

CLIMATE OF SOUTH ASIA

INDIA

India is a vast country, the tropic of cancer passes through the middle of India. As a result, there is a great difference of climate between Southern and northern India. Besides this, southern areas are more affected by the sea winds waves, because of nearness of the sea from both sides. While the Interior and northern areas are less affected. However, the northern & eastern areas of India are comparatively much cooler in winter as compare to the southern parts.

For a detailed study the climate of India. The following reasons are commonly found:

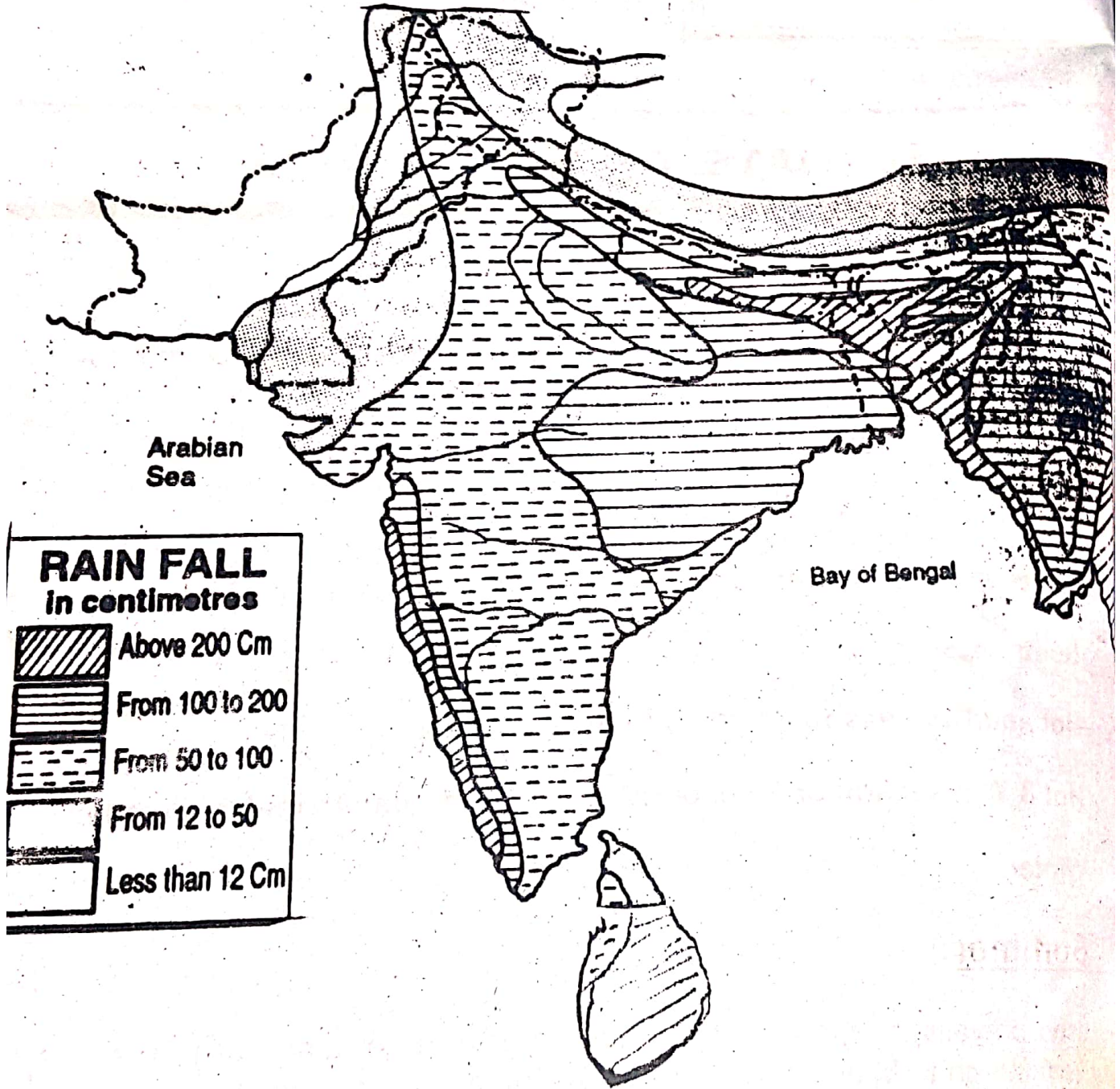
1. **Summer Season.**
2. **Hot and Dry season (Mid-March to Mid-June).**
3. **Hot & Wet season or Monsoon Season (Mid-June to mid-September).**
4. **Winter.**

1. Summer:

This season prevails in north western India from April to June but in the rest of the country from March to May. It is characterized by aridity and excessive heat almost all over India, at that time the temperature in the northern India than remains other areas. There remains a difference of 3 degree centigrade between the below southern & northern areas in the months of March and May. After the month of May, the vertical rays of the sun, on tropic of cancer and its surrounding areas, that is why the month of May, began to fall mean monthly temperature over the whole of the country high, and reaches above 32°C over most of Interior India. The temperature remains high almost 48°C in the north west and central plain areas of India. The highest recorded temperature in India at Ganga Nagar (Rajasthan), 50°C in June.

South Asian Climate

Summer Rains



So the temperature of some cities in north western India in the months of May and June are as follows:

Cities	May Temperature	June Temperature
Ludhyana	47.0 °C	47.7 °C
Ahmedabad (Gujarat)	47.2 °C	47.2 °C
Ganga Nagar (Rajasthan)	49.4 °C	50.0 °C
Bikanir (Rajasthan)	49.7 °C	48.8 °C

But the plateaus and hills are relatively cool because of elevation. At Bangalore (916 meters above mean Sea-level) the mean daily maximum temperature in April 32.6°C, in May temperature is 32.9°C and the maximum temperature recorded in may is 38.8°C.

Except for the coastal areas and high lands, temperature throughout India is remarkably uniform in May, 32.2°C (90°F) isotherm encloses most of India. south and East India is less hot in June (due to the onset of rainy season). And the North-Western India is, however, the hottest area in June, In this part of the country, mean June temperatures reaches over 46°C at some places.

Rainfall:

Thunderstorms with strong winds bring rainfall in the state of Orissa, (Tamil Nadu) West Bengal, and the areas of Karnataka. In these areas rainfall is usually recorded 10 to 25 cm. and the other parts of India remain under hot and dry conditions in these months.

Hot and Wet Season (The monsoon rainy season):

(Starting from the middle of June to middle of September)

The rainy monsoon season starts in the end of May, in the Indian state of Kerala and in the Punjab a month later, throughout the country rains bring the temperature down by a few degrees. In the interior of India July temperature is 3°C to 6°C and in north western India temperature is 2°C and 3°C cooler than June. Coastal lowlands and Assam do not record any appreciable change in temperature after the onset of rainy Season.

Cities	June	July
New Delhi	33.6 °C	30.9 °C
Bangalore	24.2 °C	23.0 °C
Bhopal	30.8 °C	26.6 °C
Gohati	28.8 °C	28.9 °C

Rainfall: From total annual rainfall of India, almost four-fifths received in this season.

The mountain areas and windward slopes receive heavy rainfall, while the west coastal low lands and the western Ghats receive more rainfall than Eastern Ghats.

Winter: In north-Western India, however, the impact of cool weather is felt earlier than in the rest of India. These areas of India remain more warm in winter than northern western areas.

In the north Indian areas, temperature remains normal and cloudless in the months of September, October, and November. In the month of November, difference in temperature is around 16°C to 20°C, while the winter temperature in the central India is more severe and long, usually winter prolong from November to February, while the coastal lowlands and areas of southern India are so cool in these months, and the winter season remain normal, and for a short period of time.

Mean January temperature in the Punjab plain is 12.5°C (54.5°F) and that in South Tamil Nadu it remains up to 25.5°C (78°F). The difference of temperature between these two far apart (2,000 km) This is because the Himalayas do not let the cold and dry winds of the interior of Asia Penetrate in to India.

Here the detail of mean temperature of some Indian cities in winter.

Cities	December	January
Ludhyana (Punjab)	6.4 °C	8.6 °C
Agra (U.P)	5.8 °C	7.8 °C
Ganga Nagar (C.P)	13.2 °C	11.7 °C

Air and its Pressure:

As the month of March ends, the temperature of most Indian cities goes on increasing, and gradually in the closing days of May the temperature becomes very high. In these days the temperature in the north & central India is recorded more than 46°C . Because of immense heat, air of these areas become very hot, these wind goes upwards and below everywhere, and than the pressure of Air becomes very low, then gradually this pressure of Air, become the lowest pressure of the world, in July, in the north western India and their adjoining areas of Pakistan. As we move from the north west of India towards the south, this pressure goes higher & higher. For example at, Bikanir (224 meter above sea level) The average mean temperature in July is about 1007.6 (m.b).

Air Pressure In Winter:

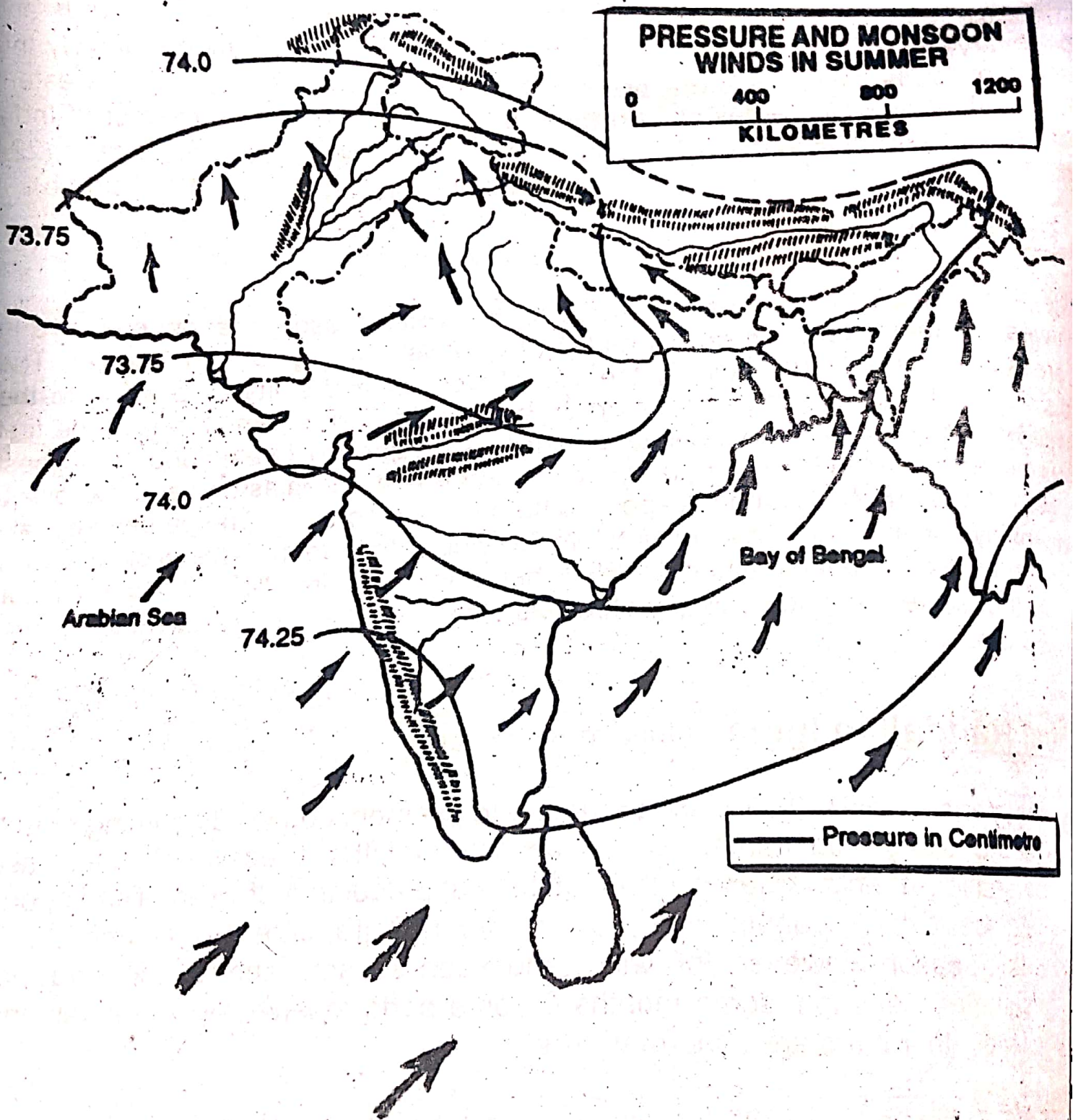
As the temperature falls with the advance of the winter season, the low pressure in north-western India weakens and is replaced by a weak anticyclone in October. The low pressure leaves North India by the end of October and shifts its position to the middle of the Bay of Bengal, Andhra Pradesh, Karnataka and Tamil Nadu in the first week of November. In the month of January the winter goes to it peak, and the highest pressure in this month (1019 m.b) is located in north-western Rajasthan and the lowest pressure. (1013 m.b) around cape Cameron is recorded. The pressure falls imperceptibly towards the east. In north India, where the isobars are wide a part in winter, the winds are generally feeble. Elsewhere the winds are slightly stronger but as a whole the winter monsoon winds blow with much less velocity than the summer monsoon winds.

Annual Rainfall in India: (June to September)

In the most parts of India, the rainfall occur due to the monsoon winds coming from the oceans, of the total annual rainfall of India, almost four fifths is received in this season. This rainy season affects largely on the Agricultural production of India. The important crops like, Rice, Corn, Peanuts, Tea, Coffee, Jowar, Bajra, Jute, Sugarcane etc., are raised in this season. However, the winter monsoon season, and it, rainfall deviates from the summer monsoon. some months & some parts receive heavy rainfall and in the same time, other parts are abnormally dry.

For example, In the year of 1996, exceptionally more rains are recorded in the states of West-Bengal, Assam, Bihar, that these areas kept under water, this not only caused casualties but also financial loss like, destruction of many agricultural envelope while other parts of India, like Gujarat, Haryana, Punjab, Maharashtra received less amount of rain.

Winter Rain



Winter Rainfall in India:

Rainfall is scanty over most of India during the winter season. The reason is air pressure is high at the dry areas, while the coastal areas or surrounded sea areas having low air pressure, in result the winds start blowing from dry areas towards coastal areas. These are called winter monsoon winds, because these winds, blow from the dry areas. In that season the Himalayas and Tamil Nadu receive more rainfall than other parts, these areas receive 15 to 60 cm annual rainfall.

Distribution of Annual Rainfall in India:

The spatial distribution of rainfall in India is uneven. The highest normal annual rainfall (1080 cm) in the world has been recorded Cherapunji (Meghalaya), while the western part of Jaisalmer district (Rajasthan) is one of the driest parts of the world recording 6 cm of rainfall annually. Thus there is a wide contrast in the amount of rainfall most of the rainfall occur in the mountain areas, where elevation is over 1600 meters to 2200 meters. Total rainfall decreases generally eastward to west wards. While the southern areas of India having more rainfalls than north eastern areas of India.

On the basis of total annual rainfall, we divide India in to five major regions.

1) Very Low Rainfall: (less than 30 cm. a year)

These areas are further divided in to some parts or regions.

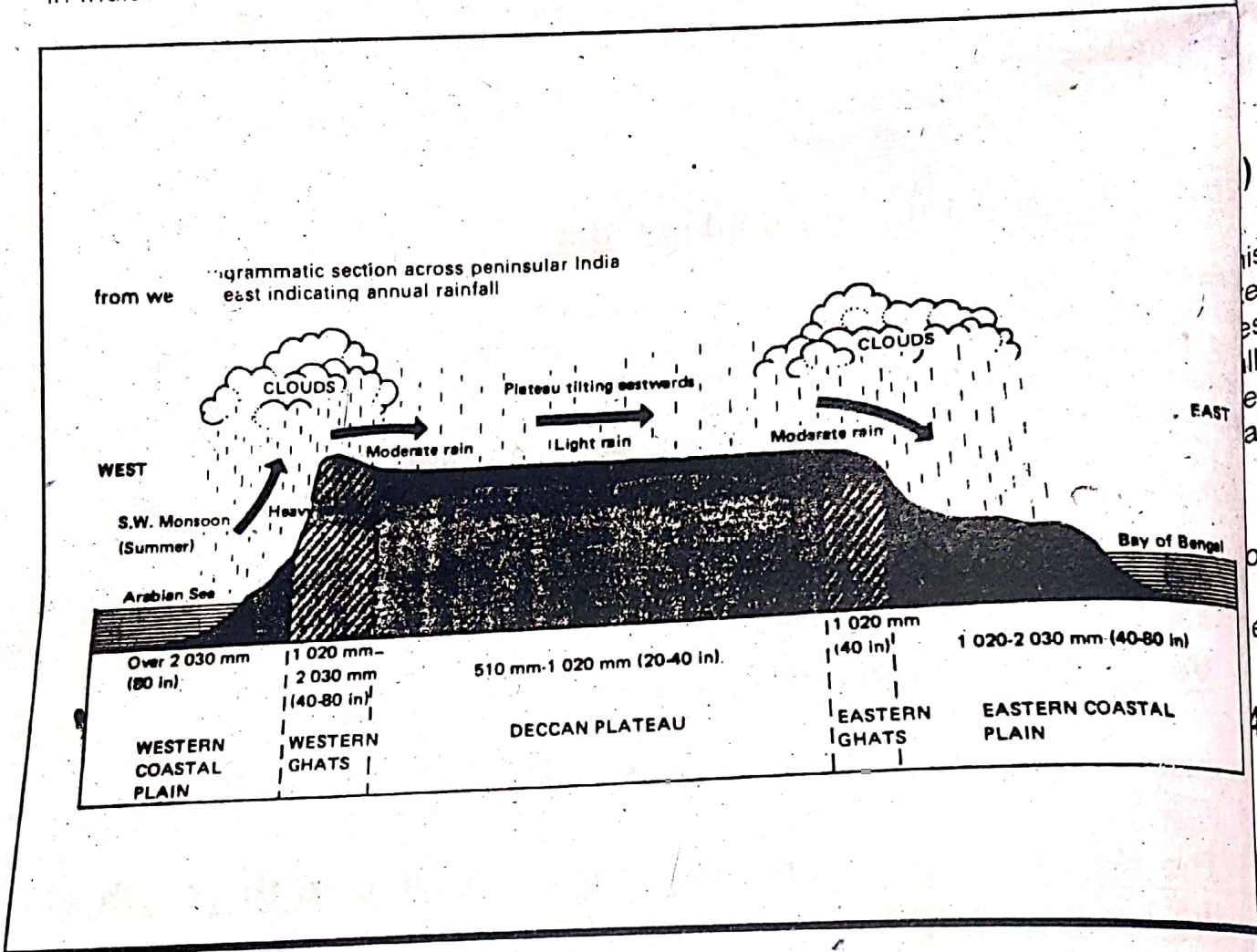
a) The Karakoram mountain & the area lying to the north of the Zaskar range:

This area is located in the north of the Great Himalayas. Its therefore, receives very little rainfall during the summer monsoon rainy season. A little rainfall is also received in the months of January, February and March by the Westerly depressions. Some rainfall occur in the months of July & August. It is, However, a very dry area and here nothing grows without irrigation.

b) Western Parts of Kutch and Rajasthan:

These areas lying to the West of a line starting from Jakhou (Kutch Coast) and running towards Haryana state (District Hisar) & Subdivision of Punjab (Fazalka) and its southern parts. These areas are generally considered very dry receive very little

amount of rainfall. The number of rainy months are four (June to September) It is during these four months that about 80% of the total annual rainfall is received. Ruili in the district Jaisalmer (Rajasthan) has recorded the lowest (8.33 cm) annual normal rainfall in India.



(2) Low Rainfall Area: (30 - 60 cm. a year)

There are three distinct area of low rainfall :

- (a) A narrow belt of mountainous country running in northwest-southeast direction and comprising mainly Deosai mountains and the Zaskar Range. Here there are two maximum of rainfall, one in August and the other in either March or April, November which receives less than 2.5 cm. of rainfall is the driest month.
- b) A crescent-shaped belt about 150-300 km wide running in north south direction and comprising (i) the Punjab-Haryana Plain west of a line starting from

roughly-central belt of Rajasthan, and western Gujarat. This belt has four rainy months (June to September) other months are very dry.

A narrow belt about 100 km. wide running in north-south direction and lying east of the western Ghats. It runs through the western part of Maharashtra Plateau, extending further south ward in Karnataka and south west of Andhra Pradesh. Generally, there are five rainy months (June to October). Other months except July are very dry and none of them receives more than 2.0 cm. of rainfall.

Medium Rainfall belt: (60 -100 cm a year)

This is a long belt running from northern Punjab southward to Cape Comorin and is interrupted by a narrow belt of low rainfall enclosed by 60 cm. isohyets east of the western Ghats and by a few patches of low rainfall in the interior of Tamil Nadu. The valley of Kashmir is also a region of medium rainfall. This region forms a narrow strip in the Eastern Punjab - Haryana Plain. Further it broadens towards Uttar Pradesh, Maharashtra, Karnataka, Gujarat, and the areas of Tamil Nadu.

In this long belt of the country, the rainy season and the number of rainy months vary from one part of the region to the other. In the months of June, July and August, rainfall is more, while the months of January, February, March receive little amount of rain. Generally it is less than 2 cm. annually.

High Rainfall belt or areas: (100 to 200)

There are four areas of high rainfall in India and these are widely separated from one another.

A very narrow belt of the width of about 20 km. in the western Ghats running throughout their length in the north-south direction. In the north this belt spreads in the coastal plain of Gujarat south of the river Narmada. The number of rainy months in that part of this belt which lies in Kerala is also five (May to July and October) Every dry month receives more than 2 cm. of rainfall.

The Jammu Hills, Himachal Pradesh (excluding a small area in the east, the Uttar Pradesh, Himalayas, Northern Uttar Pradesh Plain, Bihar, West Bengal, Orissa, central and Eastern Madhya Pradesh, a few districts of Maharashtra. In the Jammu Hills with the westerly depressions deposit sufficient rainfall in the winter, (Jan to Feb) but generally there are three months of rainy season July to September.

In some parts of west Bengal, where the rainy months are five (May to Sep).

- (c) A narrow belt about 80 km. broad along the east coast running southward from Nellore to point Calicut. The extreme rainy months are five (August to December) In other dry months, the rainfall is very low (2 cm. to 7 cm).
- (d) A belt running in the north-south direction and including small parts of middle and lower Assam valley, the Mikir Hills and Manipur state. Generally there are six rainy months, (April to September) while other dry months receive very less rainfall, almost (1.5 cm. rainfall).

(5) **Very High Rainfall:** (above 200 cm)

There are two areas of very high rainfall in a year.

A long narrow belt running from Silvassa southward to Trivandrum and including west-facing slopes of the western Ghats and the adjoining coastal plain but excluding very narrow strip along the coast from Daman to Mumbai. In the northern part there are four rainy months (June to September) six. The other dry or low rainfall months are three (November to January), world highest. The shillong plateau, facing Bangladesh have annual rainfall (1080 cm.) has been recorded at Chirrapungi (Maghilaya).

PAKISTAN

Climate:

Most areas of Pakistan are under dry & hot climatic conditions, thus while generally about the climatic conditions of Pakistan, we can say that Pakistan enjoys arid & Semi-arid conditions with hot summer and cold winter. So to discuss the various climatic conditions in the country we divide Pakistan into two greater parts.

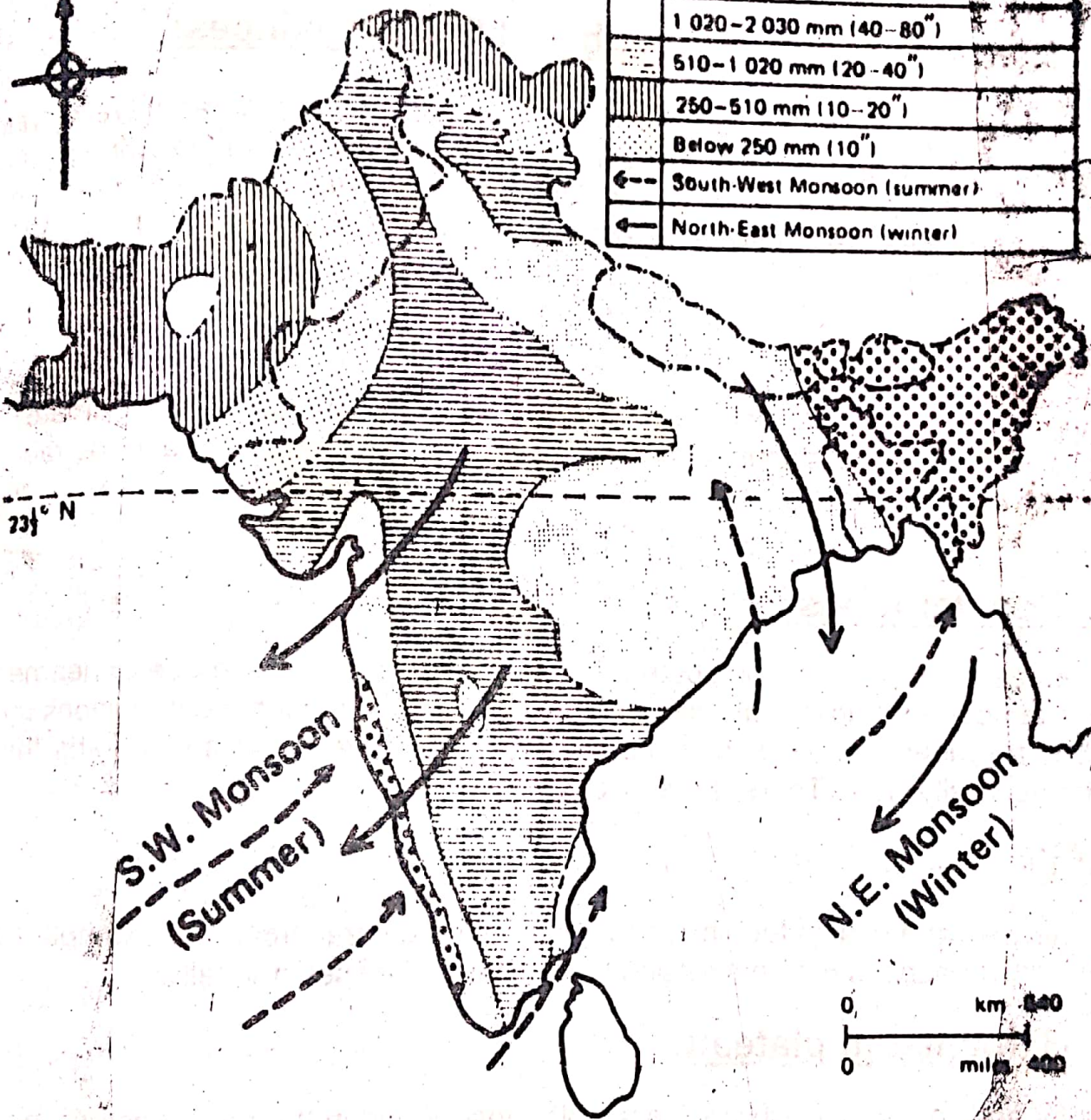
1. The North East & North Western Mountainous Region:

North east and north western mountainous areas of our country are higher elevation from the sea level. Here due to a higher altitude the winters are cold and longer. During winter months temperature often goes down to below freezing point, there is enough snow falls and the Peaks remain covered with snow. The winter here becomes more severe and longer than in the plain areas. But summer remain cool & temperate and often short.

Indian Subcontinent Annual Rainfall



	Over 2 030 mm (80")
	1 020-2 030 mm (40-80")
	510-1 020 mm (20-40")
	250-510 mm (10-20")
	Below 250 mm (10")
	South-West Monsoon (summer)
	North-East Monsoon (winter)



Rainfall:

Most rainfall in our country occurs in the north eastern mountain areas, due to summer monsoon winds. And the annual rainfall in the Murree areas approximately 40" inches annually, but the north western mountain areas receive less amount of rain comparatively, and some rainfall occur in the winter season also due to thunder storms.

2. The plain areas of Punjab and Sind Provinces:

Due to low altitude and being faraway from the Ocean, these areas have a typical continental type of climate. The temperature reaches the maximum during summer months and the summers are hot and lengthy. The winters are not severe in the region. The highest recorded temperature in this region was 126°F or 52°C at Jacobabad and Sibi.

Rainfall:

The annual rainfall in the adjoining mountain areas of Punjab is approximately 40 inches annually, but the amount of rain decreases from north to south and the rainfall in Sind Province is very low, and generally it occurs in the summer season due to monsoon winds.

3. Coastal Areas:

These areas are situated in the south of the lower Indus plain, here due to nearness to sea, the temperature does not reach up to extreme, the atmospheric conditions remain humid, & the heat in the summer months are oppressive. In winter months the sky remains generally clear. There is plenty of sun shine.

Rainfall:

The areas near the coasts face more rain than other central areas, for example annual rainfall in Hyderabad is 6.1" inches and in Karachi 8.1" inches annually.

4. Balochistan plateau:

Although conditions in Balochistan resemble those found in the north eastern region of our country. So the temperature in both the areas is different with each other. Here the summer temperature is somewhat higher than northern areas. As these areas are far away from sea, so due to high altitude temperature in winter often remains below freezing point. Rainfall being low, these areas are dry.

Rainfall:

Generally Rainfall in Balochistan occur more in winter, rather than in summer.

BANGLADESH

Climate:

Although, Bangladesh is too faraway from the equator, but due to nearness from the sea and because of heavy rains, its summer climate is hot but humid and winter remain cold but not extreme. Thus Bangladesh lies in the monsoon region, that's why the effects of Monsoon region are very prominent. thus, Bangladesh contain three important seasons:

1. Winter Season (November to February)
2. Summer Season (March to May)
3. Rainy Season (June to October)

Winter Season:

The temperature in Bangladesh during winter remain very pleasant not extremely cold and the rainfall is very low during winters. The mean temperature in January is almost 64°F or 18°C but the other parts of the country getting more cold, than the coastal areas. for example, in January temperature in Chittagang is 66.9°F, in Dhaka 66.0°F, Bogra 63.9°F and at Denajpur 63.5°F, snowfall and extreme cold conditions are not found in Bangladesh.

Rainfall:

Winter in Bangladesh is considered the driest season, and the sky remain clear throughout the winter. December is considered the lowest rainfall month. Some times, western winds and thunder storms causes light rainfall or dazdling. Northern areas receive 2" to 4" inches rainfall annually during the winter, and it is only at coastal areas of Chittagang and at north eastern areas of Silhet district.

Summer Temperature:

The temperature becomes hotter & hotter after the month of February for example in the months of February to March the temperature increases in Chittagang 6.6°C, increase in Dhaka 4.1°C, increase in Bogra 9.2°C, The temperature in April, reaches to 80°F, and remain the same till October. The difference of day-night temperature in the coastal areas is 18°C to 20°C.

Rainfall:

With the arrival of Summer, the north western winds bring the monsoon rains. These storm winds or monsoon winds called (**Kali Baisakhi**) means crises of the month (Baisakh). The Duration of these rains remain from March to the end of monsoon. Sometimes these winds turned in to hurricanes and for that reason causes heavy financial loss and many casualties. These cyclones blow usually in the afternoon, and generally their speed is 25 to 50 mile per hours, but sometimes it exceed to 75 miles per hour. In the south east of Bangladesh, these winds affects more, due to these blowing cyclones, heavy rainfall, is very often in various places of Bangladesh.

The rainfall which is caused by these winds, turned in to heavy thunder shower. Most of the rainfall occur from March to May, which is recorded 10" to 30" annually. May is the most rainy month of that season.

Rainy Season:

In Bangladesh Rainy season starts from the middle of June to the Mid of October. This monsoon winds which come from the Bay of Bengal are usually filled with water. These winds causes rainfall in the mountain areas of Chittagang, Gara, Khasia, Jentia, where these collapse with mountains. The $\frac{3}{4}$ part of total rainfalls in Bangladesh is received this season. In the winter season these winds change their direction, wind blow from dry land towards oceans. In that season, rainfall is very low, because of these winds and these winds are called winter monsoon.

In Bangladesh most of the rainfall occurs in the raining season, like in the western parts, 50" inches annually, in the south eastern and northern areas receives more than 100" inches annually. In the Silhet district of Bangladesh rainfall is 200" to 250" inches. The highest rainfall receiving place in Bangladesh is known Lala Khal, where annual rainfall is recorded down 255.76" inches. This place is also situated in the Silhet district and the lowest rainfall area in Bangladesh is Luilpur in the Rajshahi distt, having annual rainfall of about 47.9". According to climate we can divide Bangladesh in following parts.

(a) Tropical Wet Areas:

This region consists of southern & south eastern parts of Bangladesh. The summer season remain very hot and long in this particular region, the annual rainfall in the summer season is about 80" inches. Due to rainfall and nearness from the sea, the climate, in these areas remain quite humid. Winter remain normal (not extremely old) and dry. Beside this the annual-temperature or the day/night temperature remain almost the same throughout the year. In the southern parts of Chittagang district annual rainfall is more than 120" inches.

Due to the high altitude of the Chitta Gang mountain areas, temperature remain very pleasant and summer is not extremely hot.

b) Sub-tropical Wet Areas:

This region consists of northern & north eastern areas of Bangladesh. This region receive sufficient amount of rainfalls, temperature remain hot in summer and in winter it extremely cold.

The most rainy areas of Bangladesh are situated in the north eastern part of this region. Due to sufficient amount of rainfalls, the summer season in that region is not very severe.

c) Sub-tropical & Less Humid Areas:

This region consists of central & western parts of Bangladesh, these are wider towards south. This region receive less amount of rains compare to other areas. Generally, the annual rainfall in this region is 50" to 60" inches and the summer season in this region is very severe and hot compare to other previous areas. So, the climate of this region is just-like the climate of dry areas, and temperature changes towards the western side.

SRI LANKA

Climate:

The country of Sri Lanka is situated near the "Equatorial Region" and the 8°C north altitude Passes through the center of this country, because of the nearness from the equator, country remain under severe hot conditions, but it is not as hot as the interior parts of India due to the nearness of Ocean. But the affects of humidity and other factors can be felt anywhere in the country.

The temperature gets pleasant because of the blowing sea breeze, the day/night temperature is almost the same, and there is very minor difference between them, For example at Colombo the day/night temperature is not more than 12°F, and such as other months of the year, having very minor difference. Although in Sri Lanka. January is considered the coldest month and May is considered the hottest month, however winter in Sri Lanka weather remain cool in the high coastal areas. Mostly weather remain very pleasant throughout the year.

Rainfall:

Although Sri Lanka is a small island, but the amount of rainfall is different at different places, for example, in northern and western areas, annual rainfall is 40" inches and in the south western mountainous areas receive 200" inches annually. This rainfall in Sri Lanka is brought by the south western and north eastern monsoon winds. The amount of rainfall decreases from south west to north and north east direction and generally more rains occur in the months of June to October. In the areas of eastern coasts, some rain occurs in the months of November and December, due to Trade winds, areas of north Sri Lanka are comparatively dry.

NEPAL

Climate:

Nepal valley is situated in the surroundings of Himalayas. The areas, which are above from the sea level face severe climatic conditions, but the climate in the higher areas is not so severe, however, when in winter snowfalls, all the routes have been closed, and no cultivation practice can be done. The very long and severe winter season, affects lives of the people, besides this, summer season arrives for a very short time, and during summer climate becomes very pleasant mostly people of the valleys, adopt agriculture profession to fulfill their food requirements. Areas having very high altitudes, remain snow covered throughout the year and rainfall is very little except some monsoon rain in winter. The mountain slopes, which are below 18,000 thousand feet in height, have forests of various types.

Central Nepal:

Central Nepal which includes the valley of Nepal. These areas are having high altitudes, in this part except the mountain of Mahabharata Laikh and Choria Ghai, most other areas are plain. Climate in these areas is not much severe and the summer season also remains pleasant, for example in Katmandu which is almost 4386 feet above the level have the mean temperature in July is 24.4°C or 76°F and in January 10°C or 50°F. No area in the valley of Nepal has the below freezing point temperature in winter, that is why, in Katmandu and in other valleys like, Pattan & in Bhat village have very pleasant climatic conditions in winter, and snow fall is rare.

Besides this, summer season also remains very pleasant and less severe compared to the plain areas of India. Rainfall occurs due to the monsoon winds in summer and winter season. Mostly these rainfalls arrive in the months of May to September and the

weather continued from November to January. There are more rains receive in the eastern parts as compare to western parts. Due to suitable conditions through year in the central Nepal, the major occupation of the people is agriculture, crops of various kinds are other cultivated in both the seasons. Besides this, due to availability of resources areas of central Nepal are more populated as compare to other areas.

Southern Nepal:

The areas, which are situated east to west near the Indian border and also lie on the southern sides of Ghai mountains are known as the "Terai areas". These areas have comparatively long and hot summer season than central areas.

And on the other hand winter is not very severe, winter remain only for few months, and because of low altitude the temperature never goes or below freezing point. The rain occurs in these areas, because of summer monsoon.

The eastern parts receive more rain than western parts eg., eastern parts receive 80" inches annual rainfall, the amount of annual rainfall decreases as we move towards west eg., annual rainfall in western parts is 40" inches, besides this, the areas which are situated in the center of the mountains, receive more rains as compare to other areas. The areas of "Terai " are 1000 to 1500 feet above level. Many small rivers of the upper areas, emerged in to the river Ganga in India after passing through many areas. These areas are covered with thick forests and Plantations.

BHUTAN

Climate:

The country of Bhutan is divided in to three parts in view of-its Climate.

1. Northern Bhutan:

Due to high altitude areas of north Bhutan remain under severe cold conditions. The winter season in these areas remains for quite a long period often snow falls. The winter temperature, goes often snow falls freezing point, however the summer season, comes for only short due to low temperature period. Besides many high peaks remain now covered throughout the year, because the temperature in these areas remain below freezing point, and the snow of these areas does not melt instead of rain. In the winter there is heavy of snowfall rainfall. But some amount of rainfall is obtained in the summer season. That is why, slopes of many mountains are covered with thick evergreen forests:

2. Central Bhutan:

These areas are less high compare to north Bhutan. That is why the summer season is not severe. However in the winter season, temperature goes below freezing point. There is also snowfall but winter season does not remain for long period. The summer season stays long as compare to northern areas, Beside this rainfall occur more in the summer season due to monsoon winds and the annual rainfall is recorded about 140" inches.

3. South Bhutan:

The adjoining areas of a Assam & West Bengal of Indian states and the southern areas of Bhutan have the similar type of climate. These areas have very mild, humid warm conditions eg. The summer in the southern Bhutan are hot and remains for long duration, on the other hand, winter arrives only for short period, and very seldom temperature reaches about freezing point in winter. Beside this, rainfalls occur in southern Bhutan, mostly in summer due to monsoonal winds. In many areas annual rainfall is recorded 200" inches. (5000 mm).

ISLANDS OF MALDIVES

Climate & Temperatures:

This country is situated near the equatorial region. Therefore there is a uniformly high temperature throughout the year. Due to nearness from the sea, the temperature remains humid & warm throughout the year. The mean annual temperature of the country is about 27°C (80°F). There is very few amount of difference of climate and other months temperature. Therefore winter arrives only for short period. The temperature drops 3°C to 4°C in winter.

Rainfall:

This country is consists of many small Islands, However the annual mean rainfall recorded about (2550 mm) or (100 to 150 inches) surrounded by sea all-round. The rays of sun falls vertically on the sea, throughout the year so due to heavy evaporation enough rainfall is received by these Island.

