

Wweather is the atmospheric condition of a place at a *particular time*, morning, noon or evening or day. Thus, weather is about hour to hour changes in the atmosphere at a particular place. It includes changes in sunshine, wind, clouds and rainfall. Weather is hot or cold, windy or calm, cloudy or sunny, rainy or dry depending upon these four factors or elements. In other words, weather is the name of temperature, humidity and movement of air. Temperature is the measurement of the hotness or coldness of the air. Humidity is the amount of water vapour in the air.



Sunshine



Wind



Clouds



Rain

Elements of Weather

The Sun heats the ground. The air near the ground takes the heat from it, warms up and rises to cause air currents. The cool air from the water bodies move to fill the space vacated by the warm air. Thus, it makes the **wind**. The sun also heats the water to evaporate and make vapours which creates clouds and rain. Thus, the Sun is the controller of weather.

The weather may change from hour to hour. The Sun gives the same amount of heat all the time. But in the morning and evening, the Sun's rays are slanting. The same amount of heat spreads over a wider area. So less heat is received per unit area. Therefore, the weather is cooler (less hot). At noon the Sun is directly overhead. The Sun's rays are direct. The amount of heat spreads over a small area. So, more heat is received per unit area. Therefore, the weather is warmer. After sunset there are no rays from the Sun to heat up. So, the night becomes cool. It further cools as the heat from the Earth goes up.



Season and Climate

Season is the average pattern of atmospheric conditions of a place over a few months. You must have noticed that when it is hot continuously for many days you don't wear any warm clothing. Instead you like to eat or drink cold things. In contrast there are many days together, you feel cold without woollen clothes when it is very windy and chilly, you would like to have something hot to eat or drink. A year is usually divided into summer, winter, spring and autumn seasons. Seasons change due to the position of the Earth around the Sun. In chapter 3 you have learnt that the seasons are caused because the Earth spins in inclined position while going round the Sun. Revolution of the Earth around the Sun and its tilted axis are the two factors for the change of seasons.

Climate is somewhat regular or average pattern of atmospheric conditions of a place over many years (usually about 35 years). The climate of India has broadly been described as Monsoon type. Due to India's location in the tropical region, most of the rain is brought by monsoon winds. Agriculture in India is dependent on rains. Good monsoons mean adequate rain and a bountiful crop.

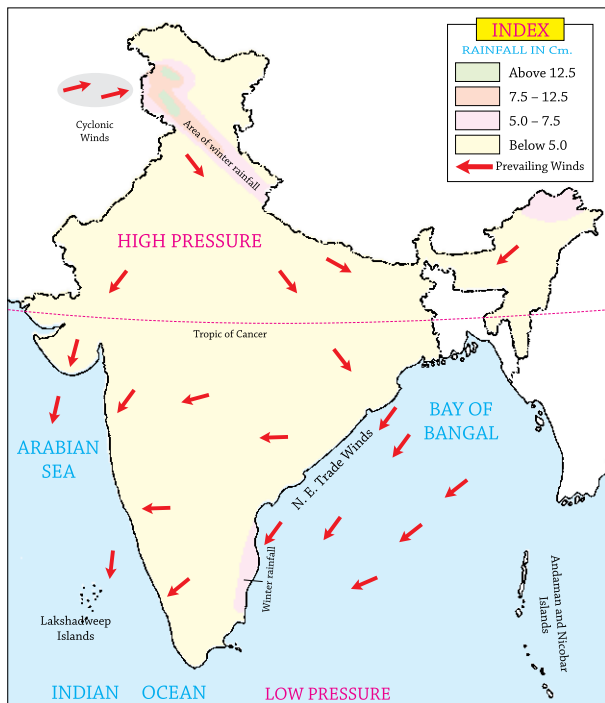
Climatic Seasons of India

The climate of India can be described in terms of the annual cycle of seasons. The four main seasons are : (i) Cold Weather Season (ii) Hot Weather Season (iii) Advancing Monsoon Season and (iv) Retreating Monsoon Season. The duration of seasons in months is given below taking the country as a whole.

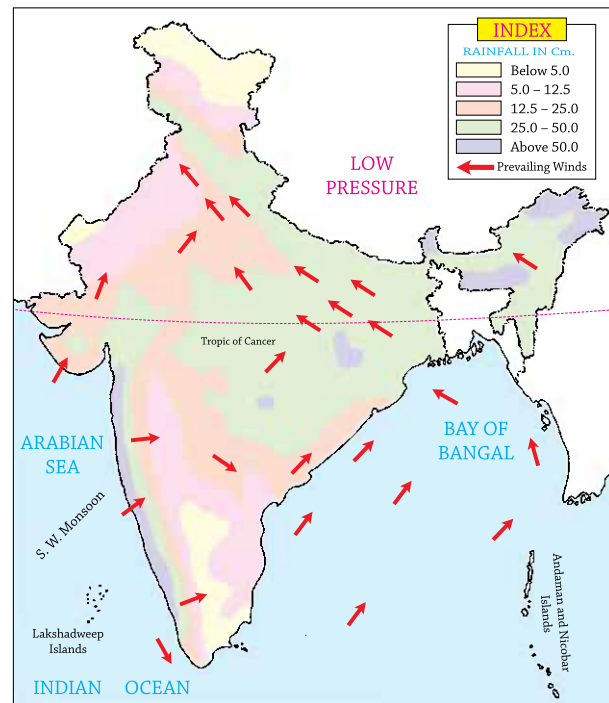
- 1. Cold Weather Season or Winter (December to February) :** The sun rays do not fall directly in the region. As a result the temperatures are quite low in Northern India. During this season high pressure prevails over northern plains. The temperature in the north India is generally less than 20°C and it is generally more than 20°C in South India. The days are warm but the nights are cold. Because the winds blow from the land are dry. These winds are called the **north-east trade winds** and the weather is dry due to them. When these winds blow over the Bay of Bengal, they pick up moisture and they cause heavy rain in the coastal areas of Tamil Nadu. Then these winds are called the **north-east monsoon** or **winter monsoon**.

Western disturbances or Westerly winds are the low pressure systems or shallow cyclonic storms originating from the Mediterranean Sea. Under the influence of upper air currents and north east trade winds, these storms strike the Himalayas causing heavy snowfall in the Great Himalayas and Karakorm. On the other hand, north-eastern hills and the peninsular hills (in south) never have any snow. The westerly winds descent towards the plain and make small amounts of rainfall in Punjab, Haryana, parts of Uttar Pradesh and Bihar.

2. **Hot Weather Season or Summer (March to May)** : Sun rays more or less directly fall in the region. Temperature becomes very high. Hot and dry winds called loo, blow during the days. In the northern belt, the upper air currents begin shifting northward. The temperature starts rising from south to north. In March the temperature is around 38° C in the Deccan Plateau. As the heat belt moves north, the temperature rises upto 42° C to 43° C in Gujarat and Madhya Pradesh. In most northwestern parts of India the day temperature may be more than 45° C. A low-pressure is created due to high temperature which often causes local thunderstorms with dust and light rain. The low air pressure invites the moist winds from the Arabian Sea toward the land, thus bringing pre-monsoon showers in Kerala and Western Ghats.



India– Rainfall and Winds (January)



India– Rainfall and Winds (July)

3. **Advancing Monsoon Season or Rainy Season (June to September)** : 80% of the rain in India occurs during this season. This is the most important season because our crop production depends on it. This season is marked by the onset and advance of monsoon. The winds blow from Arabian Sea and Bay of Bengal towards the land. The low pressure over Northern plains is strong enough to draw **south-east trade winds** across the equator. They become the **south-west monsoon** after crossing the equator. They carry moisture with them. These strong moisture laden winds blow from south-west to north-east. The monsoon divides into two branches by the Indian peninsula—the Arabian Sea branch and the Bay of Bengal branch. **The Arabian Sea branch** strikes the west coast of the country and moves towards the north. It moves along the west coast and reaches Kerala by the beginning of June. There is heavy rainfall on the Western slopes of Western



Ghats and the winds move further to north passing over western Rajasthan along the Aravallis and reaches western Himalayas without making any rain there. Thus **amount of rain decreases from south to north**.

The Bay of Bengal branch strikes the Bengal coast and eastern parts of the Himalayas from where it is deflected towards the north-west along the northern plains and Himalayan mountain ranges. **The amount of rain decreases from east to west**.

During the monsoon season the rains are hardly continuous. The rainfall is **unevenly distributed** resulting into drought at some places and floods at other places.


- 4. Retreating Monsoon Season or Autumn (October and November) :** As the temperature in the Northern India decreases, the air pressure increases, as a result of which the monsoon winds retreat. Retreat means an 'orderly' withdrawal—from Punjab by the last week of September and from West Bengal by the last week of October. The south-east monsoons make rainfall only in South India. By early November they can reach upto southern India because the overhead rays of the Sun have by then retreated. The temperature starts decreasing over the Indian subcontinent. As the low pressure area moves from north-western area to the eastern area often causing cyclonic storms resulting widespread damage and floods in Orissa, Andhra Pradesh and West Bengal.

Characteristic Features of the Monsoons : Monsoon winds are seasonal as well as uncertain and irregular in their advance and retreat. Rainfall caused by monsoons is **unequally distributed** over the country and over the year. Three-fourths of the rainfall in India takes place from June to September.

Distribution of Rainfall in India

In the Great Himalayas and Karakoram, heavy snowfall takes place in winter. This snowfall is the source of water in major rivers of Northern India. The rest of the country mostly receives rainfall during the four months of rainy season which is unevenly distributed due to *varied relief features of our country*. The western slopes of Western Ghats get heavy rains from the south-west monsoons while its eastern part falls in the rain shadow area. Large parts of Western Rajasthan get very little rain because the Aravalli hills lie parallel to the Arabic Sea branch of the South-West monsoons and hence do not obstruct these winds. Also when these winds pass over the hot sands of the desert, they get warmed up and increase their capacity to hold moisture. Thus, large parts of Rajasthan get little or almost no rainfall. As compared to many countries of the world, India has only a small area in Rajasthan which is dry.

The Bay of Bengal branch of the South-West monsoons is deflected by the Arakan Mountains of Myanmar and moves up the Ganga valley



(plains). It rains all along as it goes up the Ganga plains east to west. Thus, the rainfall decreases from east to west.

A sub-branch of the Bay of Bengal South-West monsoon enters the Brahmaputra valley. It is forced to rise suddenly through a funnel-shaped valley to the Khasi Hills. It results into highest rainfall in the world in Mawsynram (about 1200 cm of rain) and Cherrapunji on the windward side of these North-eastern hills. Shillong, situated on the leeward side (sheltering the winds) gets only 200 cm of rain.

Thus, we can divide the distribution of rainfall in India into four regions :

1. Regions under Heavy Rainfall (more than 200 cm)

North-eastern hills, Western Ghats and Western Coastal areas.

2. Regions under Moderate Rainfall (100 to 200 cm)

Some parts of West Bengal, Bihar, eastern Uttar Pradesh, sub-mountainous areas of Punjab, Orissa, Madhya Pradesh.

3. Regions under low Rainfall (50 to 100 cm)

Gujarat, eastern Rajasthan, western Uttar Pradesh, Haryana, northern Punjab, most of the Deccan surrounded by the hills on all sides.

4. Regions under Scanty Rainfall (less than 50 cm)

Kuchchh (Gujarat), western Rajasthan, southern Haryana and south-western Punjab, Ladakh in Kashmir.

Factors Affecting the Climate of India


The climate of a place is affected by its location, altitude, distance from the sea, relief and surface winds.

- 1. Location or Latitude :** Main land of India roughly lies between 8° N and 37° N. The Tropic of Cancer passes halfway through the country. Thus the southern half lies in the **tropical region**, that is, torrid/hot zone. And the northern half lies in the **sub-tropical region**, that is, warm moderate zone. Thus, the whole of India remains warm throughout the year.

The Himalayas in the north prevents the cold dry winds from Central Asia to enter into India, thus, the country is saved from the harsh winters from the north. Secondly, the Himalayas hinder the rain-bearing monsoon winds to cross over to the north toward Central Asia. Thus, India has plenty of rainfall because the rain-bearing winds strike against the mountains and turn to spread and rain other parts of India.

In this way, the climate of India as a whole is described as **Tropical Monsoon climate**.

- 2. Altitude :** Temperature decreases with increase in altitude of a place. Places in the mountains are colder than places in the plains. Shimla is located at a higher altitude than Ludhiana



though situated in the same latitude. Therefore, Shimla has a colder climate. Ooty (Udagamandalam) in South India and Mount Abu in Rajasthan are cool in summer though they are situated in the hot region, only because they are the hill stations situated at a height.

- 3. Distance from the Sea :** South India being in Tropical (Hot) zone should normally have been more hot than the Northern Plains. But it has seas on both sides. The seas has a moderating (cooling) effect on the climate. Thus, the places on the eastern and western coasts are not hotter. Also there is hardly any difference between day and night temperatures. The temperatures are almost the same throughout the year. Mumbai and Kolkata also experience the same moderate climate. Such climate is called **equable climate**.

Places far from the sea do not experience the moderating influence of the seas. As a result, there is a great difference between the day and night temperatures. The summer and winter temperatures also vary greatly. Places like Delhi, Kanpur, Jaipur experience this type of climate. They have very cold winters and hot summers. Such climate is called **continental climate or extreme climate**.


- 4. Relief :** The coastal areas along the Western Ghats are wet because the rain-bearing winds are checked there. They cause heavy rainfall on Western slopes and very little on Eastern slopes. Similarly, when the south-west monsoons strike against high Himalayas in the north-east, they change their direction towards west. They also cause heavy rainfall in the north-east.

In the Northern Hemisphere south facing slopes of mountains receive more sunshine than the north facing slopes.

- 5. Surface Winds :** Winds blow in a particular direction. When they blow over the oceans they pick up moisture. They shed this moisture in the coastal areas or while climbing a mountain. Monsoons are seasonal winds that blow over a major part of Asia including India. In winter, they blow from land to the sea as the dry North-east monsoons (capturing moisture when they move further on the Bay of Bengal). In summer, they blow from the sea to the land as the moisture-laden south-west monsoon. Other surface winds that influence India's climate are the cyclonic westerly disturbances from the Mediterranean Sea that bring rain and snow in the northern-western India in the winter season.

Natural Vegetation

The grasses, shrubs, bushes and trees which grow on their own without the help from human beings are called natural vegetation. Varied climatic conditions, especially a varied relief, temperature and unequal distribution of rainfall result in wide range of natural vegetation. It is estimated that India has over 49,000 different plant species. This



number is 7% of the total world flora. Among them 5000 plant species are those, only found in India. For a balanced ecological and economic development, it is important that a country should have at least 33% of its land under forests. At present, only 20.63% of India's land is under forest cover. Chief vegetation type of India can be classified into tropical rain forests, tropical deciduous forests, thorny bushes, mangrove forests and mountain vegetation.


Tropical Rain Forests: They are also called tropical evergreen forests for the type of trees that grow in these forests. They are called **evergreen** because all the trees do not shed their leaves in any particular season. Instead different kinds of trees shed their leaves at different times of the year. Therefore, the forests as a whole always, appear green. These trees require a rainfall of above 200 cms annually and high temperature throughout the year. These forests are **so dense** that sunlight does not reach the ground. The trees are very tall (upto 60m). Four or five layers of canopy of trees are easily visible (Fig. 8.4). The trees are mostly of hardwood. Many species of trees grow together. Important trees found in these forests are *ebony, rosewood and mahogany* which are used for high quality furniture. These forests are found on western slope of the Western Ghats, parts of North-Eastern states (hills of Assam and Meghalaya, parts of West Bengal, Orissa) and Andaman and Nicobar Islands.

Tropical Deciduous Forests : They are called deciduous because to conserve moisture the trees shed their leaves at a particular time of the year. In the beginning of summer the leaves are shed to conserve moisture for 6 to 8 weeks. These forests grow in rainfall region of 100 cm to 200 cm. They are also called **monsoon forests**. They are **less dense**. They form the main vegetation type of India.

Important trees of these forests are *sal, teak, peepal, neem* and *shisham*. They are found in Uttar Pradesh, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Orissa and in parts of Maharashtra. These forests are important for their hard wood.

Thorny Forests: The leaves of thorny bushes are in the form of spines to reduce the loss of water. Thorny bushes have the capacity to conserve moisture because of **waxy leaves**. The animals do not harm these bushes because of thorns. They are adapted to lack of rain as they have deep and radial roots and **small leaves**. They grow in the area with 25 to 75 cm of rainfall and high temperature. Cactus, khair, babool, keekar are important thorny bushes found in the States of Rajasthan, Gujarat, Punjab, Haryana and Eastern slopes of Western Ghats.

Mangrove Forests : They are named after the Sundari (Mangrove) trees found growing in abundance in these forests. The Sundari trees survive in both salt water and fresh water. These trees have stilt roots which can breathe at high tide. They are also called **Tial Forests**. They are found mainly in Sunderbans delta of Ganga and Brahmaputra in West Bengal and in the Andaman and Nicobar Islands. These are areas of



over 200 cm rain that are flooded with salty sea water. Also found in the deltas of Godavari, Krishna and Kaveri.

Mountain Forests : A wide range of plant species is found in the mountains according to the variation in height. Temperature and rainfall varies with altitude above sea level. With increase in height, the temperature falls. Tropical deciduous forests are found upto 500m altitude (bamboo and sal). Mixed hill forests or Temperate deciduous forests grow upto 1500 m (chir, oak and chestnut trees). These are of evergreen type. Coniferous forests grow 1500 m to 3300 m (pine, deodar, cedar, fir, spruce). These are called coniferous as the trees are conical in shape. Above 3300 metres there are meadows of alpine grasses and above that moss and lichens could be found. Beyond this belt is the ice-line or snow-line, the area which is always under ice and snow (beyond 4200 m).

Importance of Forests

Forests are important to mankind in the following ways :

1. Forests turn carbon dioxide into oxygen which is the controller of all life activities inside our body.
2. Forests induce rainfall and help to charge up the ground water.
3. The roots of plants and trees hold the soil, so the forests check soil erosion and floods especially in hilly areas.
4. Forests act as greatest gene pool or bank of life forms on Earth.
5. Forests provide us with timber for furniture, sports goods, fuel, wood, fodder, medicinal plants and herbs, lac, honey, gum, rubber, fruits, etc.
6. Forests are the natural habitat of wildlife.

Forests have been and are being cut recklessly for wood and clearing the land for cultivation. We should make people aware of the importance of trees and involve more people in making our Earth green by programmes like Van Mahotsav. We should plant more trees and protect the existing ones.

Wildlife

Wildlife are the animals, birds, insects, etc. that live in their natural habitat. Forests are the natural habitat of a variety of wildlife—reptiles, amphibians, mammals, birds, insects and worms. There are eighty thousand species of wild animals distributed over the country according to variation of vegetation. Mammals, like elephants, are found in the forests of Kerala, Karnataka, Tamil Nadu and in Assam. The world famous Indian lion is found in Gir forests of Gujarat. Tiger is our National Animal. The Sunderbans of West Bengal is famous for the tigers. The one-horned rhinoceroses are found in the marshy lands of Brahmaputra valley in Assam. Camels and wild asses are found in the Great Indian Desert and the Rann of Kutchh respectively. Wild goats,

snow leopards, bears, etc. are found in the Himalayan region. India has many different varieties of antelopes like the black buck. Many other animals are found in our country such as monkeys, wolves, jackals, *nilgai*, *cheetals* etc.

There are several hundreds of species of snakes found in India. Cobras and Kraits are important among them.

Common birds are peacocks, parrots, pigeons, mynah, geese, bulbul and ducks. The peacock is our National Bird. There are more than a thousand species of birds in India.

Forest and Wildlife Conservation in India

Because of reckless cutting of forests and hunting for meat and pleasure many species of wildlife of India have become extinct and many are endangered. In order to protect wildlife many national parks, sanctuaries and biosphere reserves have been set up. The Government has also started Project Tiger and Project Elephant to protect these animals. No one can hunt Tiger and Elephant in the specified areas.

Fact File

Cultivation, grazing and collection of minor forest products are permitted in a sanctuary but not in a national park. Hunting is strictly prohibited in both type of areas. Biosphere reserve is concerned with the conservation of all forms of life, plants and animals in their natural form (no biotic interference).



Wildlife of India

Every year we observe wildlife week in the first week of October, to create awareness of conserving the habitats of the animal kingdom. If you refuse to use things made of bones, horns, furs, feathers and skins of animals, you will help in their conservation.

There are about 89 national parks, 492 sanctuaries and 14 biosphere reserves in India.

Key Words

- » Climate : average of atmospheric conditions of a place over many years.
- » Extreme climate : climate with much difference in temperatures of winter and summer.
- » Equable climate : climate with little difference in temperatures of winter and summer.
- » Monsoon : rain-bearing seasonal winds which blow from the Indian ocean.
- » Trade winds : the winds that continuously blow to and from the Equator.
- » Loo : hot winds blowing in north-west India during summers.
- » Tropical Rain forests : the trees of which do not shed their leaves in any particular season.
- » Tropical Deciduous forests : the trees of which shed their leaves during a particular season.
- » Ice-line : the height of the mountain always covered with ice and snow.
- » Wildlife : the animals, birds, insects living in their natural habitats.
- » Western disturbances : shallow cyclonic storms from the Mediterranean Sea and moving eastward.
- » Leeward side : the side of the mountain that does not face the wind.



SUMMARY

- ▶ Climate is somewhat regular or average pattern of atmospheric conditions of a place over many years (usually about 35 years).
- ▶ The four main seasons of India are (a) Cold Weather Season (b) Hot Weather Season (c) Advancing Monsoon Season (d) Retreating Monsoon Season.
- ▶ The south-west monsoons make rainfall in Kerala, Maharashtra, Madhya Pradesh and whole of Northern India.
- ▶ The south-east monsoon makes rainfall only in Orissa and South India.
- ▶ The western disturbance in winter causes rain and snowfall in north-west mountains, north Punjab, Haryana, parts of Uttar Pradesh and Bihar.
- ▶ The amount of rain in the rainy season decreases from south to north and east to west.
- ▶ Rainfall caused by monsoons is unequally distributed over the country and over the year.
- ▶ The climate of a place is affected by its location, altitude, distance from the sea, relief and surface winds.
- ▶ The grasses, shrubs, bushes and trees which grow on their own without the help from human beings are called natural vegetation.
- ▶ The trees of tropical rain forests do not shed their leaves in any particular season.
- ▶ The trees of tropical deciduous forests shed their leaves in a particular season before the start of long dry spell to save moisture.
- ▶ Forests are important as they provide oxygen, charge ground water, prevent soil erosion and floods and give a number of products.
- ▶ Several wildlife sanctuaries, national parks, project tiger areas and biosphere reserves have contributed towards wildlife conservation.

Exercise Time

A. Tick (✓) the only correct choice amongst the following :

1. The world's highest rainfall occurs in
 - a. Kerala
 - b. Mahabaleshwar
 - c. Asansol
 - d. Mawsynram
2. Wild goats and snow leopards are found in
 - a. Gir forests
 - b. Peninsular region
 - c. Himalayan region
 - d. Madhya Pradesh
3. Mangrove forests can survive in
 - a. Saline water
 - b. Mountains
 - c. Polluted water
 - d. Deserts
4. During the south-west monsoon the moisture laden winds blow from
 - a. sea to land
 - b. land to sea
 - c. plateaus to plains
 - d. plains to mountains
5. The monsoon retreats in the month of
 - a. June
 - b. May
 - c. October
 - d. January

B. Fill in the blanks :

1. The winters are very cold in _____ India.
2. The monsoon advances in the month of _____.
3. Tamil Nadu receives a great amount of rainfall during the season of _____.
4. Gir forest in Gujarat is the home of _____.
5. _____ are also called monsoon forests.



C. Match the following :

- | | |
|------------------|------------------------------------|
| 1. Mahabaleshwar | a. Gir forests |
| 2. Mawsynram | b. Western slopes of Western Ghats |
| 3. Lion | c. Sunderbans |
| 4. Elephant | d. Highest rainfall in the world |
| 5. Tiger | e. Kerala |

D. Write true (T) or False (F) against the following statements in given brackets :

- | | |
|--|--------------------------|
| 1. The monsoons do not influence our lifestyle. | <input type="checkbox"/> |
| 2. The temperature at a high place is lower than at a low-lying place. | <input type="checkbox"/> |
| 3. The mangrove trees can survive in both fresh and saline water. | <input type="checkbox"/> |
| 4. One can hunt animals in a national park or wildlife sanctuary. | <input type="checkbox"/> |
| 5. The wide variety of vegetation in India is due to wide variety in rainfall and temperature. | <input type="checkbox"/> |

E. Define the following terms :

- | | | | | |
|------------|-----------|------------|------------|-------------|
| 1. Weather | 2. Season | 3. Climate | 4. Monsoon | 5. Wildlife |
|------------|-----------|------------|------------|-------------|

F. Answer in one word or one phrase :

1. Name the different seasons in India.
2. When does Chennai receive highest rainfall of the year ?
3. Name the area which receives the highest rainfall in the world.
4. Which things make the thorn bushes to have the capacity to conserve moisture ?
5. Where are tropical rain forests found ? Name one area.

G. Answer these questions briefly :

1. Which winds bring rainfall in India ? Why is it so important ?
2. What is natural vegetation ? Name the different types of vegetation found in India?
3. Why is tropical rainforest also called evergreen forest ?
4. In what way is Himalayan barrier beneficial to India ?
5. Name the climatic seasons of India and their months.

H. Answer these questions in detail :

1. How are monsoon rains caused all over India ?
2. Describe the factors that influence the climate of India.
3. Describe the mountain forests of India.
4. Give an account of the wildlife of India.

PROJECT WORK

1. Make a list of trees, shrubs, bushes and plants in your surroundings. Paste leaves of important trees and plants on your scrap book and name them.
2. Name six birds and their distinctive features that you have seen.