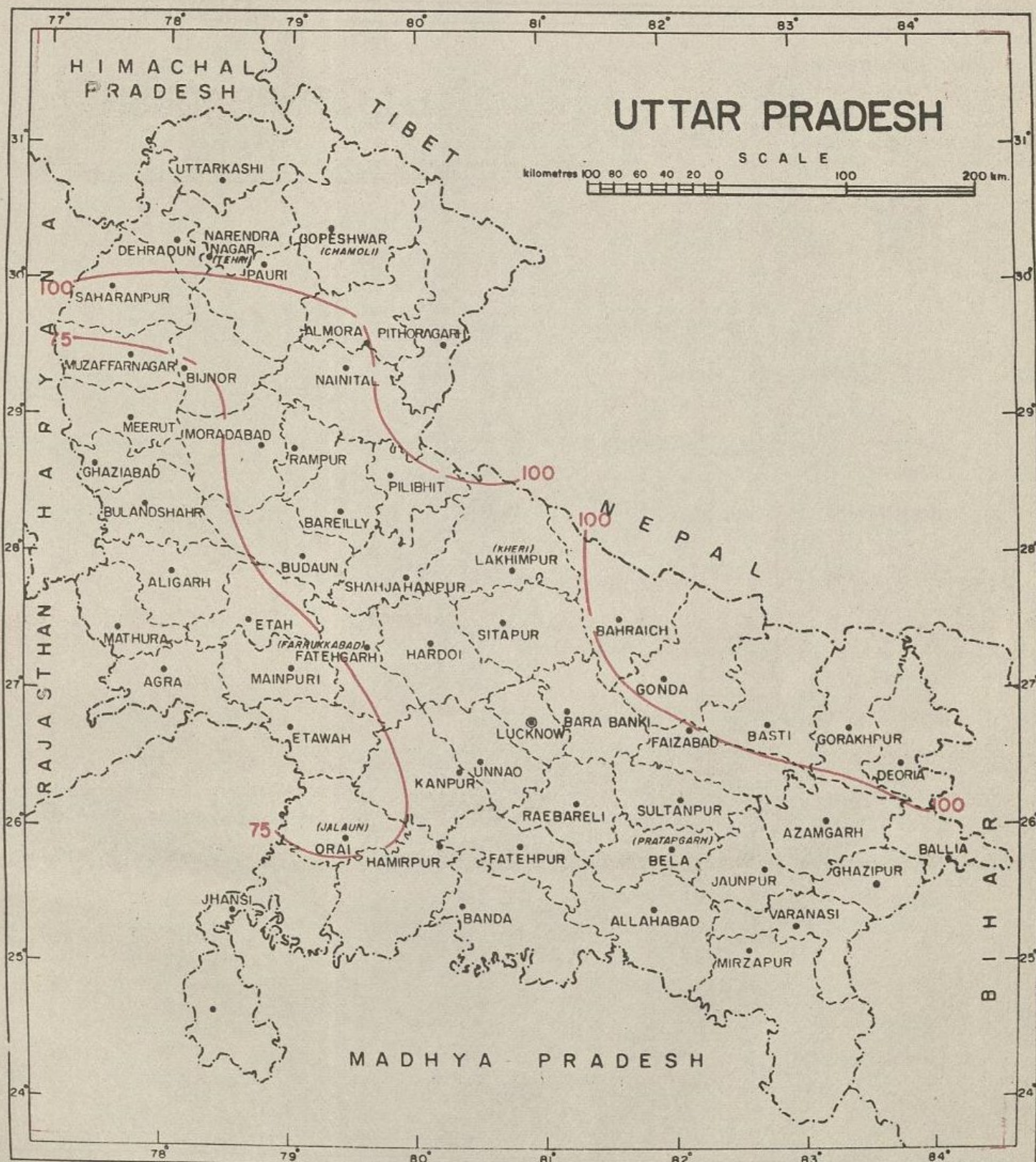


FIG.6 (c) : RAINFALL (cm) JUNE-SEPTEMBER

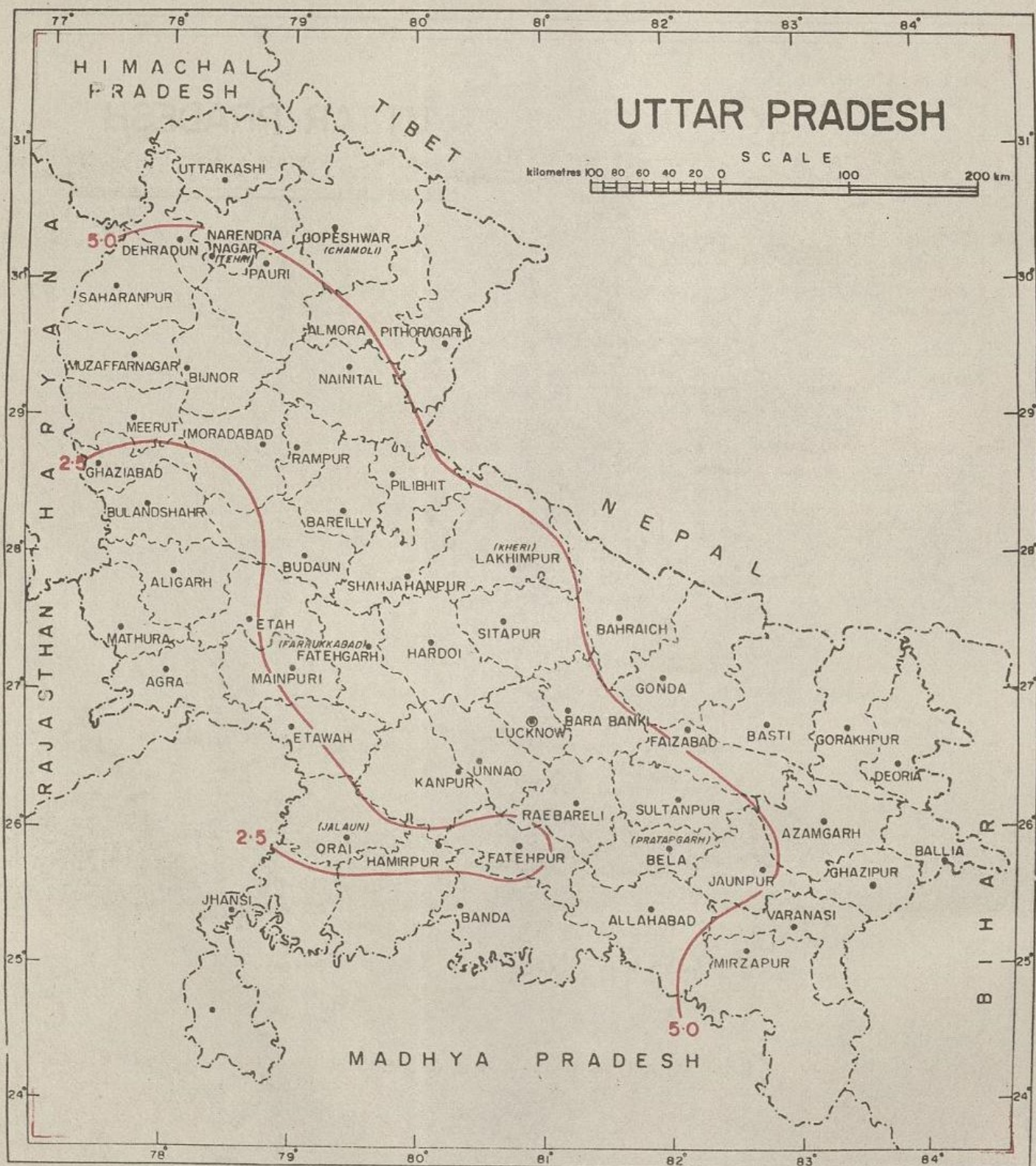


FIG. 6 (d) : RAINFALL (cm) OCTOBER-NOVEMBER

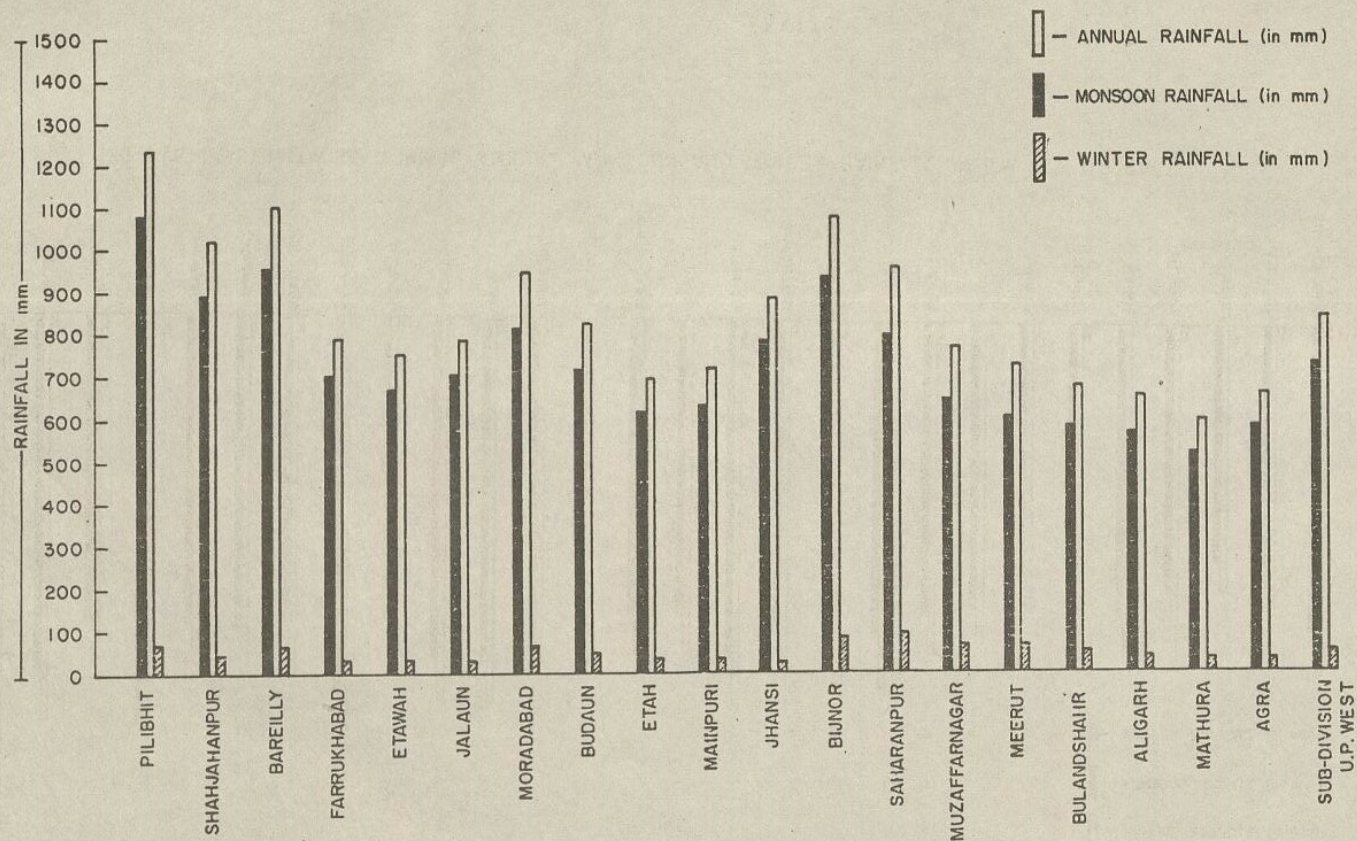


FIG.7 (a) : DISTRICTWISE NORMAL ANNUAL , MONSOON AND WINTER RAINFALL IN mm FOR U.P. WEST.

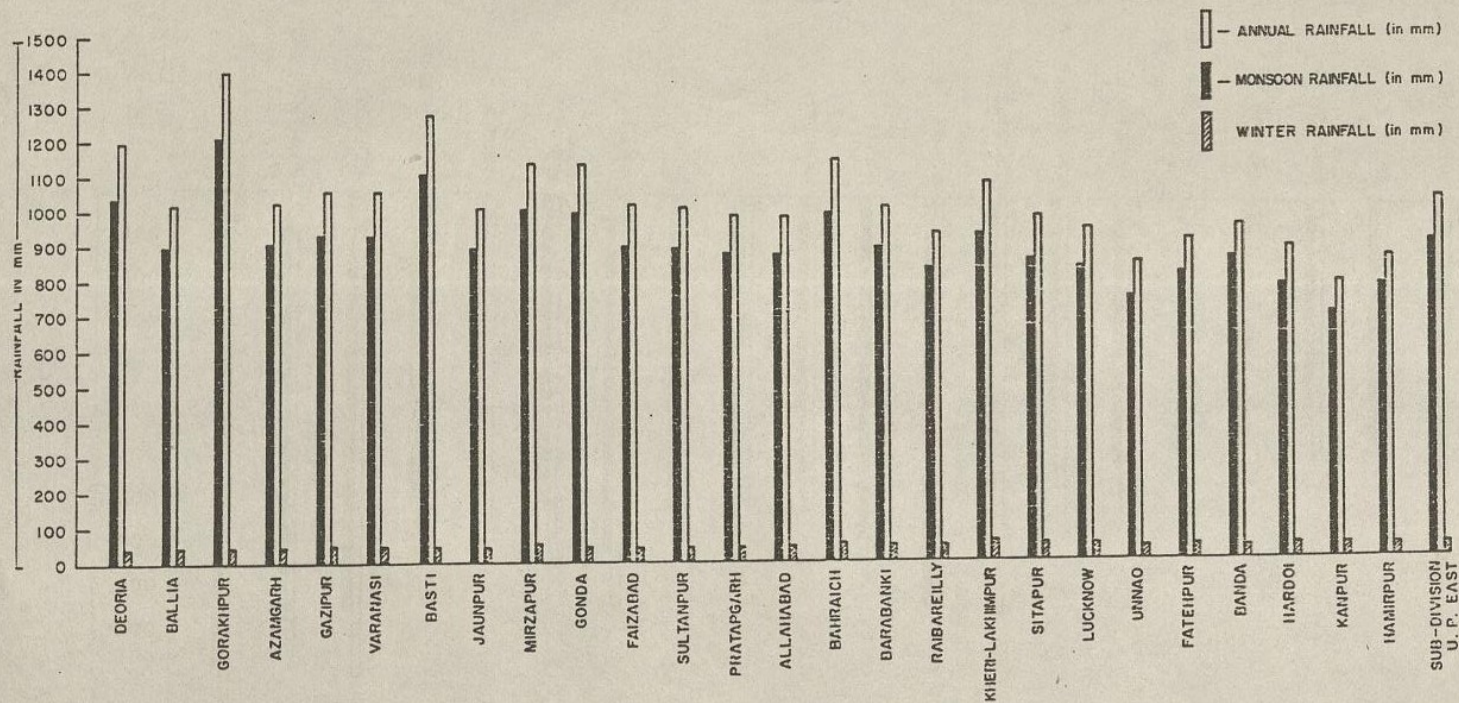


FIG.7(b) : DISTRICTWISE NORMAL ANNUAL ,MONSOON AND WINTER RAINFALL IN mm FOR U.P. EAST.

CLIMATE OF UTTAR PRADESH

INTRODUCTION

The State of Uttar Pradesh which is bounded by the area between latitudes $23^{\circ}52'N$ and $31^{\circ}18'N$ and longitudes $77^{\circ}03'E$ and $84^{\circ}39'E$, has Tibet on its north, Nepal on its northeast, Champaran, Saran, Sahabad and Palaman districts of Bihar on its east, Surguja, Sidhi, Rewa, Satna, Panna, Chhatarpur, Tikamgarh and Sagar districts of Madhya Pradesh on its south and Guna, Shivpuri, Datia, Bhind, Gwalior and Morena districts of Madhya Pradesh, Bharatpur and Dholpur districts of Rajasthan, Delhi, Gurgaon, Karnal and Ambala districts of Haryana and Sirmur, Mahasu, and Kinnaur districts of Himachal Pradesh on its west.

The front piece (fig. 1a) shows the physical features of the state and the inset (Fig. 1b) indicates its position in India.

Physical Features:-Mountains:

SIWALIK HILLS

A range of hills in Northern India running parallel to the Himalayas for about 320 Km. from Beas to the Ganges is known as Siwalik Hills. In this State, the Siwaliks lie between the Jamuna and Ganges separating Saharanpur district from Dehra Dun district, while in the west they cross the Sirmur district of Himachal Pradesh, Ambala district of Haryana and Hosiarpur district of Punjab. This part of the range is irregular and pierced by several rivers of which the Ghaggar on the west is the largest. The southern face in Uttar Pradesh rises abruptly from the plains and is scored by the bare stony beds of the water-courses which rush down in the rains. On the northern side is a more gentle descent into the elevated valley of Dehra Dun, which separates this range from the Himalayas. The greatest height does not exceed 1050 metres and the range is 16 Km. broad. The lower hills are thickly clothed with Sal (*Shorea robusta*) and Sain (*Terminalia tomentosa*), while on the higher peaks a cooler climate allows Pines to flourish.

VINDHYA HILLS

A range of hills separating the Gangetic basin from the Deccan and forming a well marked chain, across Central India is known as "Vindhya Hills". The name of the hills was formerly used in an indefinite manner to include the Satpura Hills south of the Narmada, but is now restricted to the ranges north of

that river. The Vindhyas do not form a range of hills in the proper geographical sense of the term, that is, possessing a definite axis of elevation.

The ranges to the north of the Narmada, and its eastern continuation the Kaimur to the north of the Son-Valley are merely the southern scraps of the Plateau, comprising the country known as Malwa and Bundelkhand. The hills of Vindhyas constitute a dividing line left undenuded between drainage areas. From a geographical point of view, the Vindhya range may be regarded as extending from Jobat ($22^{\circ}27'N$, $74^{\circ}35'E$) in Gujarat on the west to Sasaram ($24^{\circ}57'N$, $84^{\circ}02'E$) in the southwestern corner of Bihar on the east with a total length of 1120 Km. Throughout the whole length as thus defined the range constitutes the southern escarpment of plateau. The range crosses the State Madhya Pradesh from Jhabua district in the west and defines the southern boundary of Sagar and Damoh districts of Madhya Pradesh. From here the Kaimur branch of the range runs through Rewa district of Madhya Pradesh and Mirzapur district of Uttar Pradesh into Bihar. The Kaimur hills rise like a wall to the north of the Son-Valley and north of them a succession of short parallel ridges and deep ravines extend for about 80 Km.

To the north of this escarpment lies the Bundelkhand or Malwa Plateau, with a length of about 400 Km. and a width at its broadest part of 360 Km. The plateau is undulating and traversed by small ranges of hills, all of which are considered to belong to the Vindhyan system. The most northerly of these minor ranges called Bindachal, cuts Jhansi and Banda district bordering Madhya Pradesh and Allahabad and Mirzapur districts in Uttar Pradesh, nowhere rising above 600 m. The range forms with the Satpuras the watershed of Central India, containing the sources of the Chambal, Betwa, Sonar, Dashan and Ken rivers, besides others of less importance. Son and Narmada rise at Amarkantak, where Vindhyan and Satpura ranges join. The rivers generally rise near the southern escarpment and flow north and northeast.

KAIMUR HILLS

The eastern portion of the Vindhyan range, commencing near Kotangi in Jabalpur district of Madhya Pradesh ($23^{\circ}26'N$ and $79^{\circ}48'E$) constitutes Kaimur hills. It runs a little north of east for more than 480 Km to Sasaram in Bihar ($24^{\circ}57'N$ and $84^{\circ}02'E$). The range, after traversing the north of Jabalpur district and the southeast of Satna district of Madhya Pradesh, turns to the east and runs through Rewa district (in M.P) separating the valleys of Son and Ton rivers and continues to Mirzapur and Shahabad districts of Uttar Pradesh. Its maximum width is 80 Km. and the appearance of the range is very distinct in Madhya Pradesh.

THE HIMALAYAS

This is a system of huge and lofty mountain ranges bordering the country on the north and containing some of the highest peaks in the world. The Indus should be considered the north-western limit. From the great peak of Nanga Parbat in Kashmir, the Himalayas stretch eastward for twenty degrees of longitude, in a curve which has been compared to the blade of scimitar, the edge facing the plains of Indus. On the extreme north-west, more than half of the State of Jammu and Kashmir is situated in the Himalayas. On south-east of it, the next state is Himachal Pradesh bordering the Himalayas. East of this lies the Kumaun Division of the Uttar Pradesh, attached to which is the Tehri Garhwal District. For 800 Km. Nepal occupies the mountains and borders of the Uttar Pradesh State to its north.

The height above which snow cover is perpetual varies from 4,500 m to 4,800 m on southern side. In winter, snowfall may take place at elevations above 1,500 m in the west. Glaciers extend below the region of perpetual snow, descending to 3,600-3,900 m in Kulu and Lahul and even lower in Kumaun. This snow-cover serves as the vast store-house of the water for the great rivers which take their birth in the hills of the Himalayas. Water supply to these rivers may suffer deficiency due to drought conditions but will not come to dead stop. The main river-systems of the State is described below.

Rivers:

GANGES

This great river of northern India, which carries off the drainage of the southern Himalayas and also a smaller volume received from the northern and eastern slopes of the Vindhya, rises in Tehri Garhwal district in $30^{\circ}55'N$ and $79^{\circ}07'E$ where it issues under the name of Bhagirathi from an ice cave at the foot of the Himalayan snowbed near Gangotri 4,100 m. above the level of the sea. During its earlier course it receives the Jahnvi from the northwest, and subsequently the Alaknanda, after which the united stream is called Ganges. From Hardwar it flows south and southeast between the districts Saharanpur, Muzaffarnagar, Meerut, Bulandshahr, Aligarh and the eastern part of Farrukhabad district. It next forms the southwestern boundary of Oudh lying between latitudes $25^{\circ}34'N$ and $28^{\circ}42'N$ and longitudes $79^{\circ}41'E$ and $83^{\circ}08'E$ and then crosses the districts Allahabad, Mirzapur, Banaras, and Ghazipur. It separates the districts of Ghazipur and Ballia from Bihar State. It supplies the largest irrigation water in Uttar Pradesh and is also the source of water supply of the cities of Meerut, Kanpur and Banaras. Its chief tributaries are the Ramganga (Farrukhabad), Jamuna and Ton (Allahabad), Gomati (Ghazipur) and Gogra (Ballia).

JAMUNA

A great river of Northern India called Jamuna rises in Tehri-Garhwal district of Uttar Pradesh ($31^{\circ}01'N$, $78^{\circ}28'E$). The river travels 160 Km. from its source at Khara and separates Ambala and Karnal districts in Haryana from Saharanpur and Muzaffarnagar in the Uttar Pradesh. In Muzaffarnagar it runs in a southerly direction and continues to run in this way for 130 Km, separating Meerut district from Punjab, till it reaches Delhi. From Delhi it turns southeast or south. In this portion it receives on the east the Kothanadi and the Hindan and on the west the Sabinadi. Below Delhi the river make the boundary line between Gurgaon district in the Haryana and Bulandshahr and Aligarh districts in Uttar Pradesh. It then passes through the Mathura district and then reaches Agra. The river Chambal from Rajasthan meets it just before it enters Jalaun district of Uttar Pradesh. In Kanpur district the Sengar, and in Fatehpur the Non and Rind flow into it; close to Hamirpur it receives Betwa and in Banda district the Ken. It is finally lost into the Ganges near Allahabad after traversing a course of 1,380 Km long.

GOGRA (ALSO CALLED GHARGHARA, SARJU)

This great river of Oudh rises in Tibet ($30^{\circ}40'N$, $80^{\circ}48'E$) and runs through Nepal under the name Karnali or Kauriala. The river Kauriala enters Indian territory between Kheri and Bahraich and separates one from the other. The main branch of the Sarda called Dahawas joins it at Mallanpur, a few kilometres below Kotai Ghat, near which place the Sarju is received. Near Bahramghat another branch of the Sarda called Chauka joins its main stream and from this point the united stream regularly called Gogra or Sarju. After passing through the Ayodhya city, it separates Basti and Gorakhpur from Fyzabad and then from Azamgarh and Ballia, and receives the Rapti and little Gandak from the north. After the point where Chauka joins it, little drainage falls into the river from right bank as Gomati Valley, which lies south of it, is lower than the river Gogra. East of the Gorakhpur district the Gogra forms a boundary between Saran and Ballia districts of Uttar Pradesh. It joins the Ganges in $25^{\circ}44'N$ and $84^{\circ}42'E$.

GANDAK GREAT

This river rises in the Central mountain basin in Nepal, in $27^{\circ}27'N$ and $83^{\circ}56'E$, where its sources are known as Sapt-Gan'aki. It drains the tract between the Dhaulagiri and Gosianthan mountains. It enters the Indian territory at Tribeni and forms the boundary between Champaran district of Bihar and Gorakhpur district of Uttar Pradesh. It finally joins the Ganges opposite to Patna.

GANDAK LITTLE

This river rises in the lower Nepal hills, and enters Gorakhpur district of Uttar Pradesh, a few kilometres west of the Great Gandak. It flows from north to south through the whole length of Gorakhpur and Gagra just within Saran district of Bihar.

GOMATI

The river with a shallow river bed runs through Shahjahanpur and Kheri. Two considerable affluents, the Kathna and Sarayan, joining the Gomati in Sitapur change the character of the river and it reaches Lucknow with a well defined Channel. From Lucknow it flows through Barabanki, Sultanpur and Jaunpur districts with a gradually widening breadth. The Sai rising in Hardoi district at a place ($27^{\circ}46'N$ and $80^{\circ}09'E$) between the Gomati and Ganges and running parallel to Gomati for over 560 Km in zigzag way joins it below Jaunpur. From this point this river flows through the districts of Jaunpur and Bahⁿas and joins the Ganges at Saidpur in Ghazipur district.

TON EASTERN (ALSO CALLED CHHOTI SARJU)

It rises near Fyzabad and runs nearly parallel with Gogra. Near Mau it receives the Chhoti Sarju, a branch from Gogra. The combined stream known as the Chhoti Sarju joins the Ganges near Balhoi town.

HINDAN (ALSO CALLED CHHAJA IN ITS UPPER COURSE)

The river rises in the southern slopes of the Siwaliks in Saharanpur district ($30^{\circ}07'N$ and $77^{\circ}47'E$) runs through the Central portion of Saharanpur, Muzaffarnagar and Meerut. It then flows towards the southwest and joins the Jamuna near Bulandshahr.

METEOROLOGICAL SUB-DIVISIONS

The State is divided into three sub-divisions namely:

- (a) UTTAR PRADESH - EAST , consisting of 26 districts, Allahabad, Azamgarh, Bahraich, Ballia, Banda, Barabanki, Basti, Deoria, Fyzabad, Fatehpur, Ghazipur, Gonda, Gorakhpur, Hamirpur, Hardoi, Jaunpur, Kanpur, Kheri-Lakhimpur Lucknow, Mirzapur, Pratapgarh, Raibareilly, Sitapur, Sultanpur, Unnao and Varanasi.

- (b) PLAINS OF UTTAR PRADESH - WEST, consisting of 20 districts, Agra, Aligarh, Bulandshahr, Bareilly, Budaun, Bijnor, Etah, Etawah, Farrukhabad, Jalaun, Jhansi, Mainpuri, Mathura, Meerut, Moradabad, Muzaffarnagar, Pilibhit, Rampur, Saharanpur and Shahjahanpur.
- (c) HILLS OF UTTAR PRADESH - WEST, consisting of 8 districts, Almora, Chamoli, Dehra Dun, Nainital, Pauri-Garhwal, Pithorgarh, Tehri-Garhwal and Uttar Kashi.

Due to hilly orography of the subdivision Hills of Uttar-Pradesh West, the climate of the state will be written into two-parts, the first one for Plains of Uttar Pradesh and the second one for Hills of U.P.-West, these parts dealing with the climate type, atmospheric pressure & wind, temperature, humidity, cloudiness and rainfall for the respective regions. In addition, climatology of Cyclonic storms & depressions and other weather phenomena for the state as a whole will be included in the climate.

.....

A. CLIMATE OF PLAINS OF UTTAR PRADESH

I. CLIMATE

Plains of the State as a whole has the climatic type: sub-tropical monsoon, mild and dry winter, hot summer (cwa) based on Koeppen's classification, as shown in Fig. 2.

The year may be divided into four seasons. The winter season from December to February is followed by summer season from March to May. The period from June to September constitutes the south-west monsoon season and the period from October to November form the post-monsoon season.

The period from December to February is generally very unpleasant, due to extreme cold over the State, particularly, over the hilly region, when a series of severe cold waves associated with western disturbances affect the entire State. In the summer months weather is very dry, hot and uncomfortable. Due to the lower temperatures, the hilly regions are, however, comparatively less uncomfortable in summer but more uncomfortable in winter. Weather tends to be oppressive during June, 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. The State experiences extreme type of climate.

II. ATMOSPHERIC SEA-LEVEL PRESSURE AND WINDS:--

The seasonal variation of the atmospheric pressure over the plains 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 plains generally remains weak. During winter, the higher pressure is to the north. In April, the pressure increases slightly from north to south in Uttar Pradesh. Winds are generally westerly to north-westerly over the State in winter and summer seasons. With the establishment of the monsoon trough in the State, these winds turn gradually anticlockwise and are replaced by southwesterly to southerly winds on the southern side of the trough, while they turn clockwise and are replaced by north-easterly to easterly winds on the northern sides of the trough. Winds in the post monsoon season are mainly from north to north-westerly and variation of pressure is very slight in the plains. November is the month of transition, with weakest pressure gradient. From October onwards the change-over of the pressure and wind pattern to the winter pattern commences. Table 1 gives the monthly mean wind speed in Km. per hour for the observatory stations in the two subdivisions U.P. East and West. In addition, predominant wind directions in the

morning and evening have been included. For each subdivision, the mean monthly wind speed is given at the bottom of the respective subdivisional tables.

III. TEMPERATURE

Table 2 gives the daily maximum and minimum temperatures at the observatory stations and for each of the two sub-divisions. Fig. 2(a, b, c, d) and Fig. 3(a, b, c, d) show the distribution of the mean maximum and mean minimum temperatures respectively for selected months. Figures 4 and 5 give the extremes of temperatures ever recorded based on data available upto 1985.

Day temperatures are more or less uniform over the plains except during winter and monsoon when temperatures increase south-eastwards and north-westwards 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 of 41°C in the plains, Plateau regions and elevated places recording 2°C to 5°C lower. The highest temperature recorded at an individual station in the plains is 50.4°C at Najibabad on 28 June, 1975 which is about 19.3°C higher than the period average 31.1°C of the warmest month.

January is the coldest month when mean minimum temperature for the plains of U.P. as a whole is 8.5°C varying from about 6.5°C in the west to about 10°C in the east. During winter much lower temperatures may be experienced in the wake of western disturbances. On such occasions minimum temperatures below the freezing point can be registered at a few stations in the northern parts of the State. The lowest temperature on record at an individual plain station was -2.9°C at Najibabad on 29 Jan, 1964. This was 16.6°C below the period average 13.7°C for the coldest month.

Both maximum and minimum temperatures rise rapidly from February onwards till May. The increase in maximum temperature in the period from January to May ranges from 16°C to 20°C at individual stations as we proceed from east to west of the plains of the State, while the above increase for hill stations is only 14°C - 15°C . From the beginning of June to the end of July the maximum temperature falls by about 4°C to 7°C , whereas the minimum temperature does not fall by more than 4°C from June to September. In September a

a slight rise in the maximum temperature is experienced due to increased insolation. The night temperatures start falling rapidly, after September, while the day temperatures follow this trend after October and both attain lowest values by January. The fall in minimum and maximum temperature is about 7°C to 13°C and 15°C to 17°C respectively during these periods. In both the cases the fall increases from southern parts of the state to the northern parts.

July and August have the smallest diurnal range of temperature (about 7°C to 9°C) in the State. The diurnal range increases rapidly after the withdrawal of monsoon. During the period from November to May the diurnal range is of the order of 14°C to 18°C , being the greatest in November.

IV. HUMIDITY

Table 3 gives the mean relative humidity at 0830 and 1730 hours IST for the individual stations in the two sub-divisions. The relative humidity is generally high during the period from June to September. It is about 54% in June rising to 83% during August in East U.P. and about 45% in June rising to 80% during August in west U.P. It is least during summer afternoons when it becomes about 23-30% in East U.P. and 21-27% in West U.P. making the summer dry and hot. It is 50% in November rising to 62.5% during January in West U.P. and 60% in November, rising to 69% during January in East U.P. During winter the sudden increase in humidity is mainly due to passage of western disturbances over the state.

The diurnal variations in relative humidities are least during the monsoon season. It is highest during the winter period November to March. In the winter it is highest in the months January/February.

V. CLOUDINESS

The period November to April/May is cloudless or lightly clouded. Afternoons are, however, comparatively more clouded than forenoons in this period. In April and May the sky remains lightly clouded over the State but clouding over East U.P. where it decreases from 1.4 Oktas in the morning to 1.1 Oktas in the evening is less than that over West U.P. where it decreases from 2.1 Oktas in the morning to 1.7 Oktas in the evening. During monsoon season, (June to September) skies are heavily clouded, specially during July and August, when more than 5 Oktas of skies are covered with clouds. Over East U.P. cloudiness in the morning is more than that in the evening during these two months, the sky remains overcast on

12 and 9 days in the morning and evening respectively per months and clear on one day per month in East U.P., on 9 days both in the morning and evening per month, and clear on 2 days per month in West-U.P. During October, clouding decreases to a great extent over the entire State. Tables 4 and 4(a) give the mean monthly total cloud amount and number of days with clear and overcast skies at 0830 and 1730 hours I.S.T. respectively.

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

VI. RAINFALL

Table 5 gives districtwise and subdivisional mean monthly and annual rainfall and number of rainy days, Figs. 6 and 6(a) to 6(d) show the annual and seasonal distribution of rainfall. The total annual rainfall over the plains of the State varies from 60 cms over the areas adjacent to East Rajasthan to 140 cms over the areas near the foothills of the Himalayas. The southwest monsoon (June to September) is the principal rainy season when the plains of the State receives 87-88 percent of its annual rainfall. Rainfall in the winter season (December to February) is about 4-6 percent of the annual total, in the hot weather season (March-May) about 3-4 percent and in the post monsoon season (October-November) about 4-5 percent.

Northern districts adjacent to foothills of Himalayas constitute the area of maximum rainfall in the plains of the State. Gorakhpur and Pilibhit districts register maximum amount of rainfall in East and West U.P. respectively. The districts adjacent to East Rajasthan receive minimum amount of rainfall, annual rainfall over Mathura being the lowest and constitute the driest zone of the State. The mean annual rainfall in the East and West sub-divisions of U.P. is about 102 cm and 82 cm respectively. The southwest monsoon sets in over the eastern parts of the state by about the middle of June and extends over the entire State by the end of June. July and August are the rainiest months, each accounting individually to about 30 percent of the annual rainfall. In each of these months there are 13 rainy days (with daily rainfall of at least 2.5 mm) in East U.P. and 11 rainy days in West U.P.

The withdrawal of the southwest monsoon begins from the north-western parts of the State around the last week of September and monsoon withdraws from the entire State by the first week of October.

During winter (November to February) East and West U.P. receive 4.7 and 5.4 cms of rainfall respectively, which although small in amount, is of great significance for the growth of rabi crops. This rainfall occurs mainly in association with western disturbances which move from West to East across the northern part of the country. Table 6 gives the monthly and annual rainfall for various river catchments in the State.

VII. RAINFALL VARIABILITY

Co-efficient of variation is defined as the ratio of standard deviation to the normal N, multiplied by 100.

Therefore, co-efficient of variation (c.v.) =

$$\frac{\text{Standard deviation } (\sigma)}{\text{Normal } (N)} \times 100$$

Co-efficient of variation of rainfall is less than 30 percent over East U.P. except in the districts Barabanki, Hardoi, Lucknow, Raibarelli, Sitapur and Unnao and over some northern districts of West U.P. namely Bijnor, Muzaffarnagar, Saharanpur. This is more than 30% over rest of U.P. State. As about 87-88% of the annual rainfall occurs during the monsoon months, variability in this season also resembles closely that for the annual rainfall.

Co-efficient of variation of rainfall is extremely high in winter, hot weather and post-monsoon seasons over the State.

VIII. DROUGHTS AND EXCESSIVE RAINFALL

I. DROUGHTS

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

Areas, where frequency of drought, as defined above is 20 percent of the years examined, are classified as 'Drought Areas' and areas having drought condition for more than 40 percent of the years under consideration represents 'chronically drought affected areas'. The severity of drought not only depends upon the order of rainfall deficiency in a single year, but also upon 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.

Drought conditions as they prevailed over U.P. during the 50 year period from 1901 to 1950 are described below. Probabilities of occurrence of low rainfall, based on co-efficient of variation of rainfall described in the previous section, are also mentioned.

A. PLAINS OF UTTAR PRADESH - WEST

Districtwise drought conditions as they prevailed over this meteorological sub-division during the 50 year period from 1901 to 1950 are indicated below (Figures in the bracket show number of drought years).

Agra	(9)
Aligarh	(9)
Bulandshahr	(11)
Bareilly	(10)
Bijnor	(6)
Budaun	(12)
Etah	(10)
Etawah	(10)
Farrukhabad	(10)
Jalaun	(9)
Jhansi	(6)
Mainpuri	(8)
Mathura	(10)
Meerut	(11)
Moradabad	(7)
Muzaffar-	(11)
nagar	
Pilibhit	(7)
Saharanpur	(5)
Shahjahanpur	(9)

The 9 districts, Bulandshahr, Bareilly, Budaun, Etah, Etawah, Farrukhabad, Mathura, Meerut and Muzaffarnagar experienced the drought condition for 20 or more than 20 percent of the years under consideration and may, therefore, be classified as 'drought areas' while none of these districts belong to 'chronically drought affected areas'.

Occasions of occurrence of drought conditions in successive years were not very frequent in the case of this sub-division. The following table gives the years of successive drought (i.e. the district rainfall less than 75 percent of annual normal in each year) during the 50 year period 1901-1950, and the districts in which it occurred.

TABLE - 1

YEARS OF SUCCESSIVE DROUGHTS	AFFECTED DISTRICTS
1912 - 1913	: Budaun, Shahjahanpur.
1928 - 1929	: Agra, Aligarh, Budaun, Mathura, Meerut, Muza- ffarnagar.
1928 - 1930	: Bulandshahr.
1937 - 1938	: Budaun, Etah, Mathura.
1938 - 1939	: Meerut.
1938 - 1940	: Muzaffarnagar.

The above table clearly brings out the area which was simultaneously affected by drought conditions. Further, rainfall of less than 50 percent of the annual normal representing severe drought conditions occurred in various districts as indicated in the following table, where the actual rainfall expressed as percentage of the normal rainfall is given in brackets against each districts.

TABLE - II

YEARS OF SUCCESSIVE DROUGHTS	AFFECTED DISTRICTS (RAINFALL AS % OF NORMAL)
1905	: Agra (49), Bulandshahr (42), Etah (48), Etawah (44), Farrukhabad (48), Jalaun (41), Mainpuri (48), Mathura (44).
1913	: Agra (42), Jalaun (47), Jhansi (45).
1918	: Agra (38), Aligarh (35), Bulandshahr (38), Budaun (46), Etah (30), Etawah (36), Farrukhabad (31), Jalaun (38), Jhansi (44), Mainpuri (39), Mathura (36), Meerut (45), Muzaffarnagar (32), Saharanpur (44).
1920	: Jhansi (48).
1929	: Muzaffarnagar (49).
1941	: Agra (45), Aligarh (46), Bulandshahr (49), Mathura (41).

It can be seen that the lowest district rainfall, expressed as percentage of the annual normal was only 30 recorded in Etah district in 1918. 1905, 1913, 1918 and 1941 were the years of widespread drought when the number of districts experiencing rainfall less than 75% of the annual normal were 19, 17, 19 and 18 respectively out of 20 districts of the sub-division. The sub-division as a whole was affected by drought conditions during the years 1905, 1913, 1918 and 1941.

The probability of occurrence of drought for the whole sub-division is about 8 percent i.e. 4 times in 50 years.

B. PLAINS OF UTTAR PRADESH - EAST

As in the case of Plains of Uttar Pradesh - West, districtwise drought conditions are indicated below (Figures in the bracket show number of drought years).

Allahabad	(4)
Azamgarh	(3)
Bahraich	(5)
Ballia	(2)
Banda	(6)
Barabanki	(11)
Basti	(5)
Deoria	(7)
Fatehpur	(7)
Fyzabad	(6)
Ghazipur	(5)
Gonda	(5)
Gorakhpur	(10)
Hamirpur	(7)
Hardoi	(10)
Jaunpur	(4)
Kanpur	(9)
Kheri	(6)
Lucknow	(9)
Mirzapur	(4)

Pratapgarh	(6)
Raibareli	(10)
Sitapur	(7)
Sultanpur	(5)
Unnao	(12)
Varanasi	(3)

The five districts namely Barabanki, Gorakhpur, Hardoi, Raibareli and Unnao experienced drought condition for 20 or more than 20 percent of the year under consideration and may, therefore, be classified as 'drought areas' while none of these districts belong to chronically drought affected area.

Occasions of occurrence of drought conditions in successive years were not very frequent in this sub-division also. The following table gives the years of successive drought (i.e. the district rainfall less than 75 percent of annual rainfall normal in each year) during the 50 year period 1901-1950, and the districts in which it occurred.

TABLE - III

YEARS OF SUCCESSIVE DROUGHTS	AFFECTED DISTRICTS
1907-1908	: Azamgarh, Bahraich, Barabanki, Basti, Fyzabad, Gonda, Gorakhpur, Hardoi, Kheri, Raibareli, Sitapur, Sultanpur, Unnao.
1912-1913	: Bahraich
1925-1926	: Gorakhpur
1927-1928	: Deoria
1932-1933	: Hamirpur
1940-1941	: Barabanki, Raibareli, Unnao
1945-1946	: Unnao

The above table clearly brings out the area which was simultaneously affected by the drought conditions. In the periods 1907-1908 and 1940-41 thirteen (13) and three (3) districts were affected by drought condition respectively. In other occasions, drought-conditions occurred over single districts only and there was no case of drought for more than 2 successive years over any district. Further, rainfall of less than 50 percent representing severe drought

conditions occurred in various districts as indicated in the following table, where the actual rainfall expressed as percentage of normal rainfall is given in brackets against each district.

TABLE - IV

YEARS OF
SEVERE DROUGHTS

AFFECTED DISTRICTS

1905	: Hamirpur, (47), Kanpur (44).
1907	: Bahraich (41), Barabanki (46), Gonda (41), Hardoi (45), Kheri (47), Lucknow (44), Sitapur (46).
1908	: Barabanki (49), Fyzabad (44), Hamirpur (36), Hardoi (48), Kanpur (43), Sitapur (43), Unnao (49).
1918	: Barabanki (49), Hamirpur (36), Hardoi (48), Kanpur (43), Sitapur (43), Unnao (49).
1932	: Lucknow (46), Unnao (49).

1918 was the only year of widespread drought when the number of districts experiencing drought (rainfall less than 75 percent of the annual normal) was 21 out of 26 districts in the sub-division. In the years 1907, 1908, 1918 and 1932, the sub-division as a whole was affected by drought.

The probability of occurrence of drought for the whole sub-division is 8 percent i.e. 4 times in 50 years in the long run. The chance of the severe drought in the sub-division is nil.

During the period 1901-1950, there was no drought anywhere in both the sub-divisions in the 14 years namely, 1904, 1909, 1911, 1914, 1915, 1916, 1917, 1921, 1922, 1924, 1931, 1934, 1936 and 1948. In the 11 years namely 1906, 1910, 1915, 1923, 1925, 1926, 1927, 1943, 1946 and 1949 only one district experienced the drought condition. 1907 and 1918 were the years of widespread drought in the State when the number of districts experiencing drought were 31 and 41 respectively. It may be mentioned here that during the above 50 years period 15 districts (out of 26 districts) of East U.P. and 9 districts (out of 20 districts) of the West U.P. have fallen in the grip of drought in any two consecutive years. Occasions of the occurrence of drought conditions in successive years were more frequent in west U.P. than in East U.P. and hence, the severity of drought is more in western districts. From what has been stated, it is seen that the State as a whole is not very much drought prone.

2. EXCESSIVE RAINFALL

It may generally be said that rainfall, sufficiently in excess of the normal, is a predominant factor for occurrence of floods, particularly in the high rainfall regions. Even with co-efficient of variation of rainfall of 20 percent or less, these regions are prone to frequent floods. For the purpose of the present description annual rainfall of 125 percent or more of the normal is considered as excessive rain.

(a) PLAINS OF UTTAR PRADESH - WEST

The following table gives the districtwise years of excessive rainfall (i.e. annual rainfall of 125 percent or more of normal annual rainfall).

TABLE - V

Districts	Years of excessive rainfall	Highest amount (% of the normal) and the year.
Aligarh	1906, 1908, 1916-17, 1933, 1936, 1942, 1949-50.	121.9 cm (188%) in 1933.
Agra	1904, 1916-17, 1919, 1933, 1936, 1939, 1942, 1948-49.	103.3 cm (158%) in 1949.
Bijnor	1906, 1910, 1912, 1916, 1924, 1942, 1945-46.	165.0 cm (151%) in 1942.
Bareilly	1914, 1916, 1921-22, 1924-25, 1927, 1936.	183.8 cm (167%) in 1936.
Budaun	1916-17, 1921-22, 1925, 1927, 1933, 1936, 1948.	163.0 cm (199%) in 1936.
Buland- shahr	1906, 1914, 1917, 1922, 1924-25, 1933, 1936, 1948, 1950.	140.2 cm (209%) in 1933.
Etah	1906, 1916-17, 1919, 1921, 1931, 1933, 1936, 1942-43, 1949.	126.1 cm (181%) in 1936.

Districts	Years of excessive rainfall	Highest amount (% of the normal) and the year.
Etawah	1916-17, 1924, 1930, 1934, 1936, 1948-49.	122.5 cm (163%) in 1949.
Farrukha- bad	1915-17, 1922, 1927, 1931, 1936, 1943, 1948-49.	142.4 cm (180%) in 1936.
Jhansi	1916-17, 1919, 1926, 1934, 1942, 1948.	134.2 cm (153%) in 1919.
Jalaun	1904, 1910, 1916-17, 1919, 1924, 1934, 1944, 1948.	127.7 cm (163%) in 1919.
Mainpuri	1903, 1916, 1917, 1926, 1927, 1936.	109.6 cm (154%) in 1917.
Mathura	1904, 1908, 1917, 1924, 1926, 1931, 1933, 1936, 1942.	106.2 cm (179%) in 1908.
Meerut	1906, 1909, 1914, 1916, 1924, 1933-34, 1942, 1945.	122.2 cm (169%) in 1933.
Muzaffar- nagar	1914, 1916, 1925, 1932-33, 1936, 1942, 1945, 1948.	153.1 cm (202%) in 1942.
Moradabad	1916-17, 1921-22, 1924, 1927, 1931, 1933, 1936, 1942, 1945, 1948.	147.7 cm (156%) in 1948.
Pilibhit	1917, 1921-22, 1923-26, 1936, 1945.	108.0 cm (169%) in 1936.
Shahjahan- pur	1915, 1917, 1921-25, 1931, 1936.	188.9 cm (185%) in 1936.
Saharan- pur.	1906, 1914, 1916, 1923-24, 1932-33, 1942, 1945, 1950.	163.6 cm (172%) in 1942.

From the above table it may be seen that during the period under consideration, the districts of the sub-division recorded excessive rainfall in 34 years, the maximum amount being 209% of normal annual rainfall in the year 1933 for the district Bulandshahr. The number of years of such rainfall for each district is given below:

<u>No. of years of excessive rainfall</u>	<u>Districts</u>
6	: Mainpuri.
7	: Jhansi.
8	: Etawah, Bareilly, Bijnor.
9	: Aligarh, Budaun, Jalaun, Mathura, Meerut, Pilibhit, Shahjahanpur.
10	: Farrukhabad, Agra, Saharanpur, Muzaffarnagar.
11	: Bulandshahr.
12	: Moradabad.

In 1936 the subdivision registered maximum amount of rainfall. Successive years of excessive rainfall are shown against each district.

<u>Districts</u>	<u>Year</u>
Agra	: 1916-1917, 1948-1949.
Aligarh	: 1916-1917, 1949-1950.
Bulandshahr	: 1924-1925.
Bareilly	: 1921-1922, 1924-1925.
Budaun	: 1916-1917, 1921-1922.
Bijnor	: 1945-1946.
Etah	: 1916-1917, 1942-1943.
Etawah	: 1916-1917, 1948-1949.
Farrukhabad	: 1915-1917, 1948-1949.

<u>District</u>	<u>Year</u>
Jalaun	: 1916-1917.
Jhansi	: 1916-1917.
Mainpuri	: 1916-1917, 1926-1927.
Mathura	: -
Meerut	: -
Moradabad	: 1916-1917, 1921-1922.
Muzaffarnagar	: 1932-1933.
Pilibhit	: 1921-1926.
Saharanpur	: 1923-1924, 1932-1933.
Shahjahanpur	: 1921-1923.

Mathura and Meerut districts did not record excessive rainfall in successive years. Farrukhabad, Shahjahanpur and Pilibhit districts recorded excessive rainfall in 3, 5 and 6 consecutive year respectively only once. All other districts experienced excessive rainfall in 2 consecutive years only. The heaviest one day rainfall on record at any station in the subdivision was 823.0 mm at Nagina (Bijnor district) on 18th September, 1880.

So far as vagaries of rainfall are concerned the period of 14 years from 1905 to 1918 deserves mention. Out of 5 and 6 occasions of drought and excessive rainfall conditions respectively, experienced by the subdivision as a whole, 4 and 2 occasions of drought and excessive rainfall conditions respectively, were found to take place in this period and more over, the only severe drought condition, the sub-division experienced, occurred in this period. This year of severe drought, namely 1918, was preceded by two consecutive years of excessive rainfall (i.e. 1916-1917). The remaining 8 years were the years of normal rainfall. The probability of occurrence of heavy rain of 125 percent or more of the normal over the subdivision is about 12 percent i.e. 6 times in 50 years in the long run.

(b) PLAINS OF UTTAR PRADESH - EAST

The following table gives the districtwise years of excessive rainfall in increasing order of the number of such years with highest percentage of annual rainfall and the year in which it occurred.

TABLE - VI

Districts	Years of excess rainfall	Highest Amount (% of normal) and year.
Allahabad	1915-16, 1922, 1925, 1938, 1948.	168.3 cm (173%) in 1948.
Azamgarh	1910, 1911, 1922, 1936, 1938.	161.7 cm (158%) in 1938.
Bahraich	1915, 1927, 1936, 1938, 1949.	211.6 cm (186%) in 1938.
Ballia	1911, 1922, 1936-38,	155.9 cm (154%) in 1911.
Banda	1911, 1915-16, 1919, 1922, 1924, 1926, 1948.	133.0 cm (140%) in 1919.
Barabanki	1915-16, 1922, 1936, 1938, 1945, 1948-49.	171.7 cm (171%) in 1915.
Basti	1903, 1915, 1922, 1936, 1937, 1938.	246.7 cm (195%) in 1936.
Deoria	1903, 1910, 1915-16, 1922, 1933, 1938, 1941.	170.7 cm (144%) in 1938.
Faizabad	1903, 1915, 1922, 1936, 1938.	159.3 cm (158%) in 1903.
Fatehpur	1915, 1917, 1922-24, 1936, 1948.	152.5 cm (165%) in 1915.
Ghazipur	1911, 1922, 1936, 1942, 1944, 1948.	152.4 cm (145%) in 1936.
Gonda	1910, 1915, 1931, 1936, 1938.	226.2 cm (201%) in 1938.
Gorakhpur	1903, 1910, 1936.	181.0 cm (130%) in 1936.

Districts	Years of excessive rainfall	Highest Amount (% of normal) and the year.
Hamirpur	1904, 1906, 1916-17, 1919, 1924, 1926, 1930, 1936.	134.6 cm (158%) in 1919.
Hardoi	1915-16, 1921, 1923-25, 1934, 1936, 1938, 1948-49.	162.5 cm (185%) in 1936.
Jaunpur	1903, 1915, 1922, 1936, 1943, 1948, 1949.	147.1 cm (147%) in 1948.
Kanpur	1904, 1915-17, 1919, 1923, 1925, 1936, 1944, 1948.	121.1 cm (155%) in 1904.
Kheri- Lakhimpur	1915, 1917, 1922-23, 1936, 1938.	185.7 cm (174%) in 1922.
Lucknow	1915, 1921-23, 1925, 1930, 1936, 1938, 1947, 1949, .	181.6 cm (193%) in 1915.
Mirzapur	1917, 1922, 1936-37, 1948.	193.6 cm (171%) in 1948.
Pratapgarh	1903, 1915, 1922, 1936, 1943, 1948.	142.2 cm (145%) in 1948.
Raibareilly	1915-16, 1922-23, 1936, 1938, 1942, 1948.	154.7 cm (167%) in 1936.
Sitapur	1915, 1922-23, 1927, 1936, 1938, 1947.	191.6 cm (197%) in 1936.
Sultanpur	1903, 1915, 1917, 1922, 1936, 1942.	149.9 cm (150%) in 1903.
Unnao	1904, 1915, 1917, 1922-23, 1925, 1936, 1938, 1942, 1949.	165.3 cm (197%) in 1915.
Varanasi	1917, 1922, 1930, 1936-37, 1946, 1948.	169.7 cm (162%) in 1948.

From the above table it may be seen that during the period under consideration, the excessive rainfall occurred in the subdivision in 32 years, the maximum and minimum amount being 201 percent and 130 percent of the normal annual rainfall in the years 1938 and 1936 for the districts Gonda and Gorakhpur respectively. The number of years of such rainfall of each district is given below.

<u>No. of years of excessive rainfall</u>	<u>Districts</u>
3	Gorakhpur
5	Azamgarh, Bahraich, Ballia, Faizabad, Mirzapur.
6	Allahabad, Basti, Ghazipur, Gonda, Kheri, Pratapgarh, Sultanpur.
7	Fatehpur, Jaunpur, Sitapur, Varanasi.
8	Banda, Barabanki, Deoria, Raibareli.
9	Hamirpur
10	Kanpur, Unnao, Lucknow.
11	Hardoi.

In 1936, 23 districts of the subdivision received maximum amount of rainfall. Successive years of excessive rainfall are shown against each district.

<u>District</u>	<u>Year</u>
Allahabad	1915-1916
Azamgarh	1910-1911
Ballia	1936-1938
Banda	1915-1916
Barabanki	1915-1916, 1948-49
Basti	1936-1938
Bahraich	-

<u>District</u>	<u>Year</u>
Deoria	1915-1916
Fatehpur	1922-1924
Fyzabad	-
Ghazipur	-
Gonda	-
Gorakhpur	-
Hamirpur	1916-1917
Hardoi	1915-1916, 1923-25, 1948-49
Jaunpur	1948-1949
Kanpur	1915-1917
Kheri	1922-1923
Lucknow	1921-1923
Mirzapur	1936-1937
Pratapgarh	-
Raibareli	1915-1916, 1922-23
Sultanpur	-
Sitapur	1922-1923
Unnao	1922-1923
Varanasi	1936-1937

Each of the districts Ballia, Basti, Fatehpur, Hardoi, Kanpur and Lucknow experienced excessive rainfall in 3 consecutive years only once. None of the districts Bahraich, Fyzabad, Ghazipur, Gonda, Gorakhpur and Sultanpur had ever recorded excessive rainfall in successive years. Other districts have recorded the above rainfall in 2 consecutive years once or twice. The heaviest one-day rainfall on record at any station in the sub-division was 533.4 mm at Gangapur (in Varanasi district) on 12th July, 1865.

From the above study of irregularity of rainfall behaviour, it is revealed that, out of 4 years of drought conditions in the subdivision as a whole, three of them fell in the period of 12 years from 1907 to 1918 and out of 5 years of excessive rainfall only one of them fell in the above period. In this period drought condition occurred in two consecutive years (1907-1908) only once. Again three excessive rainfall conditions and no drought condition occurred in the period of 13 years from 1936 to 1948. The probability of occurrence of heavy rain of 125 percent or more of the normal over the sub-division is about 10 percent i.e. 5 times in 50 years in the long run.

From probability figures of drought and excessive rainfall it is seen that the frequency of occurrence of excessive rainfall is slightly more in U.P. West than in U.P. East and frequency of drought in U.P. West is the same as that in U.P. East.

Fig. 7(a) and 7(b) show the winter, monsoon and annual rainfall (in mm) of each district of U.P. West and U.P. East respectively together with the above rainfalls for the sub-divisions.

.....

TABLE - 1

Mean Wind Speed (Km. p. h.) and Predominant Wind Direction

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST														
Bahraich	a	4.0	4.8	6.0	7.3	8.4	8.4	7.8	6.3	5.4	3.7	2.7	2.9	5.6
	M	C/Var	C/W	W/NW	E/W	E	E	E	E	E/SE	C/E	C/Var	C/NW	
	E	C/W	C/W	W/NW	W/NW	W	E	E	E	C/E	C/W	C/W	C/W	
Gonda	a	3.9	5.1	6.5	7.4	7.7	7.3	6.4	5.2	4.6	3.0	2.4	2.8	5.2
	M	C/W	W	W	E	E	E	E	E	E	E	C/W	C/W	
	E	C/W	W	W	W/NW	W	E	E	C/E	C/E	C/W/NW	C	C/W	
Lucknow	a	2.3	2.9	3.7	4.0	4.4	4.9	4.0	3.3	3.0	1.7	1.6	1.7	3.1
	M	C/W	C/W	W	W	E	E	E	E	C/E	C/W	C/W	C/W	
	E	C/W	W	W	W	W	E	E	C/E	C/E	C/Var	C	C	
Gorakhpur	a	2.9	3.9	5.4	6.4	7.1	6.8	6.3	4.6	3.3	2.7	2.0	2.3	4.5
	M	C/W	W	W	W	E	E	E	E	E	C/E	C/W	C/W	
	E	C/W	W	W	W	W	E	E	E	C/E	C/W	C/W	C/W	
Kanpur Aerodrome	a	6.6	8.8	10.9	12.1	12.9	13.5	11.5	9.9	9.0	6.3	5.1	5.2	9.3
	M	C/W	W	W	W	W	E	E	E	W	C/W	C/W	C/W	
	E	NW/W	NW/W	NW/W	NW/W	NW/W	NW/W	E	E	W	N/NW	C/NW	NW	
Fatehpur	a	3.1	4.1	5.5	5.7	6.4	7.0	5.9	4.8	4.0	2.5	2.3	2.5	4.5
	M	C/Var	C/W	C/W	C/NW	C/E	Var	C/E	C/W	C/W	C/Var	C/W	C/W	
	E	C/NW	NW/C	NW	NW	NW	NW/C	C/Var	C/Var	C/Var	C	C	C	
Allahabad (Bamrauli)	a	4.8	5.5	6.7	7.7	8.7	9.4	8.4	7.4	6.6	4.5	3.4	3.6	6.4
	M	C/W	C/W	W	W	W/E	W/E	E	E	W	C/W	C/W	C/W	
	E	W/NW	W/NW	NW	NW	NW	NW	Var	W	W	C/NW	C/NW	C/NW	
Varanasi	a	6.4	7.8	8.9	9.4	10.2	9.7	9.0	8.0	6.4	5.5	5.2	5.7	7.7
	M	SW	SW	SW	SW	E	E	E	E	SW	SW	SW	SW	
	E	W/NW	W	W	NW/W	NW	NW	NE	W	NE/W	NW	W/NW	W/NW	

contd.....

TABLE - 1(contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kheri Lakhimpur	a 2.4	3.5	3.9	5.1	5.5	5.2	4.5	3.3	2.7	2.1	1.4	1.5	3.4
	M C/W	C/W	W	W	E/W	E	E	E	C/E	C/E	C/Var	C/W	
	E C/W	C/W	W	W	W	W/E	C/E	C/E	C/E	C	C	C	
Hardoi	a 4.3	5.4	6.2	7.1	7.9	7.4	7.0	5.5	5.7	3.8	2.9	3.2	5.5
	M W	W	W/NW	W/NW	W	E/SE	E	E/S ^E	E	W	C/W	C/W	
	E W/NW	NW/W	W/NW	W/NW	W	Var	E/SE	E	E	C/NW	C/NW	C/W	
Lucknow (Amausi)	a 6.1	7.9	9.2	10.2	11.0	12.0	10.4	8.6	8.3	5.4	4.0	4.1	8.1
	M C/NW	W/NW	NW	NW/W	E	E	E	E	E	C/W	C/NW/W	C/NW	
	E NW	NW/W	NW	NW	NW	NW	E	E	E	C/NW	NW	NW	
Azamgarh	a					- no data -							
	M C/W	W	W	W	E	E	E	E	E	C/E	C/W	C/W	
	E C	C/W	C/W	W	W	C/E	C/E	C/E	C/E	C	C	C	
Banda	a 1.6	2.1	3.0	3.5	4.2	4.7	2.9	2.4	2.0	1.1	0.7	0.7	2.4
	M C/W	C/W	C/W	C/W	C/W	W/SW	C/W/SW	C/W	C/W	C/Var	C	C	
	E C/W	C/W	C/W	W	W	Var	C/SW	C/W	C/W	C/Var	C	C	
Varanasi (Babatpur)	a 6.5	9.3	10.4	12.6	12.7	12.0	11.4	9.2	8.8	6.3	5.1	4.9	9.1
	M W/SW	SW/W	W/SW	W/SW	E	E	E	E	E	W/SW	SW/W	SW/W	
	E W	W	W	NW/W	NW	NE	E	Var	E	W	W	W	
Sub.Div. Means.	4.2	5.5	6.6	7.6	8.2	8.3	7.5	6.0	5.4	3.7	3.0	3.2	5.7

contd

TABLE - 1(contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH WEST													
Roorkee	a 4.0	4.8	5.4	6.1	7.2	7.3	5.8	4.6	4.2	3.2	2.6	3.1	4.9
	M C/NW	C/NW	C/NW	C/SE	SE	SE	SE	SE	SE	C/SE	C/SE	C/NW	
	E NW	NW	NW	NW	NW	NW	SE	SE	C/NW	C/NW	C/NW	C/NW	
Bareilly	a 3.5	4.8	6.0	6.5	6.7	7.3	5.8	4.7	4.2	2.7	2.2	2.7	4.8
	M C/W	C/W	W	W/NW	E	E	E	E	C/E	C/E	C/Var	C/W	
	E C/W	W	W	W	W	W	E	C/E	C/W	C/W/NW	C/W	C/W	
Aligarh	a 5.3	6.3	7.2	8.2	8.8	9.3	8.1	6.7	6.4	4.7	4.6	4.7	6.7
	M C/W	W	W	C/W	W	Var	E	E	C/W	C/W	C/W	C/W	
	E C/NW	NW	NW	NW	NW	NW	E	C/E	C/W	C/N	C/NW	C/NW	
Mainpuri	a 3.0	3.9	4.7	4.9	5.8	6.2	4.7	3.8	3.7	2.4	2.2	2.3	4.0
	M C/W	C/W	C/W	W	W	W	E	C/E	C/W	C/W	C/W	C/W	
	E C/W	C/W	W/NW	W	W	W	C/E	C/E	C/W	C/W	C/W	C/W	
Agra	a 3.6	4.2	4.9	5.1	5.9	6.9	5.8	4.9	4.5	3.2	2.6	2.9	4.9
	M C/W	C/W	C/W	C/W	C/W	C/W	C/Var	C/Var	C/W	C/Var	C/Var	C/Var	
	E C/NW	C/NW	NW	NW	NW	C/W	C/Var	C/NW	C/NW	C/NW	C/NW	C/NW	
Jhansi	a 3.9	4.4	5.4	5.8	7.1	8.1	6.9	5.9	5.5	4.3	3.5	3.3	5.3
	M C/Var	C/W	C/Var	C/W	W	W	W	C/W	W	C/W	C/SW	C/W	
	E C/NW	C/NW	NW/W	NW/W	W/NW	W	W	C/W	C/W	C/W/NW	C/Var	C/NW	
Meerut	a 4.9	7.2	7.1	7.7	8.6	8.9	7.1	5.9	6.0	4.4	4.4	3.7	6.3
	M C/NW/W	W	W/NW	C/W	E	E	C/E	C/E	C/E	C/E	C/W	C/W	
	E												
	- Not available -												
Orai	a 5.6	5.8	7.6	8.0	9.3	10.8	10.2	8.8	7.5	6.3	4.4	3.9	7.3
	M NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	
	E NW	NW	NW	NW	NW	NW	Var	NW	NW	NW	NW	NW	
Sub.Div. Means.	4.2	5.2	6.0	6.5	7.4	8.1	6.8	5.7	5.3	3.9	3.3	3.3	5.5

a - Mean Wind Speed in Kms. per hour. M - Predominant Wind Direction in the Morning. Calm - C. The next predominant wind direction is also mentioned when calm is mentioned.
E - Predominant Wind direction in the evening. Var - Variable.

TABLE - 2
Mean Maximum and Mean Minimum Temperature ($^{\circ}\text{C}$)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST														
Bahraich	Max	22.6	25.6	31.9	37.4	39.8	37.6	33.0	32.2	32.7	32.1	28.6	24.3	31.5
	Min	8.8	10.9	15.4	20.9	25.6	27.0	26.3	26.1	25.1	20.7	13.4	9.4	19.1
Gonda	Max	22.9	25.7	32.2	37.6	39.9	37.4	32.9	32.2	32.5	32.1	28.6	24.3	31.5
	Min	8.3	10.5	15.4	21.0	25.6	26.9	26.2	25.9	24.9	20.0	12.6	8.8	18.8
Lucknow	Max	23.3	26.4	32.9	38.3	41.2	39.3	33.6	32.5	33.0	32.8	29.3	24.8	32.3
	Min	8.9	11.5	16.3	21.8	26.5	28.0	26.6	26.0	25.1	19.8	12.7	9.1	19.4
Gorakhpur	Max	23.0	25.9	32.6	37.4	39.0	36.4	32.8	32.3	32.6	32.2	28.5	24.3	31.4
	Min	9.9	12.3	17.2	22.4	25.9	26.7	26.4	26.2	23.6	21.5	14.6	10.8	20.0
Kanpur Aerodrome	Max	22.8	26.0	32.7	38.3	41.7	39.9	33.7	32.1	32.7	32.7	28.9	24.3	32.1
	Min	8.6	11.0	16.3	22.0	27.2	28.7	26.6	25.8	24.9	19.6	12.3	8.5	19.3
Fatehpur	Max	23.4	26.6	33.1	38.6	42.3	40.1	33.8	32.1	32.7	32.8	29.0	24.5	32.4
	Min	8.9	11.1	16.3	22.1	27.3	28.8	26.7	25.9	25.0	20.0	12.7	9.0	19.5
Allahabad (Bamrauli)	Max	23.7	26.7	33.3	38.8	42.1	39.8	33.6	32.1	32.8	32.6	29.0	24.8	32.4
	Min	9.1	11.6	17.0	22.5	27.4	28.9	26.6	26.0	25.2	20.4	13.1	9.3	19.8
Varanasi	Max	23.4	26.6	33.4	38.6	41.5	39.1	33.5	32.2	32.7	32.5	28.6	24.4	32.2
	Min	9.5	12.0	17.2	22.4	27.0	28.3	26.5	26.0	25.4	20.7	13.4	9.7	19.8
Kheri- Lakhimpur	Max	22.3	26.2	31.6	37.6	40.3	37.9	32.7	32.2	32.7	31.5	28.5	24.3	31.5
	Min	8.9	10.9	15.9	20.9	25.3	26.6	25.9	25.8	24.9	20.3	13.1	9.7	19.0
Hardoi	Max	22.1	26.1	32.0	37.9	41.1	39.5	33.6	32.5	33.1	32.2	28.9	24.4	31.9
	Min	8.5	10.7	15.8	20.6	25.3	27.6	26.6	26.1	25.1	19.9	12.3	9.1	19.0

contd

TABLE - 2(contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lucknow (Amausi)	Max	22.2	26.2	32.4	38.1	41.1	38.9	33.4	32.3	33.0	32.2	28.5	24.3	31.9
	Min	7.9	9.7	15.0	20.6	25.7	27.5	26.5	25.9	24.8	19.4	11.1	7.7	18.5
Azamgarh	Max	23.3	27.2	33.3	39.1	41.4	38.5	33.0	32.5	31.9	32.7	29.5	25.5	32.3
	Min	9.7	11.5	17.0	21.9	26.1	27.3	26.1	26.1	25.5	21.0	13.3	9.5	19.6
Banda	Max	23.7	27.9	34.1	39.5	43.0	40.8	34.0	32.1	33.1	32.8	29.2	25.2	32.9
	Min	9.6	11.8	17.5	22.8	28.0	29.4	26.4	25.6	24.8	20.4	12.9	9.6	19.9
Varanasi (Babatpur)	Max	23.1	27.2	33.2	38.8	41.5	38.9	33.0	32.3	32.4	32.2	28.6	24.7	32.2
	Min	9.2	11.5	16.9	22.2	26.9	28.2	26.4	26.1	25.4	21.1	12.9	9.5	19.7
Sub-Div. Means.	Max	23.0	26.5	32.8	38.3	41.1	38.9	33.3	32.3	32.7	32.4	28.8	24.6	32.1
	Min	9.0	11.2	16.4	21.7	26.4	27.9	26.4	26.0	25.1	20.3	12.9	9.3	19.4
UTTAR PRADESH WEST														
Roorkee	Max	20.1	22.9	28.7	35.2	39.4	38.5	33.3	32.3	32.4	30.9	26.5	22.0	30.2
	Min	6.6	8.7	13.1	18.2	25.6	25.9	25.5	25.0	25.4	17.2	10.1	6.8	17.0
Bareilly	Max	22.0	24.9	31.0	37.0	40.5	39.0	33.8	32.6	33.0	32.3	28.4	25.8	31.5
	Min	8.6	10.8	15.6	21.1	25.8	27.5	26.2	25.6	24.7	19.5	12.6	9.4	18.9
Aligarh	Max	21.7	24.9	30.7	37.1	41.2	40.0	34.9	33.1	33.5	33.4	29.0	23.7	31.9
	Min	7.6	9.9	14.9	20.6	26.3	28.4	26.7	25.7	24.5	19.0	12.1	8.3	18.7
Mainpuri	Max	22.7	26.0	32.5	38.5	42.2	40.9	35.0	33.1	33.7	34.0	30.0	24.8	32.8
	Min	7.7	10.1	14.9	20.9	26.2	28.6	26.7	25.9	24.7	18.9	11.7	8.2	18.7

contd

TABLE - 2(contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Agra	Max	22.2	25.7	31.9	37.7	41.8	40.5	34.8	32.8	33.2	33.3	29.2	24.1	32.3
	Min	7.4	10.3	15.7	21.6	27.2	29.5	27.0	25.8	24.6	19.1	12.0	8.2	19.0
Jhansi	Max	24.1	27.5	33.5	38.9	42.6	40.4	33.5	31.7	32.5	33.3	29.7	25.5	32.8
	Min	9.2	11.7	17.4	23.3	28.8	29.3	25.9	24.9	24.1	19.5	13.1	9.3	19.7
Meerut	Max	20.6	24.5	30.1	36.1	40.0	39.5	34.3	32.7	33.4	31.9	27.9	23.2	31.2
	Min	7.9	9.8	15.0	20.2	24.8	27.4	26.4	25.7	24.3	18.5	11.3	8.1	18.3
Orai	Max	23.0	27.1	33.5	38.9	42.6	40.4	34.0	32.0	33.0	32.8	29.1	24.8	32.6
	Min	8.4	11.0	16.7	21.8	27.1	28.5	25.5	24.5	24.1	19.9	12.5	8.9	19.1
Sub-Div. Means.	Max	22.1	25.4	31.5	37.4	41.3	39.9	34.2	32.5	33.1	32.7	28.7	24.0	31.9
	Min	7.9	10.3	15.4	21.0	26.2	28.1	26.2	25.4	24.3	18.9	11.9	8.4	18.7

TABLE - 3
Mean Relative Humidity(%)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST														
Bahraich	M	82	74	55	43	50	68	81	83	80	73	72	79	70
	E	57	47	32	24	31	51	73	77	72	57	51	56	52
Gonda	M	84	73	52	39	49	69	84	85	82	79	78	84	71
	E	61	45	31	22	28	51	76	80	76	66	59	63	55
Lucknow	M	82	70	51	39	44	61	82	85	82	72	71	81	68
	E	55	43	28	23	27	45	76	79	74	60	55	58	52
Gorakhpur	M	80	70	51	43	56	72	83	84	81	74	69	77	70
	E	57	44	30	26	36	55	76	79	74	61	55	61	54
Kanpur Aerodrome	M	80	69	47	33	35	54	81	86	81	69	66	78	65
	E	51	37	29	21	21	38	68	79	69	52	43	47	46
Fatehpur	M	74	67	47	37	39	54	81	86	82	69	63	72	64
	E	51	41	26	26	25	41	73	81	74	56	47	54	50
Allahabad (Bamrauli)	M	79	67	44	30	35	54	80	85	81	69	66	76	64
	E	53	37	23	15	19	38	71	78	71	52	45	51	46
Varanasi	M	80	68	47	36	44	59	81	85	82	73	67	76	67
	E	51	37	24	20	24	45	73	79	74	55	47	51	48
Kheri- Lakhimpur	M	83	74	65	46	47	70	87	89	85	80	75	81	73
	E	63	49	39	27	29	50	76	79	77	66	60	63	57
Hardoi	M	86	72	60	40	43	62	84	87	82	77	74	84	71
	E	57	41	31	22	27	43	74	78	71	61	53	58	51

contd

TABLE - 3 (contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lucknow (Amausi)	M	84	66	52	33	37	59	85	86	81	71	65	80	66
	E	58	39	29	18	20	41	74	80	72	60	52	59	50
Azamgarh	M	86	72	57	45	52	72	86	87	84	75	73	81	73
	E	68	52	39	32	35	57	80	83	79	69	64	69	61
Banda	M	76	62	48	35	35	54	83	88	80	69	61	73	64
	E	57	41	31	23	25	44	76	82	74	59	49	58	52
Varanasi (Babatpur)	M	77	62	44	31	37	61	82	85	82	71	63	71	64
	E	57	43	26	17	22	45	73	79	74	58	48	56	50
Sub-Div. Means.	M	81	69	51	38	43	62	83	86	82	73	69	78	68
	E	57	43	30	23	26	46	74	79	74	59	52	57	52
UTTAR PRADESH WEST														
Roorkee	M	84	78	62	41	37	55	80	84	80	75	74	81	69
	E	54	43	32	22	20	37	68	73	64	51	46	51	47
Bareilly	M	81	73	55	37	39	58	81	84	79	71	70	79	67
	E	54	44	29	21	23	41	71	76	68	52	47	54	49
Aligarh	M	74	67	52	36	35	50	77	83	74	63	57	69	61
	E	47	37	25	19	22	37	65	72	61	42	37	46	43
Mainpuri	M	80	70	52	37	35	51	79	85	80	67	63	75	65
	E	53	40	29	23	23	37	69	76	69	50	44	52	47

contd

TABLE - 3 (contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Agra	M	73	64	47	32	30	48	75	81	77	59	61	68	60
	E	45	32	24	18	21	34	66	75	62	40	33	40	41
Jhansi	M	66	56	37	27	26	48	78	84	78	60	51	61	56
	E	39	28	18	16	15	37	70	76	65	40	32	39	40
Meerut	M	78	65	56	39	38	54	79	83	76	69	63	73	64
	E	- Not available -												
Orai	M	75	58	49	37	36	53	80	88	77	64	51	63	61
	E	54	38	32	28	27	42	72	81	68	50	39	48	48
Sub-Div. Means.	M	76	66	51	36	33	52	79	84	78	66	61	71	63
	E	49	37	27	21	22	38	69	76	65	46	40	47	45

M - Morning

E - Evening

TABLE - 4
(Mean Cloud Amount (Okta) and Mean Number of days of Clear and Overcast Skies at 0830 hrs. IST)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST														
Bahraich	a	15	16	17	19	20	10	1	1	5	19	24	19	13.8
	b	3	2	1	1	2	6	12	11	6	2	1	2	4.1
	c	3.2	1.9	1.7	1.2	1.3	3.6	6.0	6.0	4.2	1.6	0.6	1.3	2.7
Gonda	a	16	16	18	20	21	8	0	1	5	20	24	21	14.2
	b	2	2	1	1	1	6	12	12	5	2	1	1	3.8
	c	2.0	1.8	1.6	1.3	1.4	3.8	6.2	6.0	4.2	1.6	0.6	1.2	2.6
Lucknow	a	17	18	20	21	22	11	1	1	8	23	25	22	15.7
	b	4	2	2	1	1	6	15	14	7	2	1	1	4.7
	c	2.0	1.7	1.6	1.1	1.2	4.0	6.2	6.0	4.0	0.9	0.6	1.0	2.5
Gorakhpur	a	19	18	20	21	20	7	1	0	4	18	25	23	14.7
	b	2	2	1	1	1	6	11	10	6	2	0	1	3.6
	c	1.9	1.7	1.5	1.3	1.5	4.3	6.1	5.9	4.6	1.9	0.7	1.0	2.7
Kanpur Aerodrome	a	16	17	19	20	21	11	1	2	7	21	24	20	14.9
	b	3	1	1	1	1	4	10	10	5	2	0	1	3.3
	c	2.1	1.6	1.3	1.1	0.9	3.1	5.6	5.7	3.8	1.2	0.7	1.1	2.3
Fatehpur	a	16	18	19	20	21	10	1	1	7	21	24	21	14.9
	b	3	1	1	1	1	5	10	10	5	1	1	1	3.3
	c	2.3	1.9	1.4	1.3	1.3	3.4	5.7	5.9	3.9	1.5	0.8	1.3	2.5

contd....

TABLE - 4(contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Banda	a 16	21	21	21	24	13	2	3	9	21	25	22	16.5
	b 2	0	1	0	0	2	6	7	3	1	0	1	1.9
	c 2.5	1.0	1.2	1.0	0.8	2.7	5.1	5.4	3.2	1.4	0.6	1.1	2.1
Varanasi (Babatpur)	a 15	18	16	19	18	6	0	0	3	15	22	20	12.7
	b 3	1	2	0	0	5	11	10	5	2	1	1	3.4
	c 2.3	1.2	1.9	1.1	1.3	3.8	6.4	6.4	4.8	2.0	0.8	1.2	2.8
Sub-Div. Means.	a 17	18	19	21	21	10	1	1	6	20	24	21	14.9
	b 3	1	1	1	1	6	12	11	6	2	1	1	3.9
	c 2.2	1.6	1.6	1.2	1.2	3.6	6.0	5.9	4.1	1.6	0.7	1.2	2.6
UTTAR PRADESH WEST													
Roorkee	a 9	8	9	12	13	7	2	1	6	16	18	11	9.3
	b 5	3	2	2	2	5	9	9	4	1	0	2	3.7
	c 3.1	2.8	2.6	2.0	1.8	3.3	5.7	5.5	3.6	1.5	1.0	2.2	2.9
Bareilly	a 11	12	13	15	18	11	1	1	6	19	21	16	12.0
	b 5	2	2	1	2	5	10	10	4	2	0	2	3.6
	c 2.7	2.4	2.1	1.4	1.3	3.2	6.0	5.9	3.9	1.2	0.6	1.7	2.7
Aligarh	a 13	14	15	18	22	13	2	2	9	22	23	16	14.1
	b 3	0	1	1	1	3	8	9	4	1	0	1	2.7
	c 2.3	2.0	1.8	1.3	1.0	2.3	5.3	5.4	3.2	0.8	0.6	1.6	2.3

contd

TABLE - 4(Contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Allahabad	a 14	15	18	18	19	7	0	0	3	17	21	18	12.5
	b 3	2	1	1	1	6	14	15	8	3	1	1	4.7
	c 2.4	1.9	1.7	1.5	1.4	4.0	6.6	6.8	4.9	2.0	1.1	1.5	3.0
Varanasi	a 17	18	19	20	19	7	1	0	4	17	23	22	13.9
	b 3	2	2	2	2	8	13	14	7	2	1	1	4.7
	c 2.1	1.8	1.6	1.3	1.6	4.3	6.4	6.4	4.6	1.9	1.0	1.2	2.9
Kheri- Lekhimpur	a 20	20	22	24	25	13	2	3	10	24	27	24	17.8
	b 3	1	1	0	1	7	12	11	6	3	0	1	3.8
	c 2.0	1.5	1.5	0.8	1.0	3.4	5.7	5.5	3.5	1.5	0.4	1.1	2.3
Hardoi	a 15	17	17	19	21	11	1	2	8	18	25	17	14.5
	b 4	1	1	1	1	5	8	10	3	2	1	2	3.5
	c 2.3	1.5	1.7	1.4	1.1	3.1	5.5	5.4	3.5	1.5	0.4	2.1	2.4
Lucknow (Amausi)	a 15	16	14	18	19	9	1	0	4	18	23	17	12.8
	b 3	1	2	0	1	7	14	12	6	2	0	1	4.1
	c 2.4	1.5	1.8	1.3	1.1	3.5	6.4	6.3	4.5	1.7	0.5	1.5	2.7
Azamgarh	a 23	23	24	27	27	12	2	3	11	23	30	26	19.3
	b 3	2	3	1	2	10	17	15	8	5	0	1	5.6
	c 1.7	1.0	1.3	0.6	0.7	3.7	6.2	5.5	4.0	1.6	0.3	0.7	2.3

contd

TABLE - 4(contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mainpuri	a 14	14	16	19	20	10	2	2	8	22	25	19	14.3
	b 4	2	2	2	3	8	12	12	6	1	1	2	4.6
	c 2.5	2.2	1.9	1.4	1.4	3.5	5.8	5.9	3.7	1.1	0.7	1.5	2.6
Agra	a 16	16	17	21	22	15	3	3	11	24	25	21	16.0
	b 3	2	2	1	1	4	12	11	5	1	0	2	3.7
	c 2.5	1.6	1.6	1.2	1.1	2.7	5.3	5.5	3.2	0.8	0.6	1.5	2.3
Jhansi	a 15	18	19	19	20	9	1	1	6	21	22	19	14.2
	b 2	1	1	0	1	3	10	11	4	1	1	1	3.0
	c 2.2	1.4	1.5	1.2	1.2	3.2	5.6	5.9	3.7	1.5	0.8	1.5	2.4
Meerut	a 20	22	25	27	29	25	10	10	18	27	28	25	22.2
	b 2	1	2	1	1	2	10	10	5	1	1	1	3.1
	c 2.0	1.0	1.1	0.5	0.5	1.1	4.0	4.2	2.3	0.9	0.3	1.1	1.6
Orai	a 19	21	20	21	24	15	4	2	9	25	27	23	17.3
	b 4	1	0	1	0	3	12	14	5	2	0	2	3.7
	c 2.1	1.5	1.4	1.2	0.9	2.6	5.3	5.5	3.5	1.3	0.5	1.3	2.2
Sub-Div. Means.	a 15	16	17	19	21	15	5	5	9	22	24	19	15.1
	b 3	1	1	1	1	4	10	11	5	1	0	2	3.5
	c 2.4	1.8	1.7	1.3	1.1	2.7	5.4	5.5	3.4	1.1	0.6	1.5	2.4

a - Days with clear sky.
b - Days with sky overcast.
c - Mean Cloud Amount.

TABLE - 4(a)
MEAN CLOUD AMOUNT (OKTA) AND MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AT 1730 HRS IST.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST													
Bahraich	a 14	15	16	17	19	10	1	1	3	16	22	17	12.4
	b 3	2	2	1	1	4	7	8	5	1	0	1	2.9
	c 2.5	2.5	2.0	1.5	1.1	3.1	5.7	5.9	4.5	1.7	0.7	1.5	2.7
Gonda	a 15	14	17	18	20	9	1	1	4	18	23	19	15.3
	b 2	2	1	1	1	4	6	7	4	1	0	1	2.5
	c 2.2	2.0	1.7	1.4	1.1	3.2	5.6	5.7	4.2	1.5	0.7	1.4	2.5
Lucknow	a 16	16	18	19	22	11	1	0	6	20	24	21	14.5
	b 3	2	1	1	1	4	10	10	5	2	1	1	3.3
	c 2.0	2.0	1.6	1.2	0.9	2.8	5.7	5.5	3.8	1.5	0.6	1.3	2.4
Gorakhpur	a 18	17	20	19	20	8	0	0	3	16	24	21	13.8
	b 2	1	1	1	1	3	6	7	5	2	1	1	2.6
	c 1.9	1.8	1.5	1.4	1.3	3.6	5.3	5.5	4.6	1.9	0.9	1.2	2.6
Kanpur Aerodrome	a 14	15	17	17	19	10	1	1	5	18	23	19	15.3
	b 2	1	1	1	1	3	8	9	4	1	1	1	2.7
	c 2.0	1.9	1.6	1.5	1.0	2.9	5.7	5.7	4.1	1.4	0.7	1.4	2.5
Fatehpur	a 15	16	18	18	20	8	1	1	5	18	23	19	15.3
	b 3	1	1	0	1	4	8	9	5	1	1	1	2.9
	c 2.5	1.9	1.7	1.6	1.3	3.5	5.4	5.9	4.1	1.6	0.9	1.5	2.6

contd...

TABLE - 4(a) (contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Banda	a	17	17	18	19	18	7	1	1	5	18	24	21	15.8
	b	1	0	0	0	0	2	5	6	5	1	0	0	1.5
	c	1.5	1.2	1.5	1.5	1.5	5.2	5.0	5.0	5.5	1.6	0.7	1.2	2.5
Varanasi (Babatpur)	a	14	15	14	16	17	6	0	0	1	10	20	17	10.8
	b	2	1	1	1	0	5	9	8	5	2	0	0	2.8
	c	2.1	1.5	2.0	1.5	1.2	3.9	6.2	6.4	5.0	2.4	0.9	1.5	2.9
Sub-Div. Means.	a	16	16	17	18	20	9	1	1	5	17	25	19	15.6
	b	2	1	1	1	1	5	9	9	5	2	0	1	5.6
	c	2.0	1.8	1.7	1.4	1.1	5.5	5.6	5.7	4.2	1.7	0.7	1.5	2.6
UTTAR PRADESH WEST														
Roorkee	a	7	6	8	8	12	8	0	0	4	15	16	9	7.6
	b	4	2	3	2	2	5	5	5	2	1	0	2	2.6
	c	5.5	5.0	2.9	2.5	2.0	2.7	5.2	5.0	5.4	1.4	1.5	2.5	2.9
Bareilly	a	10	10	12	14	18	11	1	1	5	20	21	14	11.4
	b	5	5	5	2	1	5	10	10	5	1	1	1	5.6
	c	2.9	2.6	2.5	2.0	1.5	2.8	5.9	4.9	4.0	1.2	0.8	1.9	2.8
Aligarh	a	12	12	15	14	17	9	1	1	6	19	21	15	11.5
	b	5	1	2	1	1	5	6	7	4	1	0	2	2.6
	c	2.5	1.9	2.5	2.0	1.4	2.8	5.5	5.6	5.5	1.0	0.7	1.9	2.6

contd

TABLE - 4(a) (contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Allahabad (Bamrauli)	a 15	14	15	16	16	5	0	0	2	12	19	17	10.7
	b 5	1	1	1	1	6	14	14	7	2	1	1	4.5
	c 2.4	2.1	1.9	1.7	1.5	4.1	6.7	6.8	5.1	2.2	1.2	1.4	5.1
Varanasi	a 16	17	18	19	19	6	0	0	2	12	21	20	12.5
	b 2	1	2	2	2	8	12	12	7	2	1	1	4.5
	c 2.2	1.8	1.6	1.5	1.4	4.6	6.4	6.5	5.1	2.7	0.8	1.3	5.0
Kheri- Lakhimpur	a 17	18	19	25	26	14	2	2	9	24	27	20	16.7
	b 5	2	2	0	0	4	8	7	5	2	0	3	5.0
	c 2.2	1.6	1.9	1.2	0.8	2.7	5.5	5.2	5.5	1.5	0.5	1.5	2.5
Hardoi	a 15	18	15	17	21	12	1	1	7	18	25	17	15.7
	b 2	2	1	1	1	5	6	6	5	1	0	1	2.5
	c 2.0	1.5	1.9	1.5	1.1	2.6	5.0	5.0	5.5	1.5	0.6	1.6	2.5
Lucknow (Amausi)	a 15	15	15	16	19	8	0	0	1	15	21	15	11.5
	b 2	1	1	1	1	5	9	9	5	2	0	1	5.1
	c 2.2	2.1	1.9	1.7	1.1	5.5	6.1	6.5	4.4	1.9	0.7	1.6	2.8
Azamgarh	a 25	25	24	26	28	15	5	5	12	24	29	26	20.0
	b 5	2	1	1	1	9	12	14	8	5	0	1	4.6
	c 1.5	0.9	0.9	0.7	0.5	2.9	4.9	5.1	5.2	1.2	0.2	0.6	1.9

contd

TABLE - 4(a) (contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mainpuri	a 14	13	16	16	19	9	1	1	6	20	22	17	12.8
	b 3	2	3	2	2	6	10	10	5	1	1	1	3.8
	c 2.4	2.3	2.2	1.8	1.5	3.5	5.7	5.4	3.9	1.2	0.8	1.8	2.7
Agra	a 15	15	16	16	18	9	1	2	8	21	24	18	15.6
	b 3	2	2	2	1	4	10	11	4	1	1	2	3.6
	c 2.1	2.0	1.9	1.8	1.5	3.1	5.4	5.7	3.4	0.9	0.7	1.5	2.5
Jhansi	a 15	16	16	14	11	3	0	0	3	16	21	17	11.0
	b 2	1	1	1	2	5	10	11	5	1	1	1	3.4
	c 2.0	1.6	1.7	1.9	2.3	4.5	6.1	6.3	4.5	2.0	0.8	1.5	2.9
Meerut	a					- No data -							
	b					- No data -							
	c					- No data -							
Orai	a 19	20	20	19	19	10	4	3	6	20	26	22	15.7
	b 2	2	1	1	1	3	12	13	4	2	1	0	3.5
	c 1.7	1.4	1.5	1.6	1.5	3.2	5.3	5.3	3.7	1.6	0.5	1.0	2.4
Sub-Div. Means.	a 13	13	14	14	16	8	1	1	5	18	22	16	11.7
	b 3	2	2	2	1	4	9	10	4	1	1	1	3.3
	c 2.4	2.1	2.1	1.9	1.6	3.2	5.6	5.6	3.8	1.3	0.8	1.7	2.7

a - Days with clear sky

b - Days with sky overcast

c - Mean cloud amount.

TABLE - 4(b)

Mean Number of Hours of Bright Sunshine Per Day.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST													
Gorakhpur	8.1	9.4	8.8	10.1	10.1	7.9	6.0	5.9	6.7	8.5	8.9	8.1	8.2
Allahabad	8.1	9.2	8.8	9.8	9.8	7.1	5.0	4.8	6.9	8.7	9.2	8.7	8.2
UTTAR PRADESH WEST													
Muzzafarnagar	8.2	9.1	9.2	9.9	10.3	8.7	6.5	6.2	7.9	9.4	9.2	8.2	7.7
Shahjahanpur	8.3	9.5	8.8	10.1	10.7	8.4	6.0	6.2	7.2	9.0	9.5	8.1	8.5
Nagina	7.6	8.8	8.7	9.8	10.2	8.3	5.9	6.3	7.3	8.9	9.1	7.9	8.2
Phoolbagh	7.1	8.5	8.2	9.5	9.8	8.2	5.8	5.7	7.2	8.8	8.9	7.7	7.9
Saharanpur	7.3	8.7	8.7	9.9	10.5	9.1	6.5	6.3	7.7	9.1	8.7	7.6	8.1
Chaubatia	6.0	6.6	6.9	8.3	8.2	5.9	2.7	2.8	4.0	6.0	7.4	6.4	5.9
Agra	8.1	9.2	9.1	9.8	9.3	7.4	5.5	5.4	7.4	9.2	9.2	8.3	8.1

TABLE - 5
Mean Rainfall (mm) and Number of Rainy Days

District		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
UTTAR PRADESH EAST														
Allahabad	a	17.1	18.9	8.0	5.4	8.5	81.5	301.6	300.5	181.7	38.8	7.1	6.3	975.4
	b	1.5	1.8	0.8	0.5	0.7	4.1	15.6	15.7	8.0	1.9	0.6	0.6	47.8
Azamgarh	a	14.9	19.5	7.3	6.1	14.5	107.6	298.2	295.4	198.5	48.0	5.6	5.7	1021.3
	b	1.3	1.9	0.8	0.6	1.1	5.6	12.9	13.5	8.9	2.2	0.4	0.5	49.7
Bahraich	a	20.7	21.2	10.5	7.6	27.0	149.6	313.8	302.4	219.1	51.5	5.4	6.8	1135.6
	b	1.6	1.9	0.9	0.6	1.9	6.3	12.0	12.7	8.0	2.0	0.4	0.7	49.0
Ballia	a	14.9	19.6	8.3	5.9	15.3	110.6	279.3	294.5	207.8	48.3	4.7	3.9	1013.1
	b	1.3	1.8	0.9	0.5	1.3	6.0	12.5	13.4	9.1	2.2	0.3	0.4	49.7
Banda	a	14.7	15.7	6.7	4.6	6.9	73.3	300.7	309.0	168.3	32.8	7.5	6.0	946.2
	b	1.3	1.3	0.7	0.4	0.7	3.7	12.9	13.6	7.4	1.4	0.5	0.5	44.4
Barabanki	a	15.9	20.6	7.9	5.7	14.3	98.4	299.7	281.6	203.6	43.6	4.7	6.5	1002.5
	b	1.4	1.8	0.8	0.5	1.2	4.9	12.8	12.9	8.0	1.7	0.3	0.6	46.9
Basti	a	13.8	21.5	11.9	10.6	34.4	163.0	380.1	325.3	231.3	60.3	6.0	5.8	1264.0
	b	1.3	1.8	0.9	0.7	2.3	6.8	13.9	14.0	8.8	2.2	0.3	0.5	53.5
Deoria	a	12.9	17.4	9.3	13.3	38.7	168.8	328.8	319.5	214.2	58.4	5.2	3.3	1189.8
	b	1.1	1.6	0.8	0.9	2.5	7.3	13.7	13.9	9.3	2.4	0.3	0.4	54.2
Faizabad	a	13.3	18.9	7.2	6.5	14.2	106.5	306.1	282.0	196.7	46.9	4.6	5.5	1008.4
	b	1.3	1.6	0.7	0.5	1.1	5.3	13.1	12.7	8.3	1.9	0.4	0.5	47.4
Fatehpur	a	15.6	18.5	8.6	6.9	7.0	69.9	278.0	294.1	169.7	26.3	4.2	7.4	906.2
	b	1.5	1.7	0.9	0.6	0.7	4.4	12.4	13.2	7.7	1.5	0.5	0.7	45.8

contd

TABLE - 5(contd)

District		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ghazipur	a	16.0	21.2	8.1	5.1	12.5	119.6	292.2	314.1	200.5	48.7	7.7	6.1	1051.8
	b	1.3	1.7	0.9	0.5	0.9	5.6	12.8	13.8	8.6	2.3	0.5	0.5	49.4
Gonda	a	14.8	18.8	9.4	7.8	22.9	132.8	336.1	305.8	214.1	50.1	5.3	5.8	1123.7
	b	1.4	1.5	0.7	0.5	1.7	5.7	15.1	13.3	8.0	2.0	0.3	0.6	48.8
Gorakhpur	a	14.5	21.5	10.9	16.3	44.8	168.7	409.5	369.9	257.3	72.7	4.0	3.0	1393.1
	b	1.2	1.6	0.7	1.1	2.7	7.2	15.9	14.6	9.5	2.4	0.3	0.3	55.5
Hamirpur	a	13.5	12.8	7.1	4.3	6.1	69.6	275.8	277.4	145.9	23.5	8.3	6.6	850.7
	b	1.2	1.1	0.7	0.4	0.7	4.1	12.5	12.5	6.9	1.2	0.5	0.6	42.4
Hardoi	a	16.0	16.5	9.1	6.1	13.4	83.5	271.5	249.9	167.0	35.3	2.8	7.7	878.8
	b	1.5	1.5	0.9	0.6	1.2	3.9	11.3	11.5	7.3	1.3	0.2	0.6	41.8
Jaunpur	a	14.9	19.5	7.5	4.6	9.6	87.3	296.8	296.5	205.6	45.3	6.8	5.5	999.9
	b	1.3	1.8	0.8	0.5	0.9	5.0	13.7	14.2	8.7	2.0	0.5	0.5	49.9
Kanpur	a	13.2	15.4	8.1	6.3	7.1	61.9	229.5	247.6	151.7	27.5	4.9	5.5	778.9
	b	1.5	1.4	0.8	0.7	0.8	3.4	11.2	11.6	6.8	1.3	0.4	0.5	40.2
Kheri	a	20.8	24.3	12.3	8.6	25.4	139.5	297.5	289.7	195.1	41.8	5.3	8.4	1068.7
	b	1.6	1.9	1.1	0.8	1.9	6.0	12.0	12.5	7.6	1.5	0.3	0.8	48.0
Lucknow	a	16.0	17.8	8.4	7.3	13.5	86.0	290.3	265.7	189.3	34.8	5.0	6.2	940.3
	b	1.4	1.6	1.0	0.6	1.0	4.5	12.7	12.6	8.1	1.6	0.3	0.5	45.9
Mirzapur	a	23.2	24.1	11.2	5.6	10.5	102.2	337.1	358.8	200.5	42.9	9.1	4.9	1129.9
	b	2.0	2.1	1.2	0.7	1.0	5.4	15.3	15.7	8.9	2.6	0.7	0.5	56.1

contd

TABLE - 5(contd)

District		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Pratapgarh	a	14.6	19.5	8.4	6.2	10.1	82.2	505.6	298.0	184.9	38.6	5.1	6.9	977.9
	b	1.5	1.9	0.8	0.5	0.9	4.4	15.6	13.9	8.2	2.0	0.5	0.7	48.9
Raebareli	a	16.3	19.2	8.5	6.2	9.0	80.5	291.3	277.2	176.1	52.5	4.5	6.5	927.6
	b	1.5	1.7	0.8	0.6	0.7	4.2	15.2	15.1	8.0	1.7	0.4	0.6	46.5
Sitapur	a	17.8	19.9	9.9	8.7	15.6	108.5	285.1	267.7	188.5	40.9	5.9	7.5	974.0
	b	1.6	1.6	1.0	0.7	1.3	4.9	12.1	11.7	7.4	1.6	0.2	0.7	44.8
Sultanpur	a	14.7	18.7	7.5	7.0	10.7	87.3	507.1	289.7	202.8	44.4	4.0	6.5	1000.2
	b	1.5	1.8	0.7	0.6	0.9	4.8	15.8	15.8	8.7	2.0	0.4	0.7	49.7
Unnao	a	15.8	16.7	7.7	6.6	9.7	67.8	262.1	247.5	165.1	50.5	4.8	5.9	857.8
	b	1.4	1.6	0.9	0.6	0.9	5.8	12.1	12.4	7.5	1.4	0.5	0.5	45.4
Varanasi	a	19.6	21.1	10.1	6.0	11.0	85.8	505.5	328.9	205.0	44.5	8.7	5.9	1049.9
	b	1.6	1.8	0.9	0.5	1.0	5.2	15.8	14.5	8.8	2.1	0.6	0.4	51.2
Sub-Div. Means	a	15.9	19.2	8.8	7.1	15.9	105.5	505.0	295.7	195.8	42.6	5.6	6.0	1017.1
	b	1.4	1.7	0.8	0.6	1.2	5.1	12.9	15.5	8.2	1.9	0.4	0.5	48.1
UTTAR PRADESH WEST														
Agra	a	12.8	11.3	7.4	5.0	6.8	50.8	195.5	208.9	127.9	18.9	3.5	5.7	654.5
	b	1.2	1.0	0.7	0.6	0.7	3.1	10.0	10.5	6.0	0.8	0.3	0.6	35.5
Aligarh	a	15.2	15.8	10.5	6.2	8.4	61.7	184.2	191.0	127.6	18.8	1.7	6.2	647.5
	b	1.4	1.3	1.0	0.7	0.9	3.1	9.2	9.2	5.5	0.8	0.2	0.6	55.9
Bulandshahr	a	18.7	18.6	11.5	8.2	8.4	65.9	192.1	192.5	126.9	18.0	1.4	7.6	669.8
	b	1.5	1.6	1.0	0.7	0.9	3.3	8.8	8.8	5.1	0.8	0.2	0.6	55.5

contd

TABLE - 5(contd)

District		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Bareilly	a	25.9	30.4	13.8	8.4	18.8	125.2	320.3	313.1	197.7	33.9	4.3	10.2	1102.0
	b	1.9	2.0	1.2	0.8	1.5	4.9	12.2	12.4	6.9	1.1	0.3	0.8	46.0
Badaun	a	18.8	22.3	11.6	7.1	14.0	75.5	250.3	235.3	149.7	27.3	1.9	7.6	821.4
	b	1.6	1.7	1.1	0.7	1.1	4.0	11.0	11.0	6.5	1.0	0.2	0.7	40.6
Bijnor	a	34.3	35.5	17.7	10.5	17.1	107.3	317.5	310.9	191.8	29.8	4.2	11.7	1088.5
	b	2.5	2.5	1.5	1.1	1.5	4.6	12.1	12.3	6.5	1.1	0.4	1.0	47.1
Etah	a	15.6	15.0	9.2	4.4	9.2	57.0	204.0	212.1	139.0	20.7	2.3	6.4	694.9
	b	1.4	1.3	0.9	0.5	0.9	3.1	10.1	10.3	6.3	0.9	0.3	0.6	36.6
Etawah	a	13.9	12.9	7.9	7.1	7.7	54.3	221.8	245.7	147.3	22.9	4.9	6.0	752.4
	b	1.4	1.2	0.8	0.5	0.8	3.3	10.9	11.7	6.9	1.1	0.3	0.7	39.6
Farrukhabad	a	14.3	14.8	9.6	6.3	10.8	62.7	237.0	241.7	156.8	25.9	3.3	6.6	789.8
	b	1.3	1.4	0.9	0.6	1.0	3.3	10.8	11.1	6.9	1.1	0.3	0.6	39.3
Jalaun	a	13.7	12.8	7.3	5.5	7.4	64.5	241.7	259.5	139.1	20.3	5.3	5.5	782.6
	b	1.2	1.2	0.7	0.6	0.8	3.9	12.1	12.6	7.0	1.1	0.4	0.5	42.1
Jhansi	a	11.5	11.1	7.2	4.3	6.0	73.6	299.0	279.4	147.7	23.9	10.5	5.8	880.0
	b	1.1	1.0	0.7	0.4	0.6	4.3	12.3	12.5	6.6	1.1	0.6	0.6	41.6
Mainpuri	a	14.2	13.3	8.7	5.0	9.3	55.6	205.5	226.2	140.1	22.7	3.2	7.1	710.9
	b	1.4	1.1	0.8	0.6	0.9	3.1	10.0	10.7	6.4	0.9	0.3	0.6	36.8
Mathura	a	12.9	13.3	7.9	5.1	8.4	41.7	172.1	185.9	117.9	18.6	2.0	5.7	591.5
	b	1.2	1.1	0.7	0.4	0.9	2.7	9.0	9.3	5.4	0.8	0.2	0.5	32.2

contd

TABLE - 5(contd)

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Meerut	a 25.4	25.6	15.2	10.5	13.3	70.1	201.3	190.4	136.9	19.9	2.1	9.5	720.2
	b 2.0	2.1	1.3	0.9	1.3	3.4	9.4	9.0	5.1	0.8	0.3	0.9	36.5
Moradabad	a 24.3	28.6	13.6	8.1	15.6	102.2	274.5	271.6	167.1	25.7	3.3	9.7	944.3
	b 2.0	2.1	1.3	0.8	1.5	4.5	10.9	11.0	6.3	0.9	0.3	0.9	42.8
Muzaffarnagar	a 26.0	26.3	13.5	9.5	11.1	69.6	216.1	201.5	152.3	19.7	2.5	10.5	758.6
	b 2.0	2.1	1.1	0.7	1.1	3.3	9.2	8.5	4.8	0.7	0.2	1.0	34.7
Pilibhit	a 25.7	31.1	15.7	8.3	23.2	151.5	375.3	341.9	210.8	34.5	4.8	10.9	1233.7
	b 1.9	2.0	1.3	0.8	1.7	5.8	13.4	13.4	7.6	1.2	0.3	0.9	50.3
Saharanpur	a 37.1	38.3	20.1	10.6	14.1	89.2	270.4	268.7	160.3	22.8	3.9	13.8	949.3
	b 2.6	2.7	1.6	0.9	1.3	4.4	11.1	10.7	5.6	0.9	0.3	1.2	43.3
Shahajahanpur	a 16.5	22.2	11.9	8.1	17.2	119.7	300.0	284.1	187.0	41.0	3.6	8.2	1019.5
	b 1.6	1.8	1.0	0.8	1.4	4.8	11.6	12.0	7.4	1.3	0.3	0.7	44.7
Sub-Div. Means.	a 19.8	21.0	11.6	7.3	11.9	78.8	246.2	245.3	153.9	24.5	3.6	8.1	832.0
	b 1.6	1.6	1.0	0.7	1.1	3.8	10.7	10.9	6.3	1.0	0.3	0.7	39.7

TABLE - 6

RAINFALL (IN MM) OVER PARTS OF DIFFERENT RIVER BASINS FALLING
WITHIN UTTAR PRADESH

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1) <u>River Ganga upto and including river Ramaganga</u> : Districts/Parts of districts within this Catchment -													
<u>Hills of Uttar Pradesh (West)</u> :	Chamoli, Dehra Dun, Nainital, Pithorgarh, Tehri Garhwal, Uttar Kashi, Almora, Garhwal (Pauri)												
<u>Uttar Pradesh (West)</u> :	Agra, Aligarh, Bareilly, Bijnor, Budaun, Bulandshahr, Etah, Farukhabad, Mainpuri, Meerut, Moradabad, Pilibhit, Rampur, Saharanpur, Shahjahanpur.												
<u>Uttar Pradesh (East)</u> :	Hardoi												
	29.5	32.5	17.8	10.5	19.6	117.6	337.2	335.9	190.0	29.9	3.8	11.7	1136.0
2) <u>River Ganga from Ramaganga to its Confluence with river Yamuna (excluding River Yamuna)</u> : Districts/Parts of districts within this Catchment -													
<u>Uttar Pradesh (West)</u> :	Aligarh, Etah, Mainpuri.												
<u>Uttar Pradesh (East)</u> :	Allahabad, Fatehpur, Hardoi, Kanpur, Pratapgarh, Rai Bareilly, Unnao.												
	14.7	16.6	8.4	5.6	8.7	67.0	252.5	260.5	160.9	28.8	4.6	6.8	835.1
3) <u>River Yamuna upto its Confluence with river Chambal (excluding Chambal)</u> : Districts/Parts of districts within this Catchment -													
<u>Hills of</u>													
<u>Uttar Pradesh (West)</u> :	Dehra Dun, Uttar Kashi.												
<u>Uttar Pradesh (West)</u> :	Agra, Aligarh, Bulandshahr, Etah, Etawah, Farrukhabad, Mathura, Muzaffarnagar, Meerut, Mainpuri, Saharanpur.												
	20.5	20.5	11.8	7.6	9.5	62.4	213.7	215.0	138.2	19.4	2.7	8.4	729.5
4) <u>River Yamuna between river Chambal and its Confluence with river Ganga</u> : Districts/Parts of districts within this Catchment -													
<u>Uttar Pradesh (West)</u> :	Etawah, Jalaun, Jhansi.												
<u>Uttar Pradesh (East)</u> :	Allahabad, Banda, Fatehpur, Hamirpur, Kanpur.												
	13.6	13.5	7.4	4.9	6.3	68.2	271.4	275.2	151.7	25.7	7.5	6.2	851.6
5) <u>River Ganga between its confluence with river Yamuna and river Gogra (excluding river Gogra) including Gomati</u> : Districts/Parts of districts within this Catchment -													
<u>Uttar Pradesh (West)</u> :	Shahajahanpur.												
<u>Uttar Pradesh (East)</u> :	Allahabad, Azamgarh, Ballia, Banda, Barabanki, Faizabad, Gazipur, Hardoi, Jaunpur, Kheri-Lakhimpur, Lucknow, Mirzapur, Pratapgarh, Rae Bareilly, Sitapur, Sultanpur, Unnao, Varanasi.												
	16.5	19.9	8.6	6.1	12.5	98.6	301.5	295.7	196.9	42.8	6.0	6.1	1011.2

TABLE - 6(contd)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6) <u>Rest of Gogra (including River Sarda) upto its Confluence with river Ganga</u> : Districts/Parts of districts within this Catchment -													
<u>Hills of Uttar Pradesh(West)</u> : Nainital, Pithorgarh, Almora													
<u>Uttar Pradesh (East)</u> : Bahraich, Ballia, BaraBanki, Basti, Deoria, Faizabad, Gonda, Gorakhpur, Kheri-Lakhimpur.													
	16.9	21.3	10.5	10.2	31.3	152.5	350.2	321.9	225.7	55.4	4.7	5.5	1206.1
7) <u>River Son</u> : Districts/Parts of districts within this Catchment :													
<u>Uttar Pradesh (East)</u> : Mirzapur.													
	25.7	31.0	17.0	6.9	13.5	132.3	323.9	340.1	182.4	43.9	11.2	5.8	1135.7

TABLE - 7

STORMS/DEPRESSIONS AFFECTING U.P. STATE DURING 1891-1970.

AREA OF UTTAR PRADESH MONTH	HILLS OF WEST UTTAR PRADESH	WEST UTTAR PRADESH	EAST UTTAR PRADESH	UTTAR PRADESH STATE AS A WHOLE
JANUARY	-	-	-	-
FEBRUARY	-	-	-	-
MARCH	-	-	-	-
APRIL	-	-	-	-
MAY	-	-	-	-
JUNE	1	21	25	50
JULY	1	58	58	79
AUGUST	2	75	79	100
SEPTEMBER	6	55	52	78
OCTOBER	2	9	24	28
NOVEMBER	-	1	1	1
DECEMBER	-	-	-	-
TOTAL	12	219	259	316

PLAINS OF
UTTAR PRADESH WEST

AGRA DISTRICT

The district enjoys a dry climate except during the monsoon season. The summer is hotter and the rainfall somewhat less than in the neighbouring districts to the east. December to February is the cold weather period and the period March to about the middle of June is the hot season. The monsoon season is from mid June to the end of September. October and November may be termed as the transition period.

Rainfall

Records of rainfall in the district are available for a network of eight rain gauge stations for over 90 years. The statement of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average rainfall over the district is 654.5 mm in a year. Rainfall decreases in general from the south-east to northwest. 90% of the annual rainfall is received during the monsoon season. Nearly half of the remaining 10% is accounted for by the winter rains. August is the month with the maximum rainfall which is slightly less than a third of the annual rainfall. The variations in the annual rainfall are large. During the fifty year period 1901 to 1950, the highest annual rainfall amounting to 158% of the normal was received in 1949. 1918 was the year with the lowest rainfall in the district, which was only 38% of the normal. In the same fifty year period rainfall less than 80% of the normal occurred in 11 years. Of these two years were consecutive. But at individual stations there have been four or five occasions when two consecutive years had less than 80% of the normal rainfall. Three consecutive years of low rainfall have also occurred at one or two stations. It will be seen from table 2 that the rainfall in the district was between 501 and 900 mm in 37 years out of 50.

On an average there are 35 rainy days (days with rainfall of 2.5 mm or more) in the year. This number varies from 30 days at Bhikapur to 40 at Bah.

The heaviest rainfall in 24 hours recorded at any station in the district was 320.0 mm at Khairgarh on 1873 August 12.

Temperature

Agra is the only meteorological observatory station in the district. The meteorological data of this station may be taken as representative of the conditions in the district. The hot weather begins in March when temperatures rise rather rapidly with the advance of the season. May is the hottest month, the mean daily maximum temperature in that month being 41.8°C . On individual days

in this month and in June the day temperatures may reach over 48°C . The nights are also quite oppressive and they continue to be so even in the monsoon months. With the onset of the monsoon after the middle of June the day temperatures decrease by about five or six degrees centigrade, but the night temperatures remain high. In October while the day temperatures remain as in September, nights become cooler. From November both day and night temperatures steadily drop and in January, the coldest month, the mean daily maximum temperature is 22.2°C and the mean daily minimum is 7.2°C . In association with cold waves which affect the district in the wake of passing western disturbances, minimum temperatures sometimes drop as low as two degrees centigrade below the freezing point of water, and frosts occur often particularly in January and early February.

The highest maximum temperature ever recorded at Agra was 48.3°C on 1889 June 2, while the lowest minimum ever recorded was -2.2°C on 1935, January 16.

Humidity

Except during the rainy months the air is generally very dry particularly in the summer months. In the summer afternoons the relative humidities are often about 20%. The high humidities in the monsoon season which is about 75% coupled with increase in temperature during protracted breaks in the rain render the heat extremely trying.

Cloudiness

In the winter and summer months skies are generally clear or lightly clouded. But in the cold season when the district is affected by passing western disturbances cloudiness may increase for a day or two. In the monsoon season skies are generally moderately to heavily clouded.

Winds

Winds are generally light, but in the latter half of summer and early monsoon season they strengthen a little. Wind blows generally from directions between southwest and northwest during mornings and between west and north during afternoons. During monsoon season, however, the wind from directions between northeast and southeast also is not uncommon.

Special Weather Phenomena

The highest incidence of thunderstorms and duststorms occurs in the period March to June. Some of these dust or thunderstorms

cause squalls, often violent. Some of the thunderstorms are dry, but others are accompanied by heavy rain and less frequently with hail. Thunderstorms also occur in association with western disturbances in the winter months. The rainfall in the monsoon season is associated with thunder. Occasional fogs occur in the winter season.

Tables 3,4 and 5 give the data of temperature and humidity, mean wind speed and special weather phenomena respectively for Agra.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Agra (obsy)	50 a	13.2	13.5	8.4	6.6	9.1	51.8	195.6	218.2	133.9	19.6	3.3	5.8	679.0	169 (1917)	41 (1913)	286.0	1939 Sep 16
	b	1.2	1.2	0.8	0.7	1.0	3.1	10.4	11.0	6.1	0.8	0.3	0.6	37.2				
Fatehpur- Sikri	50 a	12.5	11.4	5.8	4.3	6.3	47.2	179.6	193.5	130.6	18.3	3.6	5.5	618.4	175 (1926)	27 (1918)	217.2	1919 Aug 10
	b	1.3	1.1	0.6	0.5	0.8	3.0	9.8	10.1	6.0	0.8	0.3	0.6	34.9				
Khairgarh	50 a	11.4	11.2	6.3	4.6	4.6	45.0	193.0	207.5	126.5	19.1	3.6	6.1	638.9	175 (1953)	35 (1918)	320.0	1873 Aug 12
	b	1.2	1.0	0.5	0.5	0.6	3.0	10.0	10.1	5.8	0.8	0.2	0.6	34.3				
Fatehabad	50 a	13.5	11.4	7.9	5.1	5.1	46.0	183.1	209.8	123.4	19.1	3.6	5.8	633.8	163 (1916)	31 (1913)	207.0	1912 Sep 07
	b	1.4	1.1	0.8	0.6	0.7	3.2	10.1	10.7	6.0	0.9	0.3	0.7	36.5				
Bah	50 a	13.7	10.7	8.6	6.6	8.9	60.7	236.2	225.3	131.6	20.6	4.3	6.6	733.8	191 (1936)	39 (1913)	229.1	1908 Jul 15
	b	1.4	1.0	0.9	0.8	0.8	3.5	11.2	11.2	6.8	1.0	0.3	0.7	39.6				
Firozabad	50 a	14.7	11.7	6.9	4.3	6.9	58.4	203.7	204.2	124.7	21.1	2.8	6.1	665.5	184 (1936)	34 (1918)	274.6	1949 Jul 22
	b	1.3	0.9	0.7	0.5	0.7	3.1	9.9	10.4	5.9	0.9	0.2	0.6	35.1				
Etmedpur	50 a	13.7	13.2	7.4	4.6	9.9	53.3	191.8	204.2	125.0	19.1	3.3	5.6	651.1	180 (1949)	44 (1905)	236.2	1921 Sep 21
	b	1.3	1.1	0.7	0.5	0.9	3.1	9.9	10.9	5.9	0.9	0.2	0.7	36.1				
Bhikapur	50 a	9.4	7.4	8.1	3.8	3.3	44.2	180.9	208.8	127.5	14.5	3.3	4.6	615.8	178 (1919)	28 (1918)	233.7	1912 Sep 07
	b	0.8	0.7	0.6	0.5	0.4	2.5	8.3	9.6	5.2	0.6	0.2	0.5	30.4				
Agra(Dist)	a	12.8	11.3	7.4	5.0	6.8	50.8	195.5	208.9	127.9	18.9	3.5	5.7	654.5	158 (1919)	38 (1918)		
	b	1.2	1.0	0.7	0.6	0.7	3.1	10.0	10.5	6.0	0.8	0.3	0.6	35.5				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	3	701 - 800	10
301 - 400	3	801 - 900	7
401 - 500	3	901 - 1000	3
501 - 600	8	1001 - 1100	1
601 - 700	12		

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	Date	$^{\circ}\text{C}$	Date	0830 %	1730* %
January	22.2	7.4	31.1	1946 Jan 24	-2.2	1935 Jan 16	73	45
February	25.7	10.3	35.6	1897 Feb 25	-1.7	1929 Feb 01	64	32
March	31.9	15.7	42.8	1892 Mar 27	5.6	1945 Mar 07	47	24
April	37.7	21.6	46.5	1979 Apr 28	10.2	1981 Apr 02	32	18
May	41.8	27.2	48.0	1985 May 28	16.7	1926 May 12	30	21
June	40.5	29.5	48.3	1889 Jun 02	14.0	1983 Jun 06	48	34
July	34.8	27.0	46.5	1985 Jul 26	17.0	1962 Jul 23	75	66
August	32.8	25.8	42.2	1918 Aug 14	20.8	1957 Aug 13	81	75
September	33.2	24.6	41.4	1979 Sep 02	17.2	1935 Sep 30	77	62
October	33.3	19.1	41.1	1920 Oct 01	9.4	1939 Oct 31	59	40
November	29.2	12.0	36.1	1909 Nov 01	2.8	1926 Nov 19	61	33
December	24.1	8.2	30.5	1977 Dec 02	-0.6	1926 Dec 28	68	40
Annual	32.3	19.0					60	41

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(AGRA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.6	4.2	4.9	5.1	5.9	6.9	5.8	4.9	4.5	3.2	2.6	2.9	4.9

TABLE - 5
Special Weather Phenomena
(AGRA)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.8	1.9	1.3	3.0	3.0	2.0	1.5	1.5	0.4	0.1	0.6	16.0
Hail	0.1	0	0.1	0.0	0.1	0.1	0.1	0	0	0	0	0	0.5
Dust- storm	0.0	0	0.5	0.7	1.5	1.7	0.1	0.1	0.1	0	0.1	0.1	5.0
Squall	0.0	0.1	0.2	0.5	1.1	1.0	0.3	0.2	0.3	0	0	0.1	4.0
Fog	1.1	0.3	0.1	0	0	0.2	0.8	0.5	0.6	0.1	0.1	0.8	5.0

*No. of days two and above are given in whole numbers.

ALIGARH DISTRICT

The climate of this district is characterised by a hot summer, a pleasant winter and general dryness except in the monsoon season. The cold season from about the middle of November to early March is, followed by the hot season which lasts till about the middle of June. The southwest monsoon season is from the middle of June to about the third week of September. The period from the last week of September to the middle of November may be termed the post monsoon season.

Rainfall

Records of rainfall in the district are available for 7 stations for 97 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 647.3 mm. The rainfall in the district increases from the southwest towards the northeast and varies from 604.5 mm at Hathras to 724.9 mm at Iglas. About 97 percent of the annual rainfall is received during the southwest monsoon months June to September, July and August being the two rainiest months. The variation in the rainfall from year to year in the district is quite large. In the 50 year period, 1901 to 1950 the highest annual rainfall amounting to 188 percent of the normal occurred in 1933 while the lowest annual rainfall was only 35 percent of the normal occurred in 1918. In the same 50 year period the rainfall was less than 80 percent of the normal in 13 years, two of them being consecutive. Considering the rainfall at individual stations 2 or 3 consecutive years of rainfall less than 80 percent of the normal occurred once or more at most of the stations. Even 4 consecutive years of such low rainfall occurred once at Khair. It will be seen from table 2 that the annual rainfall in the district was between 401 and 800 mm in 38 years out of 50.

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 30 at Balanpur to 36 at Atrauli and Iglas.

The heaviest rainfall in 24 hours recorded at any station in the district was 460.8 mm at Aligarh on 1952 June 25.

Temperature

There is a meteorological observatory in the district at Aligarh and the records of this observatory may be taken as fairly representative of the conditions prevalent in the district in general. Both day and night temperatures decrease rapidly from about the middle of November. January is generally the coldest

month with the mean daily maximum temperature at 21.7°C and the mean daily minimum at 7.6°C . In association with cold waves in the wake of passing western disturbances the minimum temperature occasionally drops down to about the freezing point of water and frosts may occur. After February temperatures increase rapidly till May which is the hottest month with the mean daily maximum temperature at 41.2°C and the mean daily minimum at 26.3°C . Nights are warmer in June than in May. In the summer season dust-laden scorching westerly winds blow often and the heat is intense. Day temperatures sometimes reach over 46°C . Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the monsoon in the district by about the third week of June day temperatures decrease appreciably. However nights continue to be as warm as during the summer. Even during the southwest monsoon season day temperatures become high during breaks in the rains and with the increased moisture in the air, the weather is often uncomfortable. After the withdrawal of the monsoon by about the third week of September there is a slight increase in the day temperatures but nights become progressively cooler.

The highest maximum temperature recorded at Aligarh was 46.3°C on 1958 June 17. The lowest minimum temperature was 0.6°C on 1935 January 16.

Humidity

Except during the southwest monsoon season when the humidity is high, the air is generally dry over the district. The driest part of the year is the summer season with relative humidities less than 25 percent in the afternoons.

Cloudiness

In the monsoon season skies are generally heavily clouded and overcast on some days. During the rest of the year the skies are mostly clear or lightly clouded. However for short spells of a day or two during the cold season, in association with passing western disturbances, skies become cloudy.

Winds

Winds are generally light with a slight increase in force during the summer and early part of the monsoon season. During the period October to April the winds blow mostly from directions between north and west. Southeasterlies appear in May. During the monsoon season winds are predominantly from the southeast and east.

Special Weather Phenomena

During the monsoon depressions originating in the Bay of Bengal which move in a westerly or northwesterly direction across the central parts of the country affect the weather over the district causing widespread heavy rain. During the cold season passing western disturbances affect the weather, and a few thunderstorms occur. In the summer months the district experiences duststorms and thunderstorms. Thunderstorms also occur during the monsoon season. Fog occurs occasionally during the cold season.

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

.....

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rain fall in 24 hours* Amount (mm) Date	
Aligarh	50 a	14.5	16.8	9.4	4.6	9.4	62.7	185.9	182.1	117.1	17.5	1.8	6.1	627.7	208	33	460.8	1952 Jun 25
	b	1.5	1.4	1.0	0.6	0.9	3.2	9.1	8.7	5.3	0.8	0.2	0.7	33.4	(1933)	(1918)		
Khair	50 a	15.5	14.7	10.9	6.6	7.6	57.1	173.5	185.4	117.3	19.1	2.3	6.3	616.3	186	27	178.1	1923 Aug 04
	b	1.5	1.4	1.1	0.8	0.9	3.1	9.6	9.2	5.1	0.8	0.2	0.7	34.4	(1933)	(1918)		
Atrauli	50 a	18.0	18.0	11.9	7.1	12.9	73.4	213.4	193.3	130.8	17.8	1.8	6.3	704.7	188	46	223.8	1955 Oct 13
	b	1.5	1.5	1.1	0.8	1.1	3.5	9.8	9.2	5.8	0.7	0.2	0.7	35.9	(1916)	(1941)		
Iglas	50 a	16.0	18.5	10.7	7.4	9.7	71.1	205.5	209.8	149.3	18.5	1.8	6.6	724.9	195	39	251.5	1933 Jun 30
	b	1.3	1.4	0.9	0.8	1.0	3.3	9.6	9.8	6.0	0.8	0.2	0.6	35.7	(1942)	(1918)		
Hathras	50 a	14.5	14.0	7.4	4.8	6.3	56.9	169.4	170.7	150.3	23.1	1.3	5.8	604.5	187	36	188.2	1914 Jul 16
	b	1.3	1.2	0.8	0.5	0.8	2.8	8.9	9.0	5.8	0.7	0.2	0.6	32.6	(1933)	(1941)		
Sikandrara	50 a	12.5	12.5	9.9	5.3	8.1	65.5	172.0	208.5	126.5	17.5	1.3	6.3	645.9	161	28	269.2	1885 Jul 16
	b	1.3	1.2	0.9	0.6	1.0	3.2	9.5	9.8	5.8	0.8	0.2	0.6	34.9	(1943)	(1918)		
Balanpur	50 a	15.5	16.3	13.5	7.4	5.1	45.5	169.4	187.5	121.9	18.3	1.8	6.1	608.3	240	20	304.8	1896 Jul 15
	b	1.4	1.3	1.1	0.6	0.6	2.8	8.2	8.4	4.7	0.7	0.1	0.5	30.4	(1950)	(1918)		
Aligarh (District)	a	15.2	15.8	10.5	6.2	8.4	61.7	184.2	191.0	127.6	18.8	1.7	6.2	647.3	188	35		
	b	1.4	1.3	1.0	0.7	0.9	3.1	9.2	9.2	5.5	0.8	0.2	0.6	33.9	(1933)	(1918)		

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm		No. of years	Range in mm		No. of years
201	- 300	2	801	- 900	5
301	- 400	1	901	- 1000	3
401	- 500	9	1001	- 1100	0
501	- 600	8	1101	- 1200	0
601	- 700	8	1201	- 1300	1
701	- 800				

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	21.7	7.6	30.6	1946 Jan 14	0.6	1935 Jan 16	74	47
February	24.9	9.9	33.2	1985 Feb 28	1.7	1950 Feb 11	67	37
March	30.7	14.9	41.7	1945 Mar 31	3.9	1945 Mar 06	52	25
April	37.1	20.6	44.4	1948 Apr 29	10.9	1957 Apr 09	36	19
May	41.2	26.3	46.1	1954 May 04 days	17.5	1982 Mar 14 days	35	22
June	40.0	28.4	46.3	1958 Jun 17	18.6	1957 Jun 02	50	37
July	34.9	26.7	43.9	1948 Jul 03	20.6	1957 Jul 24	77	65
August	33.1	25.7	40.6	1941 Aug 03	20.1	1957 Aug 13	83	72
September	33.5	24.5	40.2	1979 Sep 01	16.7	1962 Sep 30	74	61
October	33.4	19.0	41.7	1952 Oct 04	11.0	1983 Oct 09	63	42
November	29.0	12.1	36.1	1944 Nov 05	5.0	1937 Nov 30	57	37
December	23.7	8.3	32.8	1948 Dec 02	1.2	1973 Dec 27	69	46
Annual	31.9	18.7					61	43

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(ALIGARI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.3	6.3	7.2	8.2	8.8	9.3	8.1	6.7	6.4	4.7	4.6	4.7	6.7

TABLE - 5
Special Weather Phenomena
(ALIGARI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.1	1.6	3.0	2.0	4.0	4.0	6.0	5.0	3.0	1.1	0.2	0.6	32.0
Hail	0.1	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Dust- storm	0.0	0.1	0.3	0.8	1.7	1.5	0.1	0.0	0.1	0.1	0.0	0.1	5.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.7	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.6	1.9

*No. of days two and above are given in whole numbers.

BAREILLY DISTRICT

The climate of this district is influenced by its proximity to the hills and the Terai swamps to the north. Although the dryness of the air in the summer season is as in the western districts of Uttar Pradesh the comparatively damp climate in the rest of the year is as in other sub Himalayan districts in eastern Uttar Pradesh. The year may be divided into four seasons. The cold season from December to February is followed by the summer from March to about the middle of June. The period from middle of June to the end of September is the monsoon season. October and November constitute the post monsoon season.

Rainfall

The district has nine rain gauge stations with records ranging from 68 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1102.0 mm. Rainfall increases generally from the southwest towards the northeast. The annual rainfall varies from 982.1 mm at Aonla in the southwest corner of the district to 1260.0 mm at Baheri in the north. About 87% of the annual rainfall is received during the southwest monsoon season. The variation in the rainfall from year to year is appreciable. In the fifty year period from 1901 to 1950, 1936 was the year with the highest rainfall which amounted to 167% of the normal. The lowest annual rainfall occurred in 1918 when it was only 57% of the normal. In the same fifty year period there were 11 years when the annual rainfall was less than 80% of the normal, no two of them being consecutive. But at individual stations two or three consecutive years of such low rainfall have occurred. At Pandhera even 5 and 6 consecutive years of rainfall have occurred during 1937 - 41 and 1943 - 48 respectively. At Kundhera eight consecutive years of rainfall less than 80% have occurred during the period 1937 to 44. It will be seen from table 2 that in 32 years out of 50, the rainfall in the district was between 901 and 1400 mm.

On an average there are 46 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year and there is not much variation in this number in different parts of the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 689.5 mm at Pandhera on 1961 August 30.

Temperature

There is a meteorological observatory at Bareilly the records of which may be taken as representative of the meteorological conditions in the district. From about the middle of November temperatu-

res decreases rapidly and in January the coldest month the mean daily minimum temperature is 8.6°C while the mean daily maximum is 22.0°C . In association with the cold waves in the wake of western disturbances passing eastwards, the minimum temperatures may go down to the freezing point of water and frosts occur. Temperatures rise rapidly after February. May and early June form the hottest period of the year. In May the mean daily maximum temperature is 40.5°C and the mean daily minimum is 25.8°C . The hot dry and often dusty westerly winds in the summer season add to the intense heat. There is some relief from the heat when on a few days thunderstorms occur. With the advance of the southwest monsoon into the district in the latter half of June, day temperatures drop appreciably but nights continue to be as warm as in the summer season. But the increased moisture in the air brought in by the monsoon winds cause general oppressiveness in the weather in between the rains. In October after the monsoon rains have ceased, although the day temperatures continue as in the monsoon season nights become cool. During breaks in the monsoon in September, day temperatures increase slightly.

The highest maximum temperature recorded at Bareilly was 46.7°C on 1884 May 29, and the lowest minimum temperature was -1.3°C on 1971 January 2.

Humidity

Air is very humid in the southwest monsoon season and to a lesser extent in the post monsoon season. Thereafter there is a decrease in the humidity in the cold season. The summer season is the driest part of the year when the relative humidities in the afternoons are as low as 20 to 25%.

Cloudiness

In the monsoon season skies are heavily clouded or overcast. During the rest of the year skies are clear or lightly clouded except for short spells during the cold season when in association with passing western disturbances skies become cloudy.

Winds

Winds are generally light with calms on many days in the mornings. During the period October to April, winds from the west and northwest are more common. By May easterlies and southeasterlies appear and these predominate during the southwest monsoon season.

Special Weather Phenomena

In the summer months the district experiences dust storms and

thunderstorms, with occasional squalls. Rain during the monsoon months is often associated with thunder. Thunderstorms occur in association with spells of bad weather due to western disturbances, during the winter months. Fog is fairly common in the winter season..

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hrs* Amount Date (mm)	
Bareilly (obsy)	50 a	24.4	27.7	12.7	8.1	15.2	114.3	318.5	289.8	195.8	34.8	4.1	9.1	1052.5	158	47	378.5	1878 Jul 09
	b	1.8	2.0	1.2	0.8	1.4	4.8	12.5	12.2	7.2	1.1	0.3	0.9	46.2	(1922)	(1918)		
Nawabganj	50 a	23.9	29.2	15.5	8.1	24.1	131.1	336.0	302.5	210.1	40.1	5.3	10.2	1136.1	161	47	533.4	1882 Jul 07
	b	1.8	2.1	1.2	0.9	1.8	5.4	13.2	13.2	7.4	1.3	0.5	0.8	49.4	(1922)	(1941)		
Aonla	50 a	24.6	27.7	14.5	8.9	16.3	95.0	290.6	284.0	175.0	29.5	2.8	10.2	982.1	194	51	302.5	1958 Jul 31
	b	1.9	2.0	1.3	0.9	1.4	4.3	11.7	12.1	7.1	1.0	0.3	0.8	44.8	(1916)	(1913)		
Faridpur	50 a	19.1	23.6	12.2	8.6	15.0	108.7	296.7	289.1	176.0	37.1	2.5	9.7	998.3	180	40	312.4	1810 Aug 31
	b	1.7	1.8	1.2	0.9	1.4	4.8	11.8	11.5	7.1	1.1	0.2	0.8	44.5	(1921)	(1918)		
Baheri	50 a	27.7	39.1	15.5	10.4	22.3	147.1	375.7	361.4	211.8	31.2	5.6	11.9	1259.7	177	49	477.5	1871 Jul 29
	b	2.1	2.3	1.4	1.0	1.8	5.9	13.2	13.3	7.1	1.3	0.4	1.1	50.9	(1922)	(1930)		
Pandhera	50 a	26.7	36.6	14.7	8.6	22.1	133.1	329.7	303.0	175.0	31.7	4.6	9.4	1093.2	229	44	689.5	1961 Aug 30
	b	1.9	2.0	1.1	0.6	1.4	4.7	11.8	11.3	6.2	0.8	0.5	0.9	43.0	(1914)	(1930)		

contd

TABLE - 1 (contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hours* Amount (mm)	Date
Debiabhoj	50 a	32.5	33.0	12.2	7.9	17.3	156.7	346.7	347.7	214.6	29.5	3.1	12.7	1214.9	196	36	326.4	1927 Jun 21
	b	2.0	1.9	1.0	0.7	1.3	5.2	12.2	12.4	6.2	1.1	0.2	0.9	45.1	(1936)	(1939)		
Kundhra	50 a	31.2	28.7	13.7	8.9	21.8	121.7	323.3	335.0	208.0	37.9	4.1	9.4	1143.7	185	32	315.0	1927 Oct 07
	b	2.0	2.0	1.0	0.9	1.7	5.2	22.9	12.9	6.7	1.1	0.3	0.6	46.2	(1921)	(1941)		
Mirganj	25 a	23.4	27.7	13.5	6.3	15.0	115.8	265.7	304.3	215.4	33.0	6.6	9.4	1036.1	147	61	358.1	1870 Jun 29
	b	1.9	1.9	1.1	0.9	1.7	4.2	11.8	12.4	7.4	1.0	0.5	0.6	45.4	(1916)	(1905)		
Bareilly (District)	a	25.9	30.4	13.8	8.4	18.8	125.2	320.3	313.1	197.7	33.9	4.3	10.2	1102.0	167	57		
	b	1.9	2.0	1.2	0.8	1.5	4.9	12.2	12.4	6.9	1.1	0.3	0.8	46.0	(1936)	(1918)		

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	4	1201 - 1300	5
701 - 800	4	1301 - 1400	4
801 - 900	3	1401 - 1500	1
901 - 1000	9	1501 - 1600	3
1001 - 1100	6	1601 - 1700	1
1101 - 1200	8	1701 - 1800	1
		1801 - 1900	1

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	^o C	^o C	^o C	Date	^o C	Date	0830 %	1730* %
January	22.0	8.6	29.4	1943 Jan 05	-1.3	1971 Jan 02	81	54
February	24.9	10.8	33.6	1974 Feb 23	0.0	1905 Feb 02	73	44
March	31.0	15.6	40.0	1945 Mar 31	5.0	1945 Mar 06	55	29
April	37.0	21.1	43.9	1952 Apr 22	10.9	1981 Apr 07	37	21
May	40.5	25.8	46.7	1884 May 29	16.1	1898 May 12	39	23
June	39.0	27.5	46.1	1948 Jun 19	19.4	1912 Jun 09	58	41
July	33.8	26.2	43.9	1903 Jul 10	20.0	1931 Jul 16	81	71
August	32.6	25.6	40.6	1918 Aug 13	20.0	1984 Aug 28	84	76
September	33.0	24.7	38.7	1979 Sep 1,2	13.0	1984 Sep 31	79	68
October	32.3	19.5	38.3	1918 Oct 01	8.9	1887 Oct 28	71	52
November	28.4	12.6	36.1	1920 Nov 08	5.6	1934 Nov 30	70	47
December	23.8	9.4	30.0	1960 Dec 30	1.7	1930 Dec 28	79	54
Annual	31.5	18.9					67	49

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(BAREILLY)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.5	4.8	6.0	6.5	6.7	7.3	5.8	4.7	4.2	2.7	2.2	2.7	4.8

TABLE - 5
Special Weather Phenomena
(BAREILLY)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.0	1.8	3.0	2.0	3.0	4.0	5.0	5.0	4.0	1.7	0.2	0.8	31.0
Hail	0.2	0.1	0.3	0.1	0.0	0.0	0.4	0.5	0.0	0.1	0.0	0.0	1.7
Duststorm	0.1	0.0	0.1	0.9	1.4	1.1	0.1	0.0	0.0	0.0	0.0	0.0	4.0
Squall	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.5
Fog	6.0	1.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.5	6.0	15.0

*No. of days two and above are given in whole numbers.

BIJNOR DISTRICT

The climate of this district is characterised by general dryness except in the brief southwest monsoon season, a hot summer and a bracing cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer season from March to June. The southwest monsoon season is from July to about the middle of September. The period from the middle of September to the middle of November constitutes the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 4 stations for long periods of about 100 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1088.3 mm. The rainfall in the district increases from the southwest towards the north-east and varies from 975.2 mm at Bijnor to 1167.0 mm at Najibabad. About 85 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, July and August being the rainiest months. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 151 per cent of the normal occurred in 1942. The lowest annual rainfall amounting to 61 percent of the normal occurred in 1913 and 1929. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 9 years, two of them being consecutive. Considering the rainfall at individual stations two consecutive years of such low rainfall occurred thrice at Nagina, twice at Dhampur and once each at the other 2 stations. Even 3 consecutive years of such low rainfall occurred once at Najibabad. It will be seen from table 2 that the annual rainfall in the district was between 801 mm and 1200 mm i.e. within about 20% of the normal in only 29 years out of 50.

On an average there are 47 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 44 at Bijnor to 50 at Najibabad.

The heaviest rainfall in 24 hours recorded at any station in the district was 823.0 mm at Nagina on 1880 September 18.

Temperature

There is a meteorological observatory in the district at Najibabad. The records of this observatory may be taken as representative of the climatic conditions in the district in general. After February there is continuous increase in temperatures till

May or early June. The mean daily maximum temperature in May is 39.3°C and the mean daily minimum is 22.9°C . On individual days the maximum temperature reaches over 45°C . The heat in the summer is not as severe as in the adjoining districts to the south. Scorching dust laden winds which blow on some days in the summer make the weather a little trying. With the onset of the southwest monsoon over the district, by about the end of June there is appreciable drop in the day temperature. However the nights throughout the monsoon season are slightly warmer than during the summer. Due to the increased humidity in the monsoon air, weather is somewhat oppressive in between the rains. After the withdrawal of the monsoon by mid-September there is a slight increase in the day temperature but the nights become progressively cooler. After October both the day and night temperatures decrease rapidly. January is the coldest month with the mean daily maximum temperature at 20.3°C and the mean daily minimum at 7.0°C . During the cold season in the wake of passing western disturbances cold waves affect the district, and on such occasions the minimum temperature drops down to about the freezing point of water and frosts occur.

The highest maximum temperature recorded at Najibabad was 50.4°C on 1975 June 28. The lowest minimum was -2.9°C on 29th January 1964.

Humidity

During the mornings the humidity is generally high exceeding 70 percent except during the summer months. The air is very humid during the southwest monsoon season. The driest part of the year is the summer season when in the afternoons the relative humidity is between 20 and 40 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two during the cold season when the district is affected by passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year, the skies are mostly clear or lightly clouded.

Winds

Winds are in general light. During the period October to April the winds blow mostly from directions between north and west. Southeasterlies begin to blow in May and during the monsoon months, these predominate.

Special Weather Phenomena

In the cold season passing western disturbances affect the district and thunderstorms occur. Thunderstorms occur in the summer season. Rain during the monsoon season is often associated with thunder. Occasional duststorms occur during the summer. Fog occurs at times during the cold season.

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

.....

TABLE - 1
Normal and Extremes of Rainfall

Stations	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall i 24 hours* Amount (mm)	Date
Bijnor	50 a	32.8	33.8	17.5	11.4	15.5	100.6	277.1	274.3	167.4	30.5	3.6	10.7	375.2	158 (1906)	54 (1918)	319.5	1957 Sep 15
	b	2.5	2.3	1.5	1.1	1.4	4.2	11.5	11.4	5.9	1.1	0.4	1.0	44.3				
Nagina	50 a	33.3	33.0	17.3	9.7	19.1	106.9	325.4	311.4	202.7	30.5	3.8	11.4	1104.5	156 (1924)	50 (1929)	823.0	1880 Sep 18
	b	2.4	2.7	1.6	1.0	1.7	4.7	12.2	12.5	6.3	1.1	0.4	1.0	47.6				
Dhampur	50 a	33.0	35.3	17.5	9.7	16.0	116.3	319.8	319.3	193.5	28.5	4.6	12.5	1106.0	157 (1942)	57 (1913)	772.2	1880 Sep 18
	b	2.3	2.5	1.5	0.9	1.4	4.5	11.8	12.3	6.7	1.1	0.4	1.0	46.4				
Najibabad	50 a	38.1	39.9	18.3	11.2	17.8	105.4	347.5	338.6	203.5	29.7	4.8	12.2	1167.0	178 (1942)	52 (1907)	723.9	1880 Sep 18
	b	2.6	2.7	1.5	1.2	1.7	5.0	13.1	13.1	6.9	1.0	0.4	1.1	50.3				
Bijnor (District)	a	34.3	35.5	17.7	10.5	17.1	107.3	317.5	310.9	191.8	29.8	4.2	11.7	1088.3	151 (1942)	61 (1929)		
	b	2.5	2.5	1.5	1.1	1.5	4.6	12.1	12.3	6.5	1.1	0.4	1.0	47.1				

(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 1980 **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	3	1101 - 1200	9
701 - 800	3	1201 - 1300	2
801 - 900	6	1301 - 1400	6
901 - 1000	8	1401 - 1500	5
1001 - 1100	6	1501 - 1600	1
		1601 - 1700	1

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	20.3	7.0	27.0	1961 Jan 29	-2.9	1964 Jan 29	89	59
February	23.7	8.4	33.6	1974 Feb 25	0.8	1974 Feb 09	82	43
March	29.7	13.4	37.5	1985 Mar 28	2.2	1952 Mar 03	65	33
April	35.8	18.1	41.9	1980 Apr 23	9.1	1965 Apr 03	42	20
May	39.3	22.9	45.0	1966 May 28	15.6	1960 May 09	39	21
June	38.5	26.0	50.4	1975 Jun 28	18.3	1954 Jun 05	59	40
July	33.4	25.3	43.0	1974 Jul 02	18.4	1965 Jul 10	83	69
August	32.1	24.8	40.3	1975 Aug 03	14.6	1981 Aug 01	85	74
September	32.7	23.5	36.9	1981 Sep 13	15.6	1962 Sep 30	81	57
October	30.6	17.6	39.9	1975 Oct 03	10.0	1954 Oct 31	76	59
November	26.8	10.8	33.9	1952 Nov 01	3.3	1956 Nov 21	81	55
December	22.6	7.4	29.7	1960 Dec 01	-0.6	1956 Dec 18	87	58
Annual	30.5	17.1					72	50

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(NAJIBABAD)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.5	3.7	4.5	5.0	6.4	7.4	6.6	5.5	4.6	3.7	2.3	2.5	4.6

TABLE - 5
Special Weather Phenomena
(NAJIBABAD)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.4	1.0	2	1.8	1.7	3	5	2	3	0.2	0.2	0.3	22
Hail	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust- storm	0.0	0.3	0.0	0.6	0.9	1.1	0.0	0.0	0.0	0.0	0.1	0.0	3.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	3

*No. of days 2 and above are given in whole numbers.

BUDAUN DISTRICT

The climate of this district is characterised by general dryness, a hot summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer from March to about the third week of June. The southwest monsoon season which follows, lasts till about the third week of September. The period from the last week of September to the middle of November constitutes the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 5 stations for sufficiently long periods. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 821.4 mm. The rainfall in the district increases from the southwest towards the northeast and varies from 674.7 mm at Gunnaur to 904.2 mm at Dataganj. About 87 percent of the annual rainfall in the district is received during the monsoon months, June to September, July and August being the rainiest months. The variation of the rainfall from year to year is large. In the 50 year period 1901 to 1950, the highest annual rainfall which was 199 percent of the normal was recorded in 1936. The lowest annual-rainfall amounting to 46 percent of the normal occurred in 1918. In the same 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 14 years, two consecutive years of such low rainfall occurring thrice. Considering the annual rainfall at individual stations two and 3 consecutive years of such low rainfall is quite common. Two consecutive years of rainfall less than 80 percent of the normal occurred 4 times at Sahaswan, thrice each at Budaun and Bisauli and twice each at Gunnaur and Dataganj. Three consecutive years of such low rainfall occurred twice at Dataganj and once each at Bisauli, Gunnaur and Sahaswan. It will be seen from table 2 that the annual rainfall in the district was between 601 and 1100 mm in 32 years out of 50.

On an average there are 41 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 36 at Gunnaur to 43 at Bisauli and Dataganj.

The heaviest rainfall in 24 hours recorded at any station in the district was 409.7 mm at BISAULI on 1961 July 30.

Temperature

There is a meteorological observatory in the district at Budaun. It has been started recently. So the description which follows is based on the records of observatories in the neighbouring districts where

similar climatic conditions prevail. From about the end of February there is steady increase in temperatures. May and early June form the hottest period of the year with the mean daily maximum temperature at about 40°C and the mean daily minimum at about 25°C . The scorching dust-laden westerly winds which blow in the summer season add to the discomfort due to the increase heat in summer. On individual days the maximum temperature reaches over 46°C . Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the advance of the monsoon into the district by about the third week of June there is appreciable drop in the day temperature but the nights continue to be about as warm as during the latter part of the summer. After the withdrawal of the monsoon from the district by about the third week of September there is a slight increase in the day temperature but the night temperatures begin to decrease. After October both the day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at about 22°C and the mean daily minimum at about 8°C . The district is affected by cold waves in association with passing western disturbances in the cold season and the minimum temperatures then occasionally drop down to about the freezing point of water and frosts occur.

Humidity

The humidity is high during the southwest monsoon season. After the end of the southwest monsoon season relative humidities decrease. The driest part of the year is the summer season when the relative humidities in the afternoons become less than 30 percent.

Cloudiness

In the monsoon season the skies are generally heavily clouded or overcast. In the cold season, for brief periods of a day or two in association with passing western disturbances skies become cloudy. In the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally light especially in the mornings with calms on many days. During the period October to April the winds blow predominantly from the west and northwest. By May easterlies and southeasterlies appear and these become the predominant directions during the southwest monsoon season.

Special Weather Phenomena

During the summer months the district experiences duststorms and thunderstorms with occasional squalls. Thunderstorms also occur, in association with passing western disturbances during the cold season. Rains in the monsoon are often associated with thunder. Fog is common in the cold season.

TABLE - 1

Normals and extremes of Rainfall

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 and year**	Lowest annual rainfall as % of normal and year**	Heaviest rain fall in 24 hours* Amount (mm)	Date
Budaun	50 a	20.1	20.1	14.2	7.6	13.7	83.3	262.1	228.6	163.1	30.2	1.8	9.4	854.2	283	43	274.0	1969 Sep 23
	b	1.7	1.5	1.1	0.7	1.2	4.0	11.3	11.2	6.9	1.0	0.2	0.8	41.6	(1936)	(1918)		
Bisauli	50 a	20.8	28.5	11.4	8.1	17.8	74.2	256.3	249.4	153.4	25.9	2.8	7.6	856.2	176	49	409.7	1961 Jul 30
	b	1.8	1.9	1.3	0.8	1.4	4.1	11.4	11.6	6.5	1.0	0.3	0.7	42.8	(1916)	(1938)		
Gunnaur	50 a	15.5	17.8	10.4	5.6	11.7	55.9	214.4	197.6	119.9	18.8	1.5	5.6	674.7	174	39	303.5	1916 Jul 11
	b	1.5	1.5	1.1	0.7	0.9	3.5	9.8	9.9	5.6	0.7	0.2	0.6	36.0	(1916)	(1905)		
Sahaswan	50 a	19.1	23.4	10.9	5.8	16.0	84.6	235.7	248.4	142.5	23.1	1.3	6.9	817.7	216	36	360.6	1971 Oct 18
	b	1.6	1.8	1.2	0.7	1.2	4.0	10.7	10.7	6.3	1.0	0.2	0.6	40.0	(1936)	(1918)		
Dataganj	50 a	18.3	21.6	11.2	8.4	10.7	79.5	283.2	252.7	169.4	38.6	2.0	8.6	904.2	184	41	291.2	1969 Sep 23
	b	1.6	1.6	1.0	0.8	1.0	4.5	11.7	11.4	7.0	1.2	0.2	0.7	42.5	(1936)	(1941)		
Budaun (District)	a	18.8	22.5	11.6	7.1	14.0	75.5	250.3	235.3	149.7	27.5	1.9	7.6	821.4	199	46		
	b	1.6	1.7	1.1	0.7	1.1	4.0	11.0	11.0	6.5	1.0	0.2	0.7	40.6	(1936)	(1918)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

* Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	1	1001 - 1100	3
401 - 500	3	1101 - 1200	3
501 - 600	7	1201 - 1300	2
601 - 700	8	1301 - 1400	1
701 - 800	5	1401 - 1500	0
801 - 900	7	1501 - 1600	0
901 - 1000	9	1601 - 1700	1

BULANDSHAHR DISTRICT

The climate of this district is characterised by a cold winter, a hot summer and general dryness except during the southwest monsoon season. The year may be divided into four seasons. The cold season is from about the middle of November to February. The period from March to about the third week of June is the hot season. This is followed by the southwest monsoon season which lasts upto the third week of September. The succeeding period upto the middle of November is the post monsoon or transition period.

Rainfall

Records of rainfall in the district are available for 5 stations for periods ranging from 87 to 102 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 669.8 mm. About 86 percent of the annual rainfall in the district is received during the monsoon months June to September, July and August being the rainiest months. The rainfall in the district increases from the west towards the east. The rainfall varies from 629.3 mm at Khurja to 742.7 mm at Anupshahr. The variation in the rainfall from year to year is large. In the 50 year period, 1901 to 1950 the highest annual rainfall amounting to 209 percent of the normal occurred in 1933. The lowest annual rainfall which was only 38 percent of the normal occurred in 1918. In the same 50 year period the annual rainfall in the district was less than 80 percent of the normal in 14 years. Three consecutive years of such low rainfall occurred twice in this period. It is seen from the rainfall at individual stations that rainfall less than 80 percent of the normal in 2 or 3 consecutive years is quite common in the district, occurring once or twice at most of the stations. Even 4 consecutive years of such low rainfall occurred once each at Khurja and Bulandshahr and 5 consecutive years once each at Sikandrabad and Dayanathpur. It will be seen from table 2 that the annual rainfall in the district was between 501 and 900 mm in 33 years out of 50.

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 28 at Dayanathpur to 36 at Anupshahr.

The heaviest rainfall in 24 hours recorded at any station in the district was 447.0 mm at Bulandshahr on 1885 July 16.

Temperature

There is a meteorological observatory in the district, but it has started very recently. As such the description which follows is based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. From about the end of February there is a rapid increase in temperatures. May is gene-

rally the hottest month with the mean daily maximum temperature at about 41°C and the mean daily minimum at about 27°C . The heat in summer is intense with the maximum temperature on individual days sometimes reaching 45°C . The hot dry and dustladen westerly winds add to the discomfort of the already intensely hot summer days. Afternoon thundershowers which occur on a few days bring welcome relief though only temporarily. With the onset of the monsoon in the district by about the third week of June there is appreciable drop in day temperatures but the nights continue to be as warm as during the latter part of the summer season. After the monsoon withdraws from the district by about the third week of September there is a slight increase in the day temperatures but the nights become rapidly cooler. After the end of October day temperatures also decrease rapidly. January is generally the coldest month with the mean daily maximum at about 21°C and the mean daily minimum at about 8°C . Cold waves affect the district in the wake of passing western disturbances. The minimum temperature on such occasions drops down occasionally to about the freezing point of water and frosts occur.

Humidity

During the monsoon season the relative humidity is generally high, often exceeding 70 percent. Thereafter humidities decrease rapidly and by summer which is the driest part of the year relative humidities in the afternoons become less than 20 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two in association with passing western disturbances heavily clouded skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light with some increase in speed in the late summer and monsoon seasons. During the period October to April the winds are mostly from directions between west and north. Easterly winds appear in May. During the monsoon season easterlies or southeasterlies predominate.

Special Weather Phenomena

In association with depressions during the monsoon season which move across the central parts of the country, the district gets widespread heavy rain. In the cold season western disturbances affect the district. In association with them thunderstorms, sometimes

accompanied with hail occur. Thunderstorms also occur in the subsequent period upto October but the highest incidence is during the monsoon months. Duststorms occur occasionally in the hot season. Fog occurs at times during the cold season.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Bulandshahr	50 a	18.5	21.1	10.7	8.1	8.4	66.5	179.3	189.2	125.2	19.1	2.0	7.6	655.7	192 (1935)	38 (1905)	447.0	1885 Jul 15
	b	1.7	1.6	1.1	0.9	0.8	3.6	8.8	8.9	5.3	1.0	0.2	0.7	34.6				
Sikandrabad	50 a	22.1	18.3	10.9	7.4	9.9	66.0	196.1	176.8	137.7	18.0	1.3	7.4	671.9	197 (1933)	32 (1918)	318.0	1957 Sep 14
	b	1.8	1.7	1.0	0.8	1.1	3.5	8.7	8.7	5.1	0.8	0.2	0.7	34.1				
Anupshahr	50 a	18.8	19.6	13.2	10.7	9.9	72.9	205.5	229.6	133.3	22.3	1.8	7.1	742.7	212 (1933)	40 (1918)	266.9	1961 Jul 30
	b	1.6	1.7	1.1	0.8	1.0	3.5	9.9	9.6	5.4	0.7	0.3	0.7	36.3				
Khurja	50 a	19.3	16.3	10.2	7.4	8.4	67.6	181.1	178.8	115.6	17.3	1.5	5.8	629.3	208 (1935)	43 (1918)	279.4	1957 Sep 14
	b	1.5	1.6	1.1	0.6	1.0	3.5	8.9	8.9	5.4	0.8	0.2	0.6	34.1				
Dayanathpur	50 a	15.0	17.5	12.5	7.6	5.3	56.4	200.7	188.2	124.5	13.5	0.5	10.2	651.9	238 (1933)	16 (1918)	311.1	1923 Aug 11
	b	1.1	1.2	0.9	0.4	0.5	2.6	7.9	7.8	4.4	0.5	0.0	0.4	27.7				
Bulandshahr (District)	a	18.7	18.6	11.5	8.2	8.4	65.9	192.1	192.5	126.9	18.0	1.4	7.6	669.8	209 (1933)	38 (1918)		
	b	1.5	1.6	1.0	0.7	0.9	3.3	8.8	8.8	5.1	0.8	0.2	0.6	33.3				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	2	901 - 1000	5
301 - 400	4	1001 - 1100	0
401 - 500	5	1101 - 1200	0
501 - 600	10	1201 - 1300	0
601 - 700	6	1301 - 1400	0
701 - 800	10	1401 - 1500	1
801 - 900	7		

ETAH DISTRICT

The climate of this district is characterised by a pleasant cold season and a hot dry summer. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the third week of June. The period from about the third week of June to about the third week of September constitutes the southwest monsoon season. The succeeding period lasting till the middle of November is the post monsoon season.

Rainfall

Records of rainfall in the district are available for 4 stations for periods ranging from 81 to 100 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 694.9 mm. The rainfall in the district increases from the west towards the east and varies from 601.6 mm at Jalesar to 778.8mm at Aliganj in the east. About 88 percent of the annual rainfall in the district is received during the period June to September, July and August being the rainiest months. The variation in the rainfall from year to year is large. In the 50 year period, 1901 to 1950, the highest annual rainfall in the district, amounting to 181 percent of the normal occurred in 1936. The lowest annual rainfall which was only 30 percent of the normal occurred in 1918. In the same 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 14 years, two consecutive years of such low rainfall occurring twice. Considering the rainfall at individual stations, even 3 consecutive years of such low rainfall occurred twice at Aliganj and once at Etah. It will be seen from table 2 that the annual rainfall in the district was between 401 and 900 mm in 37 years out of 50.

On an average there are 37 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district, this number ranging from 33 at Jalesar to 38 at Aliganj and Kasgan.

The heaviest rainfall in 24 hours recorded at any station in the district was 338.8 mm at Aliganj on 1903 October 10.

Temperature

There is no meteorological observatory in the district. The description which follows is based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. After February there is continuous increase in the temperatures. May is generally the hottest part of the year. The mean daily maximum temperature in May is about 41°C and the mean daily

minimum, about 27°C . The summer season is intensely hot with the maximum temperature on individual days rising upto over 46°C . Hot dry dust laden winds which blow often during the summer make the weather very uncomfortable. Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the monsoon in the district by about the third week of June there is a rapid decrease in the day temperatures. The decrease in the night temperature is only slight. Due to the increased moisture in the atmosphere even in the monsoon season the weather is oppressive in between rains. After the withdrawal of the monsoon by about the third week of September while there is a rapid decrease in the night temperatures there is a slight increase in the day temperatures. It is only after October that both the day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at about 22°C and the mean daily minimum at about 8°C . In the cold season, in the wake of passing western disturbances, cold waves affect the district and, the minimum temperature occasionally drops down to about the freezing point of water and frosts may occur.

Humidity

Except during the monsoon season when the humidity is high, the air is generally dry over the district. The driest part of the year is the summer when the afternoon relative humidities are as low as 25 percent or less.

Cloudiness

In the southwest monsoon season the skies are generally heavily clouded or overcast. During the rest of the year the skies are mostly clear or lightly clouded. However for short spells of a day or two during the cold season, in association with passing western disturbances skies become cloudy.

Winds

Winds are generally light with a slight increase in force during the summer and early monsoon months. During the period October to April the winds blow mostly from directions between north and west. Southeasterlies appear in May. During the monsoon season the winds are predominantly from the southeast or east.

Special Weather Phenomena

During the monsoon season depressions originating in the Bay of Bengal move in a westerly to northwesterly direction across the central parts of the country and sometimes cause widespread heavy

rain in the district. During the cold season passing western disturbances affect the weather over the district and a few thunderstorms occur. Duststorms and thunderstorms occur during summer. Thunderstorms also occur during the monsoon season. Fog occurs occasionally during the cold season.

* * * * *

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Etah	50 a	16.5	14.2	10.4	4.1	8.1	55.3	200.4	215.4	129.8	19.8	1.8	7.6	681.2	167 (1919)	33 (1918)	224.8	1910 Oct 01
	b	1.5	1.2	0.9	0.5	0.8	3.2	10.4	10.5	6.2	0.9	0.2	0.7	37.0				
Kasganj	50 a	16.3	19.6	9.7	5.3	10.4	62.5	211.8	215.6	142.0	18.8	1.8	5.8	717.6	165 (1921)	29 (1918)	281.7	1958 Jul 21
	b	1.5	1.5	1.0	0.7	1.0	3.6	10.3	9.8	6.5	0.9	0.2	0.6	57.6				
Aliganj	50 a	16.0	15.0	9.9	4.5	12.2	67.1	221.7	237.5	157.7	26.7	3.6	7.1	778.8	230 (1936)	28 (1918)	338.8	1903 Oct 10
	b	1.4	1.4	1.0	0.4	2.2	3.1	10.3	10.9	6.5	0.8	0.3	0.7	38.0				
Jalesar	50 a	15.7	11.2	6.9	3.8	6.1	45.0	182.1	181.9	126.5	17.5	1.8	5.1	601.6	193 (1949)	31 (1918)	184.1	1910 Oct 01
	b	1.5	1.1	0.6	0.5	0.8	2.6	9.2	9.9	5.8	0.8	0.3	0.5	35.4				
Etah (District)	a	15.6	15.0	9.2	4.4	9.2	57.0	204.0	212.1	159.0	20.7	2.3	6.4	694.9	181 (1956)	30 (1918)		
	b	1.4	1.3	0.9	0.5	0.9	3.1	10.1	10.3	6.3	0.9	0.3	0.6	36.6				

(a) Normal rainfall in mm

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

*Based on all available data upto 1980.

**Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	1	801 - 900	10
301 - 400	3	901 - 1000	7
401 - 500	4	1001 - 1100	1
501 - 600	9	1101 - 1200	0
601 - 700	11	1201 - 1300	1
701 - 800	3		

ETAWAH DISTRICT

The climate of this district is characterised by a hot dry summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The period which follows lasting till about the end of September constitutes the southwest monsoon season. October and the first half of November form the post monsoon or the transition period.

Rainfall

Records of rainfall in the district are available for 4 stations for 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 752.4 mm. The rainfall varies from 712.9 mm at Bharthana to 801.2 mm at Bidhuna. About 89 percent of the annual normal rainfall in the district is received in the southwest monsoon months June to September, August being the rainiest month. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 163 percent of the normal occurred in 1949. The lowest annual rainfall which was only 36 percent of the normal occurred in 1918. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 11 years, none of them being consecutive. However, considering the rainfall at individual stations two consecutive years of rainfall less than 80 percent of the normal occurred twice at Bharthana and once at Bidhuna and Auraiya. It will be seen from table 2 that the annual rainfall in the district was between 501 and 1000 mm in 40 years out of 50.

On an average there are 40 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number of rainy days does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 281.9 mm at Etawah on 1874 August 21.

Temperature

There is no meteorological observatory in the district. The description which follows is based on the records of the observatories in neighbouring districts where similar climatic conditions prevail. After February there is a steady increase of temperature. May is generally the hottest month with the mean daily maximum temperature at about 42°C and the mean daily minimum at about 26°C.

The nights are slightly warmer in June than in May. The heat in summer is intense and the hot, dry and dust laden westerly winds which are common in the hot season make the weather often trying. In this season maximum temperatures on individual days sometimes reach 46°C or over. Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the southwest monsoon over the district by about the third week of June there is appreciable drop in the day temperature and the weather becomes more bearable. But the nights still continue to be as warm as in the latter part of the summer. With the withdrawal of the monsoon by about the end of September there is a slight increase in the day temperature. But there is a rapid drop in the night temperature after the withdrawal of the monsoon. After November both day and night temperatures decrease rapidly till January which is usually the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 8°C . During the cold season the district is affected by cold waves in the wake of eastward moving western disturbances and the minimum temperature occasionally goes down to about a degree or so below the freezing point of water and frosts occur.

Humidity

During the monsoon season the relative humidity is generally high being over 70 percent. Thereafter the humidities decrease and by summer which is the driest part of the year the relative humidities in the afternoons become less than 30 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two during the cold season when the district is affected by passing western disturbances, skies are generally heavily clouded to overcast. In the rest of the year mostly clear or lightly clouded conditions prevail.

Winds

Winds are generally light and are mostly from directions between southwest and northwest. In May and the southwest monsoon season, in addition, winds on many days blow also from directions between northeast and southeast.

Special Weather Phenomena

During the monsoon season depressions originating in the Bay of Bengal which move across the central parts of the country sometimes affect the weather over the district causing widespread heavy

rain and gusty winds in the district. In the cold season western disturbances affect the weather over the district causing a few thunderstorms. Dust-storms occur occasionally during the hot season. Thunderstorms occur throughout the year, the highest incidence being the monsoon season. Occasional fog occurs during the cold season.

.

TABLE -1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rain- fall in 24 Hours* Amount (mm)	Date
Etawah	50 a	13.5	12.7	7.9	7.9	6.9	52.6	225.0	252.0	143.5	19.6	5.3	6.3	753.2	201	29	281.9	1874 Aug 21
	b	1.4	1.2	0.8	0.6	0.7	3.1	10.8	11.9	6.6	1.0	0.3	0.7	39.1	(1917)	(1918)		
Bharthana	50 a	12.9	12.2	6.1	7.6	8.9	52.3	218.4	231.9	134.9	18.8	3.8	5.1	712.9	211	40	254.0	1867 Oct 03
	b	1.3	1.1	0.7	0.5	0.9	3.3	10.9	11.6	6.8	1.0	0.2	0.6	38.9	(1949)	(1905)		
Bidhuna	50 a	14.7	13.5	8.4	6.9	9.4	55.1	219.2	265.4	166.4	30.5	4.6	7.1	801.2	165	41	226.1	1880 Jul 31
	b	1.5	1.2	0.8	0.6	0.9	3.2	11.0	12.0	7.4	1.3	0.3	0.7	40.9	(1936)	(1918)		
Anraiya	50 a	14.5	13.2	9.1	5.8	5.8	57.4	224.5	233.7	144.3	22.9	6.1	5.6	742.9	174	27	223.0	1944 Aug 31
	b	1.5	1.3	0.8	0.5	0.8	3.6	10.9	11.5	6.8	1.2	0.3	0.6	39.8	(1916)	(1905)		
Etawah (District)	a	13.9	12.9	7.9	7.1	7.7	54.3	221.8	245.7	147.3	22.9	4.9	6.0	752.4	163	36		
	b	1.4	1.2	0.8	0.5	0.8	3.3	10.9	11.7	6.9	1.1	0.3	0.7	39.6	(1949)	(1918)		

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

* Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	1	801 - 900	11
301 - 400	1	901 - 1000	7
401 - 500	4	1001 - 1100	1
501 - 600	5	1101 - 1200	2
601 - 700	8	1201 - 1300	1
701 - 800	9		

FARRUKHABAD DISTRICT

The climate of this district is characterised by a hot dry summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer season from March to about the middle of June. The period from mid-June to about the end of September is the southwest monsoon season. October and the first half of November constitute the post monsoon season.

Rainfall

Records of rainfall in the district are available for 8 stations for fairly long periods. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 789.8 mm. The rainfall increases in general from the west towards the east varying from 753.4 mm at Aligarh to 832.4 mm at Fatehgarh. About 88 percent of the annual normal rainfall in the district is received during the southwest monsoon months June to September. July and August are the rainiest months. The variation in the rainfall from year to year is appreciable. In the 50 year period 1901 to 1950, the highest annual rainfall amounting to 180 percent of the normal occurred in 1936. The lowest annual rainfall which was only 31 percent of the normal occurred in 1918. The annual rainfall in the district was less than 80 percent of the normal in 11 years, none of them were consecutive. Considering the rainfall at individual stations two consecutive years of rainfall less than 80 percent of the normal occurred thrice at Digri and twice at Farrukhabad and once at 5 other stations. At Fatehgarh even three consecutive years of such low rainfall was recorded once. It will be seen from table 2 that the annual rainfall in the district was between 501 and 1000 mm in 36 years out of 50.

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. There is not much variation in the number of rainy days over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 304.8 mm at Kannauj on 1927 October 7.

Temperature

There is no meteorological observatory in the district. The description which follows is based on the records of observatories in the neighbouring districts where similar climatic conditions prevail. The cold season starts by about the middle of November when both day and night temperatures begin to decrease rapidly. January is the coldest month with the mean daily minimum temperature

at about 8°C and the mean maximum at about 23°C . In association with passing western disturbances cold waves affect the district and the minimum temperatures drop down to about the freezing point of water. After February temperatures rise rapidly. May is generally the hottest month with the mean daily maximum temperature at about 41°C and the mean daily minimum at about 26°C . The heat is intense during the summer season and scorching westerly winds blow making the weather very trying. Day temperatures sometimes go upto about 48°C on individual days. Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the monsoon into the district by about mid-June, day temperatures drop down appreciably. But the drop in the night temperatures is insignificant and nights continue to be as warm as during the summer season. After October both the day and night temperatures decrease rapidly.

Humidity

In the southwest monsoon season the humidity is high. After the withdrawal of the monsoon humidities decrease steadily. By summer which is the driest part of the year, the relative humidities in the afternoons become less than 30 percent.

Cloudiness

Skies are generally heavily clouded or overcast during the southwest monsoon season. During the rest of the year skies are lightly clouded or clear. However, during the cold season, for short spells of a day or two cloudy skies prevail in association with the passing western disturbances.

Winds

Winds are generally light. The predominant direction of , winds are between southwest and northwest throughout the year. But in May and the southwest monsoon season winds from directions between northeast and southeast blow on many days.

Special Weather Phenomena

During the southwest monsoon season some of the depressions originating in the Bay of Bengal while moving across the central parts of the country cause widespread and locally heavy rain and and gusty winds in the district. In the cold season western disturbances affect the weather over the district causing thunderstorms and duststorms. In the summer months duststorms and thunderstorms occur, occasionally, accompanied with hail and squall. Rainfall during the monsoon season is also often associated with thunder. Fogs occur occasionally during the cold season.

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Farrukhabad	44 a	13.5	12.5	10.9	6.1	11.4	68.8	241.1	236.0	159.0	19.6	5.3	5.8	788.0	201 (1936)	27 (1918)	199.4	1930 Aug 13
	b	1.3	1.3	0.8	0.8	1.0	3.6	10.9	10.6	6.9	1.1	0.2	0.6	39.1				
Kaimganj	50 a	16.0	17.0	11.4	5.3	12.2	68.3	223.5	236.7	149.3	28.5	2.8	7.6	778.6	197 (1936)	38 (1918)	217.2	1921 Sep 20
	b	1.3	1.6	0.9	0.6	1.0	3.5	10.7	11.0	6.6	1.1	0.3	0.7	39.3				
Chhibramau	50 a	16.0	12.5	8.9	5.3	9.9	62.2	227.8	233.9	155.5	24.6	3.6	6.9	767.1	198 (1949)	31 (1918)	283.5	1905 Sep 29
	b	1.6	1.3	0.9	0.6	1.2	3.5	10.9	11.4	7.4	1.2	0.3	0.7	41.0				
Kannauj	50 a	14.0	15.5	5.3	4.3	10.2	65.3	243.1	228.6	164.6	27.9	3.6	5.6	788.0	177 (1915)	35 (1918)	304.8	1927 Oct 07
	b	1.3	1.3	0.6	0.5	0.9	3.3	11.0	10.8	6.9	1.2	0.2	0.5	38.5				
Digri	50 a	13.5	12.9	9.7	4.3	3.8	47.0	388.8	272.0	166.1	27.2	3.1	6.6	805.0	241 (1948)	22 (1905)	280.7	1898 Aug 07
	b	1.1	1.0	0.6	0.4	0.4	2.6	10.4	11.0	6.8	1.1	0.2	0.5	36.1				
Fatehgarh	50 a	15.0	15.0	9.1	6.9	13.2	79.8	253.2	245.1	152.4	32.0	3.1	7.6	832.4	200 (1936)	26 (1918)	275.8	1903 Oct 10
	b	1.4	1.4	0.8	0.7	1.3	3.8	11.4	11.5	7.1	1.2	0.2	0.6	41.4				
Aligarh	27 a	12.5	13.5	11.2	6.6	12.9	55.1	232.9	233.9	141.0	25.9	2.3	3.6	753.4	172 (1922)	36 (1918)	186.2	1897 Jul 30
	b	1.0	1.4	1.0	0.7	1.0	3.0	10.3	11.0	6.1	1.0	0.2	0.4	37.1				
Thatiatiirwa	17 a	14.2	19.6	10.4	11.9	12.5	55.4	235.5	247.1	166.4	21.6	4.3	6.9	805.8	173 (1915)	47 (1905)	234.9	1915 Aug. 24
	b	1.4	1.8	1.2	0.8	1.4	3.0	10.5	11.2	7.7	0.9	0.4	0.6	40.9				
Farrukhabad (District)	a	14.3	14.8	9.6	6.3	10.8	62.7	237.0	241.7	156.8	25.9	3.3	6.6	789.8	180 (1936)	31 (1918)		
	b	1.3	1.4	0.9	0.6	1.0	3.3	10.8	11.2	6.9	1.1	0.3	0.6	39.3				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	1	901 - 1000	8
301 - 400	1	1001 - 1100	4
401 - 500	3	1101 - 1200	3
501 - 600	5	1201 - 1300	0
601 - 700	9	1301 - 1400	1
701 - 800	7	1401 - 1500	1
801 - 900	7		

JALAUN DISTRICT

The climate of this district is characterised by a hot summer and general dryness except during the southwest monsoon season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season lasting till about the middle of June. The period which follows lasting till about the end of September constitutes the southwest monsoon season. October and the first half of November may be termed the postmonsoon or transition season.

Rainfall

Records of rainfall in the district are available for 97 years for 3 stations and for 91 years for one station. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 782.6 mm. About 90 percent of the annual rainfall in the district is received during the monsoon months June to September, August being the rainiest month. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 163 percent of the normal occurred in 1919. The lowest annual rainfall which was only 36 percent of the normal occurred in 1905. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 10 years, none of them being consecutive. Considering the annual rainfall at individual stations, two consecutive years of such low rainfall occurred twice each at Jalaun and Kalpi and once at Orai. It will be seen from table 2 that the annual rainfall in the district was between 501 and 1000 mm in 36 years out of 50.

On an average there are 42 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 40 at Orai to 44 at Kalpi.

The heaviest rainfall recorded at any station in the district was 368.3 mm at Kunch on 1881 July 29.

Temperature

There is a meteorological observatory in the district at Orai. The records of this observatory may be taken as representative of the meteorological conditions in the district in general. After February temperatures begin to increase rapidly. May and the early part of June is the hottest part of the year. The mean daily maximum temperature in May is 42.6°C and the mean daily minimum 27.1°C. The heat in summer is intense and the hot dry dust laden winds which blow during this season add very much to the discomfort. On individual days the maximum temperatures sometimes reach over 47°C. With

the onset of the southwest monsoon over the district after the middle of June there is appreciable drop in the day temperatures. The nights however are about as warm as during the latter part of the summer. In September due to breaks in the monsoon day temperatures increase slightly. After the withdrawal of the monsoon early in October the day temperatures while remaining as in September night temperatures begin to drop. From November both day and night temperatures drop rapidly, till January which is the coldest month. The mean daily maximum temperature in January is 23.0°C and the mean daily minimum, 8.4°C . In the cold season in the rear of the western disturbances cold waves affect the district, the minimum temperature occasionally going down to about a degree or so below the freezing point of water.

The highest maximum temperature recorded at Orai was 47.8°C on 1978 June 8. The lowest minimum was -1.7°C on 1961 December 26.

Humidity

In the southwest monsoon season the relative humidity is high, exceeding 70 percent. Humidities decrease thereafter and by summer which is the driest part of the year relative humidities in the afternoons are as low as 30 percent or less.

Cloudiness

During the monsoon season and for brief spells of a day or two in association with passing western disturbances in the cold season, heavily clouded to overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded. In the latter half of summer, cloudiness increases in the afternoons.

Winds

Winds are generally light. During the non-monsoon months the winds blow predominantly from directions between north and west, the northerly winds being less common in the mornings. From May onwards easterlies appear and during the monsoon season, the winds between northeast and southeast are about as common as the winds between southwest and northwest.

Special Weather Phenomena

Depressions from the Bay of Bengal during the monsoon season which move in some westerly to northwesterly direction across the country sometimes affect the weather over the district causing widespread heavy rain and gusty winds. In the cold season western disturbances occasionally affect the weather and sometimes thunderstorms occur in association with them. Rain during the monsoon sea-

son is often associated with thunder. Occasional duststorms occur during the hot season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Jalaun	50 a	13.7	12.2	7.1	5.6	8.6	63.0	244.1	263.9	139.5	17.5	5.1	5.3	785.6	189	23	250.0	1967 Aug 07
	b	1.2	1.2	0.8	0.6	1.0	3.9	12.0	12.9	7.2	1.1	0.4	0.5	42.8	(1917)	(1918)		
Kalpi	50 a	13.2	15.2	9.9	7.6	6.9	73.9	256.0	292.3	149.1	22.9	5.8	7.1	859.9	170	39	306.8	1944 Aug 31
	b	1.3	1.3	0.8	0.7	0.7	4.3	12.5	12.6	7.2	1.2	0.4	0.6	43.6	(1919)	(1905)		
Kunch	50 a	15.5	11.9	5.8	4.3	6.9	59.7	235.9	245.9	143.0	21.8	6.3	4.8	759.8	155	31	368.3	1881 Jul 29
	b	1.2	1.1	0.7	0.5	0.8	3.8	12.1	12.9	7.0	1.2	0.4	0.6	42.3	(1904)	(1905)		
Orai	50 a	12.2	11.9	6.6	4.3	7.1	61.5	232.9	235.7	125.0	18.8	4.1	4.8	724.9	167	39	264.2	1879 Aug 06
	b	1.1	1.2	0.6	0.5	0.8	3.8	11.6	11.9	6.5	1.1	0.3	0.5	39.9	(1919)	(1905)		
Jalaun (District)	a	13.7	12.8	7.3	5.5	7.4	64.5	241.7	259.5	139.1	20.3	5.3	5.5	782.6	163	36		
	b	1.2	1.2	0.7	0.6	0.8	3.9	12.1	12.6	7.0	1.1	0.4	0.5	42.1	(1919)	(1905)		

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	2	701 - 800	8
301 - 400	1	801 - 900	11
401 - 500	3	901 - 1000	6
501 - 600	3	1001 - 1100	4
601 - 700	8	1101 - 1200	2
		1201 - 1300	2

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	23.0	8.4	30.1	1964 Jan 10	1.4	1973 Jan 23	73	54
February	27.1	11.0	35.1	1985 Feb 28	2.2	1951 Feb 03	58	38
March	33.5	16.7	41.1	1985 Mar 27	5.7	1979 Mar 10	49	32
April	38.9	21.8	46.4	1985 Apr 20	13.5	1981 Apr 06	37	28
May	42.6	27.1	47.2	1973 May 09	16.4	1979 May 18	36	27
June	40.4	28.5	47.8	1978 Jun 08	15.6	1957 Jun 07	53	42
July	34.0	25.5	45.0	1982 Jul 10	17.8	1962 Jul 24	80	72
August	32.0	24.5	39.1	1964 Aug 05	20.0	1985 Aug 01	88	81
September	33.0	24.1	39.8	1979 Sep 03	15.7	1979 Sep 20	77	68
October	32.8	19.9	38.3	1951 Oct 17	11.1	1957 Oct 28	64	50
November	29.1	12.5	35.3	1963 Nov 02	4.4	1950 Nov 24	51	39
December	24.8	8.9	30.6	1954 Dec 02	-1.7	1961 Dec 26	63	48
Annual	32.6	19.1					61	48

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(ORAI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
5.6	5.8	7.6	8.0	9.3	10.8	10.2	8.8	7.5	6.3	4.4	3.9	7.3

TABLE - 5
Special Weather Phenomena
(ORAI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.1	0.2	0.2	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.2	1.4
Hail	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Dust- storm	0.0	0.0	0.8	0.5	0.7	0.3	0.0	0.0	0.1	0.0	0.0	0.0	2
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6

*No. of days two and above are given in whole numbers.

JHANSI DISTRICT

The climate of this district is characterised by a hot dry summer and a cold winter. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to the middle of June. The monsoon season is from mid June to the end of September. October and November constitute the post monsoon season.

Rainfall

There are eleven rain gauge stations in the district records of which are available for periods ranging from 50 to about 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall over the district is 880.0 mm. The rainfall decreases towards the north, with the region around Mahroni-Narhat-Lalitpur getting the maximum rainfall. The monsoon reaches the district after mid June and withdraws by about the end of September. July is the month, with the heaviest rainfall. During the monsoon months the district receives 91% of the normal rainfall. The variation in the rainfall from year to year is not large generally, but there have been one or two years with very deficient rainfall. During the fifty year period from 1901 to 1950 the highest rainfall in the district amounting to 153% of the normal occurred in 1919. In 1905, the year of lowest rainfall, it was 41% of the normal. In this 50 year period there were 7 years when the district rainfall was less than 80% of the normal, no two of which were consecutive years. Two or three consecutive years of rainfall less than 80% of the normal have occurred once or twice at individual stations in the district. It will be seen from table 2 that in 40 years out of 50, the annual rainfall in the district was between 701 and 1200 mm.

On an average there are 42 rainy days (i.e. days with rain of 2.5 mm or more) in a year. This number varies from 33 at Magarwara to 48 at Mahroni.

The highest rainfall in 24 hours recorded at any station in the district was 384.1 mm on 1941 September 10 at Lalitpur.

Temperature

Meteorological data available for the observatory at Jhansi may be taken as representative of the conditions in the district. The cold season starts by about the middle of November when the temperatures begin to drop rapidly. January is the coldest month of the year when the mean daily maximum temperature is 24.1°C and

the mean daily minimum temperature is 9.2°C . During the winter season when the district is affected by cold waves in the wake of western disturbances moving eastwards across north India the minimum temperature may go down to about the freezing point of water. Both day and night temperatures begin to rise progressively from March. May is the hottest month of the year with the mean daily maximum temperature of 42.6°C and the mean daily minimum at 28.8°C . The intense heat in May and June is rendered more bearable on account of, the low moisture in the air during these months. With the onset of monsoon the temperatures drop appreciably and weather becomes pleasant. After the withdrawal of the monsoon in September, the day temperature rises slightly and a secondary maximum is reached in October. But the night temperatures decrease progressively.

The highest maximum temperature recorded at Jhansi was 47.8°C on 1973 May 8 and on 1924 June 1 and the lowest minimum temperature was 0.3°C on 1961 December 26.

Humidity

In the summer season, the air is very dry, especially in the afternoons when relative humidities are less than 20%. During the monsoon season, the moisture content of the air is high generally above 75 percent. The humidity in the post monsoon and the winter months is generally between 50 to 65% in the mornings, and between 25 to 40% in the afternoons.

Cloudiness

Heavily clouded to overcast skies prevail during the monsoon season. In the rest of the year skies are generally clear or lightly clouded.

Winds

During the post monsoon and winter seasons, winds are light and blow generally from directions between southwest and northwest in the mornings and between northwest and northeast in the afternoons. The winds strengthen slightly in the summer and the monsoon seasons and are mainly westerly or southwesterly.

Special Weather Phenomena

Heavy rain and strong winds are caused in the district by depressions which come from the Bay of Bengal during the monsoon months. Thunderstorms occur mainly during the premonsoon and monsoon months. The thunderstorms of the winter season in association

with the passage of western disturbances across North India are sometimes accompanied with hail. Fog may occur occasionally in the winter season. Occasional dust-storms occur during the summer months.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Jhansi.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Jhansi (obsy)	50 a	14.0	12.2	9.9	3.1	8.4	81.5	306.1	285.2	155.2	25.7	9.4	6.9	917.6	157 (1942)	34 (1913)	274.3	1869 Jul 22
	b	1.3	1.1	0.8	0.4	0.8	4.7	13.7	12.9	7.2	1.2	0.6	0.8	45.5				
Moth	50 a	12.9	12.7	10.2	4.3	6.6	68.6	271.8	275.6	150.6	24.4	6.9	6.6	851.2	163 (1934)	33 (1905)	252.0	1934 Aug 19
	b	1.2	1.2	0.8	0.5	0.8	4.3	12.6	12.6	6.9	1.2	0.5	0.7	43.3				
Garotha	50 a	12.9	12.9	7.9	5.8	7.1	74.9	290.3	269.5	150.9	21.6	9.1	7.4	870.3	166 (1917)	43 (1918)	327.7	1891 Sep 07
	b	1.3	1.3	0.7	0.5	0.7	4.8	13.0	13.3	7.1	1.2	0.6	0.6	45.1				
Mau	50 a	15.0	12.5	6.9	4.6	6.6	77.2	302.0	285.2	159.5	26.7	9.7	6.9	912.8	182 (1917)	30 (1905)	276.9	1869 Jul 23
	b	1.4	1.2	0.7	0.6	0.7	4.8	13.0	13.2	7.1	1.4	0.6	0.7	45.4				
Lalitpur	50 a	15.5	12.9	6.6	3.3	5.8	94.5	337.1	297.7	157.5	25.7	16.5	8.4	981.5	146 (1935)	34 (1918)	384.1	1941 Sep 10
	b	1.5	1.1	0.7	0.4	0.6	5.6	14.3	13.0	7.7	1.4	0.8	0.7	47.8				
Mahroni	50 a	16.5	11.7	7.9	3.3	5.1	96.3	339.7	303.5	166.4	29.2	19.3	6.6	1025.5	162 (1916)	37 (1905)	306.6	1916 Aug 26
	b	1.5	1.0	0.8	0.3	0.6	5.3	14.7	13.8	7.2	1.6	0.9	0.7	48.4				
Pachwara	50 a	7.9	8.9	5.3	3.8	2.3	57.4	269.5	240.8	132.3	23.9	8.1	6.3	766.5	229 (1927)	21 (1905)	228.6	1948 Aug 08
	b	0.7	0.8	0.5	0.4	0.3	3.7	11.3	10.9	5.8	0.9	0.4	0.5	36.2				
Magarwara	50 a	6.9	8.1	5.6	5.1	2.3	46.0	233.7	256.8	125.0	24.1	7.1	3.6	724.3	253	15	207.0	1963 Sep 15
	b	0.6	0.7	0.4	0.2	0.2	2.8	10.1	10.6	5.3	0.9	0.4	0.4	32.6	(1919)	(1913)		

contd

Table - 1(contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Barwasagar	50 a	8.1	9.4	6.1	1.8	3.6	54.6	282.7	269.5	131.8	18.8	6.6	3.8	796.8	181	30	272.3	1910 Sep 06
	b	0.7	0.6	0.7	0.3	0.3	2.9	10.9	10.3	5.3	0.8	0.5	0.4	33.7	(1919)	(1920)		
Narhat	17 a	9.7	9.4	5.1	3.3	8.6	97.3	334.0	319.5	165.3	26.9	14.2	4.8	997.9	143	59	340.4	1881 Aug 11
	b	0.9	0.8	0.6	0.4	0.8	4.4	12.0	13.8	7.3	1.3	0.7	0.4	43.4	(1916)	(1905)		
Talbahat	17 a	7.6	11.7	8.1	8.9	9.4	61.5	301.7	270.8	130.6	16.0	8.4	2.8	837.5	153	46	246.4	1887 Aug 28
	b	0.6	1.0	0.6	0.5	0.7	3.6	10.0	11.2	5.5	0.6	0.6	0.3	35.2	(1908)	(1913)		
Jhansi (District)	a	11.5	11.1	7.2	4.3	6.0	73.6	299.0	279.4	147.7	23.9	10.5	5.8	880.0	153	41		
	b	1.1	1.0	0.7	0.4	0.6	4.3	12.3	12.3	6.6	1.1	0.6	0.6	41.6	(1919)	(1905)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

* Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the
District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	3	801 - 900	13
401 - 500	1	901 - 1000	5
501 - 600	1	1001 - 1100	10
601 - 700	2	1101 - 1200	3
701 - 800	9	1201 - 1300	2
		1301 - 1400	1

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	24.1	9.2	33.3	1946 Jan 16	1.2	1983 Jan 14	66	39
February	27.5	11.7	37.8	1930 Feb 20	0.6	1929 Feb 02	56	28
March	33.5	17.4	45.3	1892 Mar 27	5.3	1979 Mar 10	37	18
April	38.9	23.3	45.6	1958 Apr 28	12.1	1975 Apr 10	27	16
May	42.6	28.8	47.8	1973 May 08	19.0	1977 May 02	26	15
June	40.4	29.3	47.8	1924 Jun 01	19.5	1976 Jun 18	48	37
July	33.5	25.9	45.6	1900 Jul 01	21.1	1975 Jul 20, 21	78	70
August	31.7	24.9	42.2	1911 Aug 01	18.3	1960 Aug 07	84	76
September	32.5	24.1	40.6	1913 Sep 28	17.9	1975 Sep 20	78	65
October	33.3	19.5	40.6	1913 Oct 09	11.7	1916 Oct 30	60	40
November	29.7	13.1	36.4	1965 Nov 01	5.0	1938 Nov 30	51	32
December	25.5	9.3	32.8	1940 Dec 08	0.3	1961 Dec 26	61	39
Annual	32.8	19.7					56	40

*Hours IST.

TABLE - 4
Mean Wind Speed in Km/hr
(JIANSI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.9	4.4	5.4	5.8	7.1	8.1	6.9	5.9	5.5	4.3	3.5	3.3	5.3

TABLE - 5
Special Weather Phenomena
(JIANSI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	0.6	1.4	0.8	1.3	3	2	1.7	0.9	0.5	0.1	0.1	13
Hail	0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Dust- storm	0.0	0.0	0.0	0.1	0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.2	1.1

* No. of days 2 and above are given in whole numbers.

MAINPURI DISTRICT

The climate of this district is characterised by a hot summer, and a bracing cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer season from March to about the third week of June. The succeeding period lasting till about the end of September constitutes the southwest monsoon season. October and the first half of November constitute the post monsoon or transition period.

Rainfall

Records of rainfall in the district are available for 7 stations for periods ranging from 80 to 95 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 710.9 mm. In general the rainfall in the district increases from west towards the east and varies from 692.0 mm at Shikohabad to 733.7 mm at Karhal. About 88 percent of the annual rainfall in the district is received during the southwest monsoon months, June to September, August being the rainiest month. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 154 percent of the normal occurred in 1917 while the very next year was one with the lowest annual rainfall which amounted to 39 percent of the normal. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 10 years two of them being consecutive. Considering the rainfall at the individual stations two consecutive years of such low rainfall occurred thrice each at Mustafabad, Shikohabad and Gopalpur and once at Mainpuri and Karhal. 3 and 4 consecutive years of such low rainfall also occurred once at Bhagaon and Dhandaus respectively. The annual rainfall in the district was between 601 and 900 mm in 33 years out of 50.

On an average there are 37 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 281.2 mm at Shikohabad on 1916 August 10.

Temperature

There is a meteorological observatory in the district at Mainpuri and the records of this observatory may be taken as representative of the climatic conditions prevailing in the district in

general. After February there is continuous increase in temperature till May which is generally the hottest month. The mean daily maximum temperature in May is 42.2°C and the mean daily minimum is 26.2°C . The summer season is intensely hot and on individual days the maximum temperature rises upto over 46°C . Hot dry dust laden winds, blow often during the summer. Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the monsoon in the district by about the third week of June there is appreciable drop in the day temperature. However the nights during the monsoon season are as warm as nights in the summer. After the withdrawal of the monsoon by about the third week of September there is a slight increase in day temperature but the nights become cooler. After October both the day and night temperatures decrease rapidly till January which is generally the coldest month with the mean daily maximum at 22.7°C and the mean daily minimum at 7.7°C . During the cold season the district is affected by cold waves in the wake of passing western disturbances and on such occasions the minimum temperature occasionally drops down to about a degree or two below the freezing point of water and frosts occur.

The highest maximum temperature recorded at Mainpuri was 49.2°C on 1961 June 1. The lowest minimum was -1.7°C on 1927 January 11.

Humidity

During the southwest monsoon season the relative humidity is high exceeding 70 percent on the average. After the withdrawal of the monsoon humidities decrease and by summer which is the driest part of the year the air is very dry.

Cloudiness

During the monsoon season and for brief spells of a day or two during the cold season when the district is affected by passing western disturbances, the skies are heavily clouded or overcast. In the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally very light. Throughout the year winds from directions between southwest and northwest blow on a large number of occasions. In the period May to September, winds often blow from directions between northeast and southeast on many days.

Special Weather Phenomena

During the monsoon season depressions from the Bay of Bengal move in a westerly to northwesterly direction through the central parts of the country and some of them affect the weather over the district causing widespread heavy rain and gusty winds. In the cold season western disturbances sometimes affect the weather over the district. Thunderstorms and duststorms occur in the latter part of the hot season. Rain during the monsoon season is often associated with thunder. Occasionally fog occur during the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hours* Amount Date (mm)
Mainpuri (obsy)	50 a	15.2	12.9	9.4	6.1	12.7	56.4	193.0	231.7	137.7	22.6	3.3	7.9	708.9	155	42	256.5 1949 Aug 18
	b	1.5	1.2	0.9	0.7	1.3	3.4	10.2	11.0	6.7	1.0	0.3	0.7	38.9	(1949)	(1918)	
Mustafabad	50 a	13.2	13.5	7.4	4.8	8.4	57.1	204.7	213.4	136.9	23.9	3.3	7.9	694.5	198	32	279.4 1910 Oct 01
	b	1.3	1.2	0.7	0.5	0.8	3.0	9.9	9.8	5.9	0.9	0.3	0.7	35.0	(1936)	(1918)	
Shikohabad	50 a	15.5	12.9	7.9	6.3	8.1	61.5	202.4	205.7	133.9	25.9	3.8	8.1	692.0	175	37	281.2 1916 Aug 10
	b	1.4	1.1	0.7	0.7	0.8	3.2	10.0	10.7	6.2	0.9	0.3	0.7	36.7	(1936)	(1913)	
Bhongaon	50 a	15.0	14.0	10.4	4.6	11.7	53.1	202.7	236.7	143.3	24.6	3.6	7.9	727.9	146	42	214.6 1960 Oct 04
	b	1.4	1.3	0.9	0.5	1.1	3.2	10.2	11.2	6.9	1.0	0.3	0.7	38.7	(1916)	(1918)	
Karhal	50 a	13.5	11.2	9.4	5.8	9.1	65.3	209.5	233.4	144.3	22.6	3.8	5.8	733.7	162	47	203.2 1887 Aug 03
	b	1.4	1.1	0.8	0.6	0.8	3.3	10.0	10.7	6.7	1.0	0.3	0.6	37.3	(1947)	(1905)	
Dhandaus	50 a	12.7	15.0	7.4	2.5	8.1	44.2	215.4	242.1	150.6	18.0	2.3	4.3	722.6	194	25	223.5 1927 Jul 17
	b	1.2	1.1	0.7	0.4	0.7	2.8	9.9	10.9	6.3	0.8	0.2	0.4	35.4	(1927)	(1918)	
Gopalpur	50 a	14.5	13.5	9.1	4.6	7.1	51.8	210.8	220.7	133.9	21.6	2.0	7.9	697.5	164	29	224.8 1910 Oct 01
	b	1.4	1.0	0.8	0.5	0.7	3.1	9.9	10.3	6.1	0.8	0.2	0.5	35.3	(1917)	(1918)	
Mainpuri (District)	a	14.2	13.3	8.7	5.0	9.3	55.6	205.5	226.2	140.1	22.7	3.2	7.1	710.9	154	39	
	b	1.4	1.1	0.8	0.6	0.9	3.1	10.0	10.7	6.4	0.9	0.3	0.6	36.8	(1917)	(1918)	

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

*Based on all available data upto 1980.

**Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	1	701 - 800	11
301 - 400	1	801 - 900	12
401 - 500	6	901 - 1000	3
501 - 600	4	1001 - 1100	2
601 - 700	10		

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	22.7	7.7	30.6	1946 Jan 27	-1.7	1927 Jan 11	80	53
February	26.0	10.1	35.2	1980 Feb 29	-0.6	1905 Feb 02	70	40
March	32.5	14.9	41.7	1945 Mar 31	5.0	1945 Mar 06	52	29
April	38.5	20.9	45.6	1985 Apr 30	11.1	1903 Apr 02	37	23
May	42.2	26.2	47.8	1943 Mar 24	15.6	1955 May 06	35	23
June	40.9	28.6	49.2	1961 Jun 01	18.0	1984 Jun 14	51	37
July	35.1	26.7	45.6	1903 Jul 09	16.0	1984 Jul 10	79	69
August	33.1	25.9	42.6	1985 Aug 15	15.0	1984 Aug 10	85	76
September	33.7	24.7	40.6	1905 Sep 04	8.2	1980 Sep 21	80	69
October	34.0	18.9	40.6	1896 Oct 02	9.0	1984 Oct 23	67	50
November	30.0	11.7	37.2	1984 Nov 10	2.0	1984 Nov 29	63	44
December	24.8	8.2	32.8	1981 Dec 31	-1.1	1926 Dec 27	75	52
Annual	32.8	18.7					65	47

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(MAINPURI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.0	3.9	4.7	4.9	5.8	6.2	4.7	3.8	3.7	2.4	2.2	2.3	4.0

a

TABLE - 5
Special Weather Phenomena
(MAINPURI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.6	1.1	1.8	1.3	1.5	2.0	3.0	3.0	3.0	0.2	0.1	0.4	18
Hail	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust- storm	0.0	0.0	0.1	0.5	1.0	1.3	0.1	0.1	0.1	0.1	0.0	0.0	3.0
Squall	0.1	0.0	0.0	0.1	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.9
Fog	0.6	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.5	1.4

*No. of days two and above are given in whole numbers.

MATHURA DISTRICT

The climate of this district is characterised by an intensely hot summer, a cold winter and general dryness throughout the year except during southwest monsoon season. The year may be divided into four seasons. The cold season is from December to February. The period from March to about the middle of June is the hot season. This is followed by the southwest monsoon season which continues till the end of September. October and November constitute the transition season.

Rainfall

Records of rainfall in the district are available for eight stations for periods ranging from 62 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 591.5 mm. The rainfall in the district in general increases from the southwest towards the northeast and varies from 544.3 mm at Mathura to 672.3 mm at Chhota Kosi. The rainfall during the period from June to September amounts to about 88 percent of the annual rainfall. The rainfall in August which is the rainiest month amounts to about 31 percent of the annual rainfall. The variation in the annual rainfall from year to year is large. During the fifty year period from 1901 to 1950, the highest annual rainfall which was 179 percent of the normal occurred in 1908, while the lowest which was only 36 percent of the normal occurred in 1918. During the same 50 year period the annual rainfall in the district was less than 80 percent of the normal in 14 years, two consecutive years of such low rainfall occurring twice. Considering the annual rainfall in the individual stations, two consecutive years of such low rainfall was quite frequent and occurred three or four times at five out of the eight stations. Even three to five consecutive years of such low rainfall occurred once or twice at four of the stations during the same period. It will be seen from table 2 that the annual rainfall in the district was between 401 and 800 mm in 36 years out of 50.

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 28 at Basaunti to 35 at Mat.

The heaviest rainfall in 24 hours recorded at any station in the district was 254.0 mm at Baroda on 24th September 1890.

Temperature

There is a meteorological observatory at Mathura in the district, but it has started very recently. As such the account of the

climate which follows is mainly based on the records of the observatories in the neighbouring districts where similar meteorological conditions prevail. From about the end of February the temperatures begin to rise rapidly. May is the hottest month with the mean daily maximum temperature at about 42°C and the mean daily minimum at about 26°C . The heat during the summer is intense and trying. Occasional afternoon thundershowers bring welcome relief. With the onset of the southwest monsoon by about the middle of June there is an appreciable drop in day temperatures, but the nights continue to be nearly as warm as before. With the withdrawal of the southwest monsoon by about the third week of September the night temperatures begin to decrease, but there is a slight increase in the day temperatures. Both the day and night temperatures decrease rapidly after October. January is the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 7°C . In association with eastward moving western disturbances across north India, the district sometimes experiences spells of cold weather when the minimum temperature drops down to about a degree or two below the freezing point of water.

The highest maximum temperature recorded at Mathura was 47.1°C on 1984 May 24 and the lowest minimum temperature was 0.5°C on 1978 February 11.

Humidity

Except during the brief southwest monsoon season when the relative humidities are generally between 60 and 70 percent, the air is generally dry over the district. The driest part of the year is the summer season when the relative humidities during the afternoons are as low as 20 percent.

Cloudiness

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

Winds

Winds are generally light with some increase in speed during the summer and the early part of the southwest monsoon season. During the southwest monsoon season winds blow from a southwesterly to westerly direction or from the east to southeast. In the post-monsoon and winter seasons they are from directions between southwest and northwest in the morning and from the northwest or north in

the afternoons. In the summer season winds are mostly from directions between southwest and northwest.

Special Weather Phenomena

Depressions originating in the Bay of Bengal in the southwest monsoon season which move across the central parts of the country sometimes affect the weather over the district and cause heavy rain. In the hot season dust-storms and thunderstorms occur frequently. Some of these thunderstorms are accompanied with squalls and occasionally with hail. Rain during the southwest monsoon season is often associated with thunder. Occasional fog occurs in the winter season.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm) Date	
Mathura	50 a	12.9	15.0	8.1	4.8	8.6	36.6	160.3	168.7	107.2	15.5	1.5	5.1	544.3	181	34	205.2	1958 Aug 23
	b	1.2	1.2	0.7	0.4	1.1	2.9	9.3	9.9	5.6	0.8	0.2	0.5	33.8	(1933)	(1918)		
Chhata	50 a	14.7	12.9	8.4	6.9	11.7	36.6	151.1	182.6	108.2	16.0	2.0	5.6	556.7	184	39	241.3	1890 Jul 20
	b	1.4	1.3	0.8	0.7	1.2	2.7	8.9	9.4	5.4	0.7	0.2	0.6	33.3	(1908)	(1929)		
Mat	50 a	14.7	15.7	9.4	6.6	6.9	49.0	187.5	186.4	123.2	16.5	1.5	6.6	624.0	186	24	185.4	1875 Sep 08
	b	1.4	1.2	0.8	0.7	0.8	3.0	10.0	9.4	5.7	1.1	0.2	0.6	34.9	(1908)	(1918)		
Sadabad	50 a	13.2	12.7	7.1	4.8	7.4	42.9	175.8	188.0	117.6	17.3	2.0	5.6	594.4	190	35	215.9	1894 Aug 25
	b	1.2	1.1	0.6	0.5	1.0	2.4	8.8	9.4	5.6	0.8	0.2	0.6	32.2	(1917)	(1918)		
Baroda	50 a	11.2	9.1	5.6	2.5	7.4	43.4	170.4	180.1	122.7	20.1	3.3	4.1	579.7	191	33	254.0	1890 Sep 24
	b	0.8	0.8	0.5	0.2	0.7	2.7	8.6	8.8	5.2	0.6	0.2	0.3	29.4	(1933)	(1905)		
Chhotakosi	50 a	11.4	14.5	7.9	8.4	10.9	48.3	199.4	202.9	135.6	23.1	1.8	6.1	672.3	211	27	221.0	1910 Oct 01
	b	1.1	1.2	0.6	0.5	1.1	2.6	9.1	9.4	5.4	0.8	0.2	0.6	32.4	(1933)	(1941)		
Basunti	50 a	10.2	13.7	7.4	3.1	6.1	36.6	182.4	186.2	115.1	15.0	1.5	5.6	582.9	207	29	167.9	1927 Aug 11
	b	0.9	1.0	0.5	0.3	0.7	2.5	8.2	8.4	4.7	0.4	0.2	0.4	28.2	(1908)	(1918)		
Mahaban	25 a	15.2	12.7	8.9	4.5	8.4	40.1	150.1	192.0	115.5	23.1	2.3	7.1	577.7	178	25	190.5	1908 Aug 01
	b	1.3	1.1	0.8	0.4	1.0	2.7	9.4	10.0	5.5	0.9	0.3	0.6	34.0	(1917)	(1918)		
Mathura (District)	a	12.9	13.3	7.9	5.1	8.4	41.7	172.1	185.9	117.9	18.6	2.0	5.7	591.5	179	36		
	b	1.2	1.1	0.7	0.4	0.9	2.7	9.0	9.3	5.4	0.8	0.2	0.5	32.2	(1908)	(1918)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	5	701 - 800	5
301 - 400	2	801 - 900	3
401 - 500	8	901 - 1000	1
501 - 600	10	1001 - 1100	3
601 - 700	13		

MEERUT DISTRICT

The climate of this district is largely influenced by the prevalence of air of the continental type during the major part of the year. The dryness of the air with an intensely hot summer and a cold winter are the characteristics of the climate of this district. Air of oceanic origin reaches the district only during the three monsoon months, July, August and September, bringing with it increased humidity, cloudiness and rain. The year may be divided into four seasons. The cold season starts in late November and extends to the beginning of March. This is followed by the hot season which continues to about the end of June when the southwest monsoon arrives over the district. The southwest monsoon season, is from July to September. The two post monsoon months October and November constitute a transition period from monsoon to winter conditions.

Rainfall

Records of rainfall in the district are available for seven stations for 115 years except for one station for which data are available for 55 years only. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 720.2 mm. The rainfall generally increases from the southwest to the northeast in the district. The rainfall during the southwest monsoon season constitutes about 73% of the annual rainfall July being the month with the highest rainfall. The annual rainfall in the district varies over a wide range. In the fifty year period 1901 to 1950, the highest annual rainfall was in 1933 when it amounted to 169% of the normal. The rainfall in 1918 which was the lowest in the fifty year period amounted to 45% of the normal. In the same fifty year period the rainfall was less than 80% of the normal in 12 years. Considering the district as a whole, there were two occasions when two consecutive years had rainfall less than 80% of the normal. But at some of the stations consecutive three, four or five years of rainfall less than 80% of the normal have been known to occur. It will be seen from table 2 that the annual rainfall was between 501 and 1000 mm in 38 years out of 50.

On an average there are 37 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 32 at Ghaziabad to 41 at Meerut.

The heaviest rainfall recorded in 24 hours at any station in the district was 393.7 mm at Mawana on 1880 September 18.

Temperature

There is a meteorological observatory in Meerut. The data from this observatory may be taken as representative of the meteorological conditions over the whole district. The hot season starts early in March when temperatures begin to rise rapidly. May is the hottest month with the mean daily maximum temperature at 40.0°C and the mean daily minimum at 24.8°C . Although on the mean the day temperatures are slightly lower in June than in May the night temperatures are higher. From April onwards the hot westerly winds locally known as 'luh' begin to blow and the heat is often intense in May and June. The maximum temperatures may sometimes be as high as 45° or 46°C . With the advance of the southwest monsoon into the district by about the end of June there is an appreciable drop in the day temperatures, but the nights continue to be as warm as in the summer months. Even during the southwest monsoon season, the day temperatures become high during breaks in the rains, and with the increased moisture in the air weather is often uncomfortable. With the withdrawal of the monsoon early in October, both day and night temperatures begin to drop and the weather becomes pleasant. After the middle of November, the drop in temperatures is more rapid. January is the coldest month with the mean daily maximum temperature at 20.6°C and the mean daily minimum at 7.9°C . In the winter months during cold waves which affect the district in the wake of western disturbances passing eastwards minimum temperatures may sometimes go down to the freezing point of water. The lowest minimum temperature recorded at Meerut was 0.0°C on 1971 February 2, and the highest maximum temperature was 46.1°C on 1962 June 4&7, and 1982 July 24.

Humidity

The air is dry during the greater part of the year. In the monsoon months the humidities are high about 65 to 70 percent. April and May are usually the driest months, the relative humidities in the afternoons being very low and of the order of 15 to 20 percent.

Cloudiness

During the monsoon season particularly in July and August skies are heavily clouded and often overcast. In the rest of the year skies are clear or lightly clouded mostly. But in the months of January, February and early March skies become cloudy and sometimes overcast in association with the passage of the western disturbances.

Winds

Winds are generally light in the post-monsoon and winter months. They are stronger in the summer and the monsoon months. Winds are predominantly easterly to southeasterly in the monsoon. In the other seasons winds are mostly westerly or northwesterly. Northerly or northeasterly winds are not uncommon during afternoons.

Special Weather Phenomena

April to June is the period with the highest incidence of thunderstorms and dust-storms. Violent squalls (andhis) often accompany such storms. While some of the thunderstorms are dry, others are accompanied with heavy rain and occasionally with hail. In association with western disturbances a few thunderstorms occur in the winter months also. Fogs occur sometimes in the winter season.

Tables 3, 4 and 5 give the data of temperature and humidity & mean wind speed and frequency of special weather phenomena respectively for Meerut.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Meerut (obsy)	50 a	30.2	29.7	14.5	11.7	15.2	78.2	229.9	212.6	151.1	23.9	2.5	11.4	810.9	187 (1942)	37 (1907)	227.5	1880 Sep 17
	b	2.5	2.5	1.5	0.9	1.6	3.8	10.4	9.9	5.4	0.9	0.3	1.2	40.9				
Sardhana	50 a	26.7	25.7	15.0	11.4	11.7	66.0	208.5	195.3	138.2	20.6	2.8	9.1	731.0	187 (1942)	29 (1918)	345.4	1880 Sep 18
	b	2.1	2.0	1.5	1.0	1.3	3.6	9.6	9.6	5.1	0.9	0.3	0.9	57.9				
Mawana	50 a	29.0	29.5	15.2	12.5	16.3	95.8	220.7	217.2	163.1	28.5	3.3	10.7	841.8	164 (1933)	42 (1929)	393.7	1880 Sep 18
	b	2.0	2.1	1.3	1.0	1.4	3.8	10.0	9.8	5.8	1.0	0.4	1.0	39.6				
Baghpat	50 a	22.9	22.6	13.5	10.4	14.5	55.1	153.9	160.0	119.9	15.2	2.0	8.4	598.4	182 (1933)	51 (1939)	314.7	1939 Aug 21
	b	2.1	1.9	1.3	0.9	1.3	3.3	8.2	8.3	4.4	0.8	0.3	0.9	53.7				
Ghaziabad	50 a	22.1	19.6	11.9	8.9	12.7	58.4	172.7	152.7	113.0	14.0	1.5	8.9	596.4	248 (1933)	37 (1903)	231.7	1963 Sep 16
	b	1.6	1.7	1.2	0.9	1.2	3.0	8.7	7.7	4.5	0.8	0.2	0.8	32.3				
Hapur	50 a	23.1	23.4	15.5	10.7	14.0	63.0	190.3	195.1	132.3	21.1	2.0	10.4	700.9	223 (1906)	39 (1905)	269.2	1867 Jul 22
	b	1.7	2.0	1.3	1.0	1.2	3.4	9.8	9.2	5.5	0.8	0.3	1.0	37.2				
Dasna	25 a	23.9	28.5	20.8	8.1	8.9	74.2	232.9	199.6	141.0	16.0	0.5	7.9	762.3	194 (1933)	42 (1929)	274.3	1957 Sep 14
	b	1.8	2.5	1.1	0.8	0.8	3.1	9.2	8.4	4.8	0.7	0.1	0.7	34.0				
Meerut (District)	a	25.4	25.6	15.2	10.5	13.3	70.1	201.3	190.4	136.9	19.9	2.1	9.5	720.2	169 (1933)	45 (1918)		
	b	2.0	2.1	1.3	0.9	1.3	3.4	9.4	9.0	5.1	0.8	0.3	0.9	36.5				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	3	801 - 900	5
401 - 500	5	901 - 1000	5
501 - 600	6	1001 - 1100	3
601 - 700	10	1101 - 1200	0
701 - 800	12	1201 - 1300	1

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	20.6	7.9	29.3	1978 Jan 23	0.2	1967 Jan 15	78	
February	24.5	9.8	32.0	1974 Feb 23	0.0	1971 Feb 02	65	
March	30.1	15.0	37.8	1955 Mar 30	6.2	1979 Mar 10	56	
April	36.1	20.2	43.1	1980 Apr 28	12.2	1960 Apr 06	39	
May	40.0	24.8	45.7	1978 May 19	15.8	1982 May 14	38	
June	39.5	27.4	46.1	1962 Jun 04, 07	19.4	1951 Jun 16	54	
July	34.3	28.4	46.1	1982 Jul 24	20.3	1982 Jul 21	79	
August	32.7	25.7	38.3	1979 Aug 07	19.9	1965 Aug 24	83	
September	33.4	24.3	38.2	1979 Sep 02	18.5	1965 Sep 28	76	
October	31.9	18.5	37.8	1951 Oct 17	10.9	1964 Oct 31	69	
November	27.9	11.5	34.0	1979 Nov 05	5.6	1962 Nov 30	63	
December	23.2	8.1	30.0	1964 Dec 04	0.2	1961 Dec 25	73	
Annual	31.2	18.3					64	

Data Not available

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(MEERUT)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.9	7.2	7.1	7.7	8.6	8.9	7.1	5.9	6.0	4.4	4.4	3.7	6.3

TABLE - 5
Special Weather Phenomena
(MEERUT)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0	0	0	0	0.2	0	0	0.1	0	0	0	0	0.3
Hail	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1
Duststorm	0	0	0	0	0.2	0	0	0	0	0	0	0	0.2
Squall	0	0	0	0	0	0	0	0	0	0	0	0	0
Fog	0	0	0	0	0	0	0	0	0	0.2	0	0	0.2

* No. of days two and above are given in whole numbers.

MORADABAD DISTRICT

The climate of this district is characterised by a hot summer, a bracing cold season and general dryness except in the southwest monsoon season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer lasting till about the third week of June. The period from about the third week of June to about the end of September constitutes the monsoon season. October and the first half of November form the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for six stations for periods ranging from 97 to 100 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 944.3 mm. The rainfall in the district in general, increases from the southwest towards the northeast. About 86 percent of the annual rainfall in the district is received in the monsoon months June to September, July and August being the rainiest months. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 156 percent of the normal occurred in 1948. The lowest annual rainfall which was only 57 percent of the normal occurred in 1905. In this 50 year period rainfall less than 80 percent of the normal occurred in 13 years, three of them being consecutive. Considering the rainfall at the individual stations, two consecutive years of such low rainfall occurred 4 times at the 3 stations Moradabad, Thakurdwara and Sambhal and once each at the other three stations. Even 3 consecutive years of such low rainfall occurred once at 4 out of the six stations. It will be seen from table 2 that the annual rainfall in the district was between 701 and 1200 mm in 32 years out of 50.

On an average there are 43 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 39 at Hasanpur to 48 at Thakurdwara.

The heaviest rainfall in 24 hours recorded at any station in the district was 363.7 mm at Amroha on 1957 September 15.

Temperature

There is no meteorological observatory in the district. The description of the climate which follows is based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. Temperatures rise rapidly after February. May and the early part of June form the hottest part of the

year. In May the mean daily maximum temperature is about 40°C and the mean daily minimum about 25°C . The summer days are intensely hot and dry, dustladen winds which blow often add to the discomfort. On individual days the maximum temperature rises upto over 45°C . With the advance of the monsoon into the district by about the third week of June there is appreciable drop in the day temperature. But the nights even after the advance of the monsoon continue to be as warm as during the latter part of the summer season. In September there is a slight increase in the day temperature but the night temperatures begin to decrease. After October both day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at about 21°C and the mean daily minimum is about 8°C . Cold waves affect the district in association with passing western disturbances during the cold season. The minimum temperature occasionally drops down to about the freezing point of water and frosts occur.

Humidity

The air is very humid during the southwest monsoon season. In the rest of the year the humidity is comparatively less, the mornings in general being more humid than the afternoons. The driest part of the year is the summer season with the relative humidities in the afternoons becoming less than about 30 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two in association with passing western disturbances during the cold season, skies are generally heavily clouded or overcast. In the rest of the year, skies are mostly clear or lightly clouded.

Winds

Winds are generally light with a little strengthening in the summer and monsoon seasons. During the period October to April, winds are predominantly from the west or northwest. By May easterlies and southeasterlies appear and these predominate during the monsoon season.

Special Weather Phenomena

In the cold season western disturbances affect the district causing occasional thunderstorms, at times associated with squall and hail. Duststorms and thunderstorms occur occasionally during the hot season. Rain during the monsoon months is often associated with thunder. Fogs occur sometimes in the cold season.

TABLE - 1
Normal and Extremes of Rainfall

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 year**	Lowest annual rainfall as % of normal year**	Heaviest rainfall in 24 hours*	
																	Amount (mm)	Date
Moradabad	50 a	23.9	30.7	13.7	7.1	18.8	105.2	290.3	279.4	170.7	27.4	4.3	10.9	982.4	166	52	315.0	1883 Jul 18
	b	2.0	2.1	1.5	0.8	1.8	4.5	11.5	11.1	6.3	1.0	0.4	1.0	44.0	(1927)	(1905)		
Thakurdwara	50 a	30.7	36.3	15.0	9.7	15.7	142.5	327.1	316.0	190.0	36.3	4.1	11.9	1135.3	195	53	264.2	1888 Jul 12
	b	2.2	2.5	1.5	0.9	1.5	5.2	12.5	12.0	7.3	1.1	0.4	0.9	48.0	(1917)	(1905)		
Amroha	50 a	25.9	31.5	12.5	8.6	15.2	100.6	283.7	297.9	184.9	25.1	2.3	10.2	998.4	240	46	363.7	1957 Sep 15
	b	2.0	2.1	1.2	1.0	1.4	4.6	10.3	10.8	6.2	0.9	0.3	1.0	41.8	(1948)	(1905)		
Hasanpur	50 a	22.3	23.1	14.0	6.9	12.7	87.1	236.5	232.4	157.5	21.1	2.5	7.6	823.7	194	34	278.9	1933 Jun 23
	b	1.9	2.0	1.2	0.6	1.3	3.9	10.3	10.1	6.0	0.8	0.3	0.8	39.2	(1933)	(1918)		
Sambhal	50 a	21.3	22.3	13.7	8.6	13.7	84.8	239.0	234.9	147.8	19.3	2.8	8.9	817.1	170	31	321.1	1919 Aug 11
	b	1.8	1.8	1.3	0.9	1.3	4.2	10.1	10.7	5.7	0.9	0.3	0.8	39.8	(1924)	(1918)		
Bilari	50 a	21.6	27.7	12.9	7.9	17.3	95.0	270.3	269.0	151.9	25.1	4.1	8.9	909.7	160	47	287.0	1873 Jul 28
	b	1.9	2.1	1.2	0.8	1.6	4.3	10.9	11.4	6.2	1.0	0.4	0.8	42.6	(1948)	(1918)		
Moradabad (District)	a	24.3	28.6	13.6	8.1	15.6	102.2	274.5	271.6	167.1	25.7	3.3	9.7	944.3	156	57		
	b	2.0	2.1	1.3	0.8	1.5	4.5	10.9	11.0	6.3	0.9	0.3	0.9	42.8	(1948)	(1905)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980.

**Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	3	1001 - 1100	5
601 - 700	3	1101 - 1200	2
701 - 800	9	1201 - 1300	8
801 - 900	11	1301 - 1400	3
901 - 1000	5	1401 - 1500	1

MUZAFFARNAGAR DISTRICT

The climate of this district is characterised by general dryness except in the brief monsoon season, a hot summer and a pleasant cold season. The year may be divided into four seasons. The period from the middle of November to about the end of February is the cold season. The hot season which follows continues upto about the end of June. The southwest monsoon season is from July to about the middle of September. The succeeding period till the middle of November is the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 6 stations for long periods of over 85 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 758.6 mm. The rainfall in the district in general increases from the west towards the east and varies from 559.8 mm at Kandhla to 894.7 mm at Jaoli Jansath. About 84 percent of the annual rainfall in the district is received during the months June to September, July and August being the rainiest months. The variation in the rainfall from year to year is large. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 202 percent of the normal occurred in 1942. The lowest annual rainfall which was only 32 percent of the normal occurred in 1918. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 11 years. Two and 4 consecutive years of such low rainfall occurred once each. Considering the rainfall at the individual stations, 2, 3 and 4 consecutive years of such low rainfall occurred atleast once at most of the stations. Bhainswal recorded two consecutive years of such low rainfall twice and Kandhla has recorded 3 consecutive years twice. It will be seen from table 2 that the annual rainfall in the district was between 601 and 1000 mm in 34 years out of 50.

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. This number varies from 29 at Bhainswal to 40 at Muzaffarnagar and Jaoli Jansath.

The heaviest rainfall in 24 hours recorded at any station in the district was 480.1 mm at Muzaffarnagar on 3rd July, 1956.

Temperature

There is no meteorological observatory in the district. The account which follows is based on the records of observatories in the neighbouring districts where similar climatic conditions prev-

ail. After February there is continuous increase in temperatures till May or early June which form the hottest part of the year. The mean daily maximum temperature in May is about 40°C and the mean daily minimum is about 24°C . The summer is intensely hot with the maximum temperature on individual days sometimes rising upto over 44°C . Hot dust-laden winds, which blow often during summer add to the discomfort due to the hot weather. Afternoon thundershowers which occur on some days during summer bring welcome relief though only temporarily. With the onset of the southwest monsoon in the district by about the end of June there is appreciable drop in the day temperatures. However the nights throughout the monsoon season are as warm as during summer. Due to the increased moisture in the monsoon air, weather is often oppressive in between the rains. After the withdrawal of the southwest monsoon by mid-September there is a slight increase in the day temperatures but the nights become progressively cooler. After October both, the day and night temperatures decrease rapidly. The coldest months is usually January with the mean daily maximum temperature at about, 20°C and the mean daily minimum at about 7°C . In the wake of passing western disturbances in the cold season cold waves affect the district and the minimum temperature occasionally drops down to about , the freezing point of water and frosts occur.

Humidity

The air is dry during the freater part of the year. In the southwest monsoon season, the air is very humid. April and May are usually the driest months, the relative humidities in the afternoons being less than 25 percent.

Cloudiness

During the monsoon season generally, and during the cold season for brief spells of a day or two in association with passing western disturbances, heavily clouded skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are in general light with a little strengthening in the summer and monsoon seasons. During the period October to April the winds blow mostly from the west or northwest. From May easterlies begin to blow and during the southwest monsoon season the winds are predominantly easterly or southeasterly.

Special Weather Phenomena

Dust storms and thunderstorms occur in the summer season. Violent squalls often accompany such storms. Occasionally hailstorms also occur. In association with western disturbances a few thunderstorms occur in the cold season also. Fog occurs sometimes in the cold season.

o o o o o o

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hours* Amount (mm)	Date
Muzaffarnagar	50 a	30.7	31.7	16.3	6.6	14.0	83.8	243.8	220.0	153.9	21.6	3.1	12.5	838.0	171	39	480.1	1956 Jul 03
	b	2.3	2.4	1.3	0.7	1.3	4.1	10.7	9.9	5.1	1.0	0.3	1.2	40.3	(1932)	(1918)		
Kairana	50 a	23.9	25.7	15.2	12.2	11.4	66.5	205.5	203.5	148.8	17.8	2.8	11.9	745.2	185	29	287.0	1867 Jul 22
	b	1.9	2.4	1.4	0.9	1.1	3.5	9.1	8.4	4.8	0.7	0.1	1.0	35.3	(1948)	(1918)		
Budhana	50 a	22.9	23.6	11.9	8.4	10.7	64.5	190.3	176.5	130.8	19.6	2.5	10.2	671.9	191	34	244.9	1900 Jul 16
	b	2.0	2.0	1.1	0.7	1.2	3.4	8.8	8.1	4.8	0.8	0.3	1.0	34.2	(1916)	(1918)		
Jaoli Jansath	50 a	34.8	32.8	15.0	10.9	14.5	92.2	242.8	241.1	170.2	26.2	2.8	11.4	894.7	192	41	406.4	1880 Sep 17
	b	2.2	2.2	1.3	1.0	1.3	3.8	10.4	9.7	5.3	0.9	0.4	1.2	39.7	(1936)	(1918)		
Bahinswal	50 a	22.6	23.4	11.4	9.9	7.6	53.1	231.4	195.1	160.3	18.3	2.0	7.9	743.0	417	19	325.1	1942 Jul 31
	b	1.7	1.6	0.9	0.5	0.7	2.6	8.1	7.4	3.9	0.5	0.1	0.8	28.8	(1942)	(1918)		
Kandhla	50 a	21.5	20.6	11.4	9.1	8.1	57.7	182.9	173.0	149.6	15.0	2.0	9.1	659.8	205	29	279.4	1933 Sep 19
	b	1.8	2.0	0.9	0.7	0.8	2.6	8.3	7.5	4.7	0.5	0.1	0.8	30.7	(1942)	(1918)		
Muzaffarnagar (District)	50 a	26.0	26.3	13.5	9.5	11.1	69.6	216.1	201.5	152.3	19.7	2.5	10.5	758.6	202	32		
	b	2.0	2.1	1.1	0.7	1.1	3.3	9.2	8.5	4.8	0.7	0.2	1.0	34.7	(1942)	(1918)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
201 - 300	1	901 - 1000	8
301 - 400	3	1001 - 1100	3
401 - 500	3	1101 - 1200	1
501 - 600	4	1201 - 1300	0
601 - 700	7	1301 - 1400	0
701 - 800	11	1401 - 1500	0
801 - 900	8	1501 - 1600	1

PILIBHIT DISTRICT

The climate of this district is influenced by its proximity to the hills and the Terai Swamps and is characterised by general dryness in the summer season and a bracing cold season. The summer is milder than in the districts to the south. The year may be divided into four seasons. The cold season from about the middle of November to the end of February is followed by the hot season from March to about the third week of June. The southwest monsoon season is from about the last week of June to about the last week of September. October and the first half of November constitute the post monsoon or the transition season.

Rainfall

Records of rainfall in the district are available for four stations for long periods. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1233.7 mm and varies from 1136.0 mm at Bisalpur to 1290.5 mm at Puranpur. The rainfall increases from the southwest towards the northeast in general. The period June to September is the main rainy season, July being generally the rainiest month. About 87 percent of the annual rainfall in the district is received in the period June to September. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall in the district amounting to 169 percent of the normal occurred in 1936. The lowest annual rainfall which was only 50 percent of the normal occurred in 1913. During this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 13 years, two of them being consecutive. Considering the rainfall at individual stations, two and three consecutive years of rainfall less than 80 percent of the normal occurred once or twice at all the stations. Even 5 consecutive years of such low rainfall occurred once at Pauta (1904-1908). The annual rainfall in the district was between 1001 and 1400 mm in 25 years out of 50.

On an average there are 50 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 48 at Bisalpur to 52 at Pilibhit and Puranpur.

The heaviest rainfall in 24 hours recorded at any station in the district was 345.4 mm at Pilibhit on 1879 August 2.

Temperature

A meteorological observatory has started at PILIBHIT only recently. The description which follows is therefore based on the records of observatories in the neighbouring districts where similar

climatic conditions prevail. The temperature drop rapidly after October. January is generally the coldest month with the mean daily maximum temperature at about 21°C and the mean daily minimum at about 8°C . During the cold season the district experiences cold waves in association with passing western disturbances. On such occasions, the night temperatures sometimes drop down to about the freezing point of water and frosts occur. After February both day and night temperatures steadily increase. May is the hottest month with the mean daily maximum temperature at about 39°C and the mean daily minimum at about 25.0°C . On individual days the day temperatures reach about 44°C during May and the first half of June. Afternoon thundershowers which occur on some days bring down the temperature a little. With the advent of the southwest monsoon over the district after mid-June day temperatures decrease. But nights during the monsoon season are nearly as warm as in the summer season. After the withdrawal of the monsoon by about the last week of September night temperatures decrease while there is no appreciable change in the day temperatures between September and October months.

Humidity

Humidity is generally high during the southwest monsoon season. Thereafter humidities decrease gradually. The driest part of the year is the summer season with humidities generally below 35 percent in the afternoons.

Cloudiness

The skies are generally heavily clouded or overcast during the southwest monsoon season. During the rest of the year skies are mostly clear or lightly clouded except during the short spells of a day or two in the cold season when in association with western disturbances, skies become cloudy.

Winds

Winds are generally light. Winds mostly blow from the east or southeast during the monsoon season. During the rest of the year winds blow mainly from directions between northwest and west.

Special Weather Phenomena

Western disturbances during the cold season affect the weather over the district and a few thunderstorms occur. During the summer season duststorms and thunderstorms occasionally associated with squalls occur. Rainfall during the monsoon season is often associated with thunder. Fog occurs occasionally during the cold season.

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)			Date
Pilibhit (Cutcherry)	50 a	29.2	30.5	18.5	7.9	23.4	152.7	387.9	342.4	208.5	31.0	4.8	11.2	1247.8	173 (1936)	49 (1941)	345.4	1879	Aug	02
	b	1.9	2.2	1.4	0.8	1.9	6.1	14.1	13.8	7.7	1.1	0.3	1.0	52.3						
Bisalpur	50 a	22.1	32.0	16.0	8.6	17.8	134.9	341.4	316.2	197.9	35.6	3.6	9.9	1156.0	188 (1925)	45 (1935)	294.6	1936	Jun	24
	b	1.8	2.0	1.2	0.7	1.6	5.5	12.7	12.8	7.1	1.3	0.3	0.9	47.7						
Puranpur	50 a	24.4	31.2	12.7	9.4	30.5	169.7	402.6	338.8	214.1	38.1	7.1	11.9	1290.5	165 (1945)	48 (1907)	291.8	1923	Sep	22
	b	1.9	2.0	1.4	0.9	2.0	6.2	13.6	13.5	8.3	1.3	0.3	0.9	52.3						
Pauta	50 a	26.9	30.5	15.7	7.4	21.1	148.8	369.3	370.1	222.8	33.3	3.8	10.7	1260.4	200 (1936)	44 (1947)	304.0	1901	Sep	25
	b	1.8	1.9	1.1	0.8	1.5	5.6	13.3	13.6	7.2	1.1	0.3	0.8	49.0						
Pilibhit (District)	a	25.7	31.1	15.7	8.3	23.2	151.5	375.3	341.9	210.8	34.5	4.8	10.9	1233.7	169 (1936)	50 (1915)				
	b	1.9	2.0	1.3	0.8	1.7	5.8	13.4	13.4	7.6	1.2	0.3	0.9	50.3						

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	2	1401 - 1500	1
701 - 800	2	1501 - 1600	3
801 - 900	3	1601 - 1700	4
901 - 1000	6	1701 - 1800	1
1001 - 1100	6	1801 - 1900	1
1101 - 1200	7	1901 - 2000	1
1201 - 1300	4	2001 - 2100	1
1301 - 1400	8		

RAMPUR DISTRICT

The climate of this district is characterised by a hot dry summer and a bracing winter. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer from March to about the middle of June. The period from mid-June to the end of September is the southwest monsoon season. October and the first half of November constitute the post monsoon season.

Rainfall

Records of rainfall in the district are available sporadically for two stations for only a couple of years. The description which follows is therefore mainly based on the records of the stations in the neighbouring districts. The average annual rainfall in the district is of the order of about 110 cm and varies from about 100 cm in the southwest to about 130 cm in the northeast. About 85 percent of the annual rainfall is received during the southwest monsoon season, July and August being the rainiest months. The variation in the rainfall from year to year in the district is likely to be appreciable.

On an average there are about 45 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district.

Temperature

There is no meteorological observatory in the district. The description which follows is mainly based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. After February temperatures rise rapidly. May and the early part of June constitute the hottest part of the year with the mean daily maximum temperature at about 40°C and the mean daily minimum at about 25°C. On individual days during the summer the maximum temperatures reaches about 46°C. The hot dust-laden winds blow often during the summer season which make the weather very trying. Afternoon thundershowers which occur on a few days during the summer bring welcome relief though only temporarily. With the advance of the southwest monsoon into the district by about the middle of June, day temperatures drop appreciably but the nights continue to be as warm as during the latter part of the summer. Due to the increased moisture in the monsoon air the weather is often oppressive in between the rains. From about the latter half of September there is a slight increase in the day temperatures. With the withdrawal of the monsoon by about the end of September night temperatures decrease rapidly. It is only after October that there is any appreciable drop in the day

temperatures. January is generally the coldest month with the mean daily maximum temperature at 21°C and the mean daily minimum at about 8°C . Cold waves affect the district during the cold season and the minimum temperature on individual days on such occasions sometimes drops down to about the freezing point of water.

Humidity

The air is very humid during the southwest monsoon season and to a lesser extent in the post monsoon season. Thereafter the humidity decreases. The driest part of the year is the summer season with relative humidities as low as 25 percent in the afternoons.

Cloudiness

The skies are mostly heavily clouded or overcast in the monsoon season. In the rest of the year the skies are generally mainly clear or lightly clouded. However, for brief spells of a day or two in association with passing western disturbances during the cold season cloudy skies prevail.

Winds

Winds are generally light. In the period October to April the winds blow mostly from the west or northwest. Easterlies and southeasterlies appear by May and these predominate during the southwest monsoon season.

Special Weather Phenomena

In the hot season the district experiences dust-storms and thunderstorms with occasional squalls. Rain during the monsoon season is often associated with thunder. Thunderstorms also occur in the cold season in association with passing western disturbances some of which are at times associated with hail. Fog occurs during the winter season.

.....

SAHARANPUR DISTRICT

The climate of this submontane district is characterised by general dryness except in the brief monsoon season a bracing cold season and a hot summer. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season lasting till the end of June. The period from July to about the middle of September constitutes the southwest monsoon season. The post monsoon or transition season is from mid-September to the middle of November.

Rainfall

Records of rainfall in the district are available for 11 stations for periods ranging from 72 to 99 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 949.3 mm. The rainfall in the district in general increases from the southwest towards the northeast and varies from 710.4 mm at Jarauda to 1301.0 mm at Nayashar. About 83 percent of the annual rainfall in the district is received during the period June to September, July and August being the rainiest months. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall in the district which was 172 percent of the normal occurred in 1942. The lowest annual rainfall amounting to 44 percent of the normal occurred in 1918. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 9 years, two of them being consecutive. Considering the annual rainfall at the individual stations, two consecutive years of such low rainfall was recorded twice each at Hardwar, Jarauda and Salimpur, and once at 6 out of the 8 remaining stations. Even 3 consecutive years of such low rainfall occurred twice at Nayashar and once at Saharanpur. Nakur and Kuankhera had 4 consecutive years of such low rainfall once. It will be seen from table 2 that the annual rainfall in the district was between 701 and 1200 mm in 39 years out of 50.

On an average there are 43 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 32 at Jarauda to 56 at Hardwar.

The heaviest rainfall in 24 hours recorded at any station in the district was 495.3 mm at Hardwar on 1880 September 18.

Temperature

There is a meteorological observatory in the district at Roorkee. The records of this observatory may be taken as representative of the meteorological conditions prevailing in the district

in general. From about the end of February, temperatures begin to increase rapidly. May is generally the hottest month with the mean daily maximum temperature at 39.4°C and the mean daily minimum at 23.6°C . Nights in June are slightly warmer than during May. The heat in summer is intense and the maximum temperature on individual day goes upto 45°C and over. Afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the onset of the monsoon by about the beginning of July there is appreciable drop in the day temperatures. But nights continue to be as warm as during the latter part of the summer season. There is a slight increase in the day temperatures in September but the night temperatures begin to decrease. After October temperatures decrease, the drop in the night temperatures being very rapid. January is generally the coldest month with the mean daily maximum at 20.1°C and the mean daily minimum at 6.6°C . During the cold season, in association with passing western disturbances cold waves affect the district, the minimum temperature occasionally dropping down to about a degree or two below the freezing point of water. Frosts occur on such occasions.

The highest maximum temperature recorded at Roorkee on 47.4°C , on 1978 May 22. The lowest minimum was -2.2°C on 1905 February 2.

Humidity

The humidity is high during the southwest monsoon season. Thereafter humidities decrease. The driest part of the year is the summer season particularly April and May when the relative humidities in the afternoons become less than 25 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two in association with passing western disturbances during the cold season heavily clouded or overcast skies prevail. In the rest of the year the skies are generally clear or lightly clouded.

Winds

Winds are generally light with some increase in force during the late summer and monsoon season. Winds blow predominantly from the west or northwest during the period October to April. By May southeasterlies also appear and in the next four months winds are mostly from the southeast, winds from the northwest blowing on some days in the afternoons.

Special Weather Phenomena

In the cold season passing western disturbances affect the

weather over the district causing a few thunderstorms some of which are accompanied with hail. Duststorms and thunderstorms occur during the hot season. Rain during the monsoon season is often associated with thunder. Fog occurs occasionally during the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Saharanpur	50 a	37.6	36.1	23.4	11.2	14.2	95.8	261.4	248.9	164.6	22.3	5.1	15.5	956.1	149 (1942)	44 (1918)	266.7	1895 Jul 02
	b	2.7	2.8	1.8	1.6	1.4	4.5	10.9	10.4	5.6	0.9	0.3	1.2	43.5				
Roorkee (obsy)	50 a	43.2	45.5	23.1	13.5	18.5	98.0	311.4	287.3	180.9	25.9	4.3	16.0	1067.6	216 (1942)	48 (1935)	284.7	1880 Sep 17
	b	2.8	2.9	1.8	1.2	1.7	5.0	12.3	11.8	6.2	1.0	0.3	1.3	48.3				
Nakur	50 a	28.7	31.5	15.2	10.4	7.9	73.7	205.2	207.5	137.7	19.3	3.6	11.9	752.6	165 (1942)	44 (1918)	292.1	1895 Jul 02
	b	2.4	2.5	1.5	0.9	1.0	3.7	9.9	9.2	4.7	0.8	0.3	1.0	37.9				
Deoband	50 a	32.0	32.5	17.8	9.7	12.5	75.9	243.8	234.4	153.2	24.6	5.1	12.9	852.4	178 (1945)	44 (1918)	243.6	1957 Sep 15
	b	2.3	2.5	1.4	0.9	1.4	4.1	10.5	9.9	5.6	1.0	0.3	1.1	41.0				
Hardwar	50 a	47.2	48.8	26.2	11.2	23.6	116.5	345.2	390.9	194.6	25.1	5.3	16.5	1250.9	158 (1924)	43 (1907)	495.3	1880 Sep 18
	b	3.0	3.0	1.8	0.9	1.9	5.8	14.2	14.8	7.6	1.1	0.4	1.3	55.8				
Muhammadpur	50 a	39.1	36.3	19.6	7.1	15.5	85.6	258.3	254.3	155.5	27.7	3.3	12.7	915.0	166 (1942)	56 (1929)	452.1	1880 Sep 17
	b	2.6	2.6	1.6	0.7	1.5	4.3	11.0	10.5	5.2	0.7	0.3	1.2	42.1				

contd

TABLE - 1(contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount Date (mm)	
Nayashar	50 a	48.0	53.9	24.4	10.2	19.3	109.5	401.8	404.1	184.1	23.1	5.3	17.3	1301.0	167	51	292.1	1887 Jul 06
	b	3.2	3.2	2.0	1.0	1.6	5.3	14.5	13.7	6.7	1.2	0.4	1.4	54.2	(1950)	(1918)		
Jaranda	50 a	25.9	28.5	15.5	9.4	8.1	66.5	198.4	194.3	136.4	17.0	1.5	8.9	710.4	180	15	330.2	1933 Sep 19
	b	1.9	2.2	1.1	0.7	0.8	3.1	8.1	8.1	4.2	0.7	0.1	0.7	31.7	(1933)	(1918)		
Kalsia	50 a	46.5	46.0	24.1	10.4	15.2	108.7	328.7	326.4	181.9	24.9	4.3	16.5	1153.6	205	37	323.9	1942 Aug .09
	b	3.2	3.0	1.9	1.0	1.6	5.2	12.7	11.9	6.0	1.2	0.3	1.3	49.3	(1942)	(1918)		
Kuankhera	50 a	29.7	30.7	15.7	11.9	11.2	75.2	215.4	207.8	144.5	23.4	3.3	12.5	781.3	266	25	210.8	1956 Jul 03
	b	2.2	2.6	1.4	1.0	1.1	3.4	9.2	8.6	4.9	0.8	0.2	1.1	36.5	(1923)	(1918)		
Salimpur	50 a	30.2	31.5	16.0	11.4	8.9	75.9	204.5	200.1	150.3	17.0	3.6	11.4	740.8	153	35	284.7	1933 Sep 19
	b	2.2	2.7	1.5	1.0	0.9	3.5	9.3	8.7	4.4	0.7	0.3	1.1	36.3	(1906)	(1918)		
Saharanpur (District)	a	37.1	38.3	20.1	10.6	14.1	89.2	270.4	268.7	160.3	22.8	3.9	13.8	949.3	172	44		
	b	2.6	2.7	1.6	0.9	1.3	4.4	11.1	10.7	5.6	0.9	0.3	1.2	43.3	(1942)	(1918)		

(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 1980

**Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	1	1101 - 1200	6
501 - 600	2	1201 - 1300	5
601 - 700	2	1301 - 1400	0
701 - 800	8	1401 - 1500	0
801 - 900	7	1501 - 1600	0
901 - 1000	10	1601 - 1700	1
1001 - 1100	8		

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	20.1	6.6	28.3	1898 Jan 24	-1.1	1935 Jan 17	84	54
February	22.9	8.7	36.7	1977 Feb 26	-2.2	1905 Feb 02	78	43
March	28.7	13.1	38.9	1945 Mar 31	2.8	1945 Mar 06	62	32
April	35.2	18.2	43.3	1897 Apr 19	7.2	1905 Apr 04	41	22
May	39.4	23.6	47.4	1978 May 22	14.4	1907 May 05	37	20
June	38.5	25.9	46.7	1932 Jun 13	16.1	1900 Jun 14	55	37
July	33.3	25.5	45.0	1931 Jul 01	20.0	1965 Jul 15	80	68
August	32.3	25.0	39.8	1960 Aug 14	19.8	1965 Aug 03	84	73
September	32.4	23.4	38.3	1899 Sep 10	12.0	1983 Sep 24	80	64
October	30.9	17.2	38.5	1899 Oct 07	8.9	1953 Oct 31	73	51
November	26.5	10.1	33.9	1952 Nov 01	2.8	1934 Nov 30	74	46
December	22.0	6.8	28.3	1889 Dec 05	-0.7	1902 Dec 25	81	51
Annual	30.2	17.0					69	47

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(ROORKEE)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.0	4.8	5.4	6.1	7.2	7.3	5.8	4.6	4.2	3.2	2.6	3.1	4.9

TABLE - 5
Special Weather Phenomena
(ROORKEE)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	2	3	2	1.9	5	5	8	7	3	1.3	0.4	0.4	39
Hail	0.3	0.3	0.2	0.2	0.1	0	0.5	0.5	0.1	0.0	0.0	0.0	2
Duststorm	0	0.1	0.1	0.1	0.9	1.1	0.2	0	0.1	0	0.1	0	3
Squall	0	0	0	0	0	0	0	0	0	0	0	0	0
Fog	0.7	0.3	0	0.1	0	0	0	0	0	0	0	0.4	1.5

*No. of days two and above are given in whole numbers.

SHAHAJAHANPUR DISTRICT

The climate of this district is characterised by dampness in the monsoon season, a hot dry summer and a bracing cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer from March to about the middle of June. The period from mid-June to about the end of September is the monsoon season. October and the first half of November constitute the post monsoon season.

Rainfall

Records of rainfall in the district are available for 5 stations for periods ranging from 51 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1019.5 mm. The rainfall in the district in general increases from the southwest towards the northeast. The annual rainfall varies from 860.4 mm at Jalalabad to 1108.1 mm at Pawayan. About 87 percent of the annual rainfall is received during the southwest monsoon months June to September, July being the rainiest month. The variation in the rainfall from year to year is appreciable. In the fifty year period, 1901 to 1950, the highest annual rainfall amounting to 185 percent of the normal occurred in 1936. The lowest annual rainfall which was 57 percent of the normal occurred in 1905. In the same 50 year period there were 12 years when the annual rainfall was less than 80 percent of the normal, two consecutive years of such low rainfall occurring twice. Considering the rainfall at individual stations, two consecutive years of such low rainfall occurred thrice at Shahajahanpur, Pawayan and Tilahr, twice at Khutar and once at Jalalabad. Even three consecutive years of such low rainfall occurred once each at Shahajahanpur, Jalalabad and Khutar in the same 50 years period. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1300 mm in 31 years out of fifty.

On an average there are 45 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. There is not much variation in the number of rainy days in the different parts of the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 448.6 mm at Pawayan on 1958 October 1.

Temperature

There is a meteorological observatory in the district which is Shahajahanpur. It has started functioning very recently. Therefore

the records of the observatories in the neighbouring districts where similar conditions prevail may be taken as representative of the conditions in this district. From about the middle of November temperatures decrease rapidly in January, the coldest months the mean daily maximum temperature is about 22°C and the mean daily minimum about 8°C . In the cold season in association with cold waves in the wake of passing western disturbances, the minimum temperature goes down occasionally to the freezing point of water and frosts occur. Temperatures rise rapidly after February. May and the early part of June form the hottest part of the year. In May the mean daily maximum temperature is about 40°C and the mean daily minimum is about 25°C . On individual days day temperatures rise upto about 46°C . There is some welcome relief from the heat when afternoon thundershowers occur on some days. With the advance of the southwest monsoon into the district during the latter half of June day temperatures drop appreciably but nights continue to be as warm as in the summer season. After the withdrawal of the monsoon by about the end of September although the day temperatures are about the same as in the monsoon season nights become progressively cooler.

Humidity

Air is very humid in the southwest monsoon season. Later there is a decrease in humidity. The summer is the driest part of the year, especially the afternoons when the relative humidities become less than 25 percent.

Cloudiness

During the southwest monsoon season the skies are heavily clouded or overcast. During the rest of the year skies are clear or lightly clouded except for short spells during the cold season when in association with passing western disturbances skies become cloudy.

Winds

Winds are generally light with calms on many days in the mornings. During the period October to April winds blow mostly from the west or northwest. By May easterlies and southeasterlies appear and these predominate during the southwest monsoon season.

Special Weather Phenomena

In the summer season the district experiences duststorms and thunderstorms with occasional squalls. Rain during the monsoon season is often associated with thunder. Thunderstorms also occur in association with western disturbances during the cold season. Fog is fairly common in the winter.

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Shahjahanpur	50 a	17.5	21.3	11.2	9.1	18.5	121.2	323.6	286.0	192.8	44.5	2.5	8.1	1056.3	181	55	338.1	1903 Oct 10
	b	1.6	1.8	1.0	0.9	1.4	4.6	12.2	12.4	7.5	1.2	0.2	0.8	45.6	(1936)	(1905)		
Pawayan	50 a	17.5	24.1	12.9	7.6	14.5	146.6	325.6	303.3	198.6	43.9	4.6	8.9	1108.1	186	53	448.6	1958 Oct 01
	b	1.7	1.9	1.0	0.8	1.4	5.0	12.0	12.5	7.6	1.3	0.3	0.8	46.3	(1923)	(1932)		
Tilhar	50 a	15.2	22.1	11.7	8.1	17.5	99.8	300.7	273.3	170.9	39.4	2.5	9.1	970.3	198	44	272.5	1903 Oct 10
	b	1.6	1.9	1.1	0.8	1.4	4.6	11.5	12.1	7.1	1.1	0.3	0.8	44.3	(1936)	(1918)		
Jalalabad	50 a	13.7	18.0	10.9	8.1	12.9	84.6	253.7	258.1	152.4	38.9	2.0	7.1	860.4	212	55	295.1	1903 Oct 10
	b	1.4	1.5	1.0	0.8	1.3	4.1	11.2	11.7	7.2	1.3	0.2	0.6	42.3	(1936)	(1918)		
Khutar	41 a	18.5	25.7	12.9	7.6	22.6	146.3	296.2	300.0	220.2	38.3	6.3	7.6	1102.2	176	53	414.0	1958 Oct 01
	b	1.8	2.0	0.9	0.7	1.6	5.5	11.3	11.5	7.6	1.4	0.4	0.7	45.4	(1931)	(1918)		
Shahjahanpur (District)	a	16.5	22.2	11.9	8.1	17.2	119.7	300.0	284.1	187.0	41.0	3.6	8.2	1019.5	185	57		
	b	1.6	1.8	1.0	0.8	1.4	4.8	11.6	12.0	7.4	1.3	0.3	0.7	44.7	(1936)	(1905)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2

Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	2	1201 - 1300	3
601 - 700	5	1301 - 1400	4
701 - 800	4	1401 - 1500	1
801 - 900	7	1501 - 1600	2
901 - 1000	11	1601 - 1700	0
1001 - 1100	5	1701 - 1800	0
1101 - 1200	5	1801 - 1900	1

PLAINS OF
UTTAR PRADESH EAST

ALLAHABAD DISTRICT

The climate of this district is characterised by a long and hot summer and pleasant monsoon and cold seasons. The cold season from mid November to February is followed by the summer season from March to about the middle of June. The southwest monsoon season commences by the middle of June and continues till the end of September. October and the first half of November constitute the post-monsoon season.

Rainfall

The district has nine rain gauge stations the records of eight of which extend to 96 years and of one to 62 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 975.4 mm. The rainfall generally decreases from the southeast to the northwest. The rainfall during the southwest monsoon season constitutes about 88% of the annual total. July and August are the rainiest months. The annual rainfall has a variation from year to year which is rather large. In the fifty year period 1901 to 1950, the highest annual rainfall occurred in 1948 when it was 173% of the normal rainfall. Annual rainfall amounting to only 59% of the normal was received in 1918, the year with the lowest rainfall. In the same fifty year period rainfall less than 80% of the normal was received in eight years, with two consecutive years of such low rainfall occurring twice. It will be seen from table 2 that the annual rainfall was between 701 and 1200 mm in 40 years out of 50.

On an average there are about 48 rainy days (i.e. days with rain of 2.5 mm or more) in a year. There is not much variation in this number in different parts of the district.

The highest rainfall in 24 hours recorded at any station in the district was 512.1 mm at Meja on 1916 June 22.

Temperature

There is only one meteorological observatory in the district and it is located at Allahabad. The records of this station which extend to a large number of years, may be taken to be representative of the conditions in the district as a whole. The cold season commences by about the middle of November when temperatures begin to fall rapidly. January is the coldest month with the mean daily minimum temperature at 9.1°C and the mean daily maximum at 23.7°C . In the cold season the district is affected by cold waves in the wake of western disturbances passing eastwards and on such occasions the minimum temperatures may go down to a degree or two above the freezing point of water and slight frosts may occur. After the end

of February temperatures rise rather rapidly. The heat in the summer season particularly in May and the early part of June is intense. May is usually the hottest month with the mean daily maximum temperature at 42.1°C and the mean daily minimum at 27.4°C . With the advance of the southwest monsoon into the district usually by about the middle of June the day temperatures drop appreciably, but the night temperatures are a little higher than in May. With the establishment of the monsoon the weather becomes pleasant. During breaks in the monsoon in September day temperatures show an increase. By October the day temperatures begin to drop gradually and the night temperatures rather rapidly.

The highest maximum temperature recorded at Allahabad was 48.4°C on 1966 June 9 and the lowest minimum temperature was -0.7°C on 1961 December 26.

Humidity

During the monsoon season the air is very humid, the relative humidities being generally 70 to 85%. After the monsoon season humidities decrease progressively and by the hot season the air becomes very dry with relative humidities particularly in the afternoons going down to 20% or less.

Cloudiness

During the monsoon season skies are heavily clouded to overcast. In the rest of the year skies are clear or lightly clouded generally. But in the cold season passing western disturbances cause short spells of a day or two of cloudy weather.

Winds

Winds are generally light throughout the year with some increase in force in the summer particularly in the afternoons and in the southwest monsoon season. During the period November to April winds are predominantly from the west or northwest. By May easterlies and northeasterlies also appear. In the monsoon season, wind directions are either southwest to west or northeast to east. By October the northeasterlies and easterlies become less common.

Special Weather Phenomena

Some of the monsoon depressions particularly in the early part of the season which originate in the Bay of Bengal and move across the country affect the district causing widespread heavy rain. Thunderstorms occur in the summer and monsoon months occasionally accompanied with squalls. In the summer season dust storms also occur. In the cold season in association with the passage of western di-

sturbances dust and thunderstorms accompanied sometimes by squalls, and occasionally with hail occur. Morning fogs occur occasionally in the cold season.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Allahabad.

.....

TABLE - 1
Normals and Extremes of Rainfall

Stations	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Allahabad	50 a	17.0	21.3	9.7	5.3	7.1	80.3	307.6	293.1	182.6	40.4	8.6	7.1	980.1				
	b	1.6	2.0	1.0	0.6	0.7	4.6	14.1	14.2	8.5	2.0	0.7	0.7	50.7	162 (1916)	62 (1941)	393.2	1875 Jul 30
Sirathu	50 a	16.0	18.3	8.4	5.3	8.6	68.6	300.2	312.9	186.2	36.3	5.6	8.4	974.8	171 (1948)	57 (1918)	290.1	1902 Jul 21
	b	1.5	1.6	0.8	0.5	0.8	3.8	12.9	13.4	8.0	1.7	0.5	0.7	46.2				
Manjhanpur	50 a	19.8	18.8	7.9	5.6	7.4	60.7	273.6	285.7	166.6	35.8	6.3	7.4	895.6	144 (1942)	57 (1928)	249.7	1894 Oct 02
	b	1.6	1.7	0.7	0.6	0.7	3.4	13.4	13.6	7.9	1.8	0.5	0.8	46.7				
Soraon	50 a	14.0	18.8	6.9	6.1	6.3	86.4	306.3	293.6	191.5	43.7	7.6	5.8	987.0	169 (1948)	54 (1941)	305.0	1971 Aug 01
	b	1.4	1.8	0.8	0.6	0.8	3.9	13.4	13.3	8.3	1.9	0.5	0.6	47.3				
Phulpur	50 a	15.5	20.1	7.9	5.1	5.6	83.6	297.2	296.2	184.4	39.4	6.6	5.8	967.4	163 (1916)	46 (1918)	349.8	1916 Jun 23
	b	1.3	1.9	0.9	0.5	0.7	4.3	13.4	14.0	7.9	2.1	0.5	0.6	48.1				
Handia	50 a	17.3	19.6	7.4	4.3	9.7	91.2	313.9	298.2	177.8	39.9	7.9	5.8	993.0	190 (1948)	49 (1918)	260.1	1924 Jul 25
	b	1.3	1.9	0.8	0.5	0.8	4.3	13.9	13.4	8.0	1.8	0.6	0.6	47.9				

contd...

TABLE - 1(contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Maja	50 a	19.5	21.1	8.4	5.3	12.5	99.5	343.1	323.3	185.9	34.8	6.1	6.1	1065.2	218	49	512.1	1916 Jun 22
	b	1.7	1.7	0.8	0.5	0.8	4.6	14.3	14.2	8.0	1.9	0.6	0.5	49.6	(1948)	(1918)		
Karchana	50 a	19.5	20.8	8.1	6.9	9.1	86.1	296.4	302.8	175.5	41.1	7.4	7.4	980.9	176	55	360.7	1865 Jul 15
	b	1.6	1.8	0.9	0.7	0.7	4.5	13.8	13.6	7.6	2.1	0.6	0.6	48.5	(1948)	(1933)		
Bara	25 a	15.7	11.7	6.9	4.3	9.9	77.5	276.3	299.0	184.4	37.9	7.4	5.1	934.1	156	59	282.7	1925 Sep 09
	b	1.2	1.4	0.6	0.4	0.7	3.9	13.5	13.8	8.0	1.9	0.7	0.5	46.4	(1922)	(1918)		
Allahabad (District)	a	17.1	18.9	8.0	5.4	8.5	81.5	301.6	300.5	181.7	38.8	7.1	6.3	975.4	175	59		
	b	1.5	1.8	0.8	0.5	0.7	4.1	13.6	13.7	8.0	1.9	0.6	0.6	47.8	(1948)	(1918)		

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	1	1101 - 1200	5
601 - 700	2	1201 - 1300	4
701 - 800	6	1301 - 1400	2
801 - 900	9	1401 - 1500	0
901 - 1000	13	1501 - 1600	0
1001 - 1100	7	1601 - 1700	1

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	23.7	9.1	31.1	1934 Jan 29	2.0	1972 Jan 07	79	53
February	26.7	11.6	36.1	1896 Feb 27	1.1	1905 Feb 02	67	37
March	33.3	17.0	41.7	1931 Mar 30	7.2	1906 Mar 02	44	23
April	38.8	22.5	45.1	1979 Apr 29	12.7	1965 Apr 01	30	15
May	42.1	27.4	47.2	1922 May 21	17.2	1924 May 11	35	19
June	39.8	28.9	48.4	1966 Jun 09	19.4	1930 Jun 21	54	38
July	33.6	26.6	45.6	1901 Jul 01	22.0	1975 Jul 22	80	71
August	32.1	26.0	41.4	1963 Aug 19	21.1	1953 Aug 23	85	78
September	32.8	25.2	39.4	1928 Sep 22	18.3	1912 Sep 22	81	71
October	32.6	20.4	40.6	1896 Oct 03	11.7	1898 Oct 31	69	52
November	29.0	13.1	35.9	1965 Nov 07	5.6	1941 Nov 30	66	45
December	24.8	9.3	31.3	1985 Dec 16	-0.7	1961 Dec 26	76	51
Annual	32.4	19.8					64	46

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(ALLAHABAD)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.8	5.5	6.7	7.7	8.7	9.4	8.4	7.4	6.6	4.5	3.4	3.6	6.4

TABLE - 5
Special Weather Phenomena
(ALLAHABAD)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.8	2	3	2	3	9	13	12	9	2	0.0	0.6	57
Hail	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4
Duststorm	0.1	0.2	0.2	0.9	1.9	2	0.1	0.0	0.0	0.4	0.4	1.6	8
Squall	0.1	0.3	0.7	0.4	0.4	0.8	0.5	0.4	0.8	0.2	0.0	0.1	5
Fog	1.8	0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	4

*No. of days two and above are given in whole numbers.

AZAMGARH DISTRICT

The climate of this district is moist and relaxing except in the winter and hot seasons. The year may be divided into four seasons. The period from March to the middle of June is the hot season. The southwest monsoon season which follows continues upto about the end of September. The succeeding period lasting till end of November is the post monsoon or transition season. The period from December to February is the cold season.

Rainfall

Records of rainfall in the district are available for 5 stations for 96 years and for 55 years for one station. 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 1021.3 mm. The rainfall in the district varies from 979.1 mm at Deogaon to 1060.4 mm at Azamgarh. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901-1950 the highest annual rainfall in the district which was 158 percent of the normal occurred in 1938. The lowest annual rainfall of 62 percent of the normal occurred in 1918. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 7 years, two of them being consecutive. Considering the rainfall at individual stations 2 and 3 consecutive years of such low rainfall is fairly common in the district. Two consecutive years of such low rainfall occurred thrice at Jiwanpur, twice each at Deogaon and Ghosi and once at Azamgarh and Mahul. Three consecutive years of such low rainfall occurred once each, at Azamgarh, Mahul and Mohamadabad and 4 consecutive years once at Mahul. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1300 mm in 38 years out of 50.

On an average there are 50 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 48 at Deogaon to 52 at Azamgarh.

The heaviest rainfall in 24 hours recorded at any station in the district was 355.6 mm at Azamgarh on 1868 July 21.

Temperature

There is a meteorological observatory in the district at Azamgarh and the records of this observatory may be taken as representative of the climatic conditions in the district in general. After February temperatures increase rapidly. May is generally the hottest month with the mean daily maximum temperature at 41.4°C and the mean daily minimum at 26.1°C . The summer is intensely hot and the maximum temperature on individual days rises up to over 45°C . With the

advance of the monsoon into the district by about the middle of June there is appreciable drop in the day temperature. The nights, however, continue to be as warm as during the latter part of the summer season. In September and October there is a slight increase in the day temperature but the night temperature decreases rapidly after September. After October both the day and night temperatures decrease rapidly till January which is the coldest month with the mean daily maximum temperature at 23.3°C and the mean daily minimum at 9.7°C . In the cold season in association with passing western disturbances cold waves affect the district and the minimum temperature occasionally falls down to about the freezing point of water and frosts may occur.

The highest maximum temperature recorded at Azamgarh was 47.9°C on 1960 June 6. The lowest minimum temperature was 0.9°C on 1961 December 26.

Humidity

The humidity is high during the monsoon season. Thereafter humidities decrease gradually. The driest part of the year is the summer season when the relative humidities in the afternoons are less than 40 percent.

Cloudiness

Skies are heavily clouded or overcast during the southwest monsoon season and for brief spells of a day or two in association with passing western disturbances in the cold season. In the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally light throughout the year. During the non monsoon months the predominant winds are from directions between southwest and northwest. By May winds from directions between southeast and northeast begin to blow and in the monsoon season these predominate.

Special Weather Phenomena

During the passage across the country of depressions in the southwest monsoon season spells of heavy rain occur in the district. In the hot and early part of the monsoon seasons occasional thunderstorms occur.

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

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal year**	Lowest annual rain- fall as % of normal year**	Heaviest rainfall in 24 hours* Amount (mm)	Date	
Azamgarh	50	a	16.3	21.3	7.1	6.9	14.5	112.3	307.9	295.7	215.4	48.8	8.4	5.8	1060.4	179 (1938)	41 (1918)	355.6	1868 Jul 21
		b	1.4	2.0	0.9	0.6	1.3	5.7	13.1	14.1	9.3	2.3	0.5	0.5	51.7				
Deogaon	50	a	16.0	18.8	9.7	4.6	10.2	88.9	266.5	313.2	195.6	44.7	5.6	5.3	979.1	141 (1922)	62 (1926)	284.5	1882 Aug 12
		b	1.3	1.8	0.9	0.5	0.8	5.1	12.4	13.4	8.4	2.1	0.4	0.5	47.6				
Mahul	50	a	15.5	18.5	5.8	6.9	10.2	109.2	316.5	306.3	204.0	53.3	5.1	5.3	1056.6	160 (1945)	54 (1907)	288.8	1945 Sep 17
		b	1.3	1.7	0.8	0.6	0.8	5.7	13.4	14.0	9.0	2.2	0.4	0.5	50.4				
Jiwanpur	50	a	13.5	19.1	6.9	6.3	19.3	111.5	296.9	289.1	200.9	50.8	4.3	7.1	1025.7	173 (1938)	60 (1918)	248.9	1956 Sep 15
		b	1.3	1.8	0.7	0.6	1.3	5.6	12.8	13.1	8.8	2.1	0.4	0.6	49.1				
Mohmadabad	50	a	15.0	18.8	6.3	4.3	14.7	107.7	288.3	290.8	200.1	49.5	4.1	4.8	1004.4	173 (1938)	55 (1907)	269.0	1944 Sep 23
		b	1.4	1.9	0.7	0.6	1.1	5.8	12.5	13.5	9.0	2.3	0.4	0.4	49.6				
Ghosi	46	a	12.9	20.8	7.9	7.9	18.0	116.1	312.9	277.1	175.0	40.9	6.3	5.6	1001.4	162 (1936)	60 (1928)	194.3	1943 Sep 27
		b	1.2	2.0	0.7	0.5	1.2	5.8	13.2	13.0	8.7	2.1	0.4	0.4	49.2				
Azamgarh (District)		a	14.9	19.5	7.3	6.1	14.5	107.6	298.2	295.4	198.5	48.0	5.6	5.7	1021.3	158 (1938)	62 (1918)		
		b	1.3	1.9	0.8	0.6	1.1	5.6	12.9	13.5	8.9	2.2	0.4	0.5	49.7				

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more).

* Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	3	1201 - 1300	3
701 - 800	4	1301 - 1400	2
801 - 900	7	1401 - 1500	2
901 - 1000	11	1501 - 1600	0
1001 - 1100	8	1601 - 1700	1
1101 - 1200	9		

TABLE - 3
Normal of Temperature and Relative Humidity
(AZAMGARH)

Months	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded °C	Date	Lowest Minimum ever recorded °C	Date	Relative Humidity 0830 1730* % %	
January	23.3	9.7	28.9	1964 Jan 11	1.6	1962 Jan 17	86	68
February	27.2	11.5	35.4	1969 Feb 28	2.9	1961 Feb 09	72	52
March	33.3	17.0	43.3	1949 Mar 31	6.8	1979 Mar 10	57	39
April	39.1	31.9	44.4	1966 Apr 30	13.1	1965 Apr 03	45	32
May	41.4	26.1	45.9	1970 May 14	17.8	1977 May 07	52	35
June	38.5	27.3	47.9	1960 Jun 06	19.7	1966 Jun 15	72	57
July	33.0	26.1	41.1	1962 Jul 2,3	18.6	1977 Jul 11	86	80
August	32.5	26.1	39.9	1972 Aug 01	19.0	1978 Aug 15	87	85
September	31.9	25.3	38.3	1951 Sep 05	16.4	1966 Sep 28	84	79
October	32.7	21.0	38.5	1975 Oct 16	11.2	1966 Oct 27	75	69
November	29.5	13.3	36.1	1951 Nov 01	4.8	1978 Nov 28, 29	73	64
December	25.5	9.5	31.1	1954 Dec 08	0.9	1961 Dec 26	81	69
Annual	32.3	19.6					73	61

*Hours IST

TABLE - 4
Mean Wind Speed in Km/hr.
(AZANGARI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.2	4.7	4.7	6.0	5.6	5.0	4.7	3.4	3.2	2.1	1.6	1.9	3.8

TABLE - 5

Special Weather Phenomena
(AZAMGARH)

[illegible]

BAHRAICH DISTRICT

The climate of this district is characterised by a hot dry summer and a bracing cold season. The year may be divided into four seasons. The cold season from about the middle of November to the end of February is followed by the summer season lasting till about mid-June. The period from mid-June to about the end of September constitutes the southwest monsoon season. October to middle of November is the post monsoon or transition period.

Rainfall

Long records of rainfall in the district are available for only 3 stations for periods ranging from about 87 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1135.6 mm. The rainfall in the district generally increases from the southwest towards the northeast and varies from 1071.0 mm at Kaiserganj to 1176.5 mm at Bahraich. About 87 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, July being the rainiest month. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 186 percent of the normal occurred in 1938. The lowest annual rainfall which was 41 percent of the normal occurred in 1907. During these 50 years the annual rainfall in the district was less than 80 percent of the normal in 10 years, two consecutive years of such low rainfall occurring twice. Considering the annual rainfall at the individual stations, two consecutive years of such low rainfall occurred thrice at Kaiserganj twice at Nanpura and once at Bahraich in this 50 year period. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1400 mm in 40 years out of 50.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number is fairly uniform over the district.

The heaviest rainfall in 24 hours recorded at any station, in the district was 428.0 mm at Kaiserganj on 1901 September 25.

Temperature

There is a meteorological observatory in the district, at Bahraich and the records of this observatory may be taken as representative of the climatological conditions prevailing in the district in general. From about the end of February there is steady increase in temperatures. May is generally the hottest month with the meandaily maximum temperature at 39.8°C and the mean daily minimum,

at 25.6°C . The weather in summer is intensely hot and on individual days the maximum temperature occasionally reaches over 46°C . Hot dust-laden winds occasionally blow adding much to the discomfort. With the advance of the monsoon into the district by about mid-June there is appreciable drop in the day temperature. The night temperatures are however higher during June to August than in May. Due to decrease in clouding in September there is a slight increase in day temperature. However, nights become progressively cooler from September. Both day and night temperatures decrease rapidly after October till January which is the coldest month. The mean daily maximum temperature in January is 22.6°C and the mean daily minimum 8.8°C . In the cold season, in association with passing western disturbances, the district is affected by cold waves and on such occasions, the minimum temperature sometimes drops down to about the freezing point of water and frosts may occur.

The highest maximum temperature recorded at Bahraich was 47.6°C on 1966 June 9. The lowest minimum was 0.6°C on 1936 January 14 and 1905 February 2.

Humidity

During March to May the air is least humid with humidity about 50% in the mornings and only about 30% or less in the evening. During the rest of the year the air is quite humid with humidity nearly 70% or above in the mornings and nearly 50% or above in the evenings.

Cloudiness

During the southwest monsoon season, and for brief spells of a day or two in the cold season in association with passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year, the skies are generally clear or lightly clouded.

Winds

During the monsoon season (June-Sep) the winds blow predominantly from east of southeast. October is the month of transition when the winds decrease in strength and are mostly from east or southeast in the mornings and from west in the afternoons. From November to about the middle of April winds from the sector SW-W-NW predominate. The second half of April and May is the transition period when the winds are predominantly from east or southeast in the mornings and from the sector SW-W-NW in the evenings.

Special Weather Phenomena

During the period January to April passing western disturbances affect the weather over the district. Thunderstorms occur during all the months except during November, the highest incidence being during the monsoon months. The thunderstorms during the cold and summer seasons are at times accompanied with hail. Occasional dust-storms occur during the hot season. Fog occurs occasionally in the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hrs* Amount (mm) Date
Bahraich (obsy)	50 a	21.8	21.6	10.7	8.6	30.0	155.5	318.5	313.2	226.8	56.6	5.8	7.4	1176.5	208 (1938)	40 (1907)	387.2 1969 Aug 2 0
	b	1.7	2.0	0.9	0.7	2.1	6.0	12.2	12.8	8.0	2.3	0.4	0.7	49.8			
Kaiserganj	50 a	18.5	19.8	8.4	8.1	18.0	127.5	303.3	288.5	218.2	49.3	5.6	5.8	1071.0	199 (1938)	36 (1907)	428.0 1901 Sep 2 5
	b	1.5	1.9	0.8	0.6	1.4	5.8	12.4	12.8	7.9	1.8	0.4	0.6	47.9			
Nanpara	50 a	21.8	22.1	12.5	6.1	33.0	165.9	319.5	305.6	212.3	48.5	4.8	7.1	1159.2	159 (1949)	47 (1907)	300.0 1964 Jul 2 3
	b	1.7	1.8	1.0	0.6	2.1	7.2	11.5	12.5	8.2	1.9	0.3	0.7	49.5			
Bahraich (District)	a	20.7	21.2	10.5	7.6	27.0	149.6	313.8	302.4	219.1	51.5	5.4	6.8	1135.6	186 (1938)	41 (1907)	
	b	1.6	1.9	0.9	0.6	1.9	6.3	12.0	12.7	8.0	2.0	0.4	0.7	49.0			

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901 to 1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	1	1301 - 1400	5
501 - 600	0	1401 - 1500	2
601 - 700	1	1501 - 1600	1
701 - 800	2	1601 - 1700	1
801 - 900	6	1701 - 1800	1
901 - 1000	6	1801 - 1900	0
1001 - 1100	6	1901 - 2000	0
1101 - 1200	11	2001 - 2100	0
1201 - 1300	6	2101 - 2200	1

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	22.6	8.8	28.9	1946 Jan 28	0.6	1936 Jan 15	82	57
February	25.6	10.9	34.4	1952 Feb 20	0.6	1905 Feb 02	74	47
March	31.9	15.4	40.6	1941 Mar 29	5.6	1945 Mar 06	55	32
April	37.4	20.9	44.6	1980 Apr 27	11.1	1943 Apr 03	43	24
May	39.8	25.6	45.6	1953 May 27	15.6	1944 May 03	50	31
June	37.6	27.0	47.6	1966 Jun 09	18.3	1914 Jun 02	68	51
July	33.0	26.3	44.4	1902 Jul 01	18.7	1975 Jul 02	81	73
August	32.2	26.1	38.3	1903 Aug 01	21.1	1956 Aug 21	83	77
September	32.7	25.1	38.3	1907 Sep 21	18.3	1912 Sep 21	80	72
October	32.1	20.7	37.8	1907 Oct 06	12.2	1935 Oct 29	73	57
November	28.6	13.4	34.9	1985 Nov 30	5.0	1952 Nov 28	72	51
December	24.3	9.4	31.7	1896 Dec 01	1.7	1913 Dec 29	79	56
Annual	31.5	19.1					70	52

*Hours IST

TABLE - 4
Mean Wind Speed Km/hr.
(BAHRAICH)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.0	4.8	6.0	7.3	8.4	8.4	7.8	6.3	5.4	3.7	2.7	2.9	5.6

TABLE - 5
Special Weather Phenomena
(BAHRAICH)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.5	1.2	1.3	1.0	3	4	4	3	3	1.1	0.0	0.3	22
Hail	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4
Dust- storm	0.0	0.0	0.1	0.3	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.1	1.7
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	1.1

* No. of days 2 and above are given in whole numbers.

BALLIA DISTRICT

The climate of this district is moist and relaxing except in the summer and cold seasons. The year may be divided into four seasons. The cold season from about the latter half of November to February is followed by the hot season from March to about the middle of June. The period from about the middle of June to the end of September constitutes the southwest monsoon season. October and the first half of November may be termed the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 4 stations for sufficiently long periods. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1013.1 mm. About 88 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, August being the rainiest month. Except for the areas around Sikandarpur, which gets less rainfall, the variation in the rainfall from place to place in the district is not much. The variation in the rainfall from year to year is not large. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 154 percent of the normal occurred in the year 1911, while 1932 was the year with the lower annual rainfall which was 66 percent of the normal. In this 50 year period the annual rainfall was less than 80 percent of the normal in 4 years, two of them being consecutive. Considering the rainfall at the individual stations, two consecutive years of such low rainfall occurred twice at two of the 4 stations. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1300 mm in 43 years out of 50.

On an average there are 50 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number is the lowest around Sikandarpur but over the rest of the district does not vary much.

The heaviest rainfall in 24 hours recorded at any station in the district was 320.0 mm at Rasra on 1884 October 3.

Temperature

Meteorological records are available for a short period for the only observatory station at Ballia in the district. The description which follows is based on these records supplemented by the records of observatories in the neighbouring districts which have a similar climate. After February there is a steady increase in temperature.

May is generally the hottest month with the mean daily maximum temperature at 41.8°C and the mean daily minimum at 25.4°C . On individual days the maximum temperature may reach upto 48°C . With the onset of the monsoon in the district by about the middle of June there is appreciable drop in the day temperatures but the nights continue to be as warm as during the latter part of the summer. After the withdrawal of the monsoon early in October the temperatures begin to decrease, the drop being more rapid after October. January is usually the coldest month with the mean daily maximum temperature at 23.9°C and the mean daily minimum at about 9.9°C . During the cold season, in association with passing western disturbances, cold waves affect the district and on such occasions the minimum temperature occasionally, drops down to about 2°C .

The highest maximum temperature recorded at Ballia was 48.0°C on 1980 May 24. The lowest minimum was 1.1°C on 1980 February 1.

Humidity

The relative humidity is generally high during the southwest monsoon season, being 70 percent. Thereafter the relative humidities decreases. The driest part of the year is the summer season when the relative humidities in the afternoons are less than 30 percent.

Cloudiness

During the monsoon months and for brief spells of a day or two in association with passing western disturbances the skies are generally heavily clouded or overcast. Cloudiness decreases during the post monsoon months. In the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally light with some increase in force during the latter part of the summer and early part of the monsoon season. During the non-monsoon months winds are mostly from directions between southwest and northwest. By May winds from directions between northeast and southeast begin to blow and these predominate in the southwest monsoon season. On some days during the monsoon season winds blow from the west or southwest.

Special Weather Phenomena

Some of the monsoon depressions from the Bay of Bengal move in some westerly to northwesterly direction and affect the weather over the district causing widespread heavy rain and gusty winds. Dust-storms and thunderstorms occur during the summer season. Rain in the

monsoon season is often associated with thunder. Fog occurs at times during the early part of the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Ballia	50 a	15.5	19.6	9.9	5.9	18.5	125.5	307.6	321.6	216.7	49.5	7.4	4.8	1103.5	148	62	200.7	1879 Sep 10
	b	1.3	1.7	1.0	0.7	1.5	6.6	13.3	14.3	9.8	2.7	0.5	0.5	53.9	(1946)	(1907)		
Rasra	50 a	15.7	19.6	7.9	6.1	11.9	109.5	291.9	305.3	211.6	48.8	5.6	5.1	1039.0	169	63	320.0	1884 Oct 03
	b	1.4	1.9	0.8	0.6	1.2	6.2	13.7	13.8	9.3	2.3	0.5	0.5	52.2	(1937)	(1932)		
Bansdih	50 a	14.0	19.6	8.9	7.6	18.8	114.8	287.0	285.7	200.4	48.8	5.8	4.6	1014.0	156	58	203.2	1963 Jul 14
	b	1.2	1.9	1.0	0.7	1.5	6.7	12.8	13.6	8.9	2.2	0.4	0.5	51.4	(1911)	(1907)		
Sikandar- pur	12 a	14.2	19.6	6.3	2.8	11.9	92.5	230.9	267.2	202.4	46.2	0.0	1.3	895.3	141	42	203.2	1940 Jul 22
	b	1.2	1.7	0.8	0.2	1.1	4.6	10.0	12.0	8.5	1.7	0.0	0.2	41.8	(1938)	(1950)		
Ballia (District)	a	14.9	19.6	8.3	5.9	15.3	110.6	279.3	294.5	207.8	48.3	4.7	3.9	1013.1	154	66		
	b	1.3	1.8	0.9	0.5	1.3	6.0	12.5	13.4	9.1	2.2	0.3	0.4	49.7	(1911)	(1932)		

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	2	1101 - 1200	10
701 - 800	2	1201 - 1300	7
801 - 900	7	1301 - 1400	1
901 - 1000	10	1401 - 1500	1
1001 - 1100	9	1501 - 1600	1

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

Month	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded °C	Date	Lowest Minimum ever recorded °C	Date	Relative Humidity 0830 %	1730* %
January	23.9	9.9	28.8	1961 Jan 2	1.6	1964 Jan 27	81	56
February	26.6	11.1	35.9	1974 Feb 25	1.1	1980 Feb 1	67	41
March	32.9	16.8	40.9	1973 Mar 30	5.7	1980 Mar 8	54	30
April	39.0	21.9	44.5	1961 Apr 24	11.7	1965 Apr 3	41	24
May	41.8	25.4	48.0	1980 May 24	15.7	1982 May 3	45	26
June	39.7	26.8	47.5	1966 Jun 9	16.3	1982 Jun 6	68	47
July	34.3	25.9	43.0	1962 Jul 3	17.0	1968 Jul 31	84	72
August	32.8	25.5	39.4	1972 Aug 3	17.6	1977 Aug 8	88	79
September	33.3	25.1	37.9	1974 Sep 9	17.0	1966 Sep 30	84	75
October	32.3	19.9	36.9	1974 Oct 15 and 17	10.4	1957 Oct 31	77	68
November	28.8	12.7	34.5	1961 Nov 13	5.8	1957 Nov 29	71	54
December	24.8	10.1	29.9	1958 Dec 19	1.9	1979 Dec 23	76	58
Annual	32.5	19.3					70	53

* Hours I.S.T.

TABLE - 4

Mean Wind Speed in Km/hr.
(BALLIA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.9	4.4	5.1	6.4	7.2	6.8	6.4	4.3	5.1	2.7	2.1	1.9	4.6

TABLE - 5

Special Weather Phenomena
(BALLIA)

[illegible]

BANDA DISTRICT

The climate of Banda district is characterised by a hot summer and pleasant monsoon and cold seasons. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The southwest monsoon season commences by about June and continues upto about the end of September. October and the first half of November constitute the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 9 rain-gauge stations for periods ranging from 54 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 946.2 mm. The rainfall in the district in general increases from the northwest towards the southeast, except in the region around Badausa-Kamasin which has comparatively lower rainfall than the surrounding areas. The rainfall in the district varies from 805.6 mm at Pailani to 1031.8 mm at Karwi. About 90 percent of the annual rainfall is received in the district during the southwest monsoon season, August being the rainiest month. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 140 percent of the normal occurred in 1919 while 1918 was the year with the lowest annual rainfall which was 52 percent of the normal. In the same period the annual rainfall in the district was less than 80 percent of the normal in 8 years, none of them being consecutive. However considering the annual rainfall at the individual stations two consecutive years of such low rainfall have occurred 1 to 3 times at 7 out of the 9 stations. Even 3 consecutive years of such low rainfall occurred once at Pailani. It will be seen from table 2 that the annual rainfall in the district was between 701 and 1200 mm in 37 years out of 50.

On an average there are 44 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 39 at Pailani to 49 at Girwan.

The heaviest rainfall in 24 hours recorded at any station in the district was 421.6 mm at Karwi on 1875 July 30.

Temperature

There is a meteorological observatory in the district at Banda. The records of this observatory may be taken as representa-

tive of the climatic conditions in the district in general. After February there is rapid increase in temperatures. May is the hottest month with the mean daily maximum temperature at 43.0°C and the mean daily minimum at 28.0°C . In the summer season the maximum temperatures sometimes go even above 48°C also. With the advance of the monsoon into the district by about the middle of June there is appreciable drop in temperature and the weather becomes more bearable. During breaks in the monsoon in September, day temperatures increase slightly. By October while the day temperatures remain as in September the night temperatures decrease. After October both day and the night temperatures decrease rapidly till January which is generally the coldest month. The mean daily maximum temperature in January is 23.7°C and the mean daily minimum is 9.6°C . In the cold season in association with passing western disturbances cold waves affect the district and the minimum temperature sometimes drops down to about 1°C .

The highest maximum temperature recorded at Banda was 48.6°C on 1966 June 8. The lowest minimum temperature was 0.6°C on 1962 January 18, 19.

Humidity

The relative humidity is high during the southwest monsoon season generally exceeding 70 percent. Thereafter the humidities, decrease progressively and by the hot season the air becomes very dry with the relative humidities in the afternoon going down to 25 percent or less.

Cloudiness

During the monsoon season the skies are generally heavily clouded or overcast. Cloudy skies also prevail for brief spells of a day or two in association with passing western disturbances in the cold season. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light with some increase in force during summer and the southwest monsoon season in the afternoon. In the period November to April winds are mostly from the west or northwest. By May easterlies and northeasterlies also appear. In the southwest monsoon season winds are either southwest to west or northeast to east. By October the easterlies and northeasterlies become less common.

Special Weather Phenomena

Storms and depressions during the early part of the southwest monsoon which originate in the Bay of Bengal and move across the country affect the weather over the district causing widespread heavy rain. Western disturbances also affect the weather over the district during the cold season, and occasional thunderstorms occur. Occasional dust-storms occur during the hot season. Rains during the monsoon season are often associated with thunder. Fog occurs occasionally during the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Banda	50 a	17.3	16.0	8.9	5.3	7.9	73.9	310.9	312.2	165.3	36.3	9.7	5.8	969.5	208 (1926)	36 (1918)	304.8	1868 Sep 15
	b	1.4	1.5	0.7	0.5	0.7	4.1	13.4	13.3	7.1	1.4	0.6	0.5	45.2				
Pailani	50 a	12.2	12.5	6.6	3.3	3.6	61.0	262.1	254.8	155.5	25.4	4.3	4.5	805.6	161 (1919)	38 (1905)	259.3	1915 Aug 31
	b	0.9	1.2	0.6	0.3	0.4	3.4	11.2	12.5	7.0	1.2	0.4	0.4	39.5				
Girwan	50 a	14.5	16.3	7.1	4.1	8.1	80.0	308.6	308.6	343.4	173.5	36.1	10.7	1008.0	191 (1919)	36 (1918)	227.6	1888 Jul 26
	b	1.5	1.5	0.8	0.5	0.9	4.6	13.8	14.8	7.9	1.6	0.6	0.6	49.1				
Baberu	50 a	15.7	15.2	6.3	6.1	7.6	76.5	317.3	329.9	170.4	29.7	6.6	6.1	987.4	153 (1948)	45 (1913)	272.3	1924 Jul 16
	b	1.4	1.4	0.6	0.5	0.8	3.5	12.8	13.6	7.5	1.4	0.5	0.6	44.6				
Badausa	50 a	13.2	12.7	5.8	4.3	6.3	63.3	290.8	293.1	167.1	31.7	6.1	5.1	901.5	177 (1919)	46 (1905)	406.4	1882 Jun 16
	b	1.1	1.1	0.6	0.4	0.6	3.2	13.1	12.9	7.3	1.3	0.5	0.3	42.4				

contd

Table - 1 (contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Kamasin	50 a	10.7	12.7	4.8	5.3	5.1	64.8	280.7	282.2	155.7	28.7	5.6	4.6	860.9	194	46	224.0	1894 Oct 02
	b	0.9	1.1	0.6	0.4	0.5	3.1	12.2	13.1	7.1	1.4	0.4	0.4	41.2	(1915)	(1941)		
Karwi	50 a	14.5	18.3	6.3	6.3	7.9	82.5	325.1	335.0	183.1	37.3	8.4	7.1	1031.8	166	42	421.6	1875 Jul 30
	b	1.4	1.5	0.7	0.6	0.8	3.9	15.4	14.1	7.6	1.5	0.6	0.6	46.5	(1948)	(1913)		
Mau	50 a	18.5	19.3	7.9	4.6	9.1	75.7	287.0	295.4	174.0	39.6	8.9	9.1	947.1	152	58	532.7	1953 Aug 20
	b	1.6	1.7	0.9	0.5	1.0	3.8	14.0	15.9	7.7	1.7	0.5	0.6	47.9	(1911)	(1918)		
Manikpur	44 a	15.7	18.5	6.6	2.3	6.6	81.8	525.9	534.8	169.7	39.0	7.6	6.1	1005.6	157	47	512.4	1916 Jun 24
	b	1.2	1.5	0.6	0.3	0.5	3.7	12.5	13.9	7.5	1.4	0.4	0.5	45.8	(1926)	(1918)		
Banda (District)	a	14.7	15.7	6.7	4.6	6.9	75.5	300.7	309.0	168.5	32.8	7.5	6.0	946.2	140	52		
	b	1.5	1.5	0.7	0.4	0.7	3.7	12.9	15.6	7.4	1.4	0.5	0.5	44.4	(1919)	(1918)		

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	1	901 - 1000	10
501 - 600	4	1001 - 1100	6
601 - 700	1	1101 - 1200	6
701 - 800	5	1201 - 1300	5
801 - 900	10	1301 - 1400	2

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

Month	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity		0830 %	1730* %
			°C	Date	°C	Date				
January	23.7	9.6	32.4	1964 Jan 10	0.6	1962 Jan 18, 19			76	57
February	27.9	11.8	37.8	1976 Feb 28	3.3	1950 Feb 12			62	41
March	34.1	17.5	42.3	1984 Mar 31	7.3	1979 Mar 10			48	31
April	39.5	22.8	46.7	1979 Apr 29	13.1	1963 Apr 09			35	23
May	43.0	28.0	47.8	1973 May 08	17.2	1964 May 13			35	25
June	40.8	29.4	48.6	1966 Jun 08	21.0	1962 Jun 14			54	44
July	34.0	26.4	44.5	1965 Jul 01, 02	20.6	1963 Jul 18			83	76
August	32.1	25.6	42.4	1979 Aug 31	18.2	1983 Aug 12			88	82
September	33.1	24.8	41.6	1979 Sep 01, 02	18.0	1963 Sep 30			80	74
October	32.8	20.4	39.8	1979 Oct 14	13.2	1957 Oct 28			69	59
November	29.2	12.9	37.0	1985 Nov 05	6.1	1950 Nov 30			61	49
December	25.2	9.6	31.5	1976 Dec 04	0.8	1961 Dec 27			73	58
Annual	32.9	19.9							64	52

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(BANDA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.6	2.1	3.0	3.5	4.2	4.7	2.9	2.4	2.0	1.1	0.7	0.7	2.4

TABLE - 5
Special Weather Phenomena
(BANDA)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.1	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.9
Hail	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Duststorm	0.0	0.1	0.6	0.7	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	2

*No. of days two and above are given in whole numbers.

BARA BANKI DISTRICT

The climate is generally healthy. The cold season is from December to February and is followed by the summer season from March to about the middle of June. The monsoon season from mid-June to September is followed by the post monsoon months October and November.

Rainfall

Records of rainfall in the district are available for four stations for more than 100 years. The statement of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The monsoon arrives over the district in the latter half of June and withdraws early in October. The average annual rainfall of the district is 1002.5 mm. The rainfall generally increases from south to north. The rainfall during the monsoon months June to September amounts to 88% of the annual total. The annual rainfall from year to year varies considerably. During the 50 year period 1901 to 1950 the year with the highest rainfall amounting to 171% of the normal was 1915. 1907 was the year of lowest rainfall in the district, amounting to 46% of the normal. In the fifty year period there were 12 years when the rainfall was less than 80% of the normal. Two consecutive years with low rainfall occurred twice during the period. From table 2 it will be seen that in 32 years out of fifty the rainfall was between 801 and 1300 mm.

On an average on 47 days in the year the district gets rainfall of 2.5 mm or more.

The highest rainfall in 24 hours recorded at any station in the district was 406.4 mm at Nawabganj on 1961 October 13.

Temperature

There is no meteorological observatory in the district, hence records of temperature and other meteorological conditions are not available for any station in the district. However the weather in the district is similar to that of the surrounding district where meteorological observatories exist. By late November both day and night temperatures begin to fall rapidly. January is the coldest month with the average minimum temperatures of the order of 8°C. In association with cold waves in the wake of some western disturbances which pass across North India, minimum temperatures at times drop to a degree or two of the freezing point of water and slight frost occurs. The period from March to May is one of continuous increase in temperature, May being the hottest month. The mean daily maximum temperature in May is about 40°C and the mean daily minimum is of the order of 26°C. On some days during the months May and

early June the temperature occasionally rise upto about 47°C .

Humidity

Mornings in general are highly humid except during the summer season when the relative humidity is between 35 and 50 percent. In the southwest monsoon season the relative humidity exceeds 75 percent. In the rest of the year in the afternoons the humidity is comparatively less. The driest part of the year is the summer afternoons when the relative humidity is less than 30 percent.

Cloudiness

In the southwest monsoon season and for brief spells of a day or two in the cold season when the district is affected by passing western disturbances heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light except in late summer and monsoon season when they strengthen slightly. Winds blow mainly from the east in the monsoon season while in the other seasons they are predominantly from the west.

Special Weather Phenomena

Depressions and cyclonic storms from the Bay of Bengal affect the district during the monsoon season causing heavy rain. In the cold season western disturbances affect the weather over the district causing occasionally a few thunderstorms associated with hail. Rain during the monsoon season is at times associated with thunder. Duststorms and thunderstorms occur during summer. Fog occurs occasionally in the cold season.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fallas % of normal & year**	Lowest annual rain- fallas % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Nawabganj	50 a	16.5	21.6	8.9	5.6	16.5	107.7	316.0	301.5	210.1	45.5	4.8	6.3	1061.0	223	41	406.4	1961 Oct 13
	b	1.5	1.9	0.9	0.4	1.3	5.0	13.3	13.3	8.5	1.7	0.3	0.6	48.7	(1915)	(1932)		
Sonehighat	50 a	15.2	21.1	7.4	5.6	12.9	103.9	310.4	310.6	208.8	48.3	5.3	6.9	1056.4	198	36	302.8	1955 Sep 29
	b	1.4	1.8	0.7	0.6	1.2	5.3	12.6	13.0	8.1	1.8	0.4	0.7	47.6	(1948)	(1907)		
Fatehpur	50 a	18.0	20.3	6.3	6.9	16.5	97.8	276.9	248.2	205.5	46.2	5.1	5.8	953.5	178	27	275.1	1952 Jun 30
	b	1.4	1.8	0.7	0.6	1.4	4.9	12.3	12.1	7.2	1.5	0.3	0.5	44.7	(1936)	(1918)		
Haidergarh	50 a	15.7	19.3	9.1	4.6	11.4	84.5	295.7	266.2	190.0	34.5	3.8	6.9	939.5	155	42	281.9	1871 Sep 16
	b	1.4	1.6	1.0	0.5	1.0	4.5	13.0	13.3	8.2	1.9	0.4	0.5	47.5	(1915)	(1907)		
Barabanki (District)	a	15.9	20.6	7.9	5.7	14.5	98.4	299.7	281.6	203.6	43.6	4.7	6.5	1002.5	171	46		
	b	1.4	1.8	0.8	0.5	1.2	4.9	12.8	12.9	8.0	1.7	0.5	0.6	46.9	(1915)	(1907)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rainfall of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	2	1101 - 1200	6
501 - 600	2	1201 - 1300	7
601 - 700	6	1301 - 1400	2
701 - 800	2	1401 - 1500	2
801 - 900	7	1501 - 1600	0
901 - 1000	7	1601 - 1700	1
1001 - 1100	5	1701 - 1800	1

BASTI DISTRICT

The climate of this district is more equable than the adjoining districts to the south. The climate, especially in the northern parts of the district is influenced by the proximity of the hills, to the north and the Terai swamps. The year may be divided into four seasons. The cold season from mid-November to February is followed by the summer season lasting till about the middle of June. The period from mid-June to the end of September constitutes the southwest monsoon season. October to mid-November is the post monsoon or transition period.

Rainfall

Records of rainfall in the district are available for 5 stations for periods ranging from 87 to 99 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1264.0 mm. The rainfall in the district in general increases from the southwest to the northeast and varies from 1133.9 mm at Haraiya to 1459.9 mm at Domeriaganj. About 87 percent of the annual rainfall in the district is received during the monsoon months, June to September, July being the rainiest month. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901-1950, the highest annual rainfall occurred in 1936 when it was 195 percent of the normal. The lowest annual rainfall which was 52 percent of the normal occurred in 1907. In the same period the annual rainfall in the district was less than 80 percent of the normal in 8 years. Two consecutive years of such low rainfall was recorded twice in this period. Considering the annual rainfall in the individual stations such low rainfall in two consecutive years occurred 5 times at Domeriaganj, 4 times at Bansi and thrice at Basti. Even 3 consecutive years of such low rainfall was recorded once each at Domeriaganj and Khalilabad. It will be seen from table 2 that the annual rainfall in the district was between 1001 and 1500 mm in 32 years out of 50.

On an average there are 53 rainy days (i.e. days with rain of 2.5 mm or more) in a year in the district. There is not much variation in the number of rainy days over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 412.7 mm at Basti on 1930 September 28.

Temperature

There is no meteorological observatory in the district. The account which follows is based on the records of the observatories in the neighbouring districts where similar climatic conditions

prevail. There is a rapid fall in temperatures after mid-November. January is generally the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 9°C . In association with passing western disturbances, cold waves affect the district when the minimum temperature drops down to about a degree or two above the freezing point of water. Temperatures begin to rise after February. May is usually the hottest month with the mean daily maximum temperature at about 38°C and the mean daily minimum at about 25°C . The northern parts of the district have a comparatively milder summer. On individual days during the summer the maximum temperature reaches 46°C or over. With the advent of the monsoon into the district in the latter half of June there is appreciable drop in the day temperature but the nights still remain as warm as during nights in the latter half of the summer season. Towards the end of the monsoon period, in September, there is a slight increase in the day temperature but the night temperatures begin to decrease. It is only after October that both the day and night temperatures decrease rapidly.

Humidity

In the southwest monsoon and post monsoon seasons the relative humidities are high being above 70 percent. Thereafter humidities decrease and in the summer air is very dry.

Cloudiness

During the monsoon season and for brief spells of a day or two in association with passing western disturbances in winter heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are in general very light with a slight increase in force during the late summer and monsoon seasons. In the cold season the winds are mainly from the west. In the early part of the summer season easterlies appear, but the westerlies still continue to be predominant. Easterlies and northeasterlies are the most common winds in late summer and the southwest monsoon seasons. In October the winds blow from the east or northeast and on many days from the west.

Special Weather Phenomena

Thunderstorms occur in the late summer and the southwest monsoon season. Even in the winter season thunderstorms occasionally accompanied with hail occur in association with passing western disturbances. In the northern parts of the district occasional fogs are met with in the cold season.

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Basti	50 a	14.0	19.6	13.5	9.9	28.2	130.3	361.7	304.0	246.9	59.2	6.1	6.6	1200.0	150 (1948)	50 (1907)	412.7	1930 Sep 28
	b	1.5	2.0	0.9	0.7	2.1	6.4	13.9	14.5	9.1	2.3	0.4	0.6	54.4				
Domeriaganj	50 a	16.5	26.9	14.7	13.2	44.5	209.0	423.4	371.9	248.4	76.2	8.9	6.3	1459.9	315 (1956)	40 (1907)	312.4	1867 Jul 03
	b	1.4	1.8	1.0	0.8	2.5	7.1	13.6	13.6	8.3	2.1	0.2	0.4	52.8				
Bansi	50 a	14.0	22.6	12.2	11.9	42.9	185.9	423.9	336.0	223.5	55.9	6.1	5.3	1340.2	174 (1958)	55 (1923)	241.3	1927 Jul 01
	b	1.3	1.7	1.0	0.7	2.9	7.6	14.0	13.8	8.6	2.3	0.3	0.5	54.7				
Har-Aiya	50 a	12.5	21.1	8.6	6.9	25.4	138.7	320.8	294.4	237.7	57.1	4.6	6.1	1133.9	169 (1938)	49 (1907)	286.0	1964 Aug 31
	b	1.2	1.9	0.7	0.7	1.7	6.2	13.8	14.0	8.8	2.1	0.4	0.6	52.1				
Khalilabad	50 a	11.9	17.3	10.7	11.2	31.0	150.9	370.6	320.3	200.1	53.1	4.1	4.6	1185.8	189 (1936)	49 (1918)	271.8	1930 Sep 28
	b	1.3	1.7	0.8	0.8	2.2	6.8	14.1	14.2	9.1	2.2	0.4	0.5	54.1				
Basti (District)	a	13.8	21.5	11.9	10.6	34.4	163.0	380.1	325.3	231.3	60.3	6.0	5.8	1264.0	195 (1936)	52 (1907)		
	b	1.3	1.8	0.9	0.7	2.3	6.8	13.9	14.0	8.8	2.2	0.3	0.5	53.5				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	1	1501 - 1600	5
701 - 800	2	1601 - 1700	2
801 - 900	2	1701 - 1800	1
901 - 1000	3	1801 - 1900	0
1001 - 1100	6	1901 - 2000	0
1101 - 1200	12	2001 - 2100	1
1201 - 1300	5	2101 - 2200	0
1301 - 1400	5	2201 - 2300	0
1401 - 1500	4	2301 - 2400	0
		2401 - 2500	1

DEORIA DISTRICT

The climate of this district is more equable than the adjoining districts to the south. The climate of the northern portions of the district is to some extent influenced by the Terai swamps. The year may be divided into four seasons. The cold season from mid-November to February is followed by the summer from March to the middle of June. The period from mid-June to the end of September is the southwest monsoon season. October and the first half of November constitute the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 3 stations for a long period of over 90 years. The details of the rainfall at these 3 stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district based on the data for period 1901 to 1950 is 1189.8 mm. The rainfall in the district in general increases from the southwest towards the northeast and varies from 1058.4 mm at Deoria to 1259.6 mm at Hata. About 87 percent of the annual normal rainfall in the district is received during the monsoon months June to September, July and August being the rainiest months. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 144 percent of the normal occurred in 1938. The lowest annual rainfall which was 57 percent of the normal occurred in 1907. In the same 50 year period, the annual rainfall was less than 80 percent of the normal in 8 years, three of them being consecutive. Considering the rainfall at individual stations even 4 consecutive years of such low rainfall occurred once at Hata and 7 consecutive years once at Deoria (1926 to 1932). It will be seen from table 2 that the annual rainfall in the district was between 1001 and 1500 mm in 33 years out of 50.

On an average there are 54 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 303.5 mm at Hata on 1935 September 5.

Temperature

There is no meteorological observatory in the district. The description which follows is mainly based on the records of the observatories in the neighbouring districts where the climatic conditions are similar. The cold season commences from mid-November

with a rapid fall in temperatures. January is usually the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 9°C . In winter, cold waves affect the district in the wake of western disturbances and the minimum temperature on such occasions may sometimes go down to about a degree or two above the freezing point of water. After February the temperatures begin to increase rapidly. May is generally the hottest month with the mean daily maximum temperature at about 38°C and the mean daily minimum temperature at about 25°C . The heat in summer is, often intense particularly in the southern parts of the district. The maximum temperature sometimes goes up to about 46°C or over. With the advance of the monsoon into the district by about mid-June there is appreciable fall in the day temperatures, but the nights continue to be as warm as the nights in the latter part of the summer season. In September, during breaks in the monsoon there is a slight increase in the day temperature. With the withdrawal of the monsoon early in October there is a progressive decrease in temperatures.

Humidity

During the southwest monsoon and post monsoon seasons the relative humidities generally exceed 70 percent. The humidity decreases in the winter months and in the summer season, the air is very dry, especially in the afternoons.

Cloudiness

During the monsoon season and for brief spells of a day or two in the cold season in association with passing western disturbances through the district, skies are generally heavily clouded or overcast. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light with some increase in force in the late summer and monsoon months. During the cold season the winds blow mostly from the west. Easterlies appear in the early part of the hot season but the westerlies predominate. In the late summer, and monsoon season easterlies and northeasterlies predominate. In October the winds are light and are either from the west or northeast to east.

Special Weather Phenomena

In the cold season western disturbances affect the weather over the district and then sometimes thunderstorms, occasionally

accompanied by hail occur. Occasional thunderstorms occur in the late summer and monsoon seasons. In the cold season, occasionally fogs occur, especially in the northern parts of the district.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Deoria	50 a	12.7	16.3	7.9	12.9	25.4	134.6	283.2	291.3	205.0	57.9	5.6	3.6	1058.4	146 (1916)	52 (1931)	279.7	1888 Jun 04
	b	1.1	1.6	0.7	1.0	2.0	6.7	13.3	13.4	9.0	2.3	0.3	0.4	51.8				
Hata	50 a	12.2	18.0	9.7	9.1	43.7	182.6	350.3	339.9	227.8	57.9	5.1	3.3	1239.6	145 (1922)	56 (1907)	303.5	1935 Sep 05
	b	1.0	1.7	0.9	0.8	2.7	7.3	14.2	14.3	9.5	2.6	0.4	0.4	55.8				
Padrauna	50 a	15.7	17.8	10.4	18.0	47.0	189.2	351.0	327.4	209.8	59.4	4.8	3.1	1251.6	145 (1938)	56 (1901)	281.2	1961 Aug 31
	b	1.3	1.6	0.9	1.0	2.7	7.9	13.5	14.1	9.3	2.4	0.3	0.3	55.3				
Deoria (District)	a	12.9	17.4	9.3	13.3	38.7	168.8	328.8	319.5	214.2	58.4	5.2	3.3	1189.8	144 (1938)	57 (1907)		
	b	1.1	1.6	0.8	0.9	2.5	7.3	13.7	13.9	9.3	2.4	0.3	0.4	54.2				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2

Frequency of Annual Rainfall in the District

(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	1	1201 - 1300	7
701 - 800	1	1301 - 1400	5
801 - 900	5	1401 - 1500	7
901 - 1000	5	1501 - 1600	3
1001 - 1100	8	1601 - 1700	1
1101 - 1200	6	1701 - 1800	1

FYZABAD DISTRICT

The climate is generally healthy. The year may be divided into four seasons. The cold season starts in late November and lasts till February, the summer season begins in March and continues till the onset of the monsoon by about the middle of June. The monsoon season lasts till the end of September. The post monsoon months October and November form the transition from monsoon to the cold weather season.

Rainfall

The district has six rainguage stations and their records extend to more than 80 years except for Ayodhya for which data for 25 years only are available. The data of the rainfall at the six stations and for the district are given in tables 1 and 2. The average annual rainfall of the district as a whole is 1008.4 mm 88% of which falls during the monsoon months. The rainfall generally increases from the southwest to northeast. The annual rainfall shows variations from year to year. In the fifty year period 1901-1950 the year of maximum annual rainfall was in 1903 and amounted to 158% of the normal. The lowest annual rainfall was less in 1908, and was 44% of the normal. In this fifty year period there were 7 years when the annual rainfall was less than 80% of the normal. For the district as a whole there was only one instance of two consecutive years getting low rainfall, But at some stations two or three consecutive years of low rainfall have been experienced on more than one occasion. It will be seen from table 2 that in 40 years out of fifty, rainfall in the district was between 801 and 1300 mm.

On the average rainfall of 2.5 mm or more occurs on 47 days in a year.

The highest rainfall in 24 hours which occurred at any station in the district was 368.8 mm, at Fyzabad on 1953 September 29.

Temperature

A meteorological observatory started functioning recently at Faizabad. The description of the climate is based on the records of the same. The winter starts in late November when both day and night temperatures begin to drop rapidly. January is generally the coldest month with the average minimum temperature of about 7°C and mean maximum temperature is 22.3°C. Occasional cold waves in the wake of western disturbances bring down the minimum temperature to within a degree or two of the freezing point of water and slight-frosts may occur. From March temperatures start rising rapidly and in May and early June, the hottest part of the year, day temperatures sometimes reach 47°C. The onset of the monsoon in the latter half

of June results in an appreciable drop in temperature. During breaks in the monsoon in late September and in October day temperatures shows a slight increase.

The highest maximum recorded at Faizabad was 47.4°C on 1966 June 9 and lowest minimum temperature was 0.8°C on 1964 January 27.

Humidity

Except during the monsoon and early post monsoon period the air is comparatively dry. Low values of humidity of the order of 30 percent are common in summer afternoons.

Cloudiness

The monsoon season is marked by heavily clouded overcast skies. Except during spells of bad weather associated with western disturbances, skies are generally clear in the winter months. With the advance of summer cloudiness begins to increase.

Winds

Winds are generally light except in the late summer and monsoon when they strengthen slightly. Easterly winds predominate during the monsoon season while westerlies prevail during the rest of the year.

Special Weather Phenomena

Depressions and cyclonic storms from the Bay of Bengal affect the district during the monsoon season and cause heavy widespread rain. In the winter season western disturbances cause occasional rain or hail. Violent dust or thunderstorms at times accompanied with hail are experienced in the summer months. Fog occurs at times during winter season.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount Date (mm)	
Faizabad	50 a	13.2	18.0	8.9	7.9	16.8	113.5	338.6	280.7	196.3	46.7	3.3	6.3	1050.2	187	35	368.8	1953 Sep 29
	b	1.3	1.7	0.8	0.5	1.4	5.4	13.5	13.0	8.1	1.9	0.3	0.5	48.4	(1903)	(1918)		
Akbarpur	50 a	12.2	19.1	6.6	6.6	16.5	98.2	289.8	272.5	188.5	52.3	5.1	5.1	967.5	198	44	241.3	1920 Jul 06
	b	1.3	1.8	0.7	0.6	1.0	5.4	12.7	12.7	8.1	2.0	0.4	0.5	47.2	(1915)	(1932)		
Bikapur	50 a	15.5	21.6	7.9	7.4	16.6	114.8	312.7	295.7	215.7	47.5	4.1	5.6	1064.4	178	42	273.3	1953 Aug 02
	b	1.6	1.8	0.8	0.6	1.2	5.3	13.8	13.4	9.0	2.0	0.4	0.6	50.5	(1903)	(1918)		
Tanda	50 a	13.2	18.5	8.9	6.6	14.7	107.4	319.3	204.2	205.2	48.8	5.3	4.1	1036.0	158	39	262.9	1894 Oct 02
	b	1.5	1.8	0.9	0.7	1.4	5.8	13.8	12.7	8.2	2.0	0.4	0.4	49.6	(1921)	(1908)		
Jalalpur	50 a	10.7	17.0	5.3	6.9	7.9	89.9	265.7	275.8	175.2	43.2	5.3	5.6	906.5	149	31	254.0	1896 Aug 21
	b	1.0	1.3	0.5	0.5	0.6	4.3	11.9	12.0	8.2	1.9	0.4	0.5	43.1	(1936)	(1908)		
Ayodhya	25 a	15.2	19.3	5.8	3.8	12.7	119.9	310.6	283.2	202.2	42.9	4.6	6.3	1026.5	164	35	279.4	1938 Aug 10
	b	1.3	1.3	0.6	0.4	0.8	5.5	12.6	12.2	7.9	1.6	0.3	0.8	45.3	(1938)	(1949)		
Faizabad (District)	a	13.3	18.9	7.2	6.5	14.2	106.5	306.1	282.0	196.7	46.9	4.6	5.5	1008.4	158	44		
	b	1.3	1.6	0.7	0.5	1.1	5.3	13.1	12.7	8.5	1.9	0.4	0.5	47.4	(1903)	(1908)		

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	1	1001 - 1100	13
501 - 600	2	1101 - 1200	6
601 - 700	1	1201 - 1300	6
701 - 800	3	1301 - 1400	0
801 - 900	8	1401 - 1500	2
901 - 1000	7	1501 - 1600	1

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

Month	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded °C	Date	Lowest Minimum ever recorded °C	Date	Relative Humidity 0830 1730* % %	
January	22.5	7.3	28.0	1980 Jan 28	0.8	1964 Jan 27	85	63
February	26.0	10.4	34.2	1974 Feb 24	2.1	1964 Feb 03	72	51
March	31.7	14.8	39.9	1977 Mar 31	8.1	1980 Mar 08	54	36
April	37.1	20.0	43.7	1974 Apr 27	11.4	1965 Apr 03	41	26
May	39.3	23.8	46.0	1969 May 25 26	17.7	1960 May 07 10	49	30
June	37.2	26.2	47.4	1966 Jun 09	20.9	1977 Jun 08	70	52
July	33.0	25.6	41.6	1979 Jul 08	22.0	1976 Jul 15	85	75
August	32.6	25.4	37.5	1979 Aug 08	22.3	1961 Aug 24	88	81
September	32.4	24.3	37.8	1979 Sep 12	19.8	1965 Sep 25	82	78
October	31.3	19.4	37.7	1974 Oct 14	12.9	1960 Oct 27	76	73
November	28.2	12.2	34.1	1979 Nov 01 03	6.4	1975 Nov 30	77	68
December	23.9	7.8	30.6	1978 Dec 15	2.9	1961 Dec 26 27	81	68
Annual	31.3	18.1					72	58

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(FAIZABAD)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.9	3.6	4.5	4.8	4.8	5.2	4.5	3.7	3.5	2.2	1.7	2.3	3.6

FATEHPUR DISTRICT

The climate of this district is characterised by a hot summer and a pleasant winter. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The period from about mid-June to the end of September is the southwest monsoon season. October and the first half of November constitute the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for three stations for sufficiently long periods. The details of the rainfall at these 3 stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 906.2 mm. The rainfall in the district varies from 870.3 mm at Fatehpur to 926.8 mm at Khaja. About 90 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, August being the rainiest month. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 168 percent of the normal occurred in 1915. The lowest annual rainfall amounting to 60 percent of the normal occurred in 1918. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 8 years, none of them were consecutive. Considering the annual rainfall at the individual stations, it is seen that two consecutive years of such low rainfall occurred twice each at Khajwa and Khaga. It will be seen from table 2 that the annual rainfall in the district was between 601 mm and 1100 mm in 40 years out of 50.

On an average there are 46 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 514.9 mm at Khajwa on 1915 August 31.

Temperature

There is a meteorological observatory in the district at Fatehpur and the records of this observatory may be taken as representative of the climatic conditions prevailing in the district in general. After February there is a rapid increase in temperatures. May and the early part of June constitute the hottest part of the year. The mean daily maximum temperature in May is 42.3°C and the mean daily minimum 27.3°C . The heat in summer is intense and on some

days the maximum temperature reaches over 47°C . The afternoon thundershowers which occur on some days bring welcome relief though only temporarily. With the advance of the monsoon into the district by about the middle of June there is appreciable drop in the day temperature. In the early part of the monsoon season nights are generally warm as during the latter part of the summer. In September and October there is a slight increase in day temperature but the night temperatures after September begin to decrease rapidly. It is only after October that the day temperatures begins to decrease. January is generally the coldest month with the mean daily maximum temperature at 23.4°C and the mean daily minimum at 8.9°C . In the wake of passing western disturbances in winter, cold waves affect the district and the minimum temperature drops down to about a degree or two above the freezing point of water.

The highest maximum temperature recorded at Fatehpur was 47.5°C on 1966 June 7. The lowest minimum was -0.1°C on 1982 December 27.

Humidity

During the monsoon season relative humidities are high being over 70 percent. After the withdrawal of the southwest monsoon humidity decreases steadily. The driest part of the year is the summer season when the relative humidities in the afternoons are less than 30 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two in the cold season when the district is affected by passing western disturbances heavily clouded or overcast skies prevail. In the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally very light with some increase in speed during the latter part of the summer season. Except during the period May to August winds are generally westerly to northwesterly. By May winds from directions between northeast and southeast appear and these continue up to August. Westerly to northwesterly winds also blow on many days in this period.

Special Weather Phenomena

During the early part of the monsoon season some of the depressions originating in the Bay of Bengal move across the country and affect the weather causing widespread heavy rain and gusty winds. Western disturbances occasionally affect the weather over the district in the cold season and a few thunderstorms occur accom-

panied by hail. Duststorms and thunderstorms occur during the hot season. Rain during the monsoon season is often associated with thunder. Fog occur occasionally during the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Fatehpur (obsy)	19 a	16.7	17.9	7.8	7.0	5.6	67.4	280.6	281.7	154.9	19.4	2.4	8.9	870.3	156 (1936)	62 (1941)	210.0	1970 Sep 16
	b	1.9	1.8	0.9	0.6	0.6	5.5	12.1	13.5	8.0	1.3	0.4	0.8	47.4				
Khajwa	50 a	16.0	20.3	9.4	6.6	7.1	68.6	266.2	308.4	176.8	32.0	4.6	5.8	921.8	194 (1915)	55 (1918)	514.9	1915 Aug 31
	b	1.5	1.5	1.0	0.6	0.8	3.7	12.3	12.7	7.2	1.5	0.4	0.5	45.5				
Khaga	50 a	14.2	17.3	8.6	7.1	8.4	73.7	287.3	292.3	177.5	27.4	5.6	7.4	926.8	170 (1936)	63 (1913)	263.9	1953 Aug 20
	b	1.4	1.7	0.8	0.6	0.6	4.0	12.8	15.5	8.0	1.6	0.6	0.7	46.5				
Fatehpur (District)	a	15.6	18.5	8.6	6.9	7.0	69.9	278.0	294.1	169.7	26.3	4.2	7.4	906.2	168 (1913)	60 (1918)		
	b	1.5	1.7	0.9	0.6	0.7	4.4	12.4	13.2	7.7	1.5	0.5	0.7	45.8				

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	2	1001 - 1100	10
601 - 700	6	1101 - 1200	3
701 - 800	9	1201 - 1300	2
801 - 900	9	1301 - 1400	1
901 - 1000	6	1401 - 1500	1
		1501 - 1600	1

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

Month	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded °C	Date	Lowest Minimum ever recorded °C	Date	Relative Humidity 0830 1730* % %
January	23.4	8.9	35.3	1983 Jan 25	1.1	1935 Jan 20	74 51
February	26.6	11.1	35.5	1966 Feb 27	2.1	1974 Feb 07	67 41
March	33.1	16.3	41.7	1953 Mar 08	5.3	1979 Mar 10	47 26
April	38.6	22.1	45.0	1961 Apr 30 ⁰¹	9.8	1982 Apr 27	37 26
May	42.3	27.3	47.2	1952 May 26	15.3	1969 May 02	39 25
June	40.1	28.8	47.5	1966 Jun 07	17.9	1982 Jun 05	54 41
July	33.8	26.7	44.0	1962 Jul 04	15.1	1983 Jul 03	81 73
August	32.1	25.9	41.0	1972 Aug 2, 3	14.6	1983 Aug 26	86 81
September	32.7	25.0	40.0	1970 Sep 29	13.4	1982 Sep 27	82 74
October	32.8	20.0	38.9	1951 Oct 19	11.4	1982 Oct 30 31	69 56
November	29.0	12.7	36.4	1976 Nov 26	1.7	1982 Nov 29	63 47
December	24.5	9.0	31.1	1946 Dec 01	-0.1	1982 Dec 27	72 54
Annual	32.4	19.5					64 50

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(FATEHPUR)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.1	4.1	5.5	5.7	6.4	7.0	5.9	4.8	4.0	2.5	2.3	2.5	4.5

TABLE - 5
Special Weather Phenomena
(FATEHPUR)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.0	2	1.9	1.3	2	3	3	3	3	0.5	0.0	0.3	21
Hail	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5
Dust-storm	0.0	0.5	0.3	0.6	1.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	3
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.5	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	1.1

*No. of days two and above are given in whole numbers.

GHAZIPUR DISTRICT

In common with the other eastern districts of Uttar Pradesh the climate of this district is moist and relaxing except in the summer and cold seasons. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The period from mid-June to the end of September constitutes the southwest monsoon season. The succeeding period till the middle of November is the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for only 4 stations for periods ranging from 95 to 99 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1051.8 mm. The rainfall in the district is fairly uniform except for the region round about Zamaria which gets a little less rainfall. About 88 percent of the annual normal rainfall in the district is received in the southwest monsoon season, August being the rainiest month. The variation in the rainfall from year to year is not large. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 145 percent of the normal was recorded in 1936. The lowest annual rainfall amounting to 66 percent of the normal occurred in 1932. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 7 years 3 of them being consecutive. Considering the rainfall at individual stations, two consecutive years of such low rainfall occurred twice at Saidpur Bhitari and Zamaria and once at Ghazipur. Three consecutive years of such low rainfall occurred once at Muhammadabad. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1300 mm in 36 years out of 50.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 47 at Zamaria to 50 or 51 in the rest of the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 428.8 mm at Saidpur Bhitari on 1940 August 29.

Temperature

There is no meteorological observatory in the district. The description which follows is based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. From the beginning of March temperatures begin to increase rapidly. May is usually the hottest month with the mean daily maxi-

mum temperature at about 41°C and the mean daily minimum at about 26°C . The summer is intensely hot and on individual days the maximum temperature may sometimes be as high as 47°C . With the advance of the monsoon into the district by about the middle of June there is appreciable drop in the day temperature. But the nights are as warm as during the latter part of the summer. Even in July and August when the southwest monsoon is well established day temperatures may reach over 40°C on some days during breaks in the rains. The day temperatures do not decrease even after the withdrawal of the monsoon early in October, but the nights become cooler. After October both the day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 9°C . In the cold season in association with passing western disturbances the district experiences cold waves when the minimum temperatures may go down to a degree or two above the freezing point of water.

Humidity

In the southwest monsoon season relative humidities are high, being over 70 percent. Thereafter the air gradually becomes drier. By summer, relative humidities become very low, particularly in the afternoons.

Cloudiness

In the southwest monsoon season skies are heavily clouded or overcast. Thereafter cloudiness decreases rapidly and the skies become generally clear or lightly clouded in the cold season and in summer. But in the cold season, in association with passing western disturbances, cloudy conditions occur for brief spells of a day or two.

Winds

Winds are generally light throughout the year. During the non-monsoon months the predominant winds are from directions between southwest and northwest. By May winds from directions between north west and southwest begin to blow and these predominate in the monsoon season. On some days during the monsoon winds blow from the west or southwest.

Special Weather Phenomena

Some of the monsoon depressions particularly in the early part of the season which originate at the head of the Bay of Bengal and move in some westerly to northwesterly direction across the country affect the weather over the district causing heavy rain.

Dust or thunderstorms occur in the summer months. Some thunderstorms occur in the cold season also. Occasional fogs occur in December and January.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)		
Ghazipur	50 a	17.0	22.3	8.4	6.3	12.5	121.4	303.3	315.7	205.5	44.2	7.9	6.1	1070.6	155 (1922)	60 (1947)	346.7	1940	Aug 29
	b	1.5	1.8	1.0	0.5	1.1	6.0	13.1	13.9	8.8	2.3	0.5	0.4	50.9					
Saidpur- bhitari	50 a	17.3	21.8	10.2	5.6	12.5	122.2	300.5	339.9	206.5	51.1	6.9	6.1	1100.6	147 (1922)	54 (1908)	428.8	1940	Aug 29
	b	1.5	1.8	0.9	0.5	0.8	5.5	12.8	14.7	8.2	2.3	0.6	0.5	50.1					
Zamania	50 a	15.2	20.1	5.6	3.8	9.1	121.4	265.9	287.0	177.5	47.7	7.4	6.5	965.0	157 (1936)	65 (1932)	215.9	1927	Aug 01
	b	1.1	1.6	0.8	0.4	0.7	5.4	12.2	12.8	8.5	2.1	0.5	0.4	46.5					
Muhammada- bad	50 a	16.5	20.6	8.1	4.8	15.7	113.5	299.0	313.7	212.3	51.8	8.4	5.8	1070.2	144 (1944)	65 (1908)	285.2	1953	Sep 12
	b	1.3	1.7	0.8	0.5	1.1	5.6	13.2	15.8	9.0	2.3	0.6	0.5	50.4					
Ghazipur (District)	a	16.0	21.2	8.1	5.1	12.5	119.6	292.2	314.1	200.5	48.7	7.7	6.1	1051.8	145 (1936)	66 (1932)			
	b	1.3	1.7	0.9	0.5	0.9	5.6	12.8	13.8	8.6	2.3	0.5	0.5	49.4					

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	1	1101 - 1200	7
701 - 800	5	1201 - 1300	5
801 - 900	6	1301 - 1400	6
901 - 1000	9	1401 - 1500	1
1001 - 1100	9	1501 - 1600	1

GONDA DISTRICT

The climate of this district is characterised by good rainfall mainly during the southwest monsoon season and a dry hot summer. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The southwest monsoon season is from the middle of June to September. October and first half of November constitute the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for 92 years for three stations and for 38 years for the fourth. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1123.7 mm. The rainfall in the district generally increases from the southwest towards the northeast and varies from 994.7 mm at Mankapur to 1219.0 mm at Gonda. About 88 percent of the annual rainfall is received in the district during the southwest monsoon month June to September, July being the rainiest month. The variation in the annual rainfall from year to year is large. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 201 percent of the normal occurred in 1938. The lowest annual rainfall which was only 41 percent of the normal occurred in 1907. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 6 years, two of them being consecutive. Considering the rainfall at the individual stations, two consecutive years of such low rainfall occurred thrice at Gonda, twice at Tarabganj and once each at the other two stations. It will be seen from table 2 that the annual rainfall in the district was between 901 and 1400 mm in 38 years out of 50.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 43 at Mankapur to 52 at Atraula.

The heaviest rainfall in 24 hours recorded at any station in the district was 428.0 mm at Tarabganj on 1901 September 25.

Temperature

There is a meteorological observatory in the district at Gonda. The records of this observatory may be taken as representative of the climatic conditions prevailing in the district in general. After about the end of February there is steady increase in temperature. May is generally the hottest month with the mean daily maximum temperature at 39.9°C and the mean daily minimum at

25.6°C. The summer is intensely hot, and on individual days during May and early June the maximum temperature may reach over 49°C. The hot dust-laden winds which blow on many days in the summer season particularly in the southern parts of the district make the weather very trying. Afternoon thundershowers which occur on some days during the summer bring welcome relief, though only temporarily. With the advance of the monsoon into the district by about the middle of June there is appreciable drop in the day temperature. The nights during the monsoon season are nearly as warm as during the summer. There is a slight increase in day temperature during September but the nights become progressively cooler by the end of September. After October there is rapid fall in both day and night temperatures. January is generally the coldest month with the mean daily maximum temperature at 22.9°C and the mean daily minimum at 8.3°C. In the cold season, cold waves affect the district in the wake of passing western disturbances and the minimum temperature occasionally drops down to about a degree above the freezing point, of water.

The highest maximum temperature recorded at Gonda was 49.9°C on 1958 May 8. The lowest minimum was 1.0°C on 1964 January 27, 31.

Humidity

Mornings in general are highly humid except in the summer season when they are between 35 and 50 percent. In the southwest monsoon season the relative humidity exceeds 75 percent. In the rest of the year, in the afternoons the humidity is comparatively less. The driest part of the year is the summer when in the afternoons the relative humidities are less than 30 percent.

Cloudiness

In the southwest monsoon season and for brief spells of a day or two in the cold season when the district is affected by passing western disturbances heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light with some strengthening in the latter part of the summer season. In May and the southwest monsoon season winds are predominantly from the east or southeast. By October winds from the west or northwest begin to blow and these predominate till April.

Special Weather Phenomena

Occasional thunderstorms occur in the latter half of summer and the monsoon months. In association with the passage of western disturbances in the cold season occasional thunderstorms with hail occur. In the northern parts of the district fogs occur occasionally in the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Gonda	50 a	16.5	20.8	10.2	7.1	26.2	143.3	361.7	329.7	241.8	49.5	5.6	6.6	1219.0	233	35	306.6	1938 Aug 10
	b	1.4	1.5	0.8	0.4	1.8	5.5	13.0	13.5	8.5	2.1	0.3	0.5	49.5	(1938)	(1907)		
Tarabganj	50 a	13.2	20.8	9.1	7.9	21.8	126.2	324.4	297.7	214.4	51.1	3.6	6.1	1096.3	172	47	428.0	1901 Sep 25
	b	1.3	1.7	0.9	0.6	1.6	6.0	13.6	13.9	8.1	1.9	0.3	0.6	50.5	(1938)	(1918)		
Atraula	50 a	17.0	18.8	11.4	9.9	32.5	161.8	358.4	312.7	194.1	56.4	6.9	5.3	1185.2	179	38	304.8	1887 Aug 20
	b	1.6	1.6	0.9	0.7	2.4	6.9	13.5	13.5	7.9	2.1	0.3	0.6	52.0	(1938)	(1907)		
Mankapur	29 a	12.5	14.7	6.9	6.3	11.2	99.8	300.0	285.2	206.3	43.2	5.3	5.3	994.7	221	64	411.5	1938 Aug 10
	b	1.2	1.1	0.4	0.4	1.0	4.5	12.3	12.5	7.5	1.8	0.1	0.6	43.4	(1938)	(1928)		
Gonda (District)	a	14.8	18.8	9.4	7.8	22.9	132.8	336.1	305.8	214.1	50.1	5.3	5.8	1123.7	201	41		
	b	1.4	1.5	0.7	0.5	1.7	5.7	13.1	13.5	8.0	2.0	0.3	0.6	48.8	(1938)	(1907)		

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	1	1301 - 1400	5
501 - 600	0	1401 - 1500	1
601 - 700	2	1501 - 1600	2
701 - 800	1	1601 - 1700	2
801 - 900	2	1701 - 1800	0
901 - 1000	8	1801 - 1900	0
1001 - 1100	8	1901 - 2000	0
1101 - 1200	12	2001 - 2100	0
1201 - 1300	5	2101 - 2200	0
		2201 - 2300	1

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	Date	$^{\circ}\text{C}$	Date	%	%
January	22.9	8.3	28.9	1946 Jan 27	1.0	1964 Jan 27, 31	84	61
February	25.7	10.5	35.0	1974 Feb 23	1.6	1964 Feb 02	73	45
March	32.2	15.4	41.1	1941 Mar 28	4.0	1979 Mar 10	52	31
April	37.6	21.0	44.6	1980 Apr 27, 29	11.8	1965 Apr 03	39	22
May	36.9	25.6	49.9	1958 May 08	14.9	1979 May 25	49	28
June	37.4	26.9	48.0	1966 Jun 09	16.7	1936 Jun 02	69	51
July	32.9	26.2	41.7	1957 Jul 10	17.7	1976 Jul 10	84	76
August	32.2	25.9	38.8	1980 Aug 26	16.7	1956 Aug 15	85	80
September	32.5	24.9	37.8	1932 Sep 02	16.2	1979 Sep 24	82	76
October	32.1	20.0	37.2	1951 Oct 17	12.2	1957 Oct 28	79	66
November	28.6	12.6	34.5	1979 Nov 02, 3	5.6	1934 Nov 30	78	59
December	24.3	8.8	29.0	1976 Dec 04	2.8	1964 Dec 14	84	63
Annual	31.5	18.8					71	55

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(GONDA)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.9	5.1	6.5	7.4	7.7	7.3	6.4	5.2	4.6	3.0	2.4	2.8	5.2

TABLE - 5
Special Weather Phenomena
(GONDA)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.0	1.0	1.0	1.0	2	3	3	3	2	1.0	0.0	0.3	18
Hail	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.8
Duststorm	0.3	0.0	0.0	0.2	0.3	0.4	0.0	0.0	0.1	0.0	0.0	0.0	1.3
Squall	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Fog	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	1.0	1.3

*No. of days 2 and above are given in whole numbers.

GORAKHPUR DISTRICT

The district has a climate which is more equable than that of the adjoining districts to the west and north. The climate of the northern portions of the district is influenced to some extent by the proximity of the hills to the north and the existence of the Terai swamps. The year may be divided into four seasons. The cold season from mid November to February is followed by the summer season from March to the middle of June. The period from mid-June to the end of September is the southwest monsoon season. October and the first half of November constitute the post monsoon season.

Rainfall

The district has four rain gauge stations, the records of three of them extending to 97 years. One station viz. Pharenda has rainfall data for 20 years only. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The southwest monsoon usually arrives over the district by about the middle of June, and withdraws by the end of September. The average annual rainfall in the district is 1393.1 mm. About 87% of the annual rainfall is received during the period June to September, July being the month with the heaviest rainfall. The rainfall in the district generally increases from the southwest to the north-east. There is no large variation in the rainfall from year to year. In the fifty year period 1901 to 1950, the highest annual rainfall which was 130% of the normal occurred in 1936, while the lowest annual rainfall was in 1907 when it amounted to 54% of the normal. In the same 50 year period, there were 14 years when the annual rainfall was less than 80% of the normal. Two consecutive years of rainfall less than 80% of the normal occurred twice and three or four consecutive years of such low rainfall once each. It will be seen from table 2 that the annual rainfall was between 1101 and 1600 mm in 32 years out of 50.

On an average there are 55 rainy days (i.e. days with rain of 2.5 mm or more) in a year in the district and the variation from station to station is not much.

The heaviest rainfall in 24 hours recorded at any station in the district was 439.7 mm at Maharajganj on 1900 September 28.

Temperature

There are meteorological observatories at Gorakhpur and Nautanwa in the district. While the meteorological records at Nautanwa extend to a few years only, those of Gorakhpur observatory are available for a long period of years. The data for Gorakhpur observatory may be taken as fairly representative of the meteorological conditions in the district.

logical conditions in the district, except that the northern regions of the district have a comparatively milder summer as seen from the short period records at Nautanwa. The cold season commences from mid November with a rapid fall in temperature. January is the coldest month with the mean daily maximum temperature at 23.0°C and the mean daily minimum temperature at 9.9°C . In association with cold waves in the wake of western disturbances passing eastwards in the winter season, temperatures may go down to a degree or two above the freezing point of water. Temperatures begin to rise rapidly after February. May is the hottest month with the mean daily maximum temperature at 39.0°C and the mean daily minimum at 25.9°C . With the advent of the monsoon air by the latter half of June, day temperatures drop appreciably but the nights continue to be as warm as in the summer months. During the breaks in the monsoon in September, day temperatures increase slightly. With the withdrawal of the monsoon by the beginning of October temperatures decrease progressively.

The highest maximum temperature recorded at Gorakhpur was 48.3°C on 1958 May 26 and the lowest minimum was 1.7°C on 1933 January 15.

Humidity

During the monsoon and the post monsoon seasons the relative humidities are high and are between 70 and 85%. There is some decrease in humidity in the winter months and in the summer season the air is comparatively drier.

Cloudiness

In the southwest monsoon season skies are heavily clouded to overcast. During the rest of the year clear or lightly clouded skies prevail. But in the winter season when the district is affected by passing western disturbances the skies become heavily clouded or overcast for short spells of two or three days.

Winds

Winds are generally light with a slight increase in force in the late summer and southwest monsoon months. In the cold season, winds are mainly from the west. During the early part of the hot season easterlies begin to appear, but the westerlies predominate. Easterlies and northeasterlies prevail in late summer and monsoon seasons. In October, winds are light with a large proportion of calms, and the directions are mainly west, northeast or east.

Special Weather Phenomena

Occasional thunderstorms occur in late summer and the monsoon months. In association with spells of bad weather due to the passage of western disturbances, specially in the latter part of the winter season some thunderstorms accompanied with hail occasionally occur. In the northern parts of the district occasional fogs are met with in the cold season.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Gorakhpur.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Gorakhpur	50 a	13.5	18.8	9.9	10.4	40.6	160.8	358.7	345.9	231.4	60.2	4.8	4.3	1259.3	139 (1936)	52 (1907)	284.5	1912 Aug 19
	b	1.4	2.0	0.9	0.9	2.5	7.6	14.0	15.1	10.0	2.3	0.3	0.4	57.4				
Maharajgang	50 a	13.2	19.6	11.9	14.5	55.1	190.5	405.3	338.3	245.1	67.1	4.6	3.6	1562.8	152 (1910)	60 (1919)	439.7	1900 Sep 28
	b	1.2	1.6	0.8	1.0	3.2	8.1	13.8	13.8	9.0	2.5	0.3	0.3	55.6				
Banasgaon	50 a	11.2	18.5	8.9	7.9	26.7	151.1	316.7	334.3	179.3	57.4	6.6	3.8	1102.4	151 (1910)	64 (1918)	225.0	1967 Jun 29
	b	1.1	1.7	0.8	0.7	2.0	6.4	13.2	15.0	8.6	2.4	0.4	0.4	52.7				
Pharenda	10 a	20.1	29.0	12.7	32.3	58.9	192.5	559.1	461.0	375.4	106.2	0.0	0.3	1847.5	119 (1948)	55 (1942)	348.0	1969 Aug 19
	b	1.1	1.2	0.3	1.7	3.0	6.7	14.5	14.6	10.2	2.5	0.0	0.0	55.8				
Gorakhpur (District)	a	14.5	21.5	10.9	16.3	44.8	168.7	409.5	369.9	257.3	72.7	4.0	3.0	1393.1	130 (1936)	54 (1907)		
	b	1.2	1.6	0.7	1.1	2.7	7.2	13.9	14.6	9.5	2.4	0.3	0.3	55.5				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2

Frequency of Annual Rainfall in the District

(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
701 - 800	1	1301 - 1400	8
801 - 900	2	1401 - 1500	4
901 - 1000	4	1501 - 1600	5
1001 - 1100	5	1601 - 1700	3
1101 - 1200	10	1701 - 1800	1
1201 - 1300	5	1801 - 1900	2

TABLE - 3

Normals of Temperature and Relative Humidity

(GORAKHPUR)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	23.0	9.9	39.0	1937 Jan 31	1.7	1933 Jan 15	80	57
February	25.9	12.3	35.4	1974 Feb 24	2.8	1905 Feb 02	70	44
March	32.6	17.2	41.7	1941 Mar 28	8.3	1927 Mar 03	51	30
April	37.4	22.4	44.4	1980 Apr 29	12.2	1905 Apr 05	43	26
May	39.0	25.9	48.3	1958 May 26	16.6	1977 May 02	56	36
June	36.4	26.7	46.5	1958 Jun 02	16.1	1949 Jun 01	72	55
July	32.8	26.4	41.8	1979 Jul 08	18.9	1953 Jul 28	83	76
August	32.3	26.2	39.4	1979 Aug 08	21.1	1944 Aug 29	84	79
September	32.6	25.6	38.5	1979 Sep 30	17.4	1984 Sep 29	81	74
October	32.2	21.5	37.4	1983 Oct 08	12.8	1895 Oct 31	74	61
November	28.5	14.6	38.6	1984 Nov 25	6.7	1953 Nov 17	69	55
December	24.3	10.8	30.5	1984 Dec 01	2.8	1913 Dec 29	77	61
Annual	31.4	20.0					70	54

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(GORAKHPUR)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.9	3.9	5.4	6.4	7.1	6.8	6.3	4.6	3.3	2.7	2.0	2.3	4.5

TABLE - 5
Special Weather Phenomena
(GORAKHPUR)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.2	0.2	0.1	0.5	0.7	0.5	0.5	2	0.7	0.2	0.0	0.1	6
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
Duststorm	0.1	0.0	0.1	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.2	6

*No. of days two and above are given in whole numbers.

HAMIRPUR DISTRICT

The climate of Hamirpur district is characterised by an intensely hot summer, a pleasant cold season and general dryness except during the monsoon season. The year may be divided into four seasons. The summer season from March to about the middle of June is followed by the southwest monsoon season from mid-June to the end of September. October and the first half of November constitute the post monsoon or transition period. The cold season is from about the middle of November to February.

Rainfall

Records of rainfall in the district are available for 10 rain-gauge stations for periods ranging from 54 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 850.7 mm. The rainfall in the district in general increases from the northwest towards the southeast. About 90 per cent of the annual rainfall in the district is received during the months June to September, July and August being the rainiest months. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 158 percent of the normal occurred in 1919, while the lowest annual rainfall which was only 36 percent of the normal was recorded in 1918. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 10 years, two of them being consecutive. Considering the annual rainfall at the individual stations however, two consecutive years of such low rainfall is fairly common, occurring thrice at Khannah, twice at 4 stations and once each at 3 out of the 5 remaining stations. Three consecutive years of such low rainfall also occurred twice at Belathal in the same 50 year period. It will be seen from table 2 that the annual rainfall in the district was between 601 and 1100 mm in 37 years out of 50.

On an average there are 42 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 36 at Khannah to 47 at Mahoba.

The heaviest rainfall in 24 hours recorded at any station in the district was 334.0 mm at Maudaha on 1923 September 30.

Temperature

There is a meteorological observatory at Hamirpur started very recently in the district. The description which follows is based on the records of observatories in the adjoining districts

where similar climatic conditions prevail. From about the beginning of March temperatures begin to increase rapidly. May and the early part of June is generally the hottest part of the year. The mean daily maximum temperature in May is about 43°C and the mean daily minimum about 28°C . The heat during summer is intense, the maximum temperature on individual days sometimes reaching 45°C or over. With the advance of the monsoon into the district by about the middle of June there is appreciable drop in temperature and the weather becomes more bearable. In September due to breaks in the southwest monsoon, day temperatures increase slightly. In October while days are as hot as in September nights become cooler. After October temperatures decrease steadily. In January which is usually the coldest month, the mean daily maximum temperature is about 24°C and the mean daily minimum about 10°C . During the cold season, in association with the passing western disturbances, cold waves affect the district and the minimum temperature sometimes drops down to about 2 or 3°C .

Humidity

During the monsoon season the relative humidity is high being over 70 percent. Thereafter humidities decrease progressively and by summer which is often the driest part of the year the relative humidities in the afternoons go down to 25 percent or less.

Cloudiness

During the monsoon season and for spells of a day or two in association with passing western disturbances in the cold season, skies are generally heavily clouded or overcast. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

The winds are generally light with a little increase in force in the summer and the early part of the southwest monsoon season. During the period November to April winds are mostly from the west or northwest. By May easterlies and northeasterlies also appear. In the southwest monsoon season winds are either from the southwest to west or from the northeast to east. By October easterlies and northeasterlies become less common.

Special Weather Phenomena

Storms and depressions from the Bay of Bengal during the monsoon months moving in some westerly direction approach the neighbourhood of the district and cause widespread heavy rain and gusty winds. In the cold season western disturbances affect the weather over the district causing thunderstorms. Thunderstorms and duststorms occur during summer. Rain during the monsoon season is often associated with thunder. Fog occurs occasionally during the cold season.

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Hamirpur	50 a	14.2	20.1	9.7	6.3	6.3	60.5	268.0	291.3	147.8	28.2	5.6	7.9	865.9	161 (1919)	31 (1905)	254.3	1943 Aug 07
	b	1.3	1.3	1.0	0.6	0.8	3.7	12.5	12.5	7.3	1.3	0.4	0.6	43.3				
Rath	50 a	15.2	13.7	9.7	5.1	8.1	81.3	297.7	288.8	160.8	20.8	8.1	7.6	916.9	172 (1919)	40 (1918)	233.7	1891 Sep 08
	b	1.4	1.3	0.9	0.5	1.0	4.8	13.1	13.1	7.4	1.1	0.5	0.7	45.8				
Maudaha	50 a	16.0	14.5	7.1	3.8	7.4	68.8	252.0	277.1	148.3	22.9	6.9	7.6	832.4	156 (1923)	31 (1918)	334.0	1923 Sep 30
	b	1.3	1.3	0.8	0.5	0.8	4.0	12.6	13.0	7.3	1.4	0.6	0.6	44.2				
Kulpahar	50 a	10.9	8.9	5.6	3.1	5.6	60.5	268.7	270.3	152.1	20.8	8.1	4.8	819.4	189 (1919)	29 (1918)	297.2	1882 Jun 17
	b	0.9	0.8	0.5	0.3	0.6	3.6	12.0	11.8	6.7	1.1	0.4	0.5	39.2				
Mahoba	50 a	15.7	14.7	6.6	5.8	6.6	79.3	308.6	289.1	149.9	31.0	11.2	8.6	927.1	152 (1919)	44 (1913)	287.0	1882 Jun 17
	b	1.3	1.3	0.7	0.6	0.8	4.9	14.1	13.2	7.4	1.3	0.7	0.6	46.9				
Khannah	44 a	9.7	10.4	6.6	2.3	7.1	61.2	250.7	262.9	152.1	23.1	9.4	7.1	802.6	168 (1916)	58 (1918)	299.7	1916 Sep 24
	b	0.9	1.0	0.6	0.2	0.5	3.1	10.5	11.5	6.1	0.9	0.5	0.5	36.3				

contd....

TABLE - 1(contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm) Date		
Sarlia	49 a	12.7	14.5	7.1	5.1	7.1	78.5	262.6	257.8	133.3	20.6	6.1	5.3	810.7	174 (1919)	26 (1918)	265.4	1916	Aug 26
	b	1.2	1.2	0.7	0.4	0.9	4.4	11.8	12.1	7.0	1.2	0.4	0.5	41.8					
Charkhari (Maharaj-nagar)	50 a	14.7	11.4	8.9	4.1	7.6	85.3	284.7	284.0	144.8	23.1	9.1	7.4	885.1	165 (1919)	36 (1918)	251.5	1906	Sep 12
	b	1.4	1.2	0.8	0.4	0.8	4.5	13.3	6.8	1.2	1.2	0.6	0.7	44.8					
Belathal	50 a	12.9	8.9	4.8	3.6	2.3	60.7	297.9	296.9	138.9	19.8	10.4	3.8	860.9	188 (1904)	32 (1905)	208.3	1964	Sep 25
	b	1.0	0.9	0.4	0.3	0.3	3.8	12.5	12.0	6.5	1.1	0.4	0.4	39.6					
Bijanagar	50 a	12.5	11.2	5.1	4.1	3.3	59.7	266.9	256.0	131.1	22.6	7.6	5.8	785.9	155 (1926)	35 (1918)	193.3	1897	Jun 19
	b	1.2	0.0	0.5	0.4	0.3	3.8	12.4	12.2	6.5	1.1	0.4	0.5	40.3					
Hamirpur (District)	a	13.5	12.8	7.1	4.3	6.1	69.6	273.8	277.4	145.9	23.3	8.3	6.6	850.7	158 (1919)	36 (1918)			
	b	1.2	1.1	0.7	0.4	0.7	4.1	12.5	12.5	6.9	1.2	0.5	0.6	42.4					

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	2	901 - 1000	9
401 - 500	1	1001 - 1100	6
501 - 600	4	1101 - 1200	4
601 - 700	5	1201 - 1300	1
701 - 800	4	1301 - 1400	1
801 - 900	13		

HARDOI DISTRICT

The climate of this district which is generally healthy is characterised by a hot dry summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the end of November to February is followed by the summer season from March to about the middle of June. The southwest monsoon season is from mid-June to September. October and November constitute the post monsoon season.

Rainfall

The district has four rain gauge stations with records extending to over 90 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The normal annual rainfall for the district is 878.8 mm. The rainfall increases from the southwest to the northeast in the district and varies from 764.2 mm at Bilgram to 971.2 mm at Hardoi. The monsoon advances into the district in the latter half of June and withdraws by the end of September. About 88% of the annual rainfall is received during the monsoon months June to September. The variation in the rainfall from year to year is large. In the fifty year period 1901 to 1950 the highest annual rainfall amounting to 185% of the normal occurred in 1936. In 1907, which had the lowest annual rainfall, it was only 45% of the normal. In the same fifty year period rainfall less than 80% of the normal occurred in twelve years out of which two years were consecutive. Considering the rainfall at individual stations two and three consecutive years of such low rainfall occurred twice or thrice. It will be seen from table 2 that in 38 years out of fifty the rainfall in the district was between 501 and 1100 mm.

On an average there are 42 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district out of which 34 days are in the monsoon season. The number of rainy days varies from 39 at Bilgram to 43 at Hardoi.

The heaviest rainfall in 24 hours recorded at any station in the district was 369.6 mm at Hardoi on 1938 June 22.

Temperature

The only meteorological observatory in the district is at Hardoi which has been started recently. The description that follows is based on the records of this observatory which may be taken as representative of the conditions over the district as a whole. The cold season starts in late November when both day and

night temperatures begin to decrease rapidly. January is the coldest month with the mean daily minimum temperature at 8.5°C and the mean daily maximum at 22.1°C . In association with cold waves in the wake of western disturbances passing eastwards, the minimum temperatures may drop down to about 3°C on individual days. Temperatures rise rapidly after February. May is the hottest month with the mean daily maximum temperature at 41.1°C and the mean daily minimum at 25.3°C . The heat is intense during the summer season when the scorching westerly winds blow often. Maximum temperature may sometimes go upto 48°C . With the advance of the monsoon into the district in the latter half of June there is appreciable drop in day temperatures but nights continue to be even warmer than during the summer season. During breaks in the monsoon in September day temperatures increase slightly. After October both day and night temperatures begin to decrease progressively.

The highest maximum temperature recorded at Hardoi was 48.3°C on 1951 June 18 and the lowest minimum temperature was 0.7°C on 1964 January 27.

Humidity

The summer season is the driest part of the year when the relative humidities in the afternoons specially are less than 30%. In the southwest monsoon season the air is very humid. The humidities decrease thereafter.

Cloudiness

In the monsoon season skies are heavily clouded or overcast. During the rest of the year, skies are lightly clouded or clear. During the winter, skies are generally clear except when the district is affected by passing western disturbances, when cloudy conditions prevail for a short spells of a day or two.

Winds

In the post monsoon and winter months the winds are very light and variable in direction. In the summer, winds strengthen a little and blow mainly from a westerly or northwesterly direction. In the late summer easterlies appear and these strengthen and predominate during the monsoon months.

Special Weather Phenomena

During the southwest monsoon season some of the depressions and cyclonic storms from the Bay of Bengal affect the district and

its neighbourhood, causing widespread heavy rain. In the summer months dust storms and thunderstorms occur occasionally, some of them accompanied with hail. The rainfall during the monsoon season is often associated with thunder. Fogs occur occasionally during the cold season.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Hardoi.

.....

TABLE - 1
Normals and extremes of Rainfall

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 and year**	Lowest annual rain- as % of normal & Year**	Heaviest rain fall in 24hrs* Amount Date (mm)
Hardoi	50 a	16.0	18.8	12.7	5.3	14.7	98.8	287.8	277.6	186.7	41.4	2.5	8.9	971.2	187 (1958)	41 (1907)	369.6 1938 Jun 22
	b	1.6	1.6	0.9	0.6	1.2	4.0	11.7	11.8	7.9	1.3	0.2	0.7	45.5			
Shahabad	50 a	17.5	15.5	10.7	8.6	11.9	83.3	276.9	247.4	167.6	36.3	2.5	6.6	884.8	240 (1956)	45 (1908)	306.6 1903 Oct 10
	b	1.7	1.5	1.0	0.8	1.0	4.1	10.8	11.5	7.2	1.1	0.2	0.6	41.5			
Sandila	50 a	16.0	17.3	6.1	6.1	13.7	90.4	280.7	245.6	173.2	34.8	3.8	7.1	894.8	205 (1915)	27 (1907)	309.0 1867 Jul 28
	b	1.5	1.4	0.7	0.6	1.2	4.2	11.9	11.8	7.2	1.5	0.3	0.6	42.9			
Bilgram	50 a	14.5	14.5	6.9	4.6	15.2	61.5	240.5	228.9	140.5	28.5	2.5	8.1	764.2	177 (1954)	41 (1918)	210.8 1867 Jun 15
	b	1.3	1.3	0.8	0.4	1.3	3.5	10.9	10.8	6.9	1.2	0.2	0.6	39.2			
Hardoi (District)	a	16.0	16.5	9.1	6.1	13.4	83.5	271.5	249.9	167.0	35.3	2.8	7.7	878.8	185 (1956)	45 (1907)	
	b	1.5	1.5	0.9	0.6	1.2	3.9	11.3	11.5	7.3	1.3	0.2	0.6	41.8			

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
Frequency of Annual in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	1	1001 - 1100	8
401 - 500	1	1101 - 1200	4
501 - 600	6	1201 - 1300	4
601 - 700	4	1301 - 1400	1
701 - 800	8	1401 - 1500	0
801 - 900	9	1501 - 1600	0
901 - 1000	3	1601 - 1700	1

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

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830	1730*
January	22.1	8.5	28.9	1952 Jan 25	0.7	1964 Jan 27	86	57
February	26.1	10.7	32.8	1952 Feb 20	2.2	1964 Feb 03	72	41
March	32.0	15.8	39.2	1977 Mar 26	6.5	1982 Mar 07	60	31
April	37.9	20.6	43.9	1961 Apr 30	12.0	1965 Apr 03	40	22
May	41.1	25.3	45.6	1978 May 20	17.6	1964 May 13	43	27
June	39.5	27.6	48.3	1951 Jun 18	18.5	1979 Jun 12	62	43
July	33.6	26.6	44.5	1983 Jul 09	22.6	1979 Jul 02	84	74
August	32.5	26.1	38.0	1979 Aug 29,	21.6	1958 Aug 17	87	78
September	33.1	25.1	39.5	1979 Sep 30 02	19.2	1979 Sep 22	82	71
October	32.2	19.9	37.8	1952 Oct 06	11.1	1954 Oct 31	77	61
November	28.9	12.3	34.8	1978 Nov 08	6.1	1952 Nov 29	74	53
December	24.4	9.1	31.8	1959 Dec 15	1.7	1961 Dec 27	84	58
Annual	31.9	19.0					71	51

*Hours IST.

TABLE - 4
Mean Wind Speed in Km/hr.
(HARDOI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.3	5.4	6.2	7.1	7.9	7.4	7.0	5.5	5.7	3.8	2.9	3.2	5.5

TABLE - 5
Special Weather Phenomena
(HARDOI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.1	0.2	1.5	0.3	1.0	1.2	3	2	2	0.5	0.0	0.0	12
Hail	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Dust- storm	0.0	0.0	0.2	0.1	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	5	1.2	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.4	5	12

* No. of days two and above are given in whole numbers.

JAUNPUR DISTRICT

In common with the districts of eastern Uttar Pradesh this district is moist and relaxing except in the summer and cold season. The year may be divided into four seasons. The hot season from March to about the middle of June is followed by the southwest monsoon season which lasts till the end of September. October and the first half of November constitute the post monsoon or transition season. The cold season is from about the middle of November to February.

Rainfall

Records of rainfall in the district are available for 5 stations for long periods. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 999.9 mm. The rainfall in the district in general increases from the west towards the east and varies from 956.7 mm at Machhlishahr to 1045.4 mm at Kerakat. About 89 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, July and August being the rainiest months. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall in the district which was 147 percent of the normal occurred in 1948. The lowest annual rainfall amounting to 54 percent of the normal occurred in 1918. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 8 years, none of them being consecutive. Considering the rainfall at individual stations, two consecutive years of such low rainfall occurred twice at Jaunpur and once each at all the other 4 stations. 3 consecutive years of such low rainfall occurred once at Mariahu, Kerakat and Shahganj and 4 consecutive years at Kerakat. It will be seen from table 2 that the annual rainfall in the district was between 701 and 1200 mm in 39 years out of 50.

On an average there are 50 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 49 at Shahganj to 52 at Jaunpur.

The heaviest rainfall in 24 hours recorded at any station in the district was 370.8 mm at Mariahu on 1955 July 19.

Temperature

A meteorological observatory at Jaunpur has started only recently. The account that follows, is therefore, based on the records of the observatories in the neighbouring districts where similar climatic conditions prevail. Temperatures rise rapidly

from the beginning of March. May is usually the hottest month with the mean daily maximum temperature at about 41°C and the mean daily minimum at about 26°C . The heat in summer is intense and the maximum temperature on individual days may go up to over 47°C . With the advance of the monsoon into the district by about the middle of June there is appreciable drop in the day temperatures but the nights still continue to be as warm as during the latter part of the summer. Due to breaks in the monsoon in September there is a slight increase in day temperature. With the withdrawal of the monsoon from the district early in October, temperatures begin to decrease, the drop being more rapid after October. January is generally the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 9°C . During the cold season, cold waves affect the district sometimes in the wake of passing western disturbances and on such occasions the minimum temperature drops down to a degree or two above the freezing point of water.

Humidity

During the cold season and the summer the air is very dry. In April and May the relative humidities in the afternoons are very low being less than 30 percent. In the period June to November the air is moist.

Cloudiness

During the monsoon season and for brief spells of a day or two in the cold season in association with passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light. In the non-monsoon months the winds are mostly from directions between southwest and northwest. By May winds from directions between southeast and northeast begin to blow and these predominate during the southwest monsoon season. But sometimes winds in the monsoon season are from the west or southwest although these are less frequent.

Special Weather Phenomena

Some of the monsoon depressions from the Bay of Bengal, particularly in the early part of the season moving in some westerly direction towards the central parts of the country affect the weather over the district causing widespread heavy rain and gusty winds. In the cold season in association with passing western disturbances a few thunderstorms occur. Duststorms or thunderstorms occur during the hot season. Rain showers in the monsoon season are often associated with thunder. Fog occurs occasionally during the cold season.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Jaunpur	50 a	15.5	20.6	8.4	4.1	11.2	86.6	304.3	298.7	223.5	45.5	7.1	6.1	1031.6	149 (1936)	42 (1918)	279.4	1914 Jul 07
	b	1.5	2.0	0.9	0.5	1.1	5.3	14.0	14.6	9.3	2.1	0.6	0.5	52.4				
Mariabhi	50 a	14.7	19.1	6.9	3.8	9.7	81.0	298.7	290.8	206.8	48.0	7.6	5.6	992.7	165 (1949)	48 (1918)	370.8	1955 Jul 19
	b	1.4	1.7	0.8	0.4	0.8	4.8	13.8	13.8	8.7	2.1	0.5	0.5	49.3				
Machhlisla-50 hr	a	15.0	20.6	8.6	4.6	8.4	78.2	306.6	289.1	176.8	36.3	6.9	5.6	956.7	168 (1903)	64 (1918)	333.6	1903 Aug 27
	b	1.3	1.9	0.8	0.5	0.8	4.7	14.0	13.8	8.3	1.9	0.5	0.4	48.9				
Kerakat	50 a	16.0	19.8	7.4	5.8	8.9	101.9	279.4	317.5	224.0	53.3	6.1	5.3	1045.4	157 (1922)	61 (1932)	297.2	1943 Sep 27
	b	1.3	1.8	0.8	0.6	0.8	5.5	13.4	14.5	8.8	2.2	0.5	0.5	50.7				
Shahganj	50 a	13.2	17.5	6.1	4.8	9.7	88.7	294.9	286.5	197.1	43.4	6.1	5.1	973.1	143 (1925)	46 (1918)	328.2	1943 Sep 26
	b	1.2	1.6	0.7	0.5	0.8	4.8	13.1	14.3	8.5	1.9	0.4	0.5	48.3				
Jaunpur (District)	a	14.9	19.5	7.5	4.6	9.6	87.3	296.8	296.5	205.6	45.3	6.8	5.5	999.9	147 (1948)	54 (1918)		
	b	1.3	1.8	0.8	0.5	0.9	5.0	13.7	14.2	8.7	2.0	0.5	0.5	49.8				

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	1	1001 - 1100	8
601 - 700	0	1101 - 1200	4
701 - 800	9	1201 - 1300	5
801 - 900	8	1301 - 1400	3
901 - 1000	10	1401 - 1500	2

KANPUR DISTRICT

The climate of this district, is characterised by a hot summer and general dryness except in the southwest monsoon season. The year may be divided into four seasons. The period from March to about the middle of June is the summer season. This is followed by the southwest monsoon season which lasts till about the end of September. October and the first half of November form the post monsoon or transition period. The cold season is from about the middle of November to February.

Rainfall

Records of rainfall in the district are available for 8 stations for periods ranging from 51 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 778.9 mm. The rainfall in the district varies from 642.3 mm at Narwal to 884.8 mm at Kanpur. About 89 percent of the annual normal rainfall in the district is received during the monsoon months June to September, August being the rainiest month. The variation in the annual rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 155 percent of the normal occurred in 1904. The lowest annual rainfall amounting to 43 percent of the normal occurred in 1918. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 12 years, none of them being consecutive. However considering the rainfall at individual stations, two consecutive years of such low rainfall occurred thrice at Bilhaur, Akbarpur and Ghatampur and twice at Kanpur and Bhognipur. Even 3 consecutive years of such low rainfall occurred once at Bilhaur. It will be seen from table 2 that the annual rainfall in the district was between 501 and 1000 mm in 36 years out of 50.

On an average there are 40 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 35 at Narwal to 45 at Kanpur.

The heaviest rainfall in 24 hours recorded at any station in the district was 508.0 mm at Derapur on 1882 June 18.

Temperature

There is a meteorological observatory in the district at Kanpur and the records of this observatory may be taken as representative of the climatic conditions prevailing in the district in general. From about the beginning of March there is rapid rise in the temperatures. May and the early part of June constitute the hottest part of the year. The mean daily maximum temperature in

May is 41.7°C and the mean daily minimum 27.2°C . The nights during June are warmer than in May. The heat in summer is intense and the maximum temperature on many days rises upto 45°C or over. The hot dry and dustladen westerly winds, which are common in the hot season add much to the discomfort. Afternoon thundershowers which occur on a few days during the summer bring welcome relief though only temporarily. With the onset of the monsoon in the district after the middle of June the day temperature drops down appreciably. But the nights still continue to be quite as warm as nights during the latter part of the summer. Towards the end of the monsoon in September and in October there is a slight increase in the day temperature but the nights become progressively cooler. After October both day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at 22.8°C and the mean daily minimum at 8.6°C . During the cold season, in association with passing western disturbances, cold waves affect the district and the minimum temperatures drops down to about the freezing point of water and frosts occur.

The highest maximum temperature recorded at Kanpur was 47.7°C on 1966 June 9. The lowest minimum was -1.4°C on 1961 December 26.

Humidity

During the monsoon season, relative humidities generally exceed 70 percent. Thereafter humidities decrease. The driest part of the year is the summer season when in the afternoons the relative humidity is less than 30 percent.

Cloudiness

During the monsoon season and for brief spells of a day or two during the cold season when the district is affected by passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year skies are mostly clear or lightly clouded.

Winds

The winds are generally light with some strengthening in force during the summer and early monsoon season. In the non-monsoon months winds are mostly from direction between southwest and northwest with northerlies and northwesterlies predominating in the afternoons. From May winds from directions between northeast and southeast begin to blow and in the southwest monsoon season winds are either from directions between southeast and northeast or between southwest and northwest.

Special Weather Phenomena

In association with depressions from the Bay of Bengal in the monsoon season which move across the country, the district gets widespread heavy rain and gusty winds. During the cold season western disturbances affect the weather over the district and thunder storms, sometimes associated with hail and squall occur. During the hot season duststorms and thunderstorms occur on a few days. Rain during the monsoon season is often associated with thunder. Fog occurs occasionally during the cold season.

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

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Kanpur (obsy)	50 a	13.7	18.3	8.4	6.1	8.4	70.1	262.4	274.1	179.1	30.2	6.6	7.4	884.8	175 (1915)	48 (1918)	242.8	1970 Sep 16
	b	1.5	1.5	0.8	0.7	1.1	3.9	12.6	13.1	7.6	1.5	0.3	0.7	45.3				
Bilhaur	50 a	16.3	14.7	6.3	5.3	10.2	69.1	236.3	242.1	163.6	32.5	3.8	5.8	826.0	200 (1904)	30 (1918)	346.7	1891 Aug 28
	b	1.5	1.4	0.8	0.6	0.9	3.5	11.5	11.0	6.9	1.4	0.3	0.6	40.4				
Derapur	50 a	13.2	13.7	8.9	7.9	7.4	64.5	212.1	250.4	149.6	24.1	4.3	5.1	761.2	164 (1944)	33 (1937)	508.0	1882 Jun 18
	b	1.2	1.3	0.7	0.7	0.7	3.4	11.3	11.5	6.6	1.2	0.3	0.6	39.5				
Akbarpur	50 a	12.7	14.0	6.9	6.1	6.1	58.4	216.1	245.6	136.9	22.6	4.6	5.1	735.1	162 (1904)	38 (1905)	214.1	1962 Aug 19
	b	1.3	1.4	0.7	0.6	0.6	3.5	11.4	12.1	6.3	1.1	0.3	0.6	39.9				
Bhognipur	50 a	12.9	17.3	7.6	5.8	5.8	71.1	237.7	272.3	150.1	23.4	5.6	6.1	815.7	165 (1944)	32 (1905)	456.9	1944 Aug 31
	b	1.2	1.3	0.7	0.6	0.6	3.7	11.5	12.0	6.7	1.2	0.4	0.5	40.4				
Ghatampur	50 a	14.7	15.5	9.4	4.6	5.3	57.9	225.3	250.2	161.5	27.4	5.6	6.3	782.7	173 (1917)	39 (1918)	274.3	1870 Aug 24
	b	1.3	1.4	0.9	0.6	0.7	3.8	11.3	12.4	7.0	1.2	0.4	0.5	41.5				
Shivrajpur	23 a	11.4	15.0	7.6	7.9	9.4	68.6	250.4	236.7	141.3	30.0	4.6	2.8	785.9	180 (1916)	25 (1918)	231.9	1900 Aug 25
	b	1.0	1.5	0.9	0.8	1.0	3.3	10.9	10.6	6.6	1.4	0.4	0.2	38.6				
Narwal	14 a	10.9	15.0	9.9	8.4	4.6	33.1	176.0	209.5	131.6	30.2	5.3	5.8	642.3	142 (1904)	52 (1913)	241.3	1867 Jun 15
	b	1.0	1.5	1.1	0.7	0.6	2.2	8.9	10.3	6.5	1.2	0.5	0.5	34.8				
Kanpur (District)	a	13.2	15.4	8.1	6.5	7.1	61.9	229.5	247.6	151.7	27.5	5.9	5.5	778.9	155 (1904)	43 (1918)		
	b	1.3	1.4	0.8	0.7	0.8	3.4	11.2	11.6	6.8	1.3	0.4	0.5	40.2				

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
301 - 400	2	801 - 900	6
401 - 500	3	901 - 1000	10
501 - 600	5	1001 - 1100	4
601 - 700	6	1101 - 1200	4
701 - 800	9	1201 - 1300	1

TABLE - 3
Normals of Temperature and Relative Humidity
(KANPUR AERODROME)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	Date	$^{\circ}\text{C}$	Date	0830	1730*
January	22.8	8.6	31.1	1939 Jan 21	0.8	1964 Jan 27	80	51
February	26.0	11.0	35.6	1930 Feb 28	0.6	1905 Feb 02	69	37
March	32.7	16.3	42.8	1941 Mar 27	7.2	1945 Mar 07	47	29
April	38.3	22.0	45.6	1938 Apr 30	11.1	1905 Apr 03	33	21
May	41.7	27.2	47.2	1941 May 30	17.8	1909 May 03	35	21
June	39.9	28.7	47.7	1966 Jun 09	20.6	1922 Jun 03	54	38
July	33.7	26.6	45.0	1903 Jul 10	21.2	1965 Jul 25	81	68
August	32.1	25.8	40.6	1903 Aug 01	21.7	1948 Aug 25	86	79
September	32.7	24.9	40.0	1932 Sep 02	16.1	1896 Sep 27	81	69
October	32.7	19.6	40.6	1896 Oct 03	11.1	1895 Oct 30	69	52
November	28.9	12.3	36.1	1940 Nov 04	5.0	1948 Nov 19	66	43
December	24.3	8.5	31.3	1959 Dec 15	-1.4	1961 Dec 26	78	47
Annual	32.1	19.3					65	46

*Hours I.S.T.

TABLE - 4
Mean Wind Speed in Km/hr.
(KANPUR)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.6	8.8	10.9	12.1	12.9	13.5	11.5	9.9	9.0	6.3	5.1	5.2	9.3

TABLE - 5
Special Weather Phenomena
(KANPUR)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.0	1.4	1.5	1.1	1.7	3.0	4.0	3.0	3.0	1.1	0.1	0.4	21.0
Hail	0.1	0.1	0.0	0.5	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.2
Duststorm	0.1	0.0	0.5	0.8	1.5	1.6	0.1	0.0	0.0	0.1	0.0	0.1	5.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	1.9	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1.5	5.0

*No. of days 2 and above are given in whole numbers.

KHERI DISTRICT

The climate of this district which is similar to that of the districts in the Western Uttar Pradesh plains is characterised by a hot summer and a pleasant cold season. The year may be divided into four seasons. The cold season is from about the end of November to the end of February. The period from March to about the third week of June is the summer season. The southwest monsoon season commences thereafter and continues till about the end of September. October and November constitute the post monsoon season.

Rainfall

The district has three rain gauge stations with records extending to about 90 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1068.7 mm. The rainfall generally increases from the southwest to the northeast. The monsoon advances into the district by about the third week of June and withdraws by about the last week of September. About 86% of the annual rainfall is received during the monsoon months June to September. July and August are the rainiest months. The variation in the rainfall from year to year is appreciable. In the fifty year period 1901 to 1950 the highest annual rainfall amounting to 174% of the normal occurred in 1922. The lowest annual which was in 1907 was only 47% of the normal. During this fifty year period the annual rainfall was less than 80% of the normal in 9 years. Two consecutive years with rainfall less than 80% of the normal occurred twice in this period considering the district as a whole. Nighasan had even 3 consecutive years of such low rainfall once during this fifty year period. It will be seen from table 2 that the rainfall in the district was between 801 and 1300 mm in 36 years out of fifty.

On an average there are 48 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 45 at Muham-di to 52 at Nighasan.

The heaviest rainfall in 24 hours recorded at any station in the district was 419.1 mm at Kheri on 1870 August 31.

Temperature

There is a meteorological observatory at Kheri where records extend to about a decade. The meteorological records of this observatory may be taken as representative of the conditions in the district in general. The cold season starts by about the end of November when temperatures decrease rapidly. January is the coldest month with the mean daily maximum temperature at 22.3°C and the mean daily minimum is 8.9°C . In association with the cold waves in the

wake of western disturbances passing eastwards, the minimum temperatures may drop down to about 3°C . From about the end of February temperatures begin to rise rapidly. May is the hottest month with the mean daily maximum temperature at 40.3°C and the mean daily minimum at 25.3°C . The intense heat in the summer with the dry hot westerly winds is very trying. The maximum temperature may sometimes rise upto about 47°C . With the advance of the southwest monsoon in the third week of June into the district there is an appreciable decrease in the day temperatures, but the night temperatures remain as high as during summer. With the increased moisture in the air during the southwest monsoon season, even with the decrease in day temperatures, the weather is often oppressive in between the rains. During breaks in the monsoon in September day temperatures increase slightly. After the withdrawal of the monsoon by about the end of September both day and night temperatures decrease progressively, the drop in night temperatures being more rapid.

The highest maximum temperature recorded at Kheri was 47.6°C on 1961 April 29, the lowest minimum temperature was 2.4°C on 1964 January 27, 28.

Humidity

The air is very humid in the southwest monsoon season. Thereafter the relative humidities decrease gradually. The summer season is the driest part of the year when the relative humidities especially in the afternoons are below 30%.

Cloudiness

Skies are heavily clouded or overcast during the monsoon season. During the winter skies are mostly clear except when the district is affected by passing western disturbances when the skies become cloudy for short spells of a day or two. During the rest of the year skies are lightly to moderately clouded.

Winds

Winds are generally light throughout the year. In the late summer and southwest monsoon season, easterlies and southeasterlies predominate. In the rest of the year winds are mostly from the west or northwest.

Special Weather Phenomena

Some of the depressions or cyclonic storms from the Bay of Bengal during the southwest monsoon season affect the district and neighbourhood during the last stages of their travel and cause

widespread rain. Duststorms and thunderstorms occur during the summer particularly in the latter half of the season. Rainfall during the southwest monsoon season is also often associated with thunder. The few thunderstorms during the latter part of the cold season which are associated with passing western disturbances are accompanied occasionally with hail.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Kheri.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Kheri	50 a	22.9	22.9	12.5	8.4	28.7	145.5	297.7	285.0	193.3	41.7	5.3	8.1	1070.0	193	37	419.1	1870 Aug 31
	b	1.6	1.8	1.1	0.8	2.1	6.1	11.6	12.4	7.3	1.5	0.2	0.7	47.2	(1936)	(1941)		
Muham-di	50 a	18.3	22.1	10.4	7.9	18.3	115.1	272.8	272.8	188.7	42.7	3.8	7.9	980.8	181	39	317.5	1870 Jun 29
	b	1.6	1.8	1.0	0.7	1.5	4.9	11.5	11.9	7.8	1.3	0.5	0.8	45.1	(1925)	(1918)		
Nighasan	50 a	21.3	27.9	14.0	9.4	29.2	158.0	322.1	313.4	203.2	41.1	6.9	9.1	1155.6	175	52	298.5	1922 Sep 22
	b	1.7	2.1	1.2	0.9	2.2	6.9	13.0	13.1	7.8	1.7	0.5	0.8	51.7	(1922)	(1907)		
Kheri (District)	a	20.8	24.3	12.3	8.6	25.4	159.5	297.5	289.7	195.1	41.8	5.3	8.4	1068.7	174	47		
	b	1.6	1.9	1.1	0.8	1.9	6.0	12.0	12.5	7.6	1.5	0.5	0.8	48.0	(1922)	(1907)		

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

*Based on available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	2	1201 - 1300	5
601 - 700	3	1301 - 1400	4
701 - 800	1	1401 - 1500	1
801 - 900	8	1501 - 1600	1
901 - 1000	2	1601 - 1700	0
1001 - 1100	15	1701 - 1800	0
1101 - 1200	6	1801 - 1900	2

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

Month	Mean Daily Maximum Temperature °C	Mean Daily Minimum Temperature °C	Highest Maximum ever recorded °C	Lowest Minimum ever recorded °C	Relative Humidity
			Date	Date	0830 1230*
January	22.3	8.9	27.8 1958 Jan 03	2.4 1964 Jan 27	83 63
February	26.2	10.9	32.8 1960 Feb 28	3.4 1964 Feb 01	74 49
March	31.6	15.9	39.4 1953 Mar 27	7.4 1979 Mar 10	65 39
April	37.6	20.9	47.6 1961 Apr 29	11.9 1965 Apr 03	46 27
May	40.3	25.3	47.2 1984 May 17	16.7 1958 May 18	47 29
June	37.9	26.6	46.1 1958 Jun 06	17.3 1958 Jun 24	70 50
July	32.7	25.9	41.4 1982 Jul 07 08 09	22.2 1954 Jul 23	87 76
August	32.2	25.8	37.3 1965 Aug 05	22.0 1977 Aug 23	89 79
September	32.7	24.9	37.0 1979 Sep 01	18.9 1950 Sep 28	85 77
October	31.5	20.3	36.0 1979 Oct 02 01	12.8 1954 Oct 29	80 66
November	28.5	13.1	35.3 1957 Nov 27	6.1 1952 Nov 28	75 60
December	24.3	9.7	29.3 1985 Dec 15	4.0 1964 Dec 14 16	81 63
Annual	31.5	19.0			73 57

*Hours IST

TABLE - 4
Mean Wind Speed in Km/hr.
(KHERI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.4	3.5	3.9	5.1	5.5	5.2	4.5	3.3	2.7	2.1	1.4	1.5	3.4

TABLE - 5
Special Weather Phenomena
(KHERI)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.5	0.7	3.3	1.0	2	6.0	7.0	4	4	1.8	0.3	0.2	31
Hail	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	1.2
Duststorm	0.0	0.0	0.8	0.3	1.1	2	0.3	0	0.1	0.2	0.0	0.0	5
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

*No. of days two and above are given in whole numbers.

LUCKNOW DISTRICT

The climate of this district is characterised by a hot dry summer and a bracing winter. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer season lasting till about mid-June. The period from about mid-June to the end of September, constitutes the southwest monsoon season. The succeeding period up to the middle of November is the post monsoon or transition period.

Rainfall

Records of rainfall in the district are available for only 3 stations for periods exceeding 90 years. The average annual rainfall in the district is 940.3 mm. The rainfall in the district is comparatively more around Lucknow than elsewhere. About 88 percent in the district is received during the southwest monsoon months, June to September, July being the rainiest month. The variation in the rainfall from year to year is large. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 193 percent of the normal occurred in 1915. The lowest annual rainfall which was only 44 percent of the normal was recorded in 1907. The annual rainfall in the district in this 50 year period was less than 80 percent of the normal in 13 years, two of them being consecutive. Considering the annual rainfall at the individual stations, 2 consecutive years of such low rainfall occurred thrice at Mohanlalganj and twice at Lucknow and Malihabad. It will be seen from table 2 that the annual rainfall in the district was between 601 and 1200 mm in 39 years out of 50.

On an average there are 46 rainy days (i.e. days with rain of 2.5 mm or more) in a year in the district. This number varies from 44 at Malihabad to 49 at Lucknow.

The heaviest rainfall in 24 hours recorded at any station in the district was 324.6 mm at Malihabad on 1915 September 1.

Temperature

There are two meteorological observatories at Lucknow, one in the city and the other at the Airport at Amausi. The records of the city observatory which are available for a long period may be taken as representative of the climatic conditions in the district in general. After February the temperatures increase rapidly till May which is generally the hottest month. The mean daily maximum temperature in May is 41.2°C and the mean daily minimum, 26.5°C . The weather is intensely hot in summer with the maximum temperature on individual days sometimes going over 48°C . Hot dust-laden

westerly winds blow often during the summer afternoons and these add to the discomfort. However the occasional thunderstorms cools the air a little, though only temporarily. With the advance of the southwest monsoon into the district after the middle of June, there is appreciable drop in the day temperatures. The nights are however as warm as during the latter part of the summer. Towards the end of the monsoon season, in September during breaks in the monsoon, there is a slight increase in the day temperatures. The night temperature however rapidly decrease after September. After the end of October the day temperatures also decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at 23.3°C and the mean daily minimum at 8.9°C . In the cold season, in association with passing western disturbances, cold waves affect the district and the minimum temperature occasionally drops down to about a degree or so above the freezing point of water.

The highest maximum temperature recorded at Lucknow was 48.3°C on 1901 June 12 and the lowest minimum was 1.1°C on 1946 January 3, whereas the highest maximum temperature recorded at Lucknow(Amausi) was 47.7°C on 1966 June 9 and the lowest minimum temperature was -1.0°C on 1964 January 31.

Humidity

During the monsoon season relative humidity is generally high, exceeding 75 percent. Thereafter humidities decrease. The driest part of the year is the summer season when in the afternoons relative humidities are less than 30 percent.

Cloudiness

During the monsoon season the skies are mostly heavily clouded or overcast. Cloudiness decreases rapidly in October and in the rest of the year until late summer when mainly clear or lightly clouded skies prevail. However in association with passing western disturbances, cloudy skies prevail for spells of a day or two during cold season. From late summer, cloudiness increase, especially in, the afternoons.

Winds

Winds are generally light. During the period May to September winds blow mainly from east of southwest. Winds are light and variable in direction during the post monsoon and cold seasons. In March and April winds are mostly from the west or northwest.

Special Weather Phenomena

In association with some depressions which move across the central parts of the country the southwest monsoon season widespread heavy rain and gusty winds occur. In the cold season western dis-

turbances affect the weather over the district, causing occasionally a few thunderstorms sometimes associated with hail. Rain during the monsoon season is often associated with thunder. Duststorms and thunderstorms occur during summer. Fog occurs occasionally in the cold season.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and special weather phenomena respectively for Lucknow, and tables 3(a), 4(a) and 5(a) give similar tables in respect of Amausi Airport.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rain- fall in 24 hours* Amount (mm)	Date
Lucknow (obsy)	50 a	17.5	20.6	8.6	9.1	15.0	88.9	308.1	286.5	213.1	35.1	5.6	6.3	1014.4	184 (1915)	42 (1907)	311.7	1947 Jul 17
	b	1.5	1.9	1.0	0.7	1.1	4.7	13.1	15.7	8.6	1.7	0.3	0.5	48.8				
Malihabad	50 a	15.5	15.5	8.4	6.6	14.5	89.9	282.2	242.3	171.5	33.3	4.8	6.6	891.1	218 (1915)	40 (1932)	324.6	1915 Sep 01
	b	1.4	1.5	1.1	0.5	1.1	4.5	12.2	11.8	7.7	1.5	0.3	0.4	44.0				
Mohanlalganj	50 a	15.0	17.3	8.1	6.3	10.9	79.3	280.7	268.2	183.4	36.1	4.6	5.8	915.7	179 (1915)	40 (1907)	257.0	1915 Sep 14
	b	1.4	1.5	0.8	0.6	0.9	4.3	12.8	12.4	7.9	1.6	0.4	0.5	45.1				
Lucknow (District)	a	16.0	17.8	8.4	7.3	13.5	86.0	290.3	265.7	189.3	34.8	5.0	6.2	940.3	193 (1915)	44 (1907)		
	b	1.4	1.6	1.0	0.6	1.0	4.5	12.7	12.6	8.1	1.6	0.3	0.5	45.9				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	2	1201 - 1300	4
501 - 600	1	1301 - 1400	1
601 - 700	6	1401 - 1500	2
701 - 800	9	1501 - 1600	0
801 - 900	7	1601 - 1700	0
901 - 1000	5	1701 - 1800	0
1001 - 1100	6	1801 - 1900	1
1101 - 1200	6		

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	23.3	8.9	30.6	1943 Jan 05	1.1	1946 Jan 03	82	55
February	26.4	11.5	35.0	1921 Feb 28	1.7	1905 Feb 02	70	43
March	32.9	16.3	41.7	1945 Mar 31	7.2	1945 Mar 06	51	28
April	38.3	21.8	45.6	1898 Apr 28	11.4	1965 Apr 03	39	23
May	41.2	26.5	47.2	1944 May 28	17.8	1886 May 12	44	27
June	39.3	28.0	48.3	1901 Jun 12	19.4	1886 Jun 12	61	45
July	33.6	26.6	45.6	1903 Jul 10	21.1	1963 Jul 05	82	76
August	32.5	26.0	38.9	1911 Aug 09	21.2	1958 Aug 13	85	79
September	33.0	25.1	39.4	1920 Sep 27	17.6	1964 Sep 26	82	74
October	32.8	19.8	40.0	1896 Oct 03	11.1	1895 Oct 30	72	60
November	29.3	12.7	35.0	1951 Nov 01	5.0	1920 Nov 29	71	55
December	24.8	9.1	33.3	1896 Dec 01	1.7	1902 Dec 23	81	58
Annual	32.3	19.4					68	52

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(LUCKNOW)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.3	2.9	3.7	4.0	4.4	4.9	4.0	3.3	3.0	1.7	1.6	1.7	3.1

TABLE - 5
Special Weather Phenomena
(LUCKNOW)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.1	1.3	3.0	0.7	1.4	3.0	3.0	3.0	1.1	0.3	0.0	0.2	18.0
Hail	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.5
Dust- storm	0.1	0.0	0.1	0.5	0.8	0.8	0.0	0.0	0.0	0.1	0.0	0.0	2.0
Squall	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Fog	3.0	0.5	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.2	1.8	6.0

*No. of days 2 and above are given in whole numbers.

TABLE - 3(a)
Normals of Temperature and Relative Humidity
(LUCKNOW AMAUSI)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	22.2	7.9	28.9	1965 Jan 20	-1.0	1964 Jan 31	84	58
February	26.2	9.7	34.2	1963 Feb 16	0.0	1964 Feb 02	66	39
March	32.4	15.0	40.4	1984 Mar 31	5.4	1979 Mar 10	52	29
April	38.1	20.6	44.0	1980 Apr 21	11.6	1983 Apr 01	33	18
May	41.1	25.7	45.6	1973 May 09	17.5	1979 May 04	37	20
June	38.9	27.5	47.7	1966 Jun 09	19.7	1979 Jun 12	59	41
July	33.4	26.5	44.2	1982 Jun 05	21.7	1950 Jun 01	83	74
August	32.3	25.9	38.0	1979 Aug 30,	21.2	1982 Aug 31	86	80
September	33.0	24.8	40.1	1958 Sep 31 18	17.2	1950 Sep 29	81	72
October	32.2	19.4	37.5	1979 Oct 10	10.0	1984 Oct 31	71	60
November	28.5	11.1	38.0	1963 Nov 08	3.9	1952 Nov 29	65	52
December	24.3	7.7	29.9	1976 Dec 04	0.6	1961 Dec 26	80	59
Annual	31.9	18.5					66	50

*Hours I.S.T

TABLE - 4(a)
Mean Wind Speed in Km/hr.
(Lucknow Amausi)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	sep	Oct	Nov	Dec	Annual
6.1	7.9	9.2	10.2	11.0	12.0	10.4	8.6	8.3	5.4	4.0	4.1	8.1

TABLE - 5(a)
Special Weather Phenomena
(Lucknow Amausi)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	2.0	1.9	3.0	1.1	2.0	6.0	8.0	9.0	5.0	1.7	0	0.6	40.0
Hail	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1
Dust-storm	0	0	0.5	1.5	1.8	2.0	0.1	0	0	0	0	0	6.0
Squall	0	0.1	1.0	0.7	1.0	0.8	0.5	0.6	0.4	0.3	0.1	0	5.0
Fog	3.0	0.2	0.3	0	0	0	0	0	0.1	0.1	0	3.0	7.0

*No. of days 2 and above are given in whole numbers.

MIRZAPUR DISTRICT

The climate of this district is characterised by a hot summer and pleasant monsoon and cold seasons. The year may be divided into four seasons. The cold season from about the middle of November to the end of February is followed by the hot season from March to about the middle of June. The southwest monsoon season is from the middle of June to the end of September. October and the first half of November constitute the post monsoon or retreating monsoon season.

Rainfall

Records of rainfall in the district are available for six stations for periods ranging from 17 to 99 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1129.9 mm. The rainfall generally decreases from the south-east to the northwest, except that the region around Hasanpur gets a little more rainfall than the surrounding regions. About 88 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, August being the rainiest month. The variation in the rainfall from year to year is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 171 percent of the normal occurred in 1948. The lowest annual rainfall which was 62 percent of the normal occurred in 1912. In this 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 10 years, two of them being consecutive. Considering the rainfall at the individual stations two and three consecutive years of such low rainfall occurred once or twice at most of the stations. It will be seen from table 2 that the annual rainfall in the district was between 801 and 1300 mm in 41 years out of 50.

On an average there are 56 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 51 at Ahraure to 61 at Dudhi.

The heaviest rainfall in 24 hours recorded at any station in the district was 318.5 mm at Chunar on 1936 August 8.

Temperature

There is one meteorological observatory in the district at Churk which has started recently. The description which follows, is based on the records of the observatories in the neighbouring districts which have a similar climate. From about the beginning of March temperatures rise rapidly. May is generally the hottest month with the mean daily maximum temperature at about 41°C and the mean-

daily minimum at about 26°C . The heat is oppressive in May and the early part of June before the onset of the monsoon, and the maximum temperature on some days reaches over 46°C . With the onset of the monsoon over the district by about the middle of June, the day temperatures decrease appreciably but the nights continue to be as warm as the nights in the summer season. Day temperatures may reach 40°C or over even in July and August during breaks in the rains. In October when the southwest monsoon withdraws the day temperatures continue to be as in the previous month but the nights become cooler. After October, both the day and night temperatures decrease rapidly till January which is usually the coldest month. The mean daily maximum temperature during January is about 23°C and the mean daily minimum about 9°C . In the cold season in association with passing western disturbances cold waves affect the district and the minimum temperature on such occasions drops down to about a degree or two above the freezing point of water.

Humidity

The humidity is usually the highest during the monsoon season, generally exceeding 70 percent. The air becomes dry after the withdrawal of the monsoon and by summer, the relative humidities are very low particularly in the afternoons.

Cloudiness

During the monsoon season and for brief spells of a day or two in the cold season in association with passing western disturbances heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light throughout the year, strengthening a bit during the afternoons. During the non-monsoon months the winds blow predominantly from directions between southwest and northwest. By May the winds from directions between northeast and southeast begin to blow and these predominate during the southwest monsoon season. But during the monsoon season winds from the west or southwest blow on some days.

Special Weather Phenomena

Some of the monsoon depressions from the Bay of Bengal, particularly in the early part of the season move across the country and affect the district and its neighbourhood causing widespread heavy rain. Duststorms and thunderstorms occur in the hot season, sometimes accompanied by squalls. Thunderstorms also occur during

the cold season in association with passing western disturbances,
Rain during the monsoon season is often associated with thunder.
Fog occurs occasionally during the cold season.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rain-fall in 24 hours* Amount (mm)	Date
Mirzapur	50 a	20.1	22.3	10.2	4.8	6.6	93.0	316.7	328.4	185.9	40.1	7.9	7.4	1043.4	169	49	292.1	1936 Aug 08
	b	1.8	2.0	1.0	0.6	0.8	4.8	14.6	14.3	8.7	2.1	0.6	0.6	51.9	(1956)	(1918)		
Dudhi	50 a	25.7	31.0	17.0	6.9	13.5	132.3	323.9	340.1	182.4	43.9	11.2	5.8	1133.7	153	62	193.0	1910 Aug 12
	b	1.9	2.4	1.6	0.7	1.5	7.3	16.0	16.7	9.1	3.1	0.8	0.4	61.5	(1943)	(1912)		
Robertsganj	50 a	23.9	29.7	14.0	6.6	14.5	111.8	351.5	369.1	202.4	40.4	7.6	4.8	1176.3	184	50	269.7	1937 Jul 31
	b	1.9	2.1	1.4	0.6	1.2	6.3	16.3	16.8	9.6	2.7	0.6	0.5	60.0	(1917)	(1945)		
Chunar	50 a	21.8	21.3	11.7	6.1	11.2	95.0	326.1	341.4	204.7	42.4	7.9	6.1	1095.7	188	56	318.5	1936 Aug 08
	b	1.9	1.9	1.0	0.6	0.8	5.1	14.5	14.8	8.7	2.2	0.6	0.5	52.6	(1948)	(1912)		
Hasanpur	8 a	24.6	22.9	6.1	4.3	9.4	90.2	352.0	420.9	221.7	56.9	13.5	0.0	1222.5	204	63	251.5	1948 Aug 04
	b	2.6	2.9	1.1	1.1	0.9	4.1	16.0	16.6	9.0	3.5	1.0	0.3	59.1	(1948)	(1945)		
Ahraure	27 a	22.9	17.5	8.1	4.8	7.9	90.9	352.5	353.1	204.7	34.0	6.3	5.6	1108.3	171	56	279.4	1936 Aug 08
	b	1.8	1.3	0.9	0.6	0.6	4.8	14.6	15.3	8.4	1.8	0.6	0.6	51.3	(1917)	(1933)		
Mirzapur (District)	a	23.2	24.1	11.2	5.6	10.5	102.2	337.1	358.8	200.3	42.9	9.1	4.9	1129.9	171	62		
	b	2.0	2.1	1.2	0.7	1.0	5.4	15.3	15.7	8.9	2.6	0.7	0.5	56.1	(1948)	(1912)		

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2

Frequency of Annual Rainfall in the District

(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
701 - 800	2	1401 - 1500	2
801 - 900	8	1501 - 1600	0
901 - 1000	6	1601 - 1700	2
1001 - 1100	10	1701 - 1800	0
1101 - 1200	9	1801 - 1900	0
1201 - 1300	8	1901 - 2000	1
1301 - 1400	2		

PRATAPGARH DISTRICT

The climate of this district is characterised by a hot summer and a pleasant monsoon and cold seasons. The year may be divided into four seasons. The cold season is from about the middle of November to February. The hot season which follows continues upto about the middle of June. The period from mid-June to about the end of September is the southwest monsoon season. October and the first half of November may be termed the post monsoon or transition period.

Rainfall

Records of rainfall in the district are available for 3 stations only for long periods of over 85 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 977.9 mm. The annual rainfall varies from 966.8 mm at Kunda to 996.9 mm at Pratapgarh. About 89 percent of the annual rainfall in the district is received during the southwest monsoon months June to September, July and August being the rainiest months. The variation in the rainfall from year to year is appreciable. In the 50 year period 1901 to 1950 the highest rainfall which was 145 percent of the normal was recorded in 1948. The lowest annual rainfall which was 62 percent of the normal occurred in 1908. In this, 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 8 years with two consecutive years of such low rainfall occurring twice. Considering the annual rainfall at individual stations, two consecutive years of such low rainfall occurred twice at Pratapgarh and once at Patti. Even three consecutive years of low rainfall occurred once at Pratapgarh in the same 50 year period. It will be seen from table 2 that the annual rainfall in the district was between 801 to 1200 mm in 32 years out of 50.

On an average there are 49 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 355.6 mm recorded at Pratapgarh on 27th August 1903.

Temperature

There is a meteorological observatory at Pratapgarh in the district, but it has started very recently. As such, the description which follows is based on the records of the observatories in the neighbouring districts where the climatic conditions are similar

to those in this district. There is rapid increase in temperatures after February. May and the early part of June constitute the hottest part of the year generally. The mean daily maximum temperature in May is about 42°C and the mean daily minimum, about 27°C . The heat in summer particularly in May and in June before the onset of the monsoon is intense and the maximum temperature on some days goes up to over 46°C . The hot, dry, dust-laden westerly winds which are common in the summer season add much to the discomfort. Afternoon thundershowers which occur on some days during summer bring some relief though only temporarily. With the advance of the monsoon into the district by about the mid-June there is appreciable drop in the day temperature. The nights in June even after the advance of the monsoon continue to be as warm as during the latter part of the summer. In September and October there is a slight increase in the day temperature but the night temperatures begin to decrease after September. After October both day and night temperatures decrease rapidly. January is generally the coldest month with the mean daily maximum temperature at about 24°C and the mean daily minimum at about 9°C . Cold waves affect the district in the wake of passing western disturbances in the cold season and the minimum temperature drops down to about a degree or two above the freezing point of water and slight frosts are possible.

Humidity

During the southwest monsoon season the air is very humid, the relative humidities being generally 70 percent to 85 percent. Thereafter humidities decrease progressively. The driest part of the year is the hot season when the relative humidities in the afternoons are less than 20 percent.

Cloudiness

During the southwest monsoon season and for brief spells of a day or two in association with passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light, with some increase in force during the late summer in the afternoon and the southwest monsoon seasons. During the period November to April winds are predominantly from the west or northwest. By May easterlies and northeasterlies appear. In the southwest monsoon season wind directions are either southwest to west or northeast to east. By October northeasterlies and easterlies become less common.

Special Weather Phenomena

Some of the monsoon depressions which move across the central parts of the country affect the weather over the district causing widespread heavy rain and gusty winds. In association with passing western disturbances thunderstorms sometimes accompanied with hail, and squall occur. Duststorms and thunderstorms occur during the hot season. Rain during the monsoon season is often associated with thunder. Morning fog occurs occasionally during the cold season.

.....

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Pratapgarh	50 a	15.5	20.1	7.6	6.1	9.9	88.9	312.2	298.2	186.4	41.1	4.8	6.1	996.9	158 (1922)	49 (1941)	355.6	1903 Aug 27
	b	1.6	1.9	0.8	0.6	0.9	5.0	13.9	14.4	8.5	2.4	0.5	0.7	51.2				
Kunda	50 a	14.2	18.8	10.4	6.3	9.1	78.0	292.5	315.7	173.0	35.1	5.3	8.6	966.8	177 (1943)	61 (1940)	253.5	1925 Sep 09
	b	1.4	1.8	0.7	0.6	0.8	3.7	13.5	13.9	7.8	1.7	0.5	0.7	47.1				
Patti	50 a	14.0	19.1	7.1	6.1	11.4	79.8	306.3	280.2	195.3	39.6	5.1	6.1	970.1	156 (1903)	49 (1908)	271.8	1870 Jul 08
	b	1.5	1.9	0.8	0.4	0.9	4.6	13.5	13.5	8.2	2.0	0.5	0.6	48.4				
Pratapgarh (District)	a	14.6	19.3	8.4	6.2	10.1	82.2	303.6	298.0	184.9	38.6	5.1	6.9	977.9	145 (1948)	62 (1908)		
	b	1.5	1.9	0.8	0.5	0.9	4.4	13.6	13.9	8.2	2.0	0.5	0.7	48.9				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	6	1101 - 1200	8
701 - 800	3	1201 - 1300	1
801 - 900	12	1301 - 1400	5
901 - 1000	8	1401 - 1500	1
1001 - 1100	6		

RAE BAREILLY DISTRICT

The district lies in the vast Gangetic plains of north India at an elevation of 100 to 120 metres sloping gently to SE. The river, Sai, a tributary of the Ganga, flows through the district, the Ganga, itself flowing along its southern boundary. Due to its situation, low elevation and large distance from the sea, the climate of the district is marked by a hot summer lasting from March to May or early June, and a large diurnal variation in temperature. Relief from the summer heat occurs with the advent of the monsoon in the second half of June, though the weather may often remain sultry in that month. The winter sets in November and lasts upto February.

Rainfall

Records of rainfall are available for long periods for 4 stations in the district. Table 1 gives the average rainfall and the average number of rainy days (i.e. days with rainfall amount of 2.5 mm or more) for these four stations and the district as a whole. The heaviest rainfall recorded in 24 hours as well as the rainfall, in the wettest and driest years are also given in the table. The average annual rainfall is 927.6 mm and varies from 900.2 mm at Maharajganj in the north to 980.2 mm at Salon in the southeast of the district. Rainfall generally increases towards the east. Just under 90 percent of the annual rainfall is received during the monsoon months, June to September, about 60 percent being equally shared by July and August alone. Mostly during these months and to a lesser degree in September the district is affected by monsoon storms or depressions which originate in the Bay of Bengal and normally take a NWly course passing across or south of the district. Associated with these disturbances, the district experiences spells of heavy rain and squally weather, causing floods in rivers and low lying areas. On an average 1-2 storms/depressions affect the district in each of the months of July and August. Five percent of the annual precipitation occurs in the winter months and is associated with the western disturbances which pass eastwards across north U.P. and the Himalayas. Thunderstorms occur occasionally during pre-monsoon and give some rain. The annual rainfall in the district during the 50 year period from 1901 to 1950 was less than 80 percent of the normal in 13 years with two consecutive years of such low rainfall occurring thrice. Considering the annual rainfall at individual stations, less than 80 percent of it occurred in two consecutive years 3 to 5 times at all the 4 stations; Salon recording 3 consecutive years of such low rainfall from 1903 to 1905.

The heaviest rainfall in 24 hours recorded at any station in the district was 318.0 mm recorded at Salon on 4th September 1893.

Temperature

There is no meteorological observatory in the district recording temperatures. The description which follows is based on the records of observatories in the neighbouring districts where similar climatic conditions prevail. Temperatures begin to increase rapidly in March. The rise in day temperatures is rapid and the maximum temperatures often exceed 38°C in March itself. On the other hand, as a result of inrush of cooler air in the wake of passing western disturbances across north India, minimum temperature often falls below 10°C . March is, thus a month of great temperature contrasts with the maximum mean diurnal range of temperature of about 17°C . Thereafter, both day and night temperatures progressively rise till May or early June which is the hottest part of the year, when maximum temperature may occasionally reach 48°C . Often hot scorching winds add to the discomfort due to intense heat and low humidity, which is of the order or about 30 percent or less. Afternoon duststorms which occur on some days bring welcome relief though only temporarily. With the advance of the monsoon into the district by about the middle of June there is appreciable drop in day temperatures, while night temperatures fall but slightly, thus appreciably reducing the diurnal variation in temperatures. However, owing to high relative humidity, the weather remains sultry. After the withdrawal of the monsoon by about the end of September there is a slight increase in the day temperature but the nights become progressively cooler. After October both day and night temperatures decrease rapidly, weather becomes pleasant and winter conditions begin to set in. The difference between the maximum and minimum temperatures increases becoming as much as 16.5°C in November, almost equal to the diurnal range for March. January is usually the coldest month with the mean daily maximum temperature at about 23°C and the mean daily minimum at about 8°C . During this season, the district is periodically affected by cold waves in the wake of western disturbances when the minimum temperatures may drop down to about 2°C .

Humidity

During the monsoon season the air is very humid, the relative humidity generally exceeding 70 percent. Thereafter it decreases. The driest part of the year is the Hot-Weather season with humidities less than 30 percent in the afternoons.

Cloudiness

Skies are heavily clouded to overcast during the monsoon season and for brief spells of a day or two during the cold season. During the rest of the year skies are mostly clear or lightly clouded.

Winds

Winds are generally light except in the summer. During the summer months of April to June, strong hot winds occasionally blow from a westerly direction particularly during day and occasionally continue during nights. These winds, locally known as 'Loo', add considerably to the discomfort due to intense heat and dryness. During winter strong cold winds blow from west to NW in the wake of western disturbances. These periodical cold winds are also unpleasant during January when the temperature are the lowest.

Special Weather Phenomena

Thunderstorms are most frequent (about 12 days) during the monsoon period of June to September. Thereafter the thunderstorm activity decreases till November which is practically free from it. Thunderstorms occur during the winter season in association with the western disturbances when they may be accompanied by hail. Dust-storms occur during the premonsoon months, Fog occurs occasionally in winter.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm) Date	
Rae Bareilly	50 a	14.0	20.3	7.6	5.6	8.4	85.6	285.7	279.9	177.0	28.2	4.1	6.1	918.5	187 (1936)	55 (1932)	307.3	1895 Sep 04
	b	1.5	1.6	0.7	0.6	0.7	4.3	13.5	13.0	8.2	1.6	0.4	0.5	46.6				
Maharajganj	50 a	16.0	17.8	9.4	7.1	12.5	75.9	289.6	253.7	172.7	55.1	4.3	6.1	900.2	173 (1948)	52 (1932)	285.7	1895 Sep 04
	b	1.5	1.5	0.9	0.6	0.9	4.0	12.6	12.4	7.7	1.6	0.4	0.6	44.7				
Dalman	50 a	14.5	19.1	7.9	5.3	7.6	79.3	297.9	270.8	169.9	28.2	5.1	6.9	912.5	162 (1942)	59 (1941)	265.9	1890 Jun 21
	b	1.5	1.8	0.8	0.5	0.7	4.3	13.5	13.5	7.9	1.5	0.5	0.6	47.1				
Salon	50 a	20.8	19.6	8.4	6.9	7.6	83.3	293.9	304.5	184.9	58.6	4.6	7.1	980.2	178 (1956)	57 (1940)	518.0	1895 Sep 04
	b	1.5	1.7	0.9	0.7	0.6	4.1	13.2	13.5	8.1	1.9	0.4	0.7	47.3				
Rae Bareilly (District)	a	16.3	19.2	8.3	6.2	9.0	80.5	291.3	277.2	176.1	32.5	4.5	6.5	927.6	167 (1936)	63 (1932)		
	b	1.5	1.7	0.8	0.6	0.7	4.2	13.2	13.1	8.0	1.7	0.4	0.6	46.5				

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

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	3	1101 - 1200	7
601 - 700	7	1201 - 1300	4
701 - 800	8	1301 - 1400	2
801 - 900	8	1401 - 1500	0
901 - 1000	6	1501 - 1600	1
1001 - 1100	4		

SITAPUR DISTRICT

The climate of this district is characterised by a hot dry summer and a bracing cold season. The year may be divided into four seasons. The cold season from about the middle of November to the end of February is followed by the summer season lasting till about mid-June. The period from mid-June to about the end of September constitutes the southwest monsoon season. October to middle of November is the post-monsoon or transition period.

Rainfall

The district has four rainguage stations with records extending to over 100 years. The details of the rainfall at the four stations and for the district as a whole are given in tables 1 and 2. The monsoon normally advances into the district in the latter half of June and withdraws early in October. The average annual rainfall for the district is 974.0 mm. Rainfall increases generally from southwest to northeast. About 87% of the annual rainfall is received during the monsoon months June to September. The variation of rainfall from year to year is large. In the fifty year period 1901 to 1950, 1936 was the year with the highest rainfall amounting to 197% of the normal. The lowest annual rainfall amounting to 43% of the normal occurred in 1918. In the same 50 year period there were nine years when the annual rainfall was less than 80% of the normal. Considering the district as a whole only once was the rainfall less than 80% of the normal in two consecutive years. But at individual stations two or three consecutive years of low rainfall have occurred on few occasions. It will be seen from table 2 that in 37 years out of 50 the rainfall in the district was between 701 and 1200 mm.

On an average, rainfall of 2.5 mm or more occurs on about 45 days in the year out of which 36 days are in the monsoon season.

From the available records it is seen that the highest rainfall in 24 hours at any station in the district was 506.0 mm which occurred at Biswan on 1971 September 9.

Temperature

There are no meteorological observatories in the district. The general meteorological conditions in the district, are however, similar to those in the contiguous districts where there are observatories. The cold season starts in the middle of late November when both day and night temperatures begin to fall rapidly. January is the coldest month with the average minimum temperature of the order of 9°C. In association with cold waves in the wake of western

disturbances passing eastwards the minimum temperatures may go down to a degree or two near the freezing point of water and slight frosts can occur. Temperatures rise rapidly after February. May and early June form the hottest period of the year when the temperatures may occasionally go upto 47⁰C. With the advent of the monsoon in the latter half of June the atmosphere cools down appreciably. During breaks in the monsoon in September, and in the post monsoon month of October day temperatures increase slightly.

Humidity

During March to May the air is least humid with relative humidity about 50% in the mornings and only about 30% or less in the evenings. During the rest of the year the air is quite humid with humidity nearly 70% and above in the mornings and nearly 50% or above in the evenings.

Cloudiness

During the southwest monsoon season and for brief spells of a day or two in the cold season in association with passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year, the skies are generally clear or lightly clouded.

Winds

During the monsoon season (June-September) the winds blow predominantly from east or southeast. October is the month of transition when the winds decrease in strength and are mostly from east and southeast in the mornings and from west in the afternoons. From November to about the middle of April winds from the sector southwest-west-northwest predominate. The second half of April and May is the transition period when the winds are predominantly from east and southeast in the mornings and from the sector southwest-west-northwest in the evenings.

Special Weather Phenomena

During the period January to April passing western disturbances affect the weather over the district. Thunderstorms occur during all the months except during November, the highest incidence being during the monsoon months. The thunderstorms during the cold and summer season are at times accompanied with hail. Occasional dust-storms occur during the hot season. Fog occurs occasionally in the cold season.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)	
Sitapur	50 a	17.3	18.8	10.2	10.4	15.5	110.0	272.3	369.5	190.0	41.1	3.1	8.4	966.6	200	41	296.9	1965 Sep 10
	b	1.7	1.5	1.0	0.7	1.4	5.1	12.0	11.7	7.5	1.6	0.2	0.7	45.1	(1936)	(1907)		
Biswan	50 a	19.8	21.1	12.5	11.2	18.5	122.2	320.5	283.0	195.6	42.4	5.3	7.6	1059.7	232	33	506.0	1971 Sep 09
	b	1.6	1.5	1.1	0.8	1.5	5.2	12.2	11.9	7.2	1.7	0.2	0.6	45.5	(1936)	(1918)		
Sidhauri	50 a	17.0	20.3	8.1	5.6	15.2	93.5	263.9	242.3	174.7	38.6	4.1	5.1	886.4	193	44	235.2	1915 Sep 01
	b	1.6	1.7	1.0	0.6	1.3	4.6	12.0	11.6	7.1	1.5	0.2	0.6	45.8	(1913)	(1918)		
Misrikh	50 a	17.0	19.3	8.9	7.6	15.2	108.2	285.7	276.1	193.8	41.4	3.3	9.1	983.6	214	33	260.6	1965 Sep 10
	b	1.6	1.6	0.9	0.7	1.2	4.6	12.1	11.8	7.7	1.6	0.2	0.7	44.7	(1915)	(1907)		
Sitapur (District)	a	17.8	19.9	9.9	8.7	15.6	108.5	285.1	267.7	188.5	40.9	3.9	7.5	974.0	197	43		
	b	1.6	1.6	1.0	0.7	1.3	4.9	12.1	11.7	7.4	1.6	0.2	0.7	44.8	(1936)	(1918)		

(a) Normal rainfall in mm. (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. ** Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901 - 1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	2	1201 - 1300	4
501 - 600	1	1301 - 1400	1
601 - 700	3	1401 - 1500	0
701 - 800	5	1501 - 1600	0
801 - 900	8	1601 - 1700	0
901 - 1000	9	1701 - 1800	1
1001 - 1100	10	1801 - 1900	0
1101 - 1200	5	1901 - 2000	1

SULTANPUR DISTRICT

The climate of this district is characterised by a hot summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season from March to about the middle of June. The southwest monsoon season which follows, continues upto about the end of September. October and the first half of November constitute the post monsoon season.

Rainfall

Records of rainfall in the district are available only for 4 stations with records extending to over 95 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1000.2 mm. The rainfall in the district in general increases from the southwest towards the northeast. About 89 percent of the annual rainfall in the district is received during the southwest monsoon month, June to September, July being the rainiest month. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 150 percent of the normal occurred in 1903. The lowest annual rainfall amounting to 55 percent of the normal occurred in 1908. In the same 50 year period the annual rainfall in the district was less than 80 percent of the normal in 11 years, of such low rainfall occurring twice. Considering the rainfall at individual stations, two consecutive years of such low rainfall occurred thrice at Sultanpur, twice at Musafirkhana and once at Amethi. Such low rainfall in 3 consecutive years occurred once each at all the 4 stations in the same 50 year period. It will be seen from table 2 that the annual rainfall in the district was between 801 to 1200 mm in 30 years out of 50.

On an average there are 50 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much over the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 374.9 mm at Musafirkhana on 27th August, 1903.

Temperature

There is a meteorological observatory in the district at Sultanpur. The records of this observatory are available for a very short period. The account which follows is based on the records of this observatory. By about the end of February there is a steady increase of temperature. May is generally the hottest month with the mean daily maximum at 41°C and the mean daily minimum at 26°C. The summer is intensely hot and on individual

days the maximum temperature reaches 48°C . With the advance of the monsoon over the district by about the middle of June there is appreciable drop in day temperature but the nights continue to be as warm as during the latter part of the summer. In September there is a slight increase in the day temperature. After the withdrawal of the monsoon by about the beginning of October night temperatures begin to decrease rapidly. Rapid decrease in day temperatures begins after the end of October. January is usually the coldest month with the mean daily maximum temperature at 22.4°C and the mean daily minimum at 8.8°C . In the cold season in the wake of passing western disturbances cold waves affect the district, the minimum temperature sometimes dropping down to about a degree or two above the freezing point of water.

The highest maximum temperature recorded at Sultanpur was 48.0°C on 1966 January 9. The lowest minimum was 2.4°C on 1968 December 30.

Humidity

The relative humidity is high during the southwest monsoon season, being between 75 and 85 percent. After the withdrawal of the monsoon, humidities decrease and by summer which is the driest part of the year the relative humidities in the afternoons become less than 30 percent.

Cloudiness

During the southwest monsoon season and for brief spells of a day or two in the cold season in association with passing western disturbances, heavily clouded or overcast skies prevail. In the rest of the year the skies are mostly clear or lightly clouded.

Winds

Winds are generally light to moderate with some strengthening during the later part of summer and monsoon season. Winds are mostly from the east or southeast during the period May to September. In the post monsoon season winds are light and variable in direction. Westerlies begin to appear by November. Westerly or northwesterly wind predominate during the rest of the year.

Special Weather Phenomena

In association with the passage of depressions across the central parts of the country in the monsoon season widespread heavy rain and gusty winds occur. In the cold season western disturbances affect the weather over the district and few thunderstorm

occur. Duststorms and thunderstorms occur in the hot season. Rains during the southwest monsoon season are often associated with thunder. Fog occurs occasionally during the cold season.

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

.....

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec.	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest rainfall in 24 hours*	
																	Amount (mm)	Date
Sultanpur	50 a	14.2	18.5	6.6	7.6	11.4	86.4	308.9	282.7	206.0	46.7	3.8	6.5	999.1	155 (1915)	49 (1908)	242.4	1972 Sep 14
	b	1.6	1.9	0.8	0.6	1.1	5.9	14.1	15.8	8.9	1.8	0.5	0.7	50.8				
Amethi	50 a	15.7	18.5	5.8	7.1	9.7	80.8	305.6	275.6	192.8	36.8	4.1	6.1	958.6	148 (1922)	57 (1907)	281.9	1891 Aug 19
	b	1.7	1.7	0.7	0.6	0.9	4.6	13.8	15.4	8.6	2.0	0.4	0.6	49.0				
Kadipur	50 a	14.5	19.1	7.6	6.6	9.7	86.9	336.8	316.2	220.5	57.4	4.5	7.1	1086.7	160 (1903)	48 (1918)	241.8	1905 Sep 15
	b	1.4	1.9	0.7	0.6	0.9	4.9	13.9	14.2	8.9	2.5	0.4	0.6	50.7				
Musafirkhana	50 a	14.5	18.5	9.1	6.6	12.2	95.3	277.1	284.2	192.0	36.8	3.8	6.6	956.7	160 (1936)	45 (1908)	374.9	1903 Aug 27
	b	1.4	1.7	0.8	0.6	0.9	4.8	13.5	15.7	8.5	1.9	0.4	0.7	48.9				
Sultanpur (District)	a	14.7	18.7	7.3	7.0	10.7	87.3	307.1	289.7	202.8	44.4	4.0	6.5	1000.2	150 (1903)	55 (1908)		
	b	1.5	1.8	0.7	0.6	0.9	4.8	13.8	15.8	8.7	2.0	0.4	0.7	49.7				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
501 - 600	3	1001 - 1100	7
601 - 700	2	1101 - 1200	9
701 - 800	6	1201 - 1300	5
801 - 900	8	1301 - 1400	1
901 - 1000	6	1401 - 1500	3

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

Month	Mean Daily Maximum Temperature	Mean Daily Maximum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity*	
	°C	°C	°C	Date	°C	Date	0830	1730
January	22.4	8.8	29.0	1964 Jan 11	2.9	1964 Jan 20	74	52
February	26.4	11.6	34.3	1974 Feb 24	3.2	1974 Feb 08	65	41
March	32.5	16.7	40.0	1964 Mar 19	8.4	1979 Mar 10, 17	48	27
April	38.4	22.4	43.4	1961 Apr 22, 30	13.3	1965 Apr 03	36	23
May	41.0	26.0	46.5	1972 May 14	19.0	1964 May 03	43	25
June	38.6	27.7	48.0	1966 Jun 09	22.0	1963 Jun 12	62	49
July	33.5	26.2	41.7	1962 Jul 02, 03	21.9	1963 Jul 15	81	74
August	32.2	25.8	37.2	1965 Aug 14	22.5	1965 Aug 26	87	83
September	32.5	25.1	36.2	1960 Sep 23, 24	20.5	1962 Sep 24	82	77
October	31.9	20.9	37.5	1974 Oct 14	13.9	1964 Oct 31	72	62
November	28.7	13.6	34.0	1963 Nov 01	7.9	1964 Nov 23	65	51
December	24.0	9.0	30.0	1963 Dec 01	2.4	1968 Dec 30	69	50
Annual	31.8	19.5					65	51

*Hours I.S.T

TABLE- 4
Mean Wind Speed in Km/hr.
SULTANPUR

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3.0	4.7	6.2	6.3	6.5	6.3	6.8	5.3	4.8	3.1	2.5	2.8	4.9

TABLE - 5
Special Weather Phenomena
SULTANPUR

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	1.3	1.0	0.9	3	4	4	8	4	1.4	0.1	0.1	28
Hail	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1
Duststorm	0	0	0	0.1	0.4	0.3	0	0	0	0	0	0	0.8
Squall	0	0	0	0	0	0	0	0	0	0	0	0	0
Fog	0	0.1	0	0	0	0	0	0	0	0	0	0.7	0.8

*No. of days two and above are given in whole numbers.

UNNAO DISTRICT

The climate of this district is characterised by a hot dry summer and a pleasant cold season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the summer season from March to about the middle of June. The period from mid-June to September constitutes the southwest monsoon season. October and the first half of November form the post monsoon season.

Rainfall

The district has four rain gauge stations with records extending to over 90 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 837.8 mm. The rainfall in the district varies from 805.3 mm at Unnao to 853.8 mm at Purwa. About 89 percent of the annual rainfall is received during the southwest monsoon months, June to September. July is the rainiest month. The variation in the rainfall from year to year is large. In the 50 year period, 1901 to 1950, the highest annual rainfall amounting to 197 percent of the normal occurred in 1915. The lowest annual rainfall which was 49 percent of the normal occurred in 1918. In the same 50 year period, the annual rainfall in the district was less than 80 percent of the normal in 16 years, two consecutive years of such low rainfall occurring 4 times. Considering the rainfall at individual stations it is seen that 3 consecutive years of such low rainfall occurred twice at Unnao and once at Hassanganj. It will be seen from table 2 that the annual rainfall in the district was between 601 and 1100 mm in 30 years out of 50.

On an average there are 43 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number does not vary much in the district.

The heaviest rainfall in 24 hours recorded at any station in the district was 412.5 mm at Hassanganj on 1915 September 1.

Temperature

There is no meteorological observatory in the district. The description which follows is based on the records of the observatories in the neighbouring districts where similar climatic condition prevail. From about the end of February temperatures increase rapidly till May which generally is the hottest month with the mean daily maximum temperature at about 41°C and the mean daily minimum at about 27°C. The heat in summer is intense and scorching dust-laden winds which blow on many days make the weather very trying. The maximum temperature goes up on some days to 45°C or

over. Afternoon thundershowers which occur during the summer give some relief though only temporarily. With the onset of the monsoon day temperatures decrease appreciably. But the nights continue to be as warm as nights in the latter part of the summer. Towards the end of the monsoon in September and in October day temperatures increase slightly, but night temperatures decrease rapidly. After October day temperatures also decrease steadily. January is generally the coldest month with the mean daily maximum temperature at about 22°C and the mean daily minimum at about 8°C . During the cold season the minimum temperature drops down occasionally to about 4°C when cold waves affect the district in the rear of passing western disturbances.

Humidity

In the southwest monsoon season, relative humidities are high being over 70 percent. From October humidities decrease. By summer which is the driest part of the year the relative humidities in the afternoons become less than 25 percent.

Cloudiness

In the monsoon season skies are mostly heavily clouded or overcast. In the rest of the year clear or lightly clouded conditions prevail. But in the cold season, in association with passing western disturbances skies become cloudy for brief spells of a day or two.

Winds

Winds are generally light to moderate in the district. During the period October to April winds blow mostly from directions between west and northwest. From May winds from directions between northeast and southeast begin to blow. In the southwest monsoon season winds are either from directions between southeast and northeast or from directions between southwest and northwest.

Special Weather Phenomena

During the cold season western disturbances affect the weather over the district and a few thunderstorms occur. In association with depressions passing across the central parts of the country the district gets widespread rain. Dust or thunderstorms occur in the hot season. Rain during the monsoon season is often associated, with thunder. Occasional fog occurs in the cold season.

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Unnao	50 a	12.7	15.7	7.4	6.1	8.6	60.2	252.7	246.1	158.7	26.2	5.3	5.6	805.3	215 (1915)	44 (1918)	328.7	1900 Aug 25
	b	1.3	1.6	0.9	0.6	0.9	3.6	12.3	12.1	7.5	1.4	0.3	0.5	45.0				
Purwa	50 a	14.2	16.5	8.6	5.8	8.4	73.1	264.9	254.3	167.1	29.5	4.8	6.6	855.8	182 (1915)	53 (1907)	204.0	1915 Sep 01
	b	1.3	1.5	0.8	0.6	0.8	3.9	12.5	13.2	7.6	1.6	0.4	0.6	44.8				
Safipur	50 a	15.2	17.3	7.4	8.4	10.9	67.3	250.2	256.3	166.4	34.3	4.6	6.1	844.4	185 (1915)	34 (1932)	284.5	1915 Sep 01
	b	1.6	1.6	1.0	0.7	1.0	3.7	11.4	12.1	7.7	1.5	0.4	0.6	43.3				
Hasanganj	50 a	15.2	17.5	7.6	6.1	10.9	70.6	280.7	232.4	168.4	31.2	4.6	5.3	848.5	210 (1915)	37 (1932)	412.5	1915 Sep 01
	b	1.4	1.6	0.9	0.6	1.0	3.9	12.3	12.2	7.1	1.2	0.3	0.5	43.0				
Unnao (District)	a	13.8	16.7	7.7	6.6	9.7	67.8	262.1	247.3	165.1	30.3	4.8	5.9	837.8	197 (1915)	49 (1918)		
	b	1.4	1.6	0.9	0.6	0.9	3.8	12.1	12.4	7.5	1.4	0.3	0.5	43.4				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
 Frequency of Annual Rainfall in the District
 (Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
401 - 500	3	1101 - 1200	4
501 - 600	9	1201 - 1300	2
601 - 700	6	1301 - 1400	0
701 - 800	7	1401 - 1500	1
801 - 900	5	1501 - 1600	0
901 - 1000	7	1601 - 1700	1
1001 - 1100	5		

VARANASI DISTRICT

The climate of this district resembles that of the eastern district of Uttar Pradesh being moist and relaxing except in the cold and summer seasons. The cold weather starts by about the end of November and continues till the end of February. The hot season is from March to about the middle of June. Thereafter the southwest monsoon season begins and lasts till the end of September. October and November are the post monsoon months.

Rainfall

Records of rainfall in the district extend to over eighty years at three stations. A statement of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district is 1049.9 mm. Rainfall generally decreases from the southeast to northwest. 90% of the annual rainfall is received during the monsoon season. August being the month with the maximum rainfall. There are variations in the rainfall from year to year although they are not very large. During the fifty year period 1901 to 1950, the highest annual rainfall amounting to 162% of the normal occurred in 1948 while 1941 was the year with the lowest rainfall which was only 64% of the normal. In the same fifty year period in six years the rainfall in the district was less than 80% of the normal and two of them were consecutive. But in the case of Varanasi and Gangapur rainfall less than 80% of the normal in two consecutive years occurred twice and thrice respectively. At Chandauli three consecutive years of low rainfall occurred once. It will be seen from table 2 that in 39 years out of 50 the rainfall is between 801 and 1300 mm.

On an average there are 51 rainy days (days with rain of 2.5mm or more) in a year. This number varies from 48 at Gangapur to 54 at Varanasi.

The highest rainfall in 24 hours which occurred at any station in the district was 533.4 mm at Gangapur on 1865 July 12.

Temperature

There is a meteorological observatory at Varanasi airport located at Babatpur. Another observatory located in the city and which has records for fairly long period was closed since May 1978. The climatic description that follows is mainly based on the records of the city observatory which may be taken as representative of the meteorological conditions in the district. Temperatures begin rising from the beginning of March. May is the hottest month with the mean daily maximum temperature at 41.5°C. The heat is oppressive

in this month and in June before the onset of the monsoon. Maximum temperature in this period may sometimes be as high as 47°C . Although the day temperatures begin to drop with the arrival of the monsoon in the latter half of June, night temperatures continue to be high. Even in July when the monsoon may be expected to be well established, day temperatures may reach over 40°C during breaks in the rains. In October the day temperatures continue to be as in the preceeding month, but the night temperatures begin to decrease rapidly. Thereafter both day and night temperatures drop with the advance of the season till Janaury which is the coldest month. The mean daily minimum temperature in December and January is 9.7 and 9.5°C . But in the period December to February during the cold waves in the rear of western disturbances minimum temperatures may sometimes go down to a degree or two above the freezing point of water, and frosts, mostly slight, may occur.

The highest maximum temperature ever recorded at Varanasi was 47.2°C on 1884, May 18 and 1901 June 12. While lowest minimum ever recorded was -0.4°C on 4 days of February 1980. Babatpur recorded highest maximum temperatures of 48.0°C on 1966 June 9 and the lowest minimum of 0.3°C on 1963 January 6.

Humidity

During the cold season and the first half of the hot season the air is very dry, the relative humidity being 55%. In April and May relative humidities are very low particularly in the afternoons, when they are of the order of 20 to 22%. In the period June to November the air is moist, with relative humidity being about 75 percent.

Winds

Winds are generally light throughout the year. They strengthen in the afternoons. During the non monsoon months the predominant winds are from directions between southwest and northwest. By May winds from directions between northeast and southeast begin to blow and these predominate during the monsoon months. But sometimes the winds in the monsoon season are from the west or southwest, although these are less frequent.

Special Weather Phenomena

Some of the monsoon depressions particularly in the early part of the season, which originate in the Bay of Bengal and move across the country, affect the district causing widespread heavy rain. Dust or thunderstorms occur in the summer months, sometimes accompanied

with squalls. In association with western disturbances thunder storms occur in the cold season also. The rain showers in the monsoon are often associated with thunder. Occasional fogs may occur in December and January.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Varanasi. Tables 3(a), 4(a) and 5(a) give similar data in respect of Babatpur.

.....

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rainfall in 24 hours* Amount (mm)	Date
Varanasi (obsy)	50 a	21.6	23.4	11.2	5.8	15.7	88.7	310.4	325.9	208.0	51.5	10.2	5.8	1076.0	196 (1948)	67 (1902)	349.5	1943 Sep 26
	b	1.8	2.0	0.9	0.5	1.1	5.5	14.2	15.3	9.1	2.5	0.6	0.5	53.8				
Chandauli	50 a	19.3	21.6	9.1	7.4	10.9	97.8	292.3	352.3	206.5	38.1	7.4	7.1	1069.6	148 (1930)	66 (1934)	231.4	1900 Oct 09
	b	1.6	1.7	0.9	0.6	1.0	5.6	13.8	14.5	8.9	2.0	0.6	0.4	51.6				
Gangapur	49 a	17.8	18.5	9.9	4.8	8.4	70.9	313.9	308.6	194.8	43.4	8.6	4.8	1004.2	161 (1948)	59 (1941)	553.4	1865 Jul 12
	b	1.5	1.6	0.8	0.4	1.0	4.6	13.5	15.7	8.4	2.0	0.5	0.4	48.4				
Varanasi (District)	a	19.6	21.1	10.1	6.0	11.0	85.8	305.5	328.9	203.0	44.3	8.7	5.9	1049.9	162 (1948)	64 (1941)		
	b	1.6	2.8	0.9	0.5	1.0	5.2	13.8	14.5	8.8	3.1	0.6	0.4	51.2				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
601 - 700	1	1201 - 1300	3
701 - 800	3	1301 - 1400	4
801 - 900	9	1401 - 1500	2
901 - 1000	7	1501 - 1600	0
1001 - 1100	9	1601 - 1700	1
1101 - 1200	11		

TABLE - 3
Normals of Temperature and Relative Humidity
(VARANASI CITY)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded**		Lowest Minimum recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830	1730*
January	23.4	9.5	31.1	1882 Jan 31	2.5	1964 Jan 19	80	51
February	26.6	12.0	36.1	1884 Feb 28	-0.4	1980 Feb 4 days	68	37
March	33.4	17.2	41.1	1955 Mar 25	6.7	1906 Mar 02	47	24
April	38.6	22.4	44.4	1954 Apr 23	11.1	1905 Apr 03	36	20
May	41.5	27.0	47.2	1884 May 18	17.3	1964 May 13	44	24
June	39.1	28.3	47.2	1901 Jun 12	20.6	1914 Jun 06	59	45
July	33.5	26.5	45.0	1901 Jul 01	20.0	1919 Jul 05	81	73
August	32.2	26.0	40.0	1903 Aug 01	22.2	1955 Aug 22	85	79
September	32.7	25.4	39.7	1982 Sep 22	17.8	1912 Sep 22	82	74
October	32.5	20.7	39.4	1896 Oct 05	11.7	1919 Oct 31	73	55
November	28.6	13.4	35.6	1941 Nov 03	6.7	1926 Nov 30	67	47
December	24.4	9.7	32.8	1956 Dec 02	2.2	1913 Dec 30	76	51
Annual	32.2	19.8					67	48

*Hours I.S.T

TABLE - 3(a)
Normals of Temperature and Relative Humidity
(Varanasi (Babatpur))

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	23.1	9.2	29.7	1980 Jan 28	0.3	1963 Jan 06	77	57
February	27.2	11.5	35.2	1964 Feb 23	2.4	1974 Feb 08	62	43
March	33.2	16.9	41.1	1953 Mar 27	7.9	1979 Mar 02	44	26
April	38.8	22.2	44.3	1979 Apr 29	13.5	1965 Apr 01	31	17
May	41.5	26.9	46.2	1980 May 26	12.5	1963 May 09	37	22
June	38.9	28.2	48.0	1966 Jun 09	14.3	1963 Jun 18	61	45
July	33.0	26.4	43.9	1982 Jul 05	22.1	1957 Jul 24	82	73
August	32.3	26.1	38.4	1979 Aug 30	23.2	1985 Aug 06	85	79
September	32.4	25.4	42.3	1971 Sep 24	19.3	1983 Sep 23	82	74
October	32.2	21.1	39.0	1979 Oct 10	8.9	1949 Oct 3days	71	58
November	28.6	12.9	35.3	1979 Nov 06	6.1	1952 Nov 29	63	48
December	24.7	9.5	30.6	1985 Dec 16	2.3	1977 Dec 29	71	56
Annual	32.2	19.7					64	50

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(Varanasi)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.4	7.8	8.9	9.4	10.2	9.7	9.0	8.0	6.4	5.5	5.2	5.7	7.7

TABLE - 4(a)
Mean Wind Speed in Km/hr
Varanasi/Babatpur(Aerodrome)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.5	9.3	10.4	12.6	12.7	12.0	11.4	9.2	8.8	6.3	5.1	4.9	9.1

TABLE - 5(a)
Special Weather Phenomena
Varanasi/Babatpur Aerodrome

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.5	1.3	3	2	1.3	6	11	11	8	1.4	0	0.8	47
Hail	0	0.1	0	0	0	0	0.2	0	0	0	0	0.1	0.4
Duststorm	0	0	0.2	0.9	0.8	1.1	0	0	0	0	0	0	3
Squall	0	0	0.4	0.4	0.6	0.5	0.2	0.1	0.1	0	0	0	2
Fog	4	0.7	0.3	0	0.1	0	0	0	0.1	0.3	0	1.3	7

*No. of days two and above are given in whole numbers.

TABLE - 5
Special Weather Phenomena
Varanasi

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.4	1.5	1.5	1.3	1.8	5	7	7	6	1.0	0	0	33
Hail	0	0.1	0.1	0	0	0	0	0.1	0	0	0	0	0.3
Duststorm	0	0.1	0.1	0.3	0.3	0.3	0	0	0	0	0	0	1.1
Squall	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1
Fog	2	0.5	0.1	0	0	0	0	0	0	0	0.2	1.0	4

*No. of days two and above are given in whole numbers.

HILLS OF
UTTAR PRADESH WEST

B. HILLS OF UTTAR PRADESH - WEST

General Description:

The subdivision of Hills of Uttar Pradesh West lies to the north of plains of Uttar Pradesh - West and is bounded by the Himalayan range to the north, by Nepal to the east and by Himachal Pradesh to the West. The physical features have already been described in the introduction. Rugged orography, existence of the Himalayan range and nearness of extra-Indian territory and abundance of flora and fauna have affected the climate of the subdivision. The subdivision consists of the following eight districts namely:

1. Pithorgarh
2. Almora
3. Nainital
4. Chamoli
5. Tehri-Garhwal
6. Uttar Kashi
7. Dehra Dun
8. Pauri-Garhwal

These districts are very hilly and undulating, consisting of deep and narrow valleys and steep and high ridges whose general slope is towards south or southeast. Here the terrains rise sharply to an altitude of about 3 Km with peaks and ranges, rising even upto 6 to 8 Km. The front-piece (Fig. 1a) shows the orography of the subdivision.

I. Climate:

The climate changes from place to place considerably owing to the variation of altitudes in the hilly region. According to Koepen's classification of climates, the climate in the region varies from type (Cwa) Sub-tropical monsoon, mild winter; dry winter; hot summer to the type (Cwb) Tropical upland, mild winter; dry winter; short warm summer.

The three districts Pithorgarh, Chamoli and Uttar Kashi which are nearer the Himalayan ranges contain within their limits lofty snowbound peaks of the outer Himalayas. Severe winter and comparatively higher rainfall are the chief climatic features in this region.

The year may be divided into four seasons viz. the cold winter season (December to February), the hot weather season (March to May), southwest monsoon season (June to September) followed by post-monsoon season (October to November).

2. Atmospheric Pressure and winds:-

The seasonal variation of the atmospheric pressure over any particular place 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 place generally remains weak except during the late summer and monsoon. Orography of the subdivision with deep valleys and high ridges does not permit us to analyse variation of atmospheric pressure (reduced to mean sea-level) by usual way of drawing isobars over the subdivision for a particular season.

Owing to the nature of the terrain, local effects on winds are predominant. When the general prevailing winds are not too strong, there is a tendency for diurnal reversal of winds, blowing up the slopes at night (Katabatic).

Winds are generally light, of the order of 3 to 4 Km/h in the valleys and 5 to 8 Km/h at elevation of 2 Km increasing further with higher altitudes. In the wake of western disturbances and in association with thunderstorms the winds may become quite strong. Table 1-h gives the monthly mean wind speed in Km/h for the observatory stations in the subdivision.

3. Temperature:

Table 2-h gives the daily maximum and minimum temperatures at the observatory stations. The distribution of the mean maximum and minimum temperatures over the hilly region is shown in Fig. 2(a,b,c,d) and Fig. 3(a,b,c,d) respectively for selected months. These figures show that temperature gradient is maximum near the region where plains of U.P. West meet the hills of U.P. West. Figures 4 and 5 give the distribution of the extremes of temperatures ever recorded based on data upto 1985. The sub-division being hilly with deep valleys the temperatures vary considerably from place to place depending on elevation. Generally end of May or beginning of June is the hottest period. The mean daily maximum temperature in valleys (with elevation less than 1000 m) is around 36°C in the month of May and around 26°C at about 2 Km and still lower at higher altitudes. However, on individual days, the maximum temperature may rise to over 40°C in the valleys (with elevation less than 1 Km) and to about 34°C at 2 Km in the month of May. With the onset of the monsoon, the day temperatures fall by about 3°C to 5°C . With the withdrawal of the monsoon by about the end of September, both day and night temperatures start falling, reaching lowest values in January. The mean daily maximum and minimum temperatures

in January, in the valleys (elevation less than 1 Km) are of the order of 19°C and 6°C respectively while they are of the order of 11°C to 3°C at an elevation of 2 Km. During the winter months, cold waves associated with the western disturbances may bring down night temperatures appreciably, even below the freezing point of water on some occasions.

4. Humidity:

Table 3-h gives the mean relative humidity at 0830 and 1730 hours IST for the individual stations in the sub-division. Summer (March to May) is the driest part of the year with relative humidity between 30 to 50 percent. During the monsoon season (June to September) the humidity attains a value of about 70 to 90 percent while it remains between 50 to 70 percent during the remaining parts of the year.

5. Cloudiness:

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

For general information the mean hours of bright sunshine for different months and for observatory station in the State are indicated in Table 4b(h).

6. Rainfall:

Table 5(h) gives the mean monthly annual rainfall and number of rainy days for the plain districts in the sub-division (i.e. Dehradun and Nainital). The Table 5a(h) shows monthly and annual-rainfall of hill stations in the sub-division. Annual and seasonal distribution of rainfall over the hilly region are shown in Fig 6(a) to 6(d).

As the districts are hilly, rainfall normal of the individual districts and consequently of the sub-division cannot be worked out.

So rainfall of sub-division cannot be described in terms of the districts or sub-division normal.

Rainfall is highly variable in the region due to its rugged orography, geographical position and annual rainfall of a place may have any value lying in the range 97 cm - 290 cm. The station with annual rainfall more than 200 cm are given below alongwith altitudes and the districts in which they fall:-

Station	Altitude (in metre)	District	Annual Rainfall
Ghuttu	1524	Tehri-Garhwal	284.9
Nainital	2020	Nainital	269.0
Nainital (obsy)	1953	Nainital	259.7
Munsyari	2202	Pithorgarh	259.9
Mussoorie (obsy)	2042	Dehradun	259.2
Mussoorie	-	- do -	253.8
Chaukuri	2286	Pithorgarh	231.2
Lansdowne	1692	Pauri Garhwal	211.7
Kharsali	2591	Uttar Kashi	209.3

In this sub-division Joshimath in the district Chamoli has got minimum annual rainfall i.e. 97.3 cm. Other hill stations of the sub-division have annual rainfall lying in the range 100-300 cm. The rainfall generally increases upto the valleys from southwest to northeast and decreases beyond the highest range. While the Plains in U.P. receive 87-88% of the annual rainfall, during the southwest monsoon period from June to September, the places in the hilly region receive 60-85% during the same season, depending upon the elevation and exposure to the rain bearing wind. Over the northern parts of the region the percentage contribution is less than the southern parts, perhaps due to decreasing influence of the monsoon. In the monsoon season there are a few occasions when the rainfall in the plain districts decreases but there are spurts of heavy rain in the hills causing floods in the rivers. During the monsoon period most of the depressions originating in the Bay of Bengal cross inland and move westwards or west-north-westwards over the State, some of them breaking over the hilly districts. The rest of the rainfall occurs in winter and early summer in association with the passage of western disturbances across north India. During winter period as much as 6-20% of the annual normal precipitation occurs over a place. Winter precipitation over the northern parts of the districts is at times in the form of snowfall. July and August are the rainiest months and in these two months nearly 45-60% of the annual total of rainfall of a hill station is realised. There are two rainfall minima, one in April and the other in November. After April, the rainfall gradually increases till June and thereafter sharply during July and August. It decreases rapidly after the withdrawal of southwest monsoon in September. Precipitation during the premonsoon months is mostly associated with thunderstorms and constitute

6-19 percent of the annual rainfall.

Year to year variation of rainfall at any place in the sub-division is not very much appreciable. Average number of rainy days (i.e. having rainfall of 2.5 mm or more in each day) in a year varies from 65-125.

Heaviest rainfall in 24 hours recorded at any station in the sub-division was 509.3 mm at Nainital (in Nainital district) on 22nd September, 1958.

.....

TABLE - 1(h)
Mean Wind Speed (km.p.h) and Predominant Wind Direction

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P. WEST													
Dehradun	a 2.6	3.1	3.6	4.2	4.1	3.6	2.7	2.5	2.8	3.3	3.0	2.6	3.2
	M C/NE/N	C/NE/N	C/Var	C/W	C/SW/W	C/Var	C/Var	C/Var	C/Var	C/Var	C/Var	C/NE/N	
	E C/W/SW	W/SW	W/SW	W/SW	SW/W	W/SW	C/Var	C/Var	C/W	C/Var	C	C/Var	
HILL STATIONS													
Mussoorie	a 6.7	7.4	7.9	7.9	8.4	7.3	5.6	4.7	5.4	6.1	6.3	6.8	6.7
	M C/N	C/N	C/N	C/N	C/S	C/S	C/S	C/S	C/S	C/S	C/S	C/S	
	E S	S	S	S/SW	S/SW	S	C/S	C/S	S	S	S	S	
Mukteswar	a 11.0	12.5	12.9	14.9	16.7	15.4	12.1	10.1	10.0	10.2	10.3	10.5	12.2
	M Var	W	W	W	W	W	W	E	E	W	W	W	
	E W	W	W	W	W	W	W	W	W	W	W	W	

(a) Mean wind speed in Kms. per hour
(M) Predominant wind direction in the morning
(E) Predominant wind direction in the evening
Var Variable
C Calm. The next predominant wind direction is also indicated when calm is mentioned.
Hill station - not considered for sub-divisional mean.

TABLE - 2 (h)
Mean Maximum and Mean Minimum Temperature ($^{\circ}\text{C}$)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P. WEST														
Dehradun	Max	19.1	21.4	26.4	32.1	36.2	35.3	30.4	29.5	29.6	28.2	24.7	20.9	27.8
	Min	6.1	8.2	12.4	17.0	21.5	23.6	23.1	22.7	21.3	16.1	10.3	7.0	15.8
HILL STATIONS														
Mussoorie	Max	10.2	11.9	16.2	21.1	24.8	24.1	20.8	20.2	19.9	18.7	15.8	12.7	18.0
	Min	2.5	3.7	7.2	11.8	15.1	16.4	15.9	15.6	14.3	11.1	7.4	4.3	10.4
Mukteswar (Kumaun)	Max	9.7	11.4	15.8	20.1	23.5	23.2	20.5	20.1	19.9	18.4	15.8	12.5	17.6
	Min	1.9	3.1	6.4	10.7	13.9	14.8	14.7	14.5	13.1	9.9	6.6	3.8	9.5

Hill Station - Not considered for sub-divisional mean.

TABLE - 3(h)
Mean Relative Humidity(%)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P. WEST														
Dehradun	M	78	71	58	43	41	58	85	87	80	68	70	76	68
	E	59	47	38	25	26	43	77	82	73	61	61	61	54
HILL STATIONS														
Mussoorie	M	58	56	49	44	46	68	93	94	86	65	49	50	64
	E	72	71	59	46	43	66	95	98	94	78	68	69	72
Mukteswar	M	50	51	43	37	43	67	92	92	85	58	41	40	58
	E	62	60	49	39	43	63	90	93	89	70	58	55	64
<div>M - Morning</div> <div>E - Evening</div> <div>Hill stations - Not considered for sub-divisional means.</div>														

TABLE - 4(h)
MEAN CLOUD AMOUNT (OKTA) AND MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AT 0830 HRS IST

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P.-WEST														
Dehradun	a	10	10	11	14	16	10	1	0	5	19	21	13	10.8
	b	5	5	4	1	2	6	14	15	7	2	1	2	5.2
	c	3.1	2.8	3.0	1.9	1.8	3.2	6.5	6.2	3.9	1.4	0.9	2.2	3.1
HILL STATIONS														
Mussoorie	a	10	10	10	15	15	9	2	0	4	17	18	11	9.9
	b	5	4	4	2	2	7	19	19	10	2	0	3	6.4
	c	3.9	3.3	3.3	2.2	2.1	3.6	6.6	6.9	4.5	1.6	1.1	2.6	3.5
Mukteswar (Kumaun)	a	11	12	15	16	18	9	1	1	4	19	21	14	11.6
	b	4	3	3	1	2	7	18	17	8	2	0	2	5.6
	c	2.9	2.7	2.4	1.7	1.7	3.6	6.7	6.5	4.4	1.4	0.8	1.5	3.0

a - Days with clear sky

b - Days with sky overcast

c - Mean Cloud Amount

Hill Station - Not considered for sub-divisional means.

TABLE - 4(a)-h
MEAN CLOUD AMOUNT (OKTA) AND MEAN NUMBER OF DAYS OF CLEAR AND OVERCAST SKIES AT 1730 HRS IST

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
HILLS OF U.P. - WEST														
Dehradun	a	5	6	6	6	8	5	1	0	1	11	15	0	5.3
	b	5	3	4	2	1	5	7	10	5	1	0	8	4.1
	c	3.5	3.2	3.1	2.8	2.5	3.1	5.5	5.5	4.2	1.3	1.2	2.9	3.2
HILL STATIONS														
Mussoorie	a	4	4	4	4	4	2	1	0	1	7	11	7	4.1
	b	8	6	6	2	2	7	21	23	16	5	2	4	8.5
	c	4.6	4.2	3.8	3.6	3.7	4.3	6.9	7.4	6.1	2.7	1.9	3.3	4.4
Mukteswar	a	6	5	5	5	7	4	1	1	0	7	15	10	5.5
	b	5	3	2	1	1	3	12	14	7	1	0	2	4.3
	c	5.0	3.3	3.4	2.9	2.9	3.9	5.8	6.7	5.2	2.1	1.2	2.4	3.7

a - Days with clear sky

b - Days with sky overcast

c - Mean cloud Amount

Hill station - not considered for sub-divisional means.

TABLE - 4(b)-h

Mean Number of Hours of Bright Sunshine Per Day

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P. - WEST													
Dehradun	7.5	7.9	8.3	9.6	10.1	8.4	4.9	4.3	6.8	9.0	8.3	7.9	7.7

TABLE - 5_a (h)
MEAN RAINFALL (MM) AND NUMBER OF RAINY DAYS

FOR DIFFERENT HILL STATIONS

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Missoorie	a	79.3	89.7	66.8	37.1	54.9	208.3	782.3	800.3	329.4	41.1	12.5	36.1	2537.8
	b	4.9	5.2	4.4	3.4	4.2	9.7	23.0	23.6	12.5	2.1	0.7	2.1	95.8
Mussoorie (obsy)	a	79.6	89.5	57.8	36.0	51.8	211.0	797.4	818.2	355.6	44.3	9.3	41.8	2592.3
	b	4.9	5.5	4.2	3.3	4.2	9.3	23.2	23.9	13.1	2.4	0.7	2.2	96.9
Nainital	a	69.9	73.1	52.6	38.1	84.1	390.9	769.4	750.1	362.7	61.0	12.9	25.4	2690.2
	b	3.1	3.6	3.0	2.3	4.9	12.9	22.6	22.7	12.4	2.2	0.7	1.4	91.8
Mukteswar/ (obsy) (Kumaun)	a	56.9	62.0	48.5	36.3	56.4	176.0	316.0	306.3	201.7	43.4	8.9	24.6	1337.0
	b	3.7	4.5	4.1	3.2	5.0	9.7	17.9	17.8	10.4	2.3	0.6	1.7	80.9
Almora	a	42.9	49.3	42.2	27.9	48.3	143.8	264.9	234.2	130.3	32.3	7.4	21.3	1044.8
	b	3.3	3.9	3.8	2.7	4.5	8.2	15.1	14.2	7.6	1.9	0.6	1.8	67.6
Champawat	a	67.6	75.9	49.3	30.2	62.0	194.8	339.1	287.8	198.1	43.9	12.7	25.4	1386.8
	b	3.4	4.5	3.7	2.7	5.3	10.2	17.1	16.1	8.3	1.7	0.7	1.6	75.3
Ranikhet	a	54.1	62.0	46.2	31.0	50.0	144.0	331.5	344.4	165.9	33.5	7.4	22.9	1292.9
	b	3.7	4.2	3.6	2.8	4.4	8.6	17.6	18.2	9.0	1.8	0.5	1.9	76.3
Pithorgarh	a	44.2	56.4	40.4	28.2	72.6	182.9	299.7	287.3	149.3	33.3	6.9	21.8	1223.0
	b	3.1	4.0	3.8	3.1	5.8	10.4	17.2	16.1	8.7	2.1	0.6	1.6	76.5
Askote	a	36.8	54.9	30.2	29.7	73.4	215.1	453.9	419.9	190.3	36.1	3.3	21.8	1565.4
	b	3.2	3.9	3.1	3.4	6.5	12.1	20.6	19.9	12.3	3.1	0.4	2.0	90.5

contd

TABLE 5a(h) (contd)

Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Chaukuri	a	44.7	55.9	48.8	32.0	76.7	317.7	674.6	669.5	313.7	55.9	8.1	18.0	2311.6
	b	3.3	4.4	4.3	3.1	6.2	13.6	23.3	23.8	14.3	3.3	0.5	1.5	101.6
Berinag	a	57.9	62.7	55.6	39.1	85.3	272.0	520.9	507.0	228.6	43.2	9.4	25.7	1907.4
	b	3.6	4.2	4.3	3.6	6.2	12.4	20.5	19.5	11.5	2.6	0.6	1.8	90.8
Kausanie	a	58.7	71.4	62.5	45.7	86.4	226.6	420.1	375.2	185.2	43.9	9.1	26.2	1611.0
	b	3.9	4.5	4.3	3.9	6.5	11.7	19.7	18.9	9.4	2.3	0.8	1.7	87.6
Pauri	a	60.7	66.8	55.1	32.0	51.6	132.3	326.1	359.9	148.3	33.8	8.1	28.2	1302.9
	b	4.4	4.5	4.1	2.9	5.0	8.3	16.9	17.2	8.4	1.8	0.7	1.8	76.0
Okhimath	a	66.0	67.8	52.6	40.9	73.4	196.3	524.3	570.0	232.4	36.6	6.1	22.1	1888.5
	b	4.2	4.7	4.3	4.0	6.4	11.0	22.6	23.5	13.1	2.6	0.6	1.5	98.5
Joshimath	a	65.8	92.7	98.5	54.4	35.1	88.9	176.3	184.7	108.5	28.2	12.2	27.4	972.7
	b	4.4	5.6	6.6	4.5	3.8	7.6	15.5	16.2	8.8	2.0	0.9	2.0	78.1
Bironkhal	a	63.0	71.6	45.9	30.5	63.0	165.9	315.5	265.9	131.6	36.6	5.1	27.2	1217.8
	b	3.7	4.1	3.2	2.5	4.3	9.0	15.5	15.0	6.6	1.7	0.4	1.6	67.6
Lansdowne	a	66.8	73.1	45.0	28.5	53.1	201.9	626.4	627.9	316.0	44.5	6.1	27.2	2116.5
	b	3.5	3.9	3.4	2.3	3.7	8.7	21.4	21.7	11.4	1.6	0.5	1.5	83.6
Somerford Orchard	a	58.4	76.7	54.6	39.1	56.6	214.1	380.7	371.1	224.3	46.0	12.5	32.3	1566.4
	b	3.6	4.1	3.8	3.1	4.5	9.9	17.5	17.5	9.8	1.7	0.8	1.8	78.1

contd

TABLE - 5a(h)(contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Badrinath	a -	-	-	-	-	43.0	182.9	138.5	64.9	26.2	-	-	-
	b -	-	-	-	-	6.7	18.8	15.2	6.3	2.2	-	-	-
Tijjim	a 97.5	89.9	139.0	59.1	54.4	136.6	381.9	408.6	233.9	63.1	21.3	35.6	1720.9
	b 5.2	5.6	7.9	5.3	5.4	13.2	25.6	24.3	14.8	3.9	1.5	1.6	114.3
Mansyari	a 79.1	35.5	130.7	83.2	106.3	229.9	784.8	661.0	350.3	41.2	33.8	63.6	2599.4
	b 5.0	3.0	8.2	7.5	7.6	13.8	26.3	25.8	16.7	3.3	2.6	2.0	121.8
Uttar Kashi	a 69.5	36.5	67.7	30.5	41.5	97.6	387.6	419.9	347.5	20.1	7.7	26.7	1552.8
	b 4.0	3.2	6.3	3.3	4.2	10.0	20.5	21.7	14.8	2.2	0.8	1.5	92.5
Rajgarhi	a 62.7	50.6	79.1	31.2	79.5	132.4	421.4	326.4	360.8	23.4	28.9	34.8	1631.2
	b 4.7	5.0	6.5	4.8	6.0	8.8	19.4	18.8	10.4	1.8	2.0	1.8	90.0
Jamunachetty	a 94.5	60.3	93.8	35.0	64.7	192.2	498.3	514.6	244.6	71.2	19.6	28.7	1917.5
	b 5.7	3.8	6.1	3.5	5.3	10.0	19.5	20.6	13.2	3.5	1.1	1.7	94.0
Rana	a 132.4	58.2	119.1	64.8	96.2	161.6	424.5	511.1	260.0	53.3	28.0	39.3	1948.5
	b 6.7	4.4	7.8	5.8	7.8	11.0	22.0	22.2	14.0	3.7	1.6	2.3	109.3
Kharsali	a 157.1	89.2	135.2	91.7	101.0	147.1	413.9	600.9	358.7	85.9	18.7	50.6	2092.9
	b 6.3	5.5	8.5	7.0	7.8	9.6	22.1	23.4	13.9	4.7	1.6	3.3	113.7
Mukhim (obsy)	a 69.3	56.3	73.7	43.6	75.7	131.7	431.9	348.2	251.1	66.4	15.7	42.0	1625.6
	b 4.2	4.2	5.6	4.6	5.4	9.3	19.8	18.4	12.5	3.7	1.1	2.1	90.9

contd....

TABLE -5a(h) (contd)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Dhanolti	a 48.2	51.6	56.2	25.7	55.4	139.4	518.2	473.0	301.7	41.9	33.1	27.8	1772.2
	b 4.4	3.3	4.7	3.0	4.0	7.9	20.9	20.6	11.6	3.9	1.4	1.7	87.4
Ghuttu	a 91.2	82.1	109.5	73.2	75.7	417.0	757.1	695.4	427.9	59.8	17.5	42.7	2849.1
	b 5.3	3.7	5.9	5.5	5.2	14.5	24.9	23.3	14.1	2.9	1.3	1.9	108.5
Kotdwara	a 41.9	46.0	21.6	15.5	25.4	172.5	557.0	541.8	249.7	37.1	6.3	15.2	1730.0
	b 2.6	2.9	2.0	1.5	2.0	7.3	18.2	17.5	9.0	1.4	0.4	1.1	65.9
Nainital (ohsy)	a 117.5	44.0	53.7	24.7	75.5	273.3	769.4	560.7	330.8	305.2	7.4	35.3	2597.5
	b 6.5	2.4	4.1	2.0	3.5	11.4	23.6	22.9	12.5	5.5	0.5	1.1	96.0

a - Normal rainfall. b - Average number of rainy days (days with rain of 2.5 mm or more).

TABLE - 5(h)
Mean Rainfall (mm) and Number of Rainy Days
for plain districts

District	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
HILLS OF U.P. WEST													
Nainital	a 36.6	40.3	16.9	10.4	27.3	190.0	485.6	468.3	242.4	31.5	3.0	13.6	1565.9
	b 2.1	2.6	1.5	0.9	2.0	7.2	16.1	16.2	9.0	1.3	0.2	1.0	60.1
Dehradun	a 60.5	63.0	36.3	19.8	32.9	184.9	707.8	775.8	328.0	39.9	7.5	25.3	2281.7
	b 3.8	3.6	2.8	1.8	2.7	8.3	20.3	21.1	11.1	1.8	0.5	1.6	79.4

ALMORA DISTRICT

This Himalayan district has highly rugged terrain marked with steep and high ridges and deep and narrow valleys, through which flow the Ramaganga, Kosi and Sarju, the main rivers in the district, and their tributaries. The general slope is towards the south or southeast in the eastern half and towards the west or southwest in the western half. The elevation is high ranging from about 1500 m to 3000 m a.s.l. towards the north. In the valleys in the south, elevations as low as 300 m may be reached. The climate, therefore, depends largely on elevation and exposure to the sun and winds. Severe winter is the chief climatic feature. During the season, which lasts till December to March considerable precipitation occurs often as snowfall in association with western disturbances passing across north India and affecting the district. The district, situated as it is on the southern slopes of the Himalayas, gets most of its rainfall from the monsoon current which penetrates through the valleys during June to September.

Rainfall

Long period records of rainfall in the district are available for four stations. The details of rainfall at these are given in table 1, which also gives the annual maximum and minimum precipitation and the heaviest rainfall in 24 hours recorded at individual stations. Annual precipitation is the least being of the order of 1200 mms, in the Almora region. Away from this region, the precipitation increases with elevation and the increase is most marked towards southwest where precipitation of the order of 1300 to 1500 mms is attained, as the district border is reached; precipitation towards the north increases to about 1700 mms beyond Kausani. Owing to the nature of terrain precipitation is highly variable spatially and is determined by elevation and exposure to rain bearing winds. Most of the rainfall, about 75 percent of the annual value, occurs during the monsoon months June to September. With the onset of the summer monsoon, rainfall increases sharply in June and continues to increase till August. July is the rainiest month and August the next. The two months together account for about 50 percent of the annual precipitation. In September, depressions from the Bay of Bengal occasionally reach U.P. and affect the weather in the district. In association with these, heavy rain may occur. With the withdrawal of the monsoon in September rainfall rapidly decreases. The decrease continues till November which is practically rainless. Winter precipitation though only of the order of 15 percent of the annual is of significant economic importance for the winter crops. Winter precipitation is associated with the passage of the western disturbances and is mostly in the form of snowfall over higher elevations, and the snow accumulation in the valleys is

considerable. April, which is a month of second rainfall - minimum, ushers in premonsoon showers, which become more frequent in May or June till advance of the monsoon takes place. These rains are generally associated with thunderstorms. About 7 percent of the annual precipitation occurs during these premonsoon months.

The rainfall is fairly variable in time. During the period between 1901 to 1965, for which this variation of rainfall has been considered, annual rainfall at individual stations was between 80 to 120 percent of their respective normals only on 65 to 70 percent of the occasions (years). As can be seen from table 1 precipitation, varies from the lowest value of 55 percent of the annual normal, recorded at Ranikhet in 1918, to 162 percent of the normal at Champawat in 1914. However, occasions of consecutive years of low (i.e. less than or equal to 80 percent of normal) or excessive (greater than or equal to 120 percent of normal) rainfall are rare, Champawat alone experiencing only one spell of 3 consecutive years (1921-23) when the rainfall in each year was in excess of 120 percent of its normal.

Temperature

Data of meteorological elements other than rainfall are not available for any observatories in the district. Inference has, therefore, to be drawn about the climate from the nature of altitude topography, location, etc. together with the available data for the neighbouring regions where similar climatic conditions may exist. Temperature variations from place to place are considerable and depend upon elevation as well as location, exposure to the sun, etc. At higher elevations as the insolation is intense, temperatures in the open are considerably higher than in shade in summer. In the valleys, pool of cold stagnant air causes diurnal range of temperature to be considerable. January is the coldest month with mean maximum temperature of 10°C at 2 km, the mean minimum temperature being about 2°C . Cold waves in the wake of western disturbances often make the conditions more rigorous, when the temperatures below the freezing point are recorded. Lowest temperatures of the order of -6°C can be expected to be reached during January or February at this elevation. Much lower temperatures should be expected at higher altitudes and towards north.

After January both day and night temperatures begin to rise. The rise, which is rapid till April being about 4°C per month, continues till June which is the warmest month, when the mean maximum temperature of the order of 23°C - 25°C and the mean minimum temperature of 15°C are attained. On individual days during summer, maximum temperature may rise upto 33°C at elevations of about 2 km. With the onset of monsoon, day temperature fall slightly in July and remain more or less steady at 20°C till August, while the night tempera-

tures continue to be steady at about 15°C . The temperatures continue to fall further but after October the fall in both day and night temperatures is rapid till December when winter is fully established.

The diurnal range of temperature is generally high between 8 to 10°C except during the monsoon months of July to September when it drops down to about 5°C .

Humidity

The relative humidity increases rapidly with the onset of monsoon and is generally about 80 percent during July to September. The driest part of the year is the premonsoon period, when the humidity may become as low as 35 percent during the afternoons. During winter, the humidity appreciably increases towards afternoon at high level stations.

Cloudiness

Skies are heavily clouded during the monsoon months and for short spells when the region is affected by western disturbances, otherwise, the skies generally are clear to lightly covered with medium or high clouds. Generally speaking, clouding tends to increase towards afternoons.

Winds

Owing to the nature of the terrain local effects are pronounced and when the general prevailing winds are not too strong to mask these effects, there is tendency for diurnal reversal of winds blowing up the slopes during the day (anabatic flow) and down the slopes at night (Katabatic flow). Katabatic wind can blow with considerable force.

Special Weather Phenomena

Thunderstorms are rare in November and December and most frequent in the premonsoon and monsoon months of April to September during which more than 80 percent of thunderstorms occur. Winter and premonsoon thunderstorms are occasionally accompanied with hail. Hill fog is common in monsoon. In the winter months fog may occur in the wake of western disturbance, and in the valleys morning fog is frequent.

TABLE - 1

Normals and extremes of Rainfall

Stations	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain-fall as % of normal & year**	Lowest annual rain-fall as % of normal & year**	Heaviest rain-fall in 24 hours* Amount (mm)	Date
Almora	50 a	42.9	49.3	42.2	27.9	48.3	145.8	264.9	234.2	130.3	32.3	7.4	21.3	1044.8	150 (1917)	63 (1918)	222.5	1924 Sep 29
	b	3.3	3.9	3.8	2.7	4.5	8.2	15.1	14.2	7.6	1.9	0.6	1.8	67.6				
Champawat	50 a	67.6	75.9	49.3	30.2	62.0	194.8	339.1	287.8	198.1	43.9	12.7	25.4	1386.8	162 (1914)	60 (1941)	389.9	1897 Sep 27
	b	3.4	4.5	3.7	2.7	5.3	10.2	17.1	16.1	8.3	1.7	0.7	1.6	75.3				
Ranikhet	50 a	54.1	62.0	46.2	31.0	50.0	144.0	331.5	344.4	165.9	33.5	7.4	22.9	1292.9	144 (1917)	55 (1918)	304.8	1880 Sep 18
	b	3.7	4.2	3.6	2.8	4.4	8.6	17.6	18.2	9.0	1.8	0.5	1.9	76.3				
Kausanie	44 a	58.7	71.4	62.5	45.7	86.4	226.6	420.1	375.2	185.2	43.9	9.1	26.2	1611.0	158 (1919)	56 (1954)	200.1	1910 Oct 03
	b	3.9	4.5	4.3	3.9	6.5	11.7	19.7	18.9	9.4	2.3	0.8	1.7	87.6				

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

* Based on all available data upto 1980 ** Years given in brackets.

CHAMOLI DISTRICT

The district contains within its limits lofty snowbound peaks of the outer Himalayas where, in the glaciers, the Alakananda and its tributaries take their origin. The terrain is marked with deep and narrow valleys and steep and high ridges, whose general slope is towards the south or southwest. The elevation is high ranging from 3000 metres to 8000 metres above sea level. The land slopes down towards the south, where, in the valleys elevation at places comes down to 1200 metres. The climate, therefore, depends very largely on elevation. Severe winter is the chief climatic feature. It lasts from about mid-November to March. As most of the region is situated on the southern slopes of the outer Himalayas, monsoon current can penetrate through the trenched valleys and rainfall is a maximum in the monsoon from June to September.

Rainfall

Rainfall records are available for 6 stations in the district. Data for Badrinath are available for the months June to October only for 4 to 6 years. All these stations, on account of their location, are more representative of the river valleys. The details of the rainfall at these stations are set out in table 1, which also gives the heaviest rainfall at individual stations. Rainfall generally increases from southeast to northwest reaching the maximum in the Lokpal sector. Most of the rainfall occurs during the period June to September when 70 to 80 percent of the annual precipitation is accounted for in the southern half of the district, and 55 to 65 percent in the northern half. In September depressions from the Bay of Bengal occasionally reach U.P. and affect the weather in the district. In association with these, heavy rain may occur causing floods. In the monsoon season there are a few occasions when the rainfall in the plain districts decreases but there are spurts of heavy rain in the hills causing floods in the rivers. Considerable precipitation also occurs during the winter months December to March, about 15 to 30 percent occurring in the northern half of the district and 10 to 15 percent in the south. About 8 percent of the annual rainfall occurs during the premonsoon period of April and May. July and August are the rainiest months, and November is the month with the least rainfall. Precipitation during the winter is associated with the passage of the western disturbances and is mostly in the form of snowfall particularly at higher elevations. Premonsoon rainfall is more associated with thunderstorms. Variation of rainfall from year to year is not very appreciable. As can be seen from table 1, data for long periods are available only for four stations, viz., Okhimath, Joshimath, Karnaprayag and Bironkhal. Considering the 50 years period 1901 to 1950 for these stations the total number of years of rainfall less than 80 percent of the normal was 11 at Joshimath, 8 at Bironkhal, 7 at Karnaprayag and 6 at

Okhimath, while two consecutive years of such low rainfall occurred only once each at Okhimath, Joshimath and Karnaprayag, one spell of three and one of four consecutive years of such low rainfall were registered at Joshimath only.

Temperature

There are four meteorological observatories in the district recording temperature and other weather observations. The observatory at Badrinath functions only during May to October as the place is under the snow cover during the remaining months of the year. Owing to the severity of conditions in winter, the meteorological data are often not continuous at any of these observatories. Table 2 gives the details of the temperature at these stations. The values of temperature are representative of conditions in the valleys. Much lower temperatures should be expected at higher elevations. The district being hilly, temperature variations with elevation and from place to place are considerable. January is the coldest month after which the temperatures begin to rise till June or July. The mean maximum during the warmest month is of the order of 27°C at stations 2 kms high, 15 to 18°C at 3 kms and lower temperatures at higher stations, being, for example, of the order of only 9°C at Lokpal at 6 kms a.s.l. During the coldest month, the mean minimum temperature is of the order of 2°C at 2 kms, -12°C at 6 kms in the north. Indeed, here even the mean maximum temperature is below the freezing point. They begin to fall from October. During the cold season, cold waves in the rear of western disturbance may cause temperatures to fall appreciably. Snow accumulation in valleys is considerable.

Humidity

The relative humidity is high during the monsoon season, generally exceeding 70 percent on the average. The driest part of the year is the premonsoon period, when humidity may become as low as 35 percent during the afternoons. During winter months humidity increases towards the afternoon at some high stations.

Cloudiness

Skies are heavily clouded during the monsoon months and for short spells when the region is affected by the passage of western disturbances. During rest of the year, the skies are generally clear to lightly clouded.

Winds

Owing to the nature of the terrain, local effects are pronounced, and when the general prevailing winds are not too strong to mask these effects, there is a tendency for diurnal reversal of winds, blowing up the slopes during the day (anabatic flow) and down the slopes at night (katabatic flow). Katabatic wind can blow with considerable force.

Special Weather Phenomena

Thunderstorms occur almost throughout the year except during the months of November and December which are practically free. Some of the winter and premonsoon thunderstorms are associated with hail. Hill fog is common during the monsoon. Fog also occurs occasionally during the cold season, in the wake of western disturbances. In the valleys, morning fog may be frequent in winter.

Tables 2(a) to 2(d), 3 and 4(a) and 4(b) give the available data of temperature and humidity, mean windspeed and special-weather phenomena for Joshimath, Lokpal, Badrinath and Tapoban.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount Date (mm)	
Badrinath	6 a	-	-	-	-	-	43.0	182.9	138.5	64.9	26.2	-	-	-	-	-	-	-
	b	-	-	-	-	-	6.7	18.8	15.2	6.5	2.2	-	-	-	-	-	-	-
Lokpal	12 a	214.6	164.9	215.3	93.7	41.9	136.2	445.3	432.0	251.1	96.6	66.5	107.6	2265.7	118 (1961)	85 (1957)	100.0	1961 Dec 17
	b	9.4	7.4	11.8	7.5	4.1	13.5	26.5	25.4	19.1	7.1	3.5	4.7	140.0				
Tapoban	7 a	37.3	30.1	64.6	32.3	31.0	52.1	247.6	147.1	81.5	115.2	1.4	8.9	848.9	121 (1955)	71 (1956)	190.5	1952 Jul 27
	b	4.4	2.7	5.3	3.5	3.4	4.1	14.8	13.8	7.2	5.7	0.1	1.0	65.8				
Joshimath	50 a	65.8	92.7	98.5	54.4	35.1	88.9	176.3	184.7	108.5	28.2	12.2	27.4	972.7	198 (1924)	53 (1943)	203.2	1924 Sep 28
	b	4.6	5.6	6.6	4.5	3.8	7.6	15.5	16.2	8.8	2.0	0.9	2.0	78.1				
Okhimath	50 a	66.0	67.8	52.6	40.9	73.4	196.3	524.3	570.0	233.4	36.6	6.1	22.1	1888.5	169 (1925)	55 (1913)	208.3	1925 Aug 08
	b	4.2	4.7	4.3	4.0	6.4	11.0	22.6	23.5	13.1	2.6	0.6	1.5	98.5				
Karnaprayag	50 a	55.1	66.3	55.9	37.1	51.8	148.6	374.1	386.6	175.8	34.8	7.1	23.4	1416.6	168 (1910)	59 (1959)	198.1	1942 Jun 23
	b	3.9	4.6	4.7	3.5	4.8	9.0	18.2	18.0	10.0	2.0	0.7	1.7	81.1				

(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 1980. **Years given in brackets.

TABLE - 2(a)
Means of Temperature and Relative Humidity
(JOSHIMATH)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded			Lowest Minimum ever recorded			Relative Humidity	
	°C	°C	°C	Date		°C	Date		0830 %	1730* %
January	11.6	2.0	18.2	1961	Jan 17	-15.1	1974	Jan 15	47	47
February	13.3	3.4	21.1	1962	Feb 25	-12.9	1983	Feb 10	51	48
March	18.0	6.6	27.7	1964	Mar 15	-4.0	1979	Mar 09	44	40
April	22.3	10.5	28.1	1964	Apr 30	2.3	1984	Apr 16	43	38
May	26.4	14.1	31.2	1970	May 14	3.2	1984	May 01	40	35
June	27.4	17.0	34.2	1974	Jun 14	6.2	1983	Jun 16	68	55
July	25.1	17.6	34.0	1982	Jul 11	10.3	1979	Jul 04	89	75
August	24.2	17.3	29.9	1978	Aug 01	13.2	1984	Aug 10	89	79
September	23.5	15.5	27.3	1963	Sep 13	5.5	1982	Sep 05	83	74
October	21.2	10.6	26.0	1979	Oct 02	-0.6	1975	Oct 29, 30	66	62
November	16.5	6.0	25.1	1962	Nov 17	0.1	1978	Nov 23	46	50
December	13.7	3.9	20.0	1960	Dec 31	-2.9	1977	Dec 29	48	47
Annual	20.3	10.4							59	54

*Hours I.S.T

TABLE - 2(b)
Means of Temperature and Relative Humidity
(LOKPAL)

Months	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded			Lowest Minimum ever recorded			Relative Humidity	
	°C	°C	°C	Date		°C	Date		0830 %	1730* %
January	-6.2	-11.7	-2.4	1959	Jan 24	-16.1	1955	Jan 01	69	
February	-4.6	-9.9	0.3	1960	Feb 29	-13.9	1957	Feb 04	61	
March	-2.9	-7.7	0.9	1959	Mar 24	-11.3	1961	Mar 06	73	
April	-0.7	-5.8	3.4	1961	Apr 29	-11.1	1957	Apr 01	66	
May	2.9	-3.3	10.0	1956	May 31	-7.8	1955	May 6 days	72	
June	8.0	1.0	11.7	1960	Jun 10	-3.3	1955	Jun 03	86	
July	9.2	4.9	12.3	1962	Jul 04	1.7	1956	Jul 04	94	
August	9.2	5.0	12.1	1962	Aug 06	2.2	1956	Aug 28	91	
September	8.3	2.4	10.9	1959	Sep 14	-2.2	1951	Sep 30	91	
October	4.1	-2.6	8.9	1952	Oct 31	-7.8	1954	Oct 31	77	
November	1.0	-7.7	8.9	1952	Nov 01	-12.2	1957	Nov 29	60	
December	-3.3	-11.2	2.2	1953	Dec 01	-16.7	1952	Dec 31	52	
Annual	2.1	-3.9								74

*Hours I.S.T.

TABLE - 2(c)

Means of Temperature and Relative Humidity
(TAPOBAN)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded			Lowest Minimum ever recorded			Relative Humidity	
	^o C	^o C	^o C	Date		^o C	Date		0830	1730*
January	12.1	2.4	18.9	1957	Jan 26	-4.4	1955	Jan 01	53	
February	15.3	3.9	26.7	1955	Feb 26	-2.2	1956	Feb 05	56	
March	18.7	7.2	26.7	1955	Mar 16	0.6	1957	Mar 13	46	
April	22.6	9.4	30.6	1958	Apr 24	0.6	1957	Apr 16	46	
May	25.5	12.2	31.7	1958	May 22	6.1	1957	May 28	60	
June	27.3	15.9	32.8	1958	Jun 15	7.2	1957	Jun 30	71	
July	24.6	16.4	31.7	1957	Jul 01	7.2	1957	Jul 03	89	
August	24.1	16.4	27.8	1956	Aug 08	10.0	1957	Aug 21	86	
September	25.9	14.0	27.8	1956	Sep 4 days	11.1	1957	Sep 16	81	
October	21.1	10.6	26.7	1956	Oct 21	4.4	1956	Oct 09	64	
November	19.2	6.4	21.7	1955	Nov 10	3.9	1956	Nov 26	61	
December	14.9	3.7	21.1	1956	Dec 14	0.0	1955	Dec 27	56	
Annual	20.8	9.9							64	

Data not available

* Hours I.S.T.

TABLE - 2(d)
Means of Temperature and Relative Humidity
(BADRINATH)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
May	14.4	5.7						81
June	18.2	9.1	22.0	1960 Jun 07	6.1	1960 Jun 14	78	
July	17.8	10.5	20.0	1958 Jul 15	10.0	1958 Jul 08	83	
August	17.9	10.7	21.7	1959 Aug 09	7.8	1958 Aug 29	78	
September	16.3	8.6	18.3	1958 Sep 08	6.1	1958 Sep 17	72	
October	12.4	5.6	16.1	1959 Oct 01	1.1	1959 Oct 30	74	

*Hours I.S.T.

TABLE - 3
Mean Wind Speed in Km/hr.
(JOSHIMATH)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.3	7.2	8.6	9.2	8.1	5.9	4.7	3.7	4.3	5.8	6.1	6.3	6.3

Tables 3(a), 3(b) & 3(c) for Lokpal, Tapoban & Badrinath observatories respectively has not been prepared as data is not available.

TABLE - 4(a)
Special Weather Phenomena
(JOSHIMATH)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	0.3	1.0	2.3	4.7	2.7	3.5	1.8	1.0	1.4	2.6	0.2	0.0	21.5
Hail	0.3	0.0	1.3	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	2.7
Duststorm	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Squall	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Fog	0.7	2.5	1.0	0.0	0.0	2.5	11.6	12.6	6.8	0.6	0.0	0.2	38.5

*No. of days two and above are given in whole numbers.

TABLE - 4(b)
Special Weather Phenomena
(LOKPAL)

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	1.5	0.6	0.0	0.0	0.0	0.1	0.7	1.1	0.0	4.3
Hail	0.3	2.0	1.5	5.3	2.3	0.3	0.0	0.0	0.6	1.6	1.3	0.6	15.8
Duststorm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	1.3	4.1	0.0	4.5	0.0	8.6	1.4	4.4	8.1	1.6	1.7	4.1	39.8

*No. of days two and above are given in whole numbers.

DEHRADUN DISTRICT

The district has within its limits lofty peaks of the outer Himalayas as well as the Dun with climatic conditions nearly similar to those in the plains. The temperature of any given locality in the district depends very largely on the elevation. In general the climate is temperate. The year may be divided into four seasons. The period from about the middle of November to February is the cold season. The hot season which follows continues upto about the end of June. The monsoon season is from July to about the third week of September. The following period till the middle of November is the post monsoon or transition season.

Rainfall

Records of rainfall in the district are available for one hill station and six other stations at lower altitudes for periods ranging from 66 to 97 years. The details of the rainfall at these stations and for the district as a whole are given in tables 1 and 2. The average annual rainfall in the district excluding Mussoorie, is 2281.7 mm. While in general the rainfall increases as one proceeds from the southwest towards the northeast the region around Rajpur gets the maximum rainfall while the area around Ambari and to the north get the least rainfall in the district. About 87 percent of the annual rainfall in the district is received during the months June to September, July and August being the rainiest months. The variation in the rainfall from year to year in the district is appreciable. In the 50 year period, 1901 to 1950, the highest annual rainfall which was 147 percent of the normal occurred in 1917 while the lowest annual rainfall amounting to 58 percent of the normal occurred in 1907 and 1918. In this 50 year period the annual rainfall in the district was less than 80 percent of the normal in 8 years, two of them being consecutive. Considering the rainfall, at individual stations two consecutive years of such low rainfall occurred thrice at Dehra Dun twice at Bhogpur and once each at Rajpur and Mussoorie. It will be seen from table 2 that the annual rainfall in the district was between 1901 and 2500 mm in 26 years out of 50.

On an average there are 79 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district. This number varies from 72 at Ambari to 96 at Mussoorie.

The heaviest rainfall in 24 hours recorded at any station in the district was 487.0 mm at Dehradun (obsy) on 1966 July 25.

Temperature

There are two meteorological observatories in the district, at Mussoorie and Dehradun. The district being hilly, temperature variations due to differences in elevation are considerable. However the records of Dehradun may be taken as representative of the conditions in the Dun, and those of Mussoorie, broadly representative of the hilly regions. After February both day and night temperatures begin to increase rapidly. May and the early part of June is generally the hottest part of the year. The highest maximum temperature in May at Dehradun is 36.2°C and that of Mussoorie is 24.8°C . On individual days, the maximum temperature rises upto over 42°C at Dehradun, while at Mussoorie the maximum temperature goes upto over 34°C . In the hilly regions the summer is pleasant. But in the Dun the heat is often intense, although not as intense as in the plains of the adjoining districts. Afternoon thundershowers which occur on some days bring welcome relief from the heat. With the onset of the southwest monsoon over the district by about the last week of June there is appreciable drop in the day temperatures but the nights are nearly as warm as during summer. With the withdrawal of the monsoon by about the third week of September temperatures begin to decrease, the drop in night temperatures being more rapid. January is generally the coldest month with the mean daily maximum temperature of 19.1°C at Dehradun and 10.2°C at Mussoorie. The mean daily minimum temperature in January is 6.1°C at Dehradun and 2.5°C at Mussoorie. During the cold season cold waves affect the district in the rear of passing western disturbances the minimum temperature sometimes falling down to about a degree below the freezing point of water at places like Dehradun and to about -6 or -7°C at places like Mussoorie and frosts occur.

The highest maximum temperature recorded at Dehradun was 43.9°C on 1902 June 4 and that at Mussoorie was 34.4°C on 1949 May 24. The lowest minimum temperature at Dehradun was -1.1°C on 1905 February 1 and 1945 January 11. While at Mussoorie it was -6.7°C on 1950 February 10.

Humidity

The relative humidity is high during the southwest monsoon season, generally exceeding 70 percent on the average. The mornings are comparatively more humid than the afternoons. It is comparatively less humid in the rest of the year, the driest part of the year being the summer season while the relative humidity in the afternoons becoming less than 45 percent.

Cloudiness

During the southwest monsoon season and for short spells of a day or two in the cold season in association with passing western disturbances skies are generally heavily clouded or overcast. The hills are often enveloped in cloud. It is usually lightly clouded or clear in the rest of the year.

Winds

Winds are generally light. In the Dun winds in the post monsoon season and in the mornings in the rest of the year are variable in direction. In the afternoons winds are mostly from directions between southwest and northwest throughout the year except in October and November. In the hilly regions in the period May to September winds blow from directions between southwest and southeast. In the post monsoon and cold seasons these winds continue to be most common, but on many days in the mornings northerly to northeasterly winds also blow. In March and April morning winds are northerly to northeasterly and afternoon winds from direction between southeast and southwest.

Special Weather Phenomena

During the cold season passing western disturbances affect the weather over the district causing occasional thunderstorms some of which are associated with hail. Thunderstorms occur during the summer and monsoon seasons. Fog occurs occasionally during the cold season.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and special weather phenomena respectively for Dehradun and tables 3(a), 4(a) and 5(a) give similar data for Mussoorie.

.....

TABLE - 1
Normals and Extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount Date (mm)		
Dehradun (obsy)	50 a	57.9	66.8	37.9	19.6	35.8	184.4	655.6	713.0	304.5	41.9	7.6	24.9	2149.9	143 (1936)	54 (1907)	487.0	1966	Jul 25
	b	3.8	3.8	3.1	1.9	3.0	8.5	20.4	21.2	11.8	2.1	0.5	1.7	81.8					
Rajpur	50 a	69.3	65.8	43.2	24.4	39.4	246.1	968.0	1058.7	392.4	43.9	9.1	25.7	2386.0	164 (1917)	50 (1907)	440.4	1954	Aug 25
	b	4.0	3.7	3.1	2.0	3.1	9.4	22.9	23.8	12.0	1.9	0.7	1.6	88.2					
Chakrata	50 a	-	-	-	47.7	54.4	173.0	428.7	420.1	184.1	33.3	12.9	-	-	-	-	246.4	1871	Jul 29
	b	-	-	-	3.8	4.7	9.0	19.4	18.3	8.7	1.7	0.8	-	-					
Ambari	50 a	65.0	65.3	35.3	21.1	24.6	151.1	599.9	582.2	256.8	30.2	7.1	27.9	1865.0	147 (1917)	46 (1918)	304.8	1886	Jul 26
	b	4.0	3.5	2.7	1.7	2.5	7.3	18.8	18.6	9.4	1.3	0.5	1.7	72.0					
Bhojpur	50 a	59.2	56.1	33.0	17.8	33.5	179.1	680.5	818.9	361.7	42.2	7.4	24.4	2315.8	171 (1936)	43 (1907)	381.0	1890	Jul 29
	b	3.8	3.4	2.4	1.6	2.5	8.2	19.2	21.3	11.4	1.8	0.5	1.6	77.7					
Raipur	50 a	53.1	60.5	32.3	16.0	31.2	163.6	635.0	706.4	324.6	41.1	6.1	25.6	2093.5	151 (1917)	54 (1907)	294.6	1924	Sep 03
	b	3.6	3.6	2.6	1.6	2.5	8.0	20.0	20.5	11.1	2.1	0.5	1.5	77.6					
Dehradun (District)	a	60.5	63.0	36.3	19.8	32.9	184.9	707.8	775.8	328.0	39.9	7.5	25.3	2281.7	147 (1917)	58 (1918)			
	b	3.8	3.6	2.8	1.8	2.7	8.3	20.3	21.1	11.1	1.8	0.5	1.6	79.4					
Hill Station																			
Mussoorie	50a	79.3	89.7	66.8	37.1	54.9	208.3	782.3	800.3	329.4	41.1	12.5	36.1	2337.8	186 (1917)	50 (1918)	439.4	1890	Aug 19
	b	4.9	5.2	4.4	3.4	4.2	9.7	23.0	23.6	12.5	2.1	0.7	2.1	95.8					

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
1301 - 1500	2	2301 - 2500	6
1501 - 1700	2	2501 - 2700	2
1701 - 1900	6	2701 - 2900	4
1901 - 2100	11	2901 - 3100	6
2101 - 2300	9	3101 - 3300	1
		3301 - 3500	1

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	°C	°C	°C	Date	°C	Date	0830 %	1730* %
January	19.1	6.1	28.0	1980 Jan 20	-1.1	1945 Jan 11	78	59
February	21.4	8.2	30.1	1974 Feb 23	-1.1	1905 Feb 01	71	47
March	26.4	12.4	37.2	1892 Mar 28	2.2	1945 Mar 06	58	38
April	32.1	17.0	40.6	1892 Apr 27	7.2	1981 Apr 23	43	25
May	36.2	21.5	42.8	1944 May 28	11.4	1982 May 16	41	26
June	35.3	23.6	43.9	1902 Jun 04	13.9	1906 Jun 10	58	43
July	30.4	23.1	40.6	1931 Jul 01	16.8	1983 Jul 06	85	77
August	29.5	22.7	37.2	1949 Aug 05	18.4	1982 Aug 30	87	82
September	29.6	21.3	34.4	1938 Sep 30	14.3	1982 Sep 30	80	73
October	28.2	16.1	36.1	1901 Oct 02	8.4	1983 Oct 24	68	61
November	24.7	10.3	30.6	1952 Nov 01	2.8	1938 Nov 30	70	61
December	20.9	7.0	27.2	1960 Dec 30	0.0	1954 Dec 11	76	61
Annual	27.8	15.8					68	54

*Hours I.S.T

TABLE - 3(a).
Normals of Temperature and Relative Humidity
(MUSSOORIE)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	oC	oC	oC	Date	oC	Date	0830	1730*
January	10.2	2.5	21.1	1949 Jan 14	-5.0	1935 Jan 16	58	72
February	11.9	3.7	23.3	1953 Feb 26	-6.7	1950 Feb 10	56	71
March	16.2	7.2	26.1	1971 Mar	-2.5	1960 Mar 23	49	59
April	21.1	11.8	28.9	1956 Apr 22	-1.5	1965 Apr 02	44	46
May	24.8	15.1	34.4	1949 May 24	3.1	1982 May 12, 13	46	43
June	24.1	16.4	31.7	1935 Jun 03	4.1	1962 Jun 01	68	66
July	20.8	15.9	29.4	1949 Jul 07	11.7	1983 Jul 05	93	95
August	20.2	15.6	25.6	1957 Aug 23	7.4	1962 Aug 05	94	98
September	19.9	14.3	27.2	1946 Sep 11	1.3	1963 Sep 16	86	94
October	18.7	11.1	28.1	1983 Oct 06	2.6	1961 Oct 31	63	78
November	15.8	7.4	25.0	1952 Nov 17	-2.1	1960 Nov 29	49	68
December	12.7	4.3	23.3	1965 Dec 30	-3.9	1954 Dec 31	50	69
Annual	18.0	10.4					64	72

*Hours IST-

TABLE - 4
Mean Wind Speed in Km/hr.
(DEHRADUN)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2.6	3.1	3.6	4.2	4.1	3.6	2.7	2.5	2.8	3.3	3.0	2.6	3.2

TABLE - 4(a)
Mean Wind Speed in Kmph.
(MUSSOORIE)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
6.7	7.4	7.9	7.9	8.4	7.3	5.6	4.7	5.4	6.1	6.3	6.8	6.7

TABLE - 5
Special Weather Phenomena
(DEHRADUN)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	3	2	5	4	8	10	12	12	10	3	0.5	0.7	70
Hail	0.2	0.1	0.3	0.2	0.2	0.5	0	0	0	0.1	0	0	1.6
Duststorm	0	0	0	0	0.2	0.1	0	0	0	0	0	0	0.3
Squall	0	0.1	0.4	0.3	0.1	0.1	0	0	0	0	0	0	1.0
Fog	0.2	0.3	0	0	0	0.2	1.1	0.8	0.6	0.0	0.1	0.1	3

*No. of days two and above are given in whole numbers.

TABLE - 5(a)

Special Weather Phenomena
(MUSSOORIE)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.6	1.6	4	5	8	9	9	9	9	2	0.5	1.4	60
Hail	2	1.7	1.8	1.2	0.8	0.2	0	0.1	0.1	0.1	0.1	0.7	9
Duststorm	0	0	0	0	0.2	0.1	0	0	0	0	0	0	0.3
Squall	0.3	0.3	0.5	0.5	0.8	0.3	0	0	0.3	0	0	0.1	3
Fog	3	1.6	0.7	0.4	0.5	6	19	17	13	3	1.0	2	67

*No. of days two and above are given in whole numbers.

NAINITAL DISTRICT

The climate of the different parts of the district is largely dependent on the altitude. The mountains of the outer Himalayas in the northern portion of the district have a general elevation of about 2000 meters above the sea level while the highest summits attain to a height of over 2400 meters. Below the foot of the hills is the narrow forest-covered belt of country known as Bhabar. To the south of the Bhabar lies the swampy area called Tarai. The summer season is from March to about the end of June. The southwest monsoon season starts thereafter and lasts till about the middle of September. Mid-September to November constitutes the post monsoon season, and December to February is the cold season.

Rainfall

Records of rainfall in the district are available for fifteen stations for periods ranging from 25 to 96 years. The details of the rainfall at these stations and for the district excluding the mountainous northern region of the district are given in tables 1 and 2. More rainfall occurs on the outer slopes of the hills. Nainital itself owing to its position on the southern slope receives about double the rainfall of Mukteswar which is at a higher elevation. The zone of heavy rainfall extends from the great peaks of Gagar range to the foot of the hills. There is a general increase of rain from the southwest towards the northeast in the Tarai and Bhabar regions.

Although the main rainy season is the southwest monsoon season, from about the last week of June to September-mid, some rainfall much less in amount occurs in the cold season from December to February in association with the passage of western disturbances, when the precipitation is mostly as snowfall in the hills and rain at lower elevations at foot of the hills. The average annual rainfall in the southern non-mountainous region is 1565.9 mm of which 88% occurs in the southwest monsoon period June to September. About 7% of annual rainfall occurs in the cold season. In the fifty year period 1901 to 1950, the annual rainfall was the highest in 1922 and amounted to 148% of the normal. 1913 was the year with the lowest annual rainfall, which was only 56% of the normal. In the same fifty year period the annual rainfall was less than 80% of the normal in ten years. There were three occasions when two consecutive years had rainfall less than 80% of the normal. It will be seen from table 2 that in 29 years out of fifty the rainfall in the district, excluding the hilly region, was between 1201 and 1700 mm.

On an average there are 60 rainy days (i.e. days with rainfall of 2.5 mm or more) in a year in the district, excluding the hilly region. The variation in the number of rainy days in the district

is similar to that of rainfall.

In the northern mountainous region, the highest rainfall in 24 hours ever recorded was 509.3 mm at Nainital on 1958 September 22. In the southern non-mountainous region, the highest rainfall in 24 hours recorded at any station was 413.0 mm at Kaladungi, on 1970 July 10 and 413.0 mm at Haldwani on 1970 July 11.

Temperature

Meteorological records are available for Mukteswar for a long period and for Nainital for a shorter period. While these may be taken as fairly representative of the meteorological conditions in hilly parts of the district, temperature and other meteorological conditions in Bhabar and Tarai regions for which meteorological records are not available, may be taken to be more or less similar to those of the adjoining plains of Uttar Pradesh. Temperatures begin to increase from March. May and June are the hottest months. In the mountainous terrain, the mean daily maximum temperature is of the order of 23°C to 24°C and mean daily minimum are of the order of 14° to 17°C . In the plains during the same season, the mean daily maximum temperature is of the order of 39°C and mean daily minimum temperature of the order of 27°C . With the onset of the southwest monsoon by about the end of June day temperatures decrease while night temperatures remain as in the summer season. During the post monsoon season, mid-September to November, both day and night temperatures begin to drop appreciably. January is the coldest month, the mean daily minimum temperature being about 2°C and mean daily maximum temperature of about 10°C in the mountainous region. In the plains during this month the mean daily minimum temperature is of the order of 7°C and the mean daily maximum temperature of the order of 21°C . On individual days in association with cold waves in the wake of western disturbances which affect the district during the winter season, the minimum temperatures may go down to 5° or 7°C below the freezing point of water in the mountainous regions and near about the freezing point of water in the plains.

The highest maximum temperature ever recorded at Mukteswar was 30.8°C on 1966 June 9 and lowest minimum temperature was -7.8°C on 1905 February 10. At Nainital the highest maximum temperature recorded was 29.8°C on 1966 June 9 and the lowest minimum was -5.6°C on 1953 January 17.

Humidity

The humidities are high during the monsoon season and to a lesser extent in the cold months. In the summer months humidities are generally low and are between 35 and 45% in the hilly northern regions while in the Tarai regions the humidities continue to be high.

Cloudiness

In the winter season the skies are generally clear or lightly clouded except for brief spells of a day or two each time when in association with the passage of western disturbances particularly in the northern parts of the district skies become cloudy. Skies are clear or lightly clouded in the summer and post monsoon seasons. Heavily clouded to overcast skies prevail in the monsoon season.

Winds

In the northern portions of the district winds are generally light to moderate throughout the year and blow mainly from the southwesterly or westerly directions. During the winter and southwest monsoon seasons, easterly and southeasterly winds also blow. But in the Tarai regions westerly to northwesterly winds are predominant in the post monsoon season, winter and the early part of summer. In the latter part of summer and monsoon season winds are mainly easterly to southeasterly.

Special Weather Phenomena

Thunderstorms occur in all the months, the occurrence being least in the period November to January, and highest during May and June. Occasional hail in the winter and summer months and fog during the winter occur in the hilly regions.

Tables 3, 4 and 5 give the temperature and humidity, mean wind speed and frequency of special weather phenomena respectively for Mukteswar. Tables 3(a), 4(a) and 5(a) give similar data for Nainital.

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount Date (mm)	
Kala Jungi	15 a	40.4	45.2	16.0	10.9	28.7	209.8	551.9	514.3	275.1	20.1	1.3	10.9	1722.6	135 (1945)	63 (1944)	415.0	1970 Jul 10
	b	2.1	2.9	1.3	1.1	2.1	8.4	18.3	18.3	10.4	1.4	0.2	0.8	67.3				
Tanakpur	15 a	40.1	53.6	16.5	14.5	47.5	272.5	646.9	519.7	279.1	38.3	0.3	15.0	1944.0	152 (1936)	59 (1947)	305.1	1961 Aug 20
	b	1.9	3.1	1.4	0.9	3.1	9.8	20.3	17.3	10.7	1.8	0.1	0.8	71.2				
Khatima	15 a	48.3	58.3	13.7	10.4	24.1	238.3	463.0	459.9	231.9	42.4	0.5	11.4	1562.2	158 (1956)	48 (1941)	405.6	1972 Sep 15
	b	1.9	2.7	1.5	0.7	2.2	8.5	16.6	15.7	8.8	2.0	0.1	0.8	61.5				
Rudrapur	50 a	26.9	34.5	13.7	7.1	19.3	130.8	393.2	369.6	206.3	32.8	5.1	12.9	1252.2	171 (1922)	53 (1930)	307.1	1907 Jul 25
	b	1.9	2.0	1.3	0.9	1.6	5.1	14.0	14.2	7.4	1.1	0.4	1.0	50.9				
Bazpur	15 a	37.6	41.1	17.5	11.7	19.8	147.3	448.3	423.7	244.9	13.2	0.3	14.2	1421.6	145 (1945)	54 (1941)	406.4	1954 Oct 03
	b	2.4	2.5	1.4	0.9	1.6	5.9	14.1	16.3	8.6	1.0	0.1	1.1	55.9				
Kilpuri	49 a	29.7	34.8	16.3	8.6	27.7	167.4	439.2	416.8	232.9	37.1	6.3	11.4	1428.2	188 (1922)	48 (1944)	350.2	1885 Aug 06
	b	2.0	2.2	1.4	0.9	2.1	6.4	14.6	15.5	8.1	1.3	0.3	0.9	55.7				
Gadarpur	15 a	32.5	29.0	11.2	8.9	10.9	146.8	414.8	409.5	206.0	15.7	0.5	8.9	1294.7	167 (1954)	60 (1941)	274.3	1950 Jul 05
	b	1.8	2.3	1.3	0.6	0.9	5.8	14.5	15.3	8.5	0.9	0.1	0.7	52.7				
Kashipur	50 a	32.8	40.4	14.2	10.9	22.9	163.6	366.0	367.0	212.6	36.1	4.8	12.2	1283.5	220 (1917)	49 (1913)	315.0	1954 Oct 02
	b	2.2	2.5	1.5	1.0	1.7	5.6	12.4	12.6	7.0	1.2	0.3	1.0	49.0				

contd.....

TABLE - 1(contd)

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Haldwani	50 a	41.1	48.8	21.3	12.2	35.6	244.1	621.5	611.9	275.6	36.3	3.3	21.1	1972.8	165 (1922)	57 (1913)	415.0	1970 Jul 11
	b	2.5	2.9	1.9	1.1	2.6	8.6	18.7	18.6	10.3	1.5	0.3	1.3	70.3				
Ramanagar	50 a	39.4	40.1	20.3	10.2	33.0	164.6	447.3	459.5	208.8	30.7	4.8	16.5	1475.2	189 (1930)	56 (1913)	266.7	1927 Oct 08
	b	2.5	2.7	2.0	1.1	2.4	7.1	16.3	16.0	8.6	1.2	0.3	1.2	61.4				
Kathgodam	50 a	42.2	48.5	23.6	13.5	35.8	264.2	635.3	652.0	305.3	37.3	5.1	16.8	2079.6	151 (1950)	59 (1913)	306.6	1897 Jul 15
	b	2.4	2.9	2.0	1.2	2.9	9.5	19.7	20.1	11.7	1.7	0.4	1.1	75.6				
Nagla	50 a	28.2	31.0	18.0	6.3	22.1	130.8	400.1	433.6	229.9	38.6	3.3	11.0	1553.8	258 (1923)	50 (1941)	325.6	1922 Sep 20
	b	1.9	2.0	1.2	0.6	1.3	5.4	14.0	14.1	7.6	1.1	0.3	0.8	50.3				
Nainital (District)	a	36.6	40.3	16.9	10.4	27.3	190.0	485.6	468.3	242.4	31.5	3.0	13.6	1565.9	148 (1922)	56 (1913)		
	b	2.1	2.6	1.5	0.9	2.0	7.2	16.1	16.2	9.0	1.3	0.2	1.0	60.1				
HILL STATIONS																		
Nainital	50 a	69.9	73.1	52.6	38.1	84.1	390.9	769.4	750.1	362.7	61.0	12.9	23.4	2690.2	153 (1950)	58 (1907)	509.3	1958 Sep 22
	b	3.1	3.6	3.0	2.3	4.9	12.9	22.6	22.7	12.4	2.2	0.7	1.4	91.8				
Mukteshwar	50 a	56.9	62.0	48.5	36.3	56.4	176.0	316.0	306.3	201.7	43.4	8.9	24.6	1537.0	169 (1936)	52 (1918)	254.5	1914 Sep 18
	b	3.7	4.5	4.1	3.2	5.0	9.7	17.9	17.8	10.4	2.3	0.6	1.7	80.9				
Somerfeld Orchard	46 a	58.4	76.7	54.6	39.1	56.6	214.1	380.7	371.1	224.3	46.0	12.5	32.3	1566.4	164 (1936)	56 (1918)	242.1	1924 Sep 28
	b	3.6	4.1	3.8	3.1	4.5	9.9	17.5	17.5	9.8	1.7	0.8	1.8	78.1				

(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 1980. **Years given in brackets.

TABLE - 2
Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
801 - 900	1	1601 - 1700	7
901 - 1000	0	1701 - 1800	4
1001 - 1100	1	1801 - 1900	1
1101 - 1200	4	1901 - 2000	2
1201 - 1300	6	2001 - 2100	5
1301 - 1400	7	2101 - 2200	1
1401 - 1500	5	2201 - 2300	1
1501 - 1600	4	2301 - 2400	1

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

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded			Lowest Minimum ever recorded			Relative Humidity	
	°C	°C	°C	Date		°C	Date		0830 %	1730* %
January	9.7	1.9	20.0	1980	Jan 27, 28	-6.7	1974	Jan 15	50	62
February	11.4	3.1	23.9	1953	Feb 26	-7.8	1905	Feb 10	51	60
March	15.8	6.4	27.0	1974	Mar 21	-6.0	1982	Mar 07	43	49
April	20.1	10.7	28.0	1985	Apr 20	-1.7	1937	Apr 05	37	39
May	23.5	13.9	30.4	1984	May 19	2.7	1977	May 07	43	43
June	23.2	14.8	30.8	1966	Jun 09	6.7	1903	Jun 05	67	63
July	20.5	14.7	34.4	1983	Jul 17	9.4	1930	Jul 28	92	90
August	20.1	14.5	31.9	1983	Aug 04	10.4	1965	Aug 04	92	93
September	19.9	13.1	25.6	1946	Sep 11	1.3	1964	Sep 26	85	89
October	18.4	9.9	25.5	1974	Oct 07	1.7	1913	Oct 28	58	70
November	15.8	6.6	23.1	1962	Nov 17	-1.1	1918	Nov 30	41	58
December	12.5	3.8	21.7	1944	Dec 02	-5.0	1954	Dec 31	40	55
Annual	17.6	9.5							58	64

*Hours I.S.T.

TABLE - 3(a)
 Normals of Temperature and Relative Humidity
 (NAINITAL)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded				Lowest Minimum ever recorded				Relative Humidity	
	°C	°C	°C	Date			°C	Date			0830 %	1730* %
January	10.3	1.6	18.4	1974	Jan	26	-5.6	1953	Jan	17	66	73
February	13.1	4.1	21.7	1953	Feb	26	-3.9	1961	Feb	08, 09	47	61
March	16.7	7.9	23.4	1964	Mar	15	-3.0	1979	Mar	09	45	55
April	21.2	12.1	28.0	1964	Apr	04	0.0	1965	Apr	03	36	37
May	24.0	15.4	29.4	1969	May	26	6.7	1964	May	03	45	41
June	24.0	16.9	29.8	1966	Jun	09	11.1	1957	Jun	07	63	63
July	21.4	16.9	26.1	1954	Jul	01	10.4	1964	Jul	11	86	87
August	21.1	16.4	25.3	1975	Aug	14,	12.8	1956	Aug	29	87	87
September	20.9	14.8	24.7	1979	Sep	02	-1.1	1962	Sep	22	79	83
October	18.5	9.8	24.8	1964	Oct	31	4.4	1961	Oct	31	59	74
November	15.7	5.6	21.4	1964	Nov	01	0.6	1962	Nov	24	53	71
December	13.1	3.5	21.8	1964	Dec	04	-4.4	1954	Dec	31	59	69
Annual	18.3	10.4									60	67

*Hours I.S.T

TABLE - 4
Mean Wind Speed in Km/hr.
(MUKTESWAR)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
11.0	12.3	12.9	14.9	16.7	15.4	12.1	10.1	10.0	10.2	10.3	10.5	12.2

TABLE - 5
Special Weather Phenomena
(MUKTESWAR)

Mean No. of days with*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.5	2.0	5.0	5.0	10.0	10.0	6.0	5.0	6.0	3.0	0.3	0.7	55.0
Hail	0.6	0.7	0.7	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.3	3.0
Dust storm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	3.0	1.3	1.7	0.5	0.8	0.5	19.0	20.0	11.0	3.0	0.2	1.2	62.0

*No. of days two and above are given in whole numbers.

TABLE - 4(a)
Mean Wind Speed in Km/hr.
(NAINITAL)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
7.1	7.9	7.9	8.1	8.0	7.5	8.3	7.0	7.0	7.3	7.1	6.7	7.5

TABLE - 5(a)
Special Weather Phenomena
(NAINITAL)

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	0.5	0.4	1.0	0.3	0.1	0.1	0.0	0.0	0.1	3.0
Hail	0.1	0.1	0.6	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Duststorm	0.0	0.0	0.0	0.1	0.1	0.5	0.0	0.0	0.0	0.0	0.3	0.0	1.0
Squall	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fog	0.1	0.5	0.0	0.0	0.0	0.6	0.5	2.0	0.4	0.0	1.3	0.6	6.0

*No. of days two and above are given in whole numbers.

PAURI GARHWAL DISTRICT

The district has a highly mountainous terrain with high ridges and narrow deep valleys. The elevation in some parts of the district goes upto 3,000 metres - and therefore elevation has great influence on the climate of the district.

A fairly long and moderately severe winter is the chief characteristic of the climate of this district. Being situated on the southern slopes of the Himalayas, the district gets good rainfall from the southwest monsoon current. However, in the valleys and comparatively lower elevated areas in the district, tropical heat may be experienced during April to May and first half of June.

The rainy season generally commences from third week of June and lasts till end of September. The period from October to about middle of November constitutes the post-monsoon season and thereafter the winter season sets in lasting till about the middle of March followed by the summer or premonsoon season (middle of March to middle of June).

Rainfall

Long term rainfall records are available for five rain gauge stations in the district. Details of the rainfall at these stations are given in table 1, wherein heaviest rainfalls in 24 hours recorded at individual stations have also been indicated.

Rainfall in the district has large variations, mainly due to its orography. In the southwestern part of the district, the annual rainfall is 2117 mm at Lansdowne while at Srinagar in the north it is as low as 948 mm. Nearly 80 percent of the annual total of rainfall in the district is realised during the monsoon months June to September. July and August are the rainiest months and in these two months nearly 55 percent of the annual total of rainfall in the district is realised. The winter precipitation during December to February accounts for nearly 10 percent of the annual total. There are two rainfall minima, one in April and the other in November. After April, the rainfall gradually increases till June and thereafter sharply during July and August. It decreases rapidly after the withdrawal of the southwest monsoon in September. During monsoon under favourable conditions spurts of heavy rain may occur in the hills causing inundation of the small tributaries. Precipitation during winter months is often associated with the passage of low pressure systems from the west (known as Western Disturbances) and is sometimes in the form of snowfall particularly at higher elevations. Precipitation during the premonsoon months is mostly associated with thunderstorms.

Year to year variation of rainfall in the district as a whole is not very appreciable. In the 50 year period (1901 to 1950), the district recorded the highest rainfall in 1917 and the lowest in 1918. Frequency of annual rainfall in the district in various ranges is given in Table II. Frequency is highest in the rainfall range 1201 and 1500 mms.

Average number of rainy days (i.e. having rainfall of 2.5 mm or more in each day) in a year varies from 59.2 at Srinagar to 83.6 at Lanailowne.

Heaviest rainfall in 24 hours recorded at any station in the district was 349.0 mm at Kotdwara on 27th August 1892.

Temperature

There being no meteorological observatory in the district, the description that follows is based on records of observatory stations in the surrounding districts having similar climatic conditions.

The district being hilly with deep valleys, the temperature varies considerable from place to place depending on elevation. Generally end of May or beginning of June is the hottest period. The mean daily maximum temperature in valleys (with elevation less than 1 Km) is around 36°C in the month of May and around 26°C at about 2 km and still lower at higher altitudes. However, on individual days, the maximum temperature may rise to over 40°C in the valleys and to about 34°C at 2 km in the month of May. With the onset of the monsoon, the day temperature fall by about 3°C to 5°C . With the withdrawal of monsoon by end of September, both day and night temperatures start falling, reaching lowest values in January. The mean daily maximum and minimum temperatures in January in the valleys (elevation less than 1 km) are of the order of 19°C and 6°C respectively, while they are of the order of 11°C and 3°C at an elevation of 2 km. During the winter months, cold waves associated with the western disturbances may bring down night temperatures appreciably, even below freezing point of water on some occasions.

Humidity

Summer (March to May) is the driest part of the year with relative humidity between 30 to 40 percent. During monsoon season (June to September), the humidity attains a value of about 70 to 90 percent while it remains between 50 to 60 percent during the remaining parts of the year.

Cloudiness

In the monsoon months of July to September, skies are generally heavily clouded. Heavy clouding also persists in short spell during winter months when the district is affected by passing western disturbances.

Winds

Winds are generally light, of the order of 3 to 4 Kmph in the valleys and 5 to 8 Kmph at elevation of 2 km. increasing further with higher altitudes. In the wake of western disturbances and in association with thunderstorms the winds may become quite strong. Strong Katabatic winds may also be experienced during night as local effects produced by nature of terrain.

Special Weather Phenomena

Thunderstorms occur throughout the year, frequency being least in November and December. Thunderstorm activity is generally greatest during the period May to September. Thunderstorms during winter and pre-monsoon months are sometimes accompanied by hail. Dust-storms are rare and occur, if at all, in the valleys in summer. Hill fog is common during the monsoon months. Fog may also occur in association with western disturbances. In the valleys morning fog may occur frequently in winter.

.....

TABLE - 1
Normals and Extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Pauri	50 a	60.7	66.8	55.1	32.0	51.6	132.3	326.1	359.9	148.3	33.8	8.1	28.2	1302.9	175	52	224.5	1921 Aug 18
	b	4.4	4.5	4.1	2.9	5.0	8.3	16.9	17.2	8.4	1.8	0.7	1.8	76.0	(1917)	(1918)		
Srinagar	50 a	55.1	56.1	36.8	22.1	42.7	118.4	244.1	223.3	97.3	24.9	5.6	21.8	948.2	152	59	190.5	1880 Sep 18
	b	3.9	4.0	2.9	2.3	3.7	7.2	13.3	12.4	6.5	1.3	0.5	1.4	59.2	(1936)	(1918)		
Kotdwara	50 a	41.9	46.0	21.6	15.5	25.4	172.5	557.0	541.8	249.7	37.1	6.3	15.2	1730.0	154	54	349.0	1892 Aug 27
	b	2.6	2.9	2.0	1.5	2.0	7.3	18.2	17.5	9.0	1.4	0.4	1.1	65.9	(1921)	(1913)		
Bironkhal	50 a	63.0	71.6	43.9	30.5	63.0	165.9	315.5	263.9	131.6	36.6	5.1	27.2	1217.8	169	63	255.3	1924 Sep 29
	b	3.7	4.1	3.2	2.5	4.3	9.0	15.5	15.0	6.6	1.7	0.4	1.6	67.6	(1910)	(1926)		
Lansdowne	50 a	66.8	73.1	45.0	28.5	53.1	201.9	626.4	627.9	316.0	44.5	6.1	27.2	2116.5	155	53	323.1	1924 Sep 29
	b	3.5	3.9	3.4	2.3	3.7	8.7	21.4	21.7	11.4	1.6	0.5	1.5	83.6	(1924)	(1929)		

(a) Normal rainfall in mm (b) Average no. of rainy days (i.e. days with rain of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

TABLE - 2

Frequency of Annual Rainfall in the District
(Data 1901-1950)

Range in mm	No. of years	Range in mm	No. of years
901 - 1000	3	1601 - 1700	6
1001 - 1100	2	1701 - 1800	2
1101 - 1200	3	1801 - 1900	1
1201 - 1300	8	1901 - 2000	3
1301 - 1400	6	2001 - 2100	2
1401 - 1500	10	2101 - 2200	1
1501 - 1600	3		

PITHORGARH DISTRICT

The terrain of this Himalayan district is highly rugged marked with steep and high ridges and deep and narrow valleys, through which flow the many tributaries of the rivers Sarju and Kali, which mark the southern and eastern boundaries of the district. The general slope of the valleys is from northwest to southeast. The elevation ranges from as low as 500 meters a.s.l. in valleys in the south to over 7000 metres in the snow-bound Himalayas in the north or northwest. The highest portions are along the ridge extending from the well known Nandadevi peak towards southeast and lying to the north of the central parts of the district.

The climate, therefore, largely depends on altitude. Although tropical heat may be experienced during the summer in the southern valleys, severe winter is the chief climatic feature. As most of the district is situated on the southern slopes of the Himalayas, monsoon current can penetrate through the deeply trenched valleys and rainfall is maximum in the monsoon season from June to September particularly in the southern half of the district; northern half gets considerable rain during the winter season also, which lasts from mid-November to March.

Rainfall

There are 8 rain recording stations in the district. Out of these, three stations at Munsyari, Garbyang and Tijjim are of recent origin and have data for very short and discontinuous periods. As such the mean values based on their data should be taken with reservation. The details of rainfall at these 8 stations are given in Table 1, which also gives the heaviest rainfall recorded at individual stations upto 1980.

All these stations, on account of their location, are more representative of the river valleys. Rainfall generally increases from the south towards the north till the Munsyari sector is reached after which it probably begins to decrease beyond the highest range. Owing to the nature of the terrain, the rainfall is highly variable spatially. Most of the rainfall occurs during the monsoon period June to September which accounts for 75 to 85 percent of the annual precipitation in the south and 50 to 70 percent in the extreme north and northeast. In September, depressions from the Bay of Bengal occasionally reach U.P. and affect the weather in the district. In association with these, heavy rain can occur causing floods. In the monsoon season there are a few occasions when the rainfall in the plain districts decreases but there are spurts of heavy rain in the hills causing floods in the rivers. During the winter months (Dec-March) considerable precipitation occurs in association with passage of the western disturbances

across the region, particularly in the northern parts where it is considerably more than in the rest of the district, being about 20 to 40 percent of the annual total. It will be seen that February and September have comparable rainfall at Garbyang. July and August are the rainiest months except in the north. November is the month with the least rainfall.

During the fairly long periods for which rainfall data are available for five stations, the number of years when precipitation less than 80 percent of the annual normal occurred, was 13 at Askote, 12 at Pithorgarh, 10 at Chaukuri, 9 at Berinag and 2 at Dharchula. Also, the number of spells of two consecutive years when such low precipitation was recorded was one each at Pithorgarh and Berinag and two at Chaukuri the number of spells of three such consecutive years was two at Askote, which also recorded a long spell of five years from 1928 to 1932 of such low rainfall.

The heaviest rainfall in 24 hours recorded at any station in the district was 274.3 mm at Chaukuri on 22nd June 1916.

Temperature

Data of meteorological elements other than rainfall are not available for any station in the district. Inference has therefore to be drawn about the climate from the nature of altitude, location etc., together with the available data for neighbouring regions, where similar climatic conditions exist. Temperature variations from place, to place are considerable, and depend upon elevation as well as other aspects. At high altitudes, as the insolation is intense, temperatures in the open are considerably higher than in shade in the summer. In the valleys, pool of cold stagnant air causes diurnal range of temperature to be considered. January is the coldest month with mean maximum, temperature of 10°C at 2 Km; the mean minimum temperature being at the freezing point (0°C). Cold waves in the wake of the western disturbances often make the winter conditions more rigorous. Much lower temperatures should be expected at higher altitudes and towards the north. In association with the western disturbances, precipitation occurs which is mostly in the form of snowfall at higher elevations. Snow accumulation in valleys is considerable.

After January both day and night temperatures begin to rise. The rise is rapid from March to May or June which is the warmest period, with mean daily maximum temperature of the order of 25°C at stations 2 Km high, 15°C to 18°C at 3 Km and lower temperatures at higher elevations. With the incursions of the monsoon current, temperatures fall slightly by about 3°C to 5°C . The fall in temperature is rapid after October, when winter conditions begin to set in.

Humidity

Humidity is the highest during the monsoon months and particularly during the rainiest months of July and August. During winter months humidity increases towards the afternoon at some high stations.

Cloudiness

Skies are heavily clouded during the monsoon months and for short spells when the region is affected by western disturbances. During rest of the year skies are generally clear or lightly clouded.

Winds

Owing to the nature of the terrain, local effects are pronounced and when the general prevailing winds are not too strong to mask these effects, there is a tendency for diurnal reversal of winds blowing up the slopes during the day (anabatic flow) and down the slopes at night (katabatic flow). Katabatic wind can blow with considerable force.

Special Weather Phenomena

Thunderstorms occur throughout the year. But the activity is the least in November and December, and is at its maximum in the monsoon season. Winter and premonsoon thunderstorms are occasionally accompanied with hail. Hill fog is common during monsoon months. In the winter months fog may occur in the wake of western disturbances. In the valleys morning fog may be frequent in winter.

.....

TABLE - 1

Average Rainfall and extremes of Rainfall

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 & year**	Lowest annual rainfall as % of normal & year**	Heaviest rainfall in 24 hours* Amount	Date
Pithorgarh	60 a	47.4	54.9	43.7	27.6	71.5	186.5	316.6	296.6	153.1	49.0	7.4	20.0	1274.3	149 (1919)	70 (1928)	200.7	1921 Jun 26
	b	3.5	3.8	3.9	3.0	5.6	10.2	17.3	16.6	8.8	2.4	0.6	1.4	77.1				
Chaukuri	60 a	45.1	50.0	47.4	31.3	75.0	280.6	644.3	652.1	304.3	63.8	8.0	16.9	2218.8	175 (1914)	53 (1951)	274.3	1916 Jun 22
	b	3.6	4.1	4.2	3.0	6.1	13.4	23.3	23.6	14.4	3.5	0.5	1.4	101.1				
Askote	35 a	44.6	60.3	36.3	26.8	77.0	261.0	502.0	487.2	253.9	61.5	4.5	23.6	1830.7	171 (1959)	59 (1931)	191.8	1952 Jun 17
	b	3.5	3.6	3.4	2.9	6.1	12.7	21.6	20.9	13.2	3.6	0.4	1.8	93.7				
Berinag	60 a	57.9	59.8	55.3	38.3	84.5	267.9	524.3	524.8	241.9	52.8	9.2	23.3	1940.0	133 (1914)	47 (1951)	225.5	1961 Aug 09
	b	3.7	4.0	4.1	3.4	6.0	12.0	20.0	29.4	11.4	2.7	0.6	1.6	88.9				
Dharchula	17 a	44.5	33.8	37.9	25.1	51.3	274.6	408.2	465.8	208.5	43.9	8.1	12.9	1612.6	145 (1915)	66 (1921)	134.6	1917 Jun 03
	b	3.1	3.2	3.5	2.6	4.7	14.2	22.2	24.2	14.5	3.2	0.8	1.2	97.4				
Tijjim	9 a	97.5	89.9	139.0	59.1	54.4	136.6	381.9	408.6	233.9	63.1	21.3	35.6	1720.9	116 (1962)	89 (1965)	110.4	1966 Mar 05
	b	5.2	5.6	7.9	5.3	5.4	13.2	25.6	24.3	14.8	3.9	1.5	1.6	114.3				
Munsyari	6 a	79.1	35.5	130.7	83.2	106.3	229.9	784.8	661.0	350.3	41.2	33.8	63.6	2599.4			203.6	1965 Jul 07
	b	5.0	3.0	8.2	7.5	7.6	13.8	26.3	25.8	16.7	3.3	2.6	2.0	121.8				
Garbyang	6 a	100.0	197.8	175.4	41.5	34.7	137.0	175.9	147.0	199.7	44.3	19.8	69.2	1382.3			118.2	1963 Sep 16
	b	4.3	7.0	6.0	4.7	8.5	14.4	17.3	16.0	13.5	3.6	2.4	2.4	100.1				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more),

* Based on all data available upto 1980. ** Years given in brackets.

TEHRI-GARHWAL DISTRICT

The district is highly mountainous marked with series of high ridges and narrow deep valleys through which flows the Ganga (Bhagirathi) and its tributaries in a southeasterly to southwesterly directions. The elevation generally ranges from 2000 metres in the southern parts to over 3000 metres in the north. In valleys however, much lower elevations are reached. The climate, therefore, depends on elevation and aspect. Fairly long and severe winter season is the chief climatic feature. As most of the district is situated on the southern slopes of the outer Himalayas, monsoon current can penetrate through the valleys and maximum rainfall occurs in the period July to September. In the valleys, particularly in the south, tropical heat may be experienced during the premonsoon period April to May and the first half of June.

Rainfall

Short period records of precipitation in the district are available for seven stations only, out of which only two stations, viz., Tehri and Mukhim have records for unbroken periods. Details of rainfall at these stations are given in table 1, which give also the heaviest falls in 24 hours at individual stations, with dates of their occurrence. Region of lowest rainfall with annual precipitation of under 100 cms, lies along the Bhagirathi valley which has an elevation of as low as 450 metres at Deoprayag in the south, increasing to 900 metres near the northern boundary of the district. On both sides of the valley rainfall increases rapidly up the steep slopes, reaching the value of about 300 cms in the northeastern region (with elevation of the order of 3000 m), and over 200 cm in the western most parts of the district (elevation about 2200 m). Due to the nature of terrain, rainfall is variable and depends upon elevation and exposure to the prevailing wind. Over 70 percent of rain occurs during the monsoon months June to September, July being the rainiest, which alone receives 25 to 35 percent of total precipitation. There are two rainfall minima, one in April and the other in November. The precipitation during December and the winter period January to March is of the order of 10 to 20 percent of the annual total. Rainfall after April gradually increases till June, and then very rapidly till July. It decreases rapidly after the withdrawal of southwest monsoon in September. During monsoon, spurts of heavy rain may occur in the hills, causing floods in rivers. The winter precipitation is in association with the passage of western disturbances and is often in the form of snowfall particularly at higher elevations. The precipitation during the premonsoon months, which is less than 3 percent in the southern parts and about 5 percent in the northern parts of the district, is mostly associated with thunderstorms. There is no appreciable variation of rainfall from year to year. During the short period

of about 10 years for which rainfall records are available, only Tehri and Kirtinagar recorded rainfall of less than 80 percent of the annual average, while no station recorded two consecutive years of such low rainfall.

Average number of rainy days (i.e. having rainfall of 2.5mm or more on each day) varies, from 56.1 at Deoprayag to 108.5 for Ghuttu. The lowest number of rainy days in the district has been 48 at Deoprayag in 1962 and the highest about 120 at Ghuttu in the same year.

Heaviest rainfall in 24 hours recorded at any station in the district was 345.7 mm at Ghuttu on 10th July 1957. Considering the rainfall data for unbroken periods which are available for Mukhim and Tehri only, the maximum annual precipitation was 123 percent of the annual at Mukhim on 1961 and 117 percent at Tehri in 1964, while the minimum annual precipitation at these stations was respectively 76 percent (in 1965) and 70 percent (in 1960) of the annual normal values.

Temperature

There are two meteorological observatories of recent origin in the district recording temperature and other weather conditions. Tables 2 and 2(a) gives details of temperature at these stations. The description that follows is based on the short period data for these stations and the data of stations in the neighbouring districts experiencing similar type of climate. The district being hilly with deep valleys, temperature varies considerably with elevation and from place to place. As the insolation at high altitudes is intense, temperatures are much higher in the open than in shade in summer, while in the valleys, stagnant pool of cold air causes large diurnal variation of temperature. After January, temperatures begin to rise, the increase being particularly rapid till March. June is the warmest month with mean maximum temperature of about 37°C in valleys (with elevation less than 1 Km), 26°C at 2 kms and still lower temperatures at stations at higher altitudes. With the onset of the monsoon towards the end of June or early July, day temperatures fall by about 3°C to 5°C . With the withdrawal of monsoon in September, the decrease in day and night temperatures become more rapid, till January which is the coldest month with mean daily maximum and minimum temperatures respectively of about 19°C and 5°C in valleys (elevation less than 1 km), 12°C and 3.6°C at 2 km and still lower at higher elevations. During the cold season, cold waves in the wake of western disturbances cause the temperature to fall appreciably. There may also be considerable accumulation of snow in the valleys.

Humidity

The driest part of the year is the summer from April to May, when the relative humidity towards afternoons may be less than 25 percent in the valleys and 35-40 percent over highlands. Humidity increases rapidly with the onset of monsoon. Relative humidity generally decreases towards afternoons appreciably in the valleys and only slightly at high elevations due to rise of moisture from below with the advance of the day. Relative humidity for the two observatory stations are given in tables 2 and 2(a).

Cloudiness

In the monsoon months of July to September skies are generally heavily clouded and also, for short spells, during the winter months when the region is affected by passing western disturbances. Cloudiness is the least in May and November.

Winds

Winds are mostly light. In the wake of western disturbances however, and also in association with thunderstorms, they may, be quite strong. Strong Katabatic winds may also be experienced during night as local effects produced by nature of terrain. Table 3 gives mean wind speed in respect of Tehri for which only data are available.

Special Weather Phenomena

Thunderstorms occur throughout the year, except in November and December which are practically free. The thunder activity is at its maximum in May to July, about 50 percent of the thunderstorms occurring during this period. Premonsoon thunderstorms may be accompanied by hail. Duststorms are rare and occur if at all, in the valleys in summer. Hill fog is common during monsoon months. Fog may also occur in association with western disturbances. In the valleys morning fog may be frequent in winter. Tables 4 and 4(a) give the frequencies of special weather phenomena at the two observatory stations.

.....

TABLE - 1
Normals and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Heaviest rainfall in 24 hours*			
															Amount (mm)		Date	
Tehri (obsy)	8 a	56.4	56.7	40.1	28.5	41.6	50.4	244.0	203.6	166.0	28.1	10.6	34.8	960.8	194.8	1957	Dec	12
	b	4.5	3.5	4.0	3.1	3.5	4.0	13.9	11.7	7.6	2.3	0.7	1.9	60.7				
Mukhim (obsy)	10 a	69.3	56.3	73.7	43.6	75.7	151.7	431.9	348.2	251.1	66.4	15.7	42.0	1625.6	267.2	1957	Jul	19
	b	4.2	4.2	5.6	4.6	5.4	9.3	19.8	18.4	12.5	3.7	1.1	2.1	90.9				
Narendra-nagar	8 a	69.3	47.1	29.8	5.6	20.1	144.3	808.6	763.3	418.9	54.2	16.2	36.5	2473.9	271.5	1955	Jul	31
	b	3.6	2.4	2.3	0.9	2.6	7.4	23.0	22.3	15.3	2.9	0.9	2.0	85.6				
Keertinagar	8 a	68.2	61.0	58.5	21.8	37.0	95.1	417.9	230.5	192.5	32.8	13.9	28.7	1257.9	198.1	1956	Oct	08
	b	3.0	3.9	3.4	1.7	2.7	5.7	17.0	12.5	6.5	1.6	1.0	1.5	60.5				
Deoprayag	8 a	54.8	40.4	42.5	3.7	25.9	64.0	347.7	163.2	182.9	33.2	11.5	38.8	1006.6	215.9	1956	Oct	09
	b	3.4	3.0	3.1	0.9	2.7	4.5	16.3	10.6	7.5	1.7	1.0	1.4	56.1				
Dhanolti	8 a	48.2	51.6	56.2	25.7	55.4	139.4	518.2	473.0	301.7	41.9	33.1	27.8	1772.2	188.0	1972	Jul	17
	b	4.4	3.5	4.7	3.0	4.0	7.9	20.9	20.6	11.6	3.9	1.4	1.7	87.4				
Ghutti	8 a	91.2	82.1	109.5	73.2	75.7	417.0	757.1	695.4	427.9	59.8	17.5	42.7	2849.1	345.7	1957	Jul	10
	b	5.3	3.7	5.9	5.5	5.2	14.5	24.9	23.3	14.1	2.9	1.3	1.9	108.5				

(a) Normal rainfall in mm (b) Average number of rainy days (days with rain of 2.5 mm or more).

*Based on all available data upto 1980.

TABLE - 2
Normals of Temperature and Relative Humidity
(MUKHIM)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded		Lowest Minimum ever recorded		Relative Humidity	
	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	Date	$^{\circ}\text{C}$	Date	0830	1730*
							%	%
January	11.9	3.6	19.0	1977 Jan 10	-3.4	1960 Jan 22	56	59
February	13.3	4.3	22.3	1985 Feb 27	-9.0	1974 Feb 09	51	52
March	17.8	7.6	27.6	1974 Mar 27	0.0	1962 Mar 05	51	47
April	22.9	11.9	29.3	1985 Apr 20	-0.3	1982 Apr 06	45	37
May	25.5	15.4	32.1	1984 May 21	5.9	1982 May 16	44	37
June	26.1	17.2	33.2	1958 Jun -	9.4	1962 Jun 01	62	56
July	23.4	17.4	29.6	1964 Jul 22	11.7	1983 Jul 28	91	87
August	23.3	17.3	28.0	1975 Aug 10	13.4	1984 Aug 23	90	83
September	23.2	15.7	27.5	1979 Sep 30	9.2	1982 Sep 24	84	83
October	21.1	11.8	27.4	1974 Oct 24	2.7	1961 Oct 13	69	67
November	17.5	7.6	24.5	1974 Nov 04	2.2	1961 Nov 17	53	57
December	14.2	5.5	21.2	1960 Dec 05	-0.6	1977 Dec 27	50	55
Annual	20.0	11.3					62	60

*Hours I.S.T.

TABLE - 3
Mean Wind Speed in Km/hr.
(TEHRI)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1.5	2.1	2.9	3.4	4.4	5.3	3.4	2.9	2.7	2.5	1.5	1.3	2.8

TABLE - 4
Special Weather Phenomena
(MUKHIM)

Mean No. of days with	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.2	2.3	3.8	3.9	6.9	8.4	5.4	2.0	4.3	2.6	0.7	0.6	42.1
Hail	0.4	0.2	0.9	0.8	0.6	0.3	0.7	0.0	0.4	0.4	0.4	0.0	5.1
Duststorm	0.2	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.9
Squall	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Fog	1.7	0.7	0.7	0.3	0.7	1.5	7.9	6.1	4.3	2.2	0.2	0.6	26.9

TABLE - 4(a)
Special Weather Phenomena
(TEHRI)

Mean No. of days with	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Thunder	1.0	1.3	3.4	2.7	6.7	8.0	3.9	1.1	3.7	0.9	0.7	0.7	34.1
Hail	0.0	0.0	0.1	0.5	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.1	1.2
Duststorm	0.6	0.1	0.3	1.0	1.1	0.7	0.0	0.0	0.1	0.0	0.0	0.0	3.9
Squall	0.0	0.0	0.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Fog	4.6	1.3	0.9	0.6	0.3	0.1	0.0	0.4	0.9	0.3	0.9	3.6	13.9

TABLE - 2(a)
 Normals of Temperature and Relative Humidity
 (TEHRİ)

Month	Mean Daily Maximum Temperature	Mean Daily Minimum Temperature	Highest Maximum ever recorded			Lowest Minimum ever recorded			Relative Humidity	
	°C	°C	°C	Date		°C	Date		0830 %	1730* %
January	18.9	5.0	25.6	1961	Jan 27	-1.2	1963	Jan 02	91	58
February	22.4	6.6	30.2	1977	Feb 19	0.2	1964	Feb 03	81	42
March	27.2	11.1	36.7	1977	Mar 31	1.9	1962	Mar -	73	34
April	33.0	15.8	39.3	1979	Apr 29	7.4	1965	Apr 03	54	25
May	36.8	19.7	42.5	1970	May 14	12.2	1962	May -	46	25
June	37.1	22.5	43.8	1966	Jun 08	12.1	1957	Jun 24	54	36
July	33.0	23.3	40.6	1961	Jul -	13.2	1957	Jul 13	82	62
August	32.7	23.5	37.2	1979	Aug 07	19.8	1965	Aug 22	83	63
September	32.3	21.7	36.4	1974	Sep 10	14.9	1963	Sep 27	83	60
October	29.5	16.1	35.5	1979	Oct 06	8.6	1960	Oct 31	79	51
November	25.4	9.2	31.7	1977	Nov 02	4.1	1961	Nov 30	81	53
December	20.9	4.9	26.9	1976	Dec 02	-1.5	1961	Dec 18, 22	92	54
Annual	29.1	14.9							75	47

*Hours I.S.T.

UTTAR KASHI DISTRICT

This Himalayan district is highly mountainous, marked with series of high ridges and narrow deep valleys. It lies in the upper reaches of the sacred rivers the Ganga and the Jamuna, and contains their snowbound source regions near Gangotri and Jamnotri. The elevation is generally 3000 to 6700 meters above mean sea level. The highest portions are to the northeast of the central part of the district. The land slopes down steeply towards the southwest, where in the valleys the elevation at places dips down to 1500 meters.

The climate, therefore, varies naturally according to aspect and elevation. Fairly long and severe winter season is the chief climatic feature. As most of the district is situated on the southern slopes of the outer Himalayas, monsoon current can penetrate through the trenched valleys and rainfall is a maximum in the monsoon season from June to September.

Rainfall

Short-period records of precipitation in the district are available for six stations only, which are situated in the valleys of the Ganga and Jamuna. Details of the rainfall at these stations are given in table 1, which gives also the annual maximum and minimum precipitation and the heaviest rainfall in 24 hours, at individual stations. Rainfall generally increases up the valleys over the southern half of the district and decreases beyond the highest range. Rainfall is highly variable spatially and depends upon elevation and aspect. About 75 percent of rain occurs during the monsoon season—June to September, August being the rainiest month. In September, depressions from the Bay of Bengal occasionally reach U.P. and affect the weather in the district. In association with these, heavy rain can occur causing floods. In the monsoon season there are few occasions when the rainfall in the plain district decreases but there are spurts of heavy rain in the hills causing floods in the rivers. Rainfall rapidly decreases after September and is the least in November. About 17 percent of the annual precipitation occurs in four winter months. The winter precipitation is in association with the passage of the western disturbances and is mostly in the form of snowfall particularly at higher elevations. The precipitation during the premonsoon month which is about 7 percent of the annual total and the post-monsoon months is more associated with thunderstorms. During the short-periods for which rainfall data are available, precipitation less than 80 percent of the annual normal has not occurred at Rajgarhi,

while it occurred only once at Jamna Chetty and Uttar Kashi, twice at Rana and Dharasu and thrice at Kharsali. No two consecutive years recorded such low rainfall. The mean number of rainy days varies, in the district, from 61 at Dharasu to 114 at Kharsali. The lowest recorded number of rainy days in the district has been 52 at Dharasu in 1958 and the highest 142 at Rana in 1956, during the period for which data are available.

The heaviest rainfall in 24 hours recorded at any station in the district was 400.8 mm, at Kharsali on 15th September, 1963.

Temperature

Data of meteorological elements other than rainfall are not available for any station in the district. The description that follows, is therefore, to be regarded as a general inference about the climate drawn from the nature of altitude, location, etc., together with the available data for the neighbouring regions, where similar climatic conditions exist. Variations of temperature from place to place are considerable and depend upon elevation and exposure to the sun. As the insolation at high altitudes is intense, temperatures in the open are considerably higher than in shade in summer. In the valleys, pool of cold stagnant air causes diurnal range of temperature to be considerable. Temperatures generally begin to rise rapidly from about the end of February. May and June are the warmest months, when mean maximum temperature may be about 25°C at stations 2 km high, 15 to 18°C at 3 km and lower temperatures at higher stations. With the onset of the monsoon towards the end of June, day temperatures fall by about 3° to 5°C . With the withdrawal of monsoon towards the 3rd or 4th week of September, day and night temperatures begin to decrease initially at a slower rate, but more rapidly after October till January, which is the coldest month, with mean daily maximum temperature of the order of 10°C at 2 Km and the mean minimum temperature near about the freezing point (0°C). During the cold season, cold waves in the wake of western disturbances may cause the temperature to fall appreciably. Snow accumulation in valleys is considerable.

Humidity

Humidity is the highest, nearly 90 percent in the monsoon season, and the least during the pre-monsoon months when it may drop down to less than 40 percent.

Cloudiness

Skies are heavily clouded during the rainy season and for

short spells in the winter, when the region is affected by passing western disturbances. During the transition months thunder clouds occasionally develop particularly in the afternoons.

Winds

Winds are mostly light. In the wake of western disturbances however, and also in association with thunderstorms, they may be quite strong. Anabatic and katabatic winds are also experienced as local effects produced by the nature of terrain.

Special Weather Phenomena

Thunderstorms occur throughout the year; but the activity is, the least in November and December. The thunder activity is at its maximum in June in July. Thunderstorms may be accompanied with hail during winter and premonsoon periods. Hill fog is common during monsoon months. Fog may also occur in winter in the wake of western disturbances. In the valleys morning fog may be frequent in winter.

.....

TABLE - 1
Average rainfall and extremes of Rainfall

Station	No. of years of data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Highest annual rain- fall as % of normal & year**	Lowest annual rain- fall as % of normal & year**	Heaviest Rainfall in 24 hours* Amount (mm)	Date
Dharasu	6 a	98.5	60.2	47.5	26.3	55.2	41.7	256.3	186.2	237.0	27.8	19.4	38.9	1095.0	120	68	90.0	1950 Sep 29
	b	5.2	3.5	3.5	2.5	3.0	3.7	14.2	11.3	10.3	1.5	1.0	1.8	61.5	(1957)	(1960)		
Uttar Kashi (Barahat)	7 a	69.5	36.5	67.7	50.5	41.5	97.6	587.6	419.9	347.5	20.1	7.7	26.7	1552.8	131	78	120.0	1964 Sep 26
	b	4.0	3.2	6.3	3.3	4.2	10.0	20.5	21.7	14.8	2.2	0.8	1.5	92.5	(1959)	(1964)		
Rajgarhi	7 a	62.7	50.6	79.1	31.2	79.5	132.4	421.4	326.4	560.8	23.4	28.9	34.8	1631.2	114	84	134.6	1964 Sep 25
	b	4.7	5.0	6.5	4.8	19.4	18.8	10.4	1.8	2.0	1.8	2.0	1.8	90.0	(1964)	(1958)		
Jamuna Chetty	13a	94.5	60.3	93.8	35.0	64.7	192.2	498.3	514.6	244.6	71.2	19.6	28.7	1917.5	127	34	175.0	1962 Jul 16
	b	5.7	3.8	6.1	3.5	5.3	10.0	19.5	20.6	13.2	3.5	1.1	1.7	94.0	(1957)	(1958)		
Rana	13 a	132.4	58.2	119.1	64.8	96.2	161.6	424.5	511.1	260.0	53.3	28.0	39.3	1948.5	159	32	281.0	1963 Jul 16
	b	6.7	4.4	7.8	5.8	7.8	11.0	22.0	22.2	14.0	3.7	1.6	2.3	109.3	(1957)	(1958)		
Kharsali	13 a	157.1	89.2	135.2	91.7	101.0	147.1	413.9	600.9	358.7	85.9	18.7	50.6	2092.9	233	65	400.8	1963 Sep 15
	b	6.3	5.5	8.5	7.0	7.8	9.6	22.1	23.1	13.9	4.7	1.6	3.3	113.7	(1963)	(1958)		

(a) Normal rainfall in mm (b) Average number of rainy days (days with rainfall of 2.5 mm or more)

*Based on all available data upto 1980. **Years given in brackets.

**CYCLONIC STORMS / DEPRESSIONS
AND
SPECIAL WEATHER PHENOMENA**

C. CYCLONIC STORMS AND DEPRESSIONS AND SPECIAL WEATHER PHENOMENA

1. The cyclonic storms and depressions which mostly affect India originate and/or intensify over the Bay of Bengal, mostly during May to November or December. They usually travel west to northwest and cross the coast. Some of them originating over the Arabian Sea also affect Konkan, Gujarat, Saurashtra and Kutch and northwest India during the above period. In general, storms and depressions weaken on entering land. Hence Uttar Pradesh 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 May storms/depressions which cross the coast and travel inland weaken faraway from the State and cannot affect it. During the period 1891-1970, no such storms originating either over the Arabian Sea or over the Bay of Bengal affected the State in May. The disturbances during the period June to September form over head Bay of Bengal and travelling westwards pass across the State of Madhya Pradesh. During this period sometimes they move west/northwestwards as far as Rajasthan. In association with these systems, heavy to very heavy rain occur over the area affected by them. The storms and depressions affecting the State as a whole during the monsoon and post-monsoon seasons are about 91% and 9% of the annual total number of such storms/depressions.

2. The tract of the Bay cyclones is even more southerly in October and November and these have practically no influence over Uttar Pradesh weather. During the period 1891-1970, only one such severe cyclonic storm originating over the Indian Ocean, South of Colombo (position Lat. $06^{\circ}30'N$, Long. $79^{\circ}30'E$) on 14th November, 1896, moving northwest initially and then recurving towards northeast from the position near Lat. $16^{\circ}N$ and Long. $68^{\circ}E$ over the Arabian Sea, crossed the Gujarat coast near Broach, after grazing over the coast of Bharuch district of Saurashtra and Kutch and passed over the Gujarat and Madhya Pradesh, on the way to U.P. and affected the weather of U.P. 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 August/September.

The Table 7 gives the total number of storms/depressions which affected each of the three sub-divisions during the 80 years period

OTHER WEATHER PHENOMENA:-

Thunderstorms and duststorms:-

Thunderstorms and duststorms:-

Fog:-