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*STUDY AREA*

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## **STUDY AREA**

### **Location**

The crescent shaped region, the district of Kutch, which forms a part of western India, is located in western part of Gujarat State. The district stretches roughly in between, 22°-44'-11" to 24°-41'-25" (approx.) North longitudes and 68°-9'-46" to 71°-54'-47" (approx.) East longitudes. It is bounded on north by Pakistan; on east by Banaskantha and Surendranagar districts of Gujarat State; on south by Gulf of Kutch and Arabian sea and on west by gulf of Kutch and Pakistan. (Plate 1)

### **Area and Topography**

The total area of the district of Kutch is 41,147 sq.km. The district has nine talukas including Great Rann and Little Rann of Kutch. Out of these 2 talukas are excluded from study area. The study area includes localities viz. Bhuj,

Anjar, Mundra, mandvi, Nakhtrana, Nalia, Lakhapat and surrounding areas. The major part of the area is more or less plain and at few places low hillocks are observed. The noteworthy hillocks are Dinodhar, Kaladungar, Bhujiya, and Mata na Madh. A coast line of 350-360 Km., comprising of some part of Gulf of Kutch and Arabian sea, extends along the south and south west boundaries of the area.

There is no perennial river in the entire area of the district. However, a few rivers starting from central upland, find their way over short course, either to Rann of Kutch on north or Arabian sea in south. Moreover, quite a few rivers and rivulets flooded with shallow water are noticed during the brief monsoon period. Due to fluctuation in monsoon, water level also fluctuates; and gives some of the rivers flowing fast and winding their way between steep banks which often facilitate soil erosion which cause more of soil erosion instead of supplying water. The noteworthy rivers of the region are Kanakwati, Rukmavati, Khari, Khari (Bhuj), Bhuki, out of which Kanakvati is the largest, about 55 km long.

There are a few small lakes, ponds and reservoirs present in the area like Hamirsar, Desalsar, and Pragsar near Bhuj city, Sinay and Ningal in Anjar taluka. Some have been constructed by the Maharaja of Kutch in old days and some by

the Government of Gujarat on the rivers. Gajod, Kanakwati, Ganjansar and Rudramata may be noted. Each and every village is having a small size of constructed pond with a circumference ranging from 1-2 kms. All these support the fresh water aquatic vegetation of Kutch. But due to fluctuation in water level, succession is taking place, with change of the seasons.

### **Geology and Soils**

The Kutch peninsula can be longitudinally divisible into four zones, from north to south. 1) Rann, 2) Low lying Banni area; 3) The rocky mainland and 4) The coastal plains.

Geological formations of Kutch peninsula ranges from Jurassic to recent, breaking the succession between Middle Cretaceous and Supratrappan; Supratrappan and Kirtar, and finally Miocene and Pleiocene to Recent., The Jurassic rocks occupy a large area in Kutch and are exposed in the form of broken islands. Along the central part of the region, Deccan trap is dominant with tertiary and quaternary rocks towards south. Along the coast line newer Alluvial is predominant. (Plate 2 )

The soils of the Kutch can be broadly classified into

Alluvial, Sandy, Black clayey or loamy and Saline swampy. Alluvial soils are found in valleys and along river sides. Sandy soils are commonly dispersed all along the district, particularly in the southern and northern parts. Localities around Bhuj have yellow and red soil, but at Mandvi and Nakhtrana tehsils black clayey and loamy soil is predominant, along with alluvial and sandy soil. Around Lakhapat and Nalia tehsils alluvial and yellow/red soil is dominant. Due to high lime and salt contents the soils are generally poor in nutrients, the existing soil cover at many places is depleted, due to aggravated wind and flood currents.

Several areas near Lakhapat, Mandvi, Mundra, Adesar are covered by small sized sand dunes, at times attaining a height of 10 meters which often migrate inwards into areas where crop cultivation is practiced.

### **Climate**

The climate of the district of Kutch has been classified as Ed (arid with little or no surplus water) by Subramanayam (1956). Brief erratic monsoon, hot summer and cold winter characterise the climate of the area. Even at times in the months of may and June. the area is struck with violent dust storms. The most important climatic features which directly

affects vegetation of the region are Rainfall, Temperature and Relative humidity.

The rainfall received, are mainly under the influence of South west monsoon. The rainy season extends for 4 months i.e. from June to September. Most of the total annual rainfall is occurring during the month of July and August. The details of the monthly rainfall recorded for Bhuj and Nalia stations for the years 1988-1991 are represented in (table 2 & 3), respectively.

One of the characteristic features of the area is extremes of temperature. The hottest and driest months are May and June, during which temperatures reaches its peak i.e. 42.4°C for Bhuj station and 38.5° for Nalia station. The minimum temperature during these months are 23.9°C for Bhuj and 24.5°C for the Nalia stations. The area experiences severe winter during November to January and the mercury touches 2°C to 0.5°C on certain days at both the stations. The details of the temperatures recorded for Bhuj and Nalia stations for the years 1988 to 1991 are represented in (table 2 & 3 )

The another climatic factors relative humidity is recorded maximum during the months of July and August, which

decreases considerably during winter months and again increases in the months of April and May. The recorded details for the years 1988 to 1991 is represented in (table 2.1 & 2.2) for Bhuj and Nalia stations respectively.

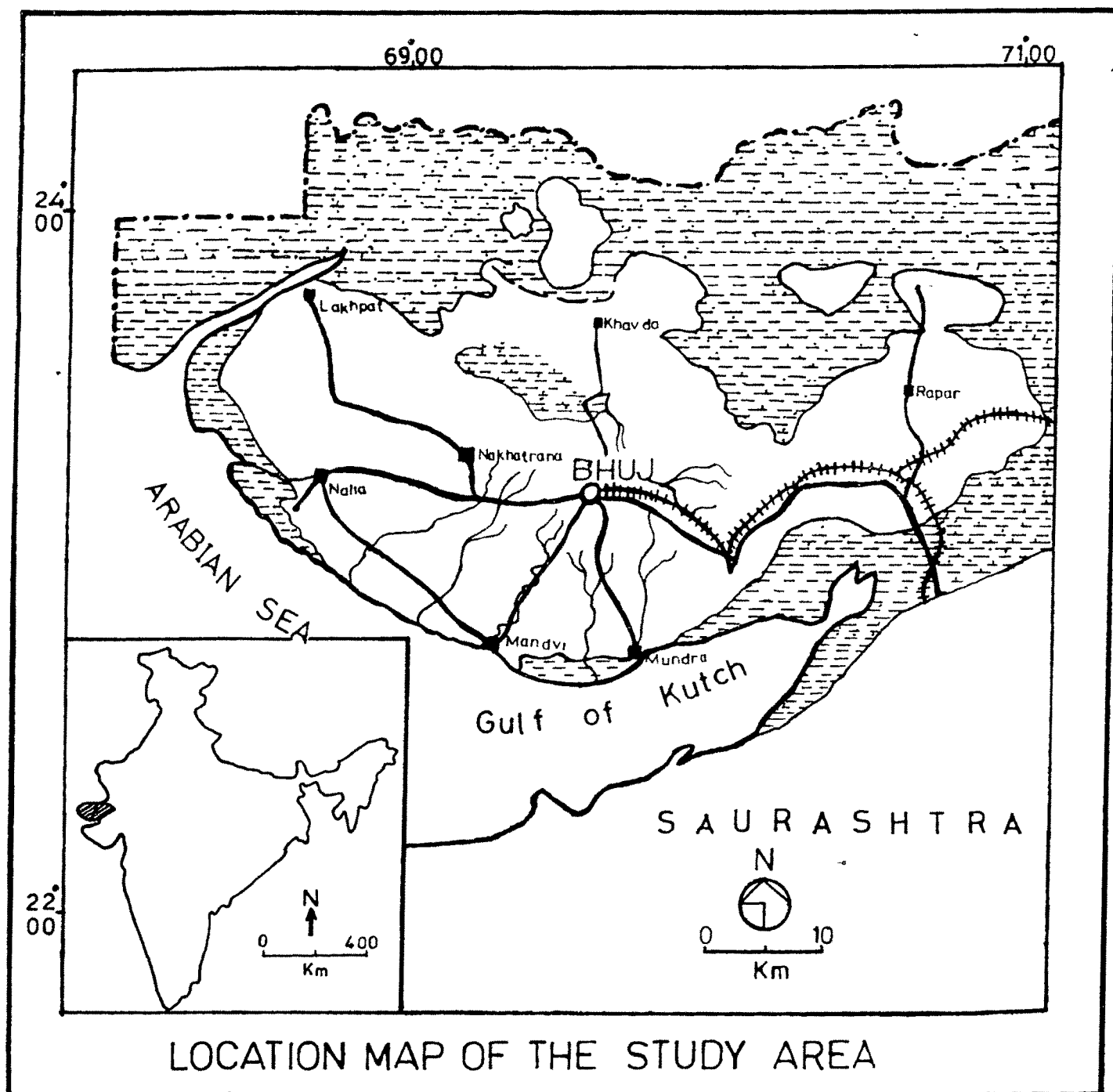


Plate-1



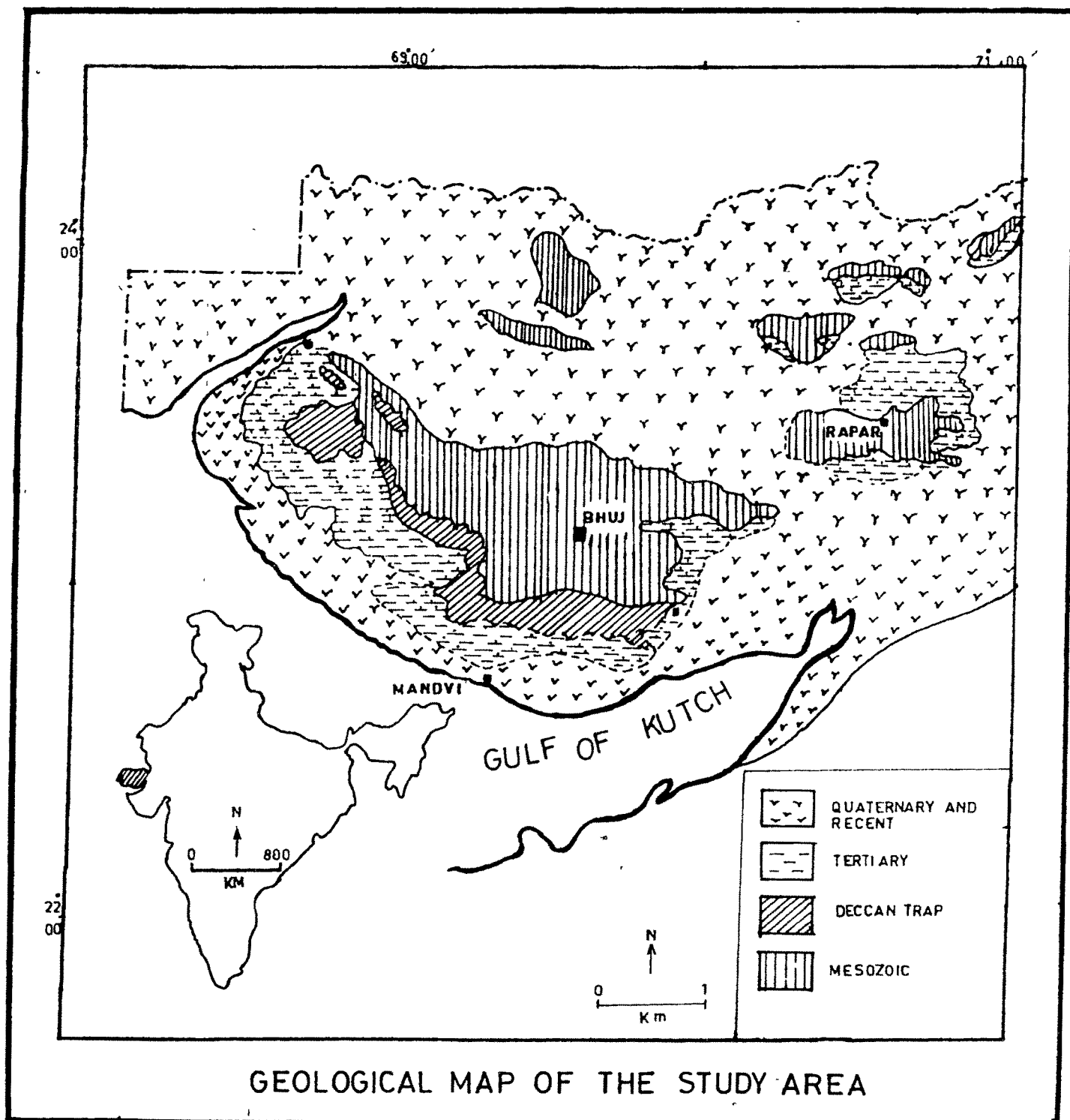


Plate - 2

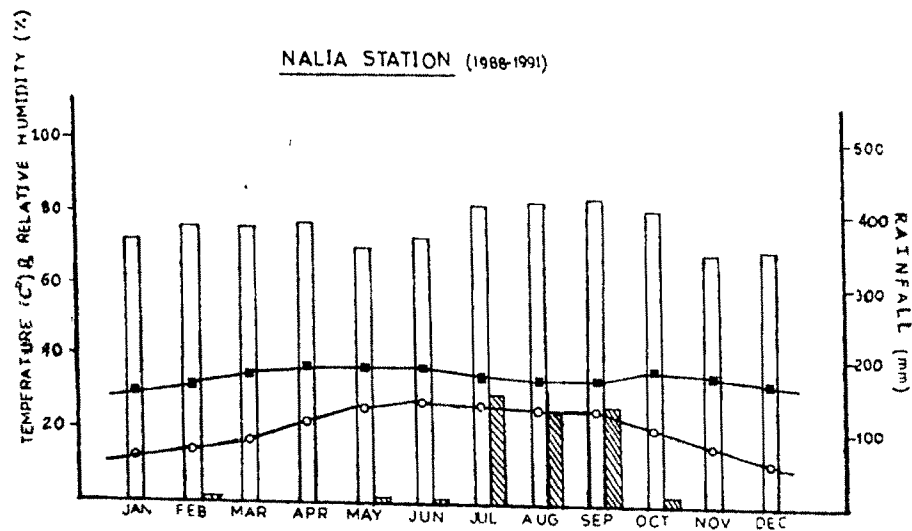
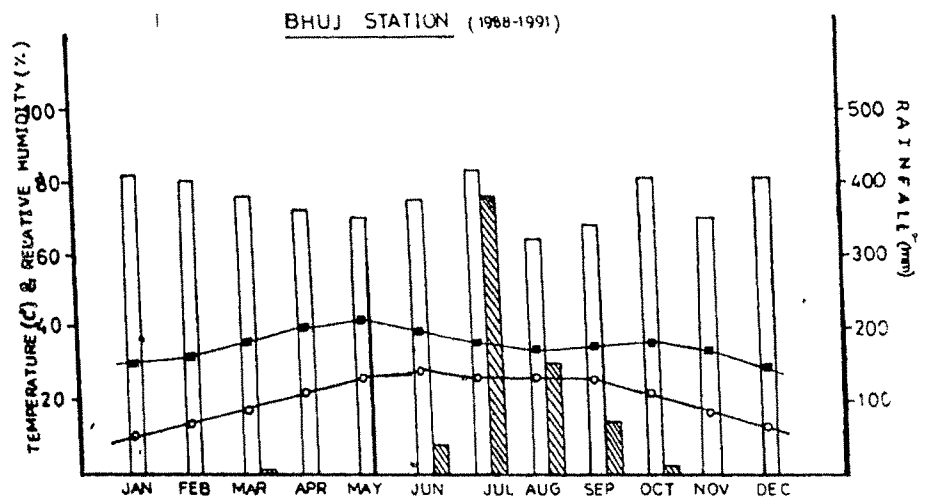


Plate 3 Ombrothermic diagram for Bhuj and Nalia stations (1988-91 mean)

Table 2.1 : Meteorological data for Bhuj Station

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<b>1988</b>												
Max. temp. (°C)	29.1	32.1	34.8	40.3	42.1 (45.4)	39.0	34.1	32.8	35.2	36.2	33.6	23.6
Min. temp. (°C)	10.8 (4.2)	14.1	27.8	23.1	25.9	28.0	26.4	25.6	25.8	20.8	12.4	09.0
Rainfall (mm)	94.4	-	15.0	-	-	05.9	328.9	129.8	167.5	-	-	-
Relative humidity (%)	69	76	79	72	72	74	74	83	87	87	74	86
<b>1989</b>												
Max. temp. (°C)	27.3	31.2	35.1	39.8	41.4 (45.6)	36.4	34.5	32.5	34.9	36.9	34.2	28.4
Min. temp. (°C)	06.4 (1.3)	11.2	16.2	20.7	23.9	26.7	26.1	25.3	23.9	19.9	14.8	09.8
Rainfall (mm)	1.4	03.0	03.0	-	-	127.5	141.0	225.5	20.6	13.7	-	-
Relative humidity (%)	81	82	82	61	66	77	87	76	83	85	81	87
<b>1990</b>												
Max. temp. (°C)	29.8	29.7	33.5	39.1	39.9 (44.1)	37.9	34.1	33.2	33.5	35.6	32.6	28.8
Min. temp. (°C)	13.4	09.4	15.8	21.6	26.3	27.4	26.8	25.5	24.5	19.5	14.7	9.9 (0.6)
Rainfall (mm)	10.8	-	-	-	-	0.2	1000.1	247.6	59.5	19.8	-	-
Relative humidity (%)	92	84	80	82	75	74	79	35	38	78	82	82
<b>1991</b>												
Max. temp. (°C)	26.5	29.4	35.8	39.1	39.7 (46.5)	39.7	39.5	35.6	34.6	34.2	33.7	31.4
Min. temp. (°C)	07.5 (1.8)	10.9	17.1	21.9	25.5	25.5	27.4	26.9	26.9	25.7	22.2	18.4
Rainfall (mm)	-	-	-	-	-	-	75.5	4.0	0.20	-	-	-
Relative humidity (%)	84	79	64	73	69	76	81	49	62	76	64	70

Table 3 : Meteorological data for Malia station

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
<b>1988</b>												
Max. temp. (°C)	29.1	30.4	31.3	35.4	34.3	35.8	32.2	30.9	34.0	31.5	33.4	29.7
Min. temp (°C)	12.2 (6.8)	14.4	17.3	22.3	22.3	28.4	27.0	26.3	26.0	21.2	14.5	11.9
Rainfall (mm)	-	-	-	-	01.5	00.4	225.5	75.1	17.4	-	-	-
Relative humidity (%)	60	71	76	84	76	70	89	90	88	88	67	76
<b>1989</b>												
Max.temp. (°C)	26.8	28.4	34.0	34.5	34.7 (40.4)	36.1	31.5	36.4	32.0	39.0	34.1	29.1
Min. temp. (°C)	08.7	11.7	16.7	18.9	24.5	26.9	26.1	26.5	24.7	20.0	17.1	12.6
Rainfall (mm)	-	-	-	-	-	-	138.5	200.5	198.0	76.7	51.4	-
Relative humidity (%)	71	85	92	79	79	74	79	89	86	79	73	68
<b>1990</b>												
Max.temp.(°C)	29.5	29.8	31.2	34.3	35.1 (41.1)	35.2	32.3	31.5	32.4	35.1	32.8	28.6
Min. temp.(°C)	11.5	14.2	16.3	21.3	26.8	27.9	27.2	25.3	25.2	20.8	16.4	12.6
Rainfall (mm)	-	08.2	0.7	-	-	-	1.1	158.2	138.0	09.5	-	-
Relative humidity (%)	84	71	73	74	72	75	81	83	78	78	67	66
<b>1991</b>												
Max. temp. (°C)	28.5	29.2	32.1	34.7	34.9	38.9	32.2	33.4	32.6	32.2	30.4	27.9
Min. temp. (°C)	11.1	13.3	16.5	21.3	25.7	27.4	26.9	25.7	25.6	20.5	16.2	09.8 ( 8.2)
Rainfall (mm)												
Relative humidity (%)	74	78	62	74	56	72	82	71	87	81	69	71