

Like to know...

- River **Sindhu** is 2900 km long.
- In 1960, a Treaty was signed with Pakistan regarding the distribution of the water of Sindhu river.
- Accordingly, India can use only 20 % of its water.
- Irrigation has been possible in Punjab, Haryana and south-western parts of Rajasthan by harnessing the waters of Satluj, Ravi and Beas rivers.

Ganga River System : Rivers **Bhagirathi** and Alaknanda emerging from the **Gangotri** area in Himalayas, merge with each other near **Devprayag** (Uttarakhand). Ganga leaves the mountainous terrain and enters plains near **Haridwar**.

Many Himalayan rivers meet Ganga. Among them **Ghaghra**, **Gandak** and **Kosi** are major rivers. **Yamuna** emerges from **Yamnotri** in Himalayas. Flowing to the right side of Ganga, it merges with Ganga near **Allahabad**. The source of Ghaghra, Gandak and Kosi rivers lies in Nepal. Hence the northern plain experiences flood disasters every year. There is a heavy loss of lives and property in some areas, yet India has been able to attain prosperity in agriculture through the fertile plains formed by these rivers.

Few rivers like **Chambal**, **Betwa** originate in peninsular plateau and meet Yamuna. **Son** river meets Ganga. These rivers originate in semi - arid area, their flow length is shorter and have limited volume of water.

The combined flow of the rivers from north and south is divided ahead into two branches. One branch enters Bangladesh and is known there as **Padma**. Another branch is known as **Bhagirathi - Hugli** in west Bengal. Finally, these two branches meet the Bay of Bengal.

The flow of Ganga, which is known as **Padma** in Bangladesh, merges there with Brahmaputra river and their combined flow is called **Meghna**. The Ganga - Brahmaputra delta is the most fertile delta. and is known as **Sundarvan**.

Like to know...

- The delta region of Ganga is called '**Sundarvan**' because the trees known as 'sundari' grow in large number here.
- Sundarvan delta is more famous as mangrove forests.
- Total length of Ganga exceeds 2500 kilometres. Ambala City works as a water divide between Ganga and Sindhu rivers. Ambala to Sundarvan is about 1800 km, but the slope is very gentle. Ambala is at an altitude of 300 metres from sea level, while Sundarvan is at sea level. Considering this, the slope happens to be less than one metre for every 6 km so there are many meanders in this river.

Brahmaputra River System : River Brahmaputra originates near Mansarovar in Tibet. Its source is the near the place of origin of rivers Sindhu and Satluj. Most of its flow is outside India. This river flows in the east parallel to Himalayan Mountain System. Near Namcha Barwa, it takes 'u' shape turn and enters Arunachal Pradesh. Here it is known as Dihang. This river, with Lohit and Kenula tributaries, is collectively known as Brahmaputra in Assam.

Like to know...

- Brahmaputra is the only river having a masculine pronoun, and is about 2900 kilometres long.
- Brahmaputra is known as Tsang Po in Tibet and as Jamuna in Bangladesh.
- 'Mazuli', an island in Brahmaputra, is the largest riverine island in the world.

There is less of sedimentation in this river in Tibet. In India, the river passes through regions of heavy rainfall. So further down there is more of water mass as well as sediments. Many tributaries meet this river in Assam. Thus river Brahmaputra flows in a braided form.

Every year, there is a huge increase in its water as it overflows during rainy season. As a result, devastating floods often occur in Assam and Bangladesh. There is a contrast in this river compared to other rivers of North India. Due to heavy rains in Assam during monsoon, there is a huge deposition. The increasing level of sand in this river brings its bed higher. So there are frequent changes in the course of the river.

(2) Peninsular Rivers :

Western Ghats is considered to be the main water divide for peninsular rivers. Major rivers of the peninsula are Mahanadi, Godavari, Krishna, Kaveri etc. All these rivers flow eastwards and meet the Bay of Bengal. Many rivers flow to the west of Western Ghats. Large rivers like Narmada and Tapi flow from east to west and meet the Arabian Sea in the west.

Narmada Basin : Narmada originates near Amarkantak plateau in Madhya Pradesh. It flows westward in a rift valley. It flows through a rocky terrain of marbles near Jabalpur, and flows faster due to slope. The Dhuadhar Falls are located here.

Tributaries of this river do not have longer flow. Most of the rivers meet at right angles. Its basin area is spread over Madhya Pradesh and Gujarat. Narmada is about 1312 km long.

Tapi Basin : Satpuda ranges are located in Madhya Pradesh. Tapi river originates in Betul District. It flows in a rift valley, parallel to Narmada, and meets Arabian Sea. It has an extensive basin in Madhya Pradesh and Maharashtra.

Coastal plain between Arabian Sea and Western Ghats is very narrow. So the rivers have a shorter flow. Major rivers flowing westward have shorter course. Major rivers flowing westward are Sabarmati and Mahi (Mahisagar). Tapi is almost 724 km long.

Godavari Basin: This is the largest of the peninsular rivers. It starts from the slopes of western Ghats near Nasik in Maharashtra. It is about 1465 km long. It flows to the east and meets Bay of Bengal. It has the largest basin among the peninsular rivers. About 50 % of its basin lies in Maharashtra, and the rest is in Madhya Pradesh and Andhra Pradesh.

Many tributaries meet Godavari. Among them, Purna, Vardha, Pranhita, Manjara, Vainganga and Penganga are major rivers. Godavari has a longer flow and a large basin, so it is also known as Ganga of south.

Mahanadi Basin : Mahanadi originates in the mountainous area of Chhattisgarh. It flows through Odisha and meets Bay of Bengal. It is about 860 km long and has a basin spread in Chhattisgarh, Jharkhand and Odisha.

Krishna Basin : It originates near Mahabaleshwar in Maharashtra. It is about 1400 km long. Tungbhadra, Koyna, Ghatprabha, Musi and Bhima are her major tributaries. Its basin extends in Maharashtra, Karnataka and Andhra Pradesh.

Kaveri Basin : It has its origin in the Brahmagiri Range in Western Ghats and is about 760 km long. Amravati, Bhavani, Hemvati and Kalini are her major tributaries. Its basin extends in Kerala, Karnataka and Tamil Nadu. It meets the Bay of Bengal to the south of Cuddalore in Tamil Nadu.

There are other smaller rivers which flow eastwards and meet Bay of Bengal. These rivers include Damodar, Brahmani, Vaitarni and Suvarnarekha.

Like to know...

- Hydrosphere exists over about 71 % on the earth's surface.
- About 97 % of it is saline water.
- Only 3 % water is available as fresh water. One-fourth of its portion is in the form of ice.

Lakes

There are many lakes in India. Fresh water lakes are found more in the Himalayan region. Most of the lakes contain water during rainy season. In Kashmir, glacial lakes are formed. A few lakes are formed due to wind, rivers and human actions. In rivers having many meanders, ox-bow lakes are formed. Sea tides have created 'lagoon' lakes. Chilka, Kolleru and Pulicat are examples of this type of lakes. Sambhar lake in Rajasthan is a saline lake and salt is produced from it.

Himalaya has many fresh water lakes which are formed due to glacial action. Water was filled in the depressions which led to the formation of lakes. Beautiful lakes are formed here due to melting of snow. Wular Lake in Kashmir has a tectonic origin. Other fresh water lakes of this area are Dal, Bhimtal, Loktal and Badapani.

Importance of lakes : Lakes are useful to man in many ways. Some rivers have originated from lakes. In the regions which have more rain, more water can be accumulated in the lakes. The accumulated water can be utilised for irrigation and other purposes. The stored water can also be used during drought. Reservoirs and lakes formed due to dam are useful for generating hydel power. Few lakes enhance the natural beauty, hence such lakes have been developed as tourist spots. Lakes are also important for fishery and as tourist resorts.

Economic importance of rivers

Rivers have remained most important during human history. Rivers are the natural resource of water. These are very much important for many human activities. It has satisfied basic need of man. Agriculture and industries have developed due to rivers. Ancient civilizations also flourished along rivers. Major cities have developed along the river banks, e.g. Delhi, Kolkata, Ahmedabad, Bharuch, Surat etc.

River is considered to be the base for an agrarian country like India. In recent times, river water is utilised for drinking, irrigation, hydel power and for navigation.

River – pollution

River water is used more in domestic activities, agriculture and in industrial production. We know the rivers as 'Lokmata', consider it to be very holy, and yet we release industrial effluents in the rivers. The sewage water is dumped into the river near the city. Besides, we also throw solid waste in the river. As a result, the river water is polluted. Thus, water pollution increases due to industrialization and urbanization. Pollution of river water has become our national problem. Government is putting in special efforts to prevent river pollution. At this stage, public participation is equally expected along with the government's efforts.

Measures to prevent water pollution

Rules to prevent water pollution should be implemented very strictly. Water purification projects must be implemented through National River Conservation Project. Strict rules should be formed to prevent industrial units from releasing industrial effluents in the rivers. Industrial units should filter harmful contents from the chemical effluents before releasing them in the river. In order to keep the river water clean, every citizen should take care not to mix up the domestic waste into the river.

Like to know...

- NCRP (National River Conservation Project)
- National River Conservation Project was introduced at the second stage of Ganga River Purification.

Self study

1. Write short answers for the following questions :

- (1) Give difference : Himalayan rivers – Peninsular rivers
- (2) Explain : Drainage Pattern and Water Divide
- (3) Explain the utility of lakes
- (4) State the remedies to prevent water pollution.
- (5) ‘Godavari is named as Ganga of South’ – Give reasons.

2. Answers the following :

- (1) Explain the Ganga River System.
- (2) Discuss the Narmada basin.
- (3) Describe in detail the Krishna and Kaveri basins.

3. Find out the correct option from the given options :

- (1) Which lakes are formed due to meandering of rivers ?
(A) Lagoon (B) Ox-bow (C) Oval-shape (D) square
- (2) What is it called when a mountain or an upland separates the water flow of rivers from one another ?
(A) water formation (B) Water divide (C) River system (D) Basin
- (3) Which of the following is not a peninsular river ?
(A) Godavari (B) Krishna (C) Kosi (D) Kaveri
- (4) Which of the following lakes is used for producing salt ?
(A) Dhebar (B) Sambhar (C) Wuler (D) Nal
- (5) Which are the main tributaries of Ganga ?
(A) Yamuna, Ghaghra, Gandak and Kosi (B) Yamuna, Chambal, Ghaghra and Kosi
(C) Yamuna, Ghaghra, Sharavati and Kosi (D) Narmada, Ghaghra, Gandak and Kosi

Activities

- Prepare charts about the rivers and the multi-purpose projects.



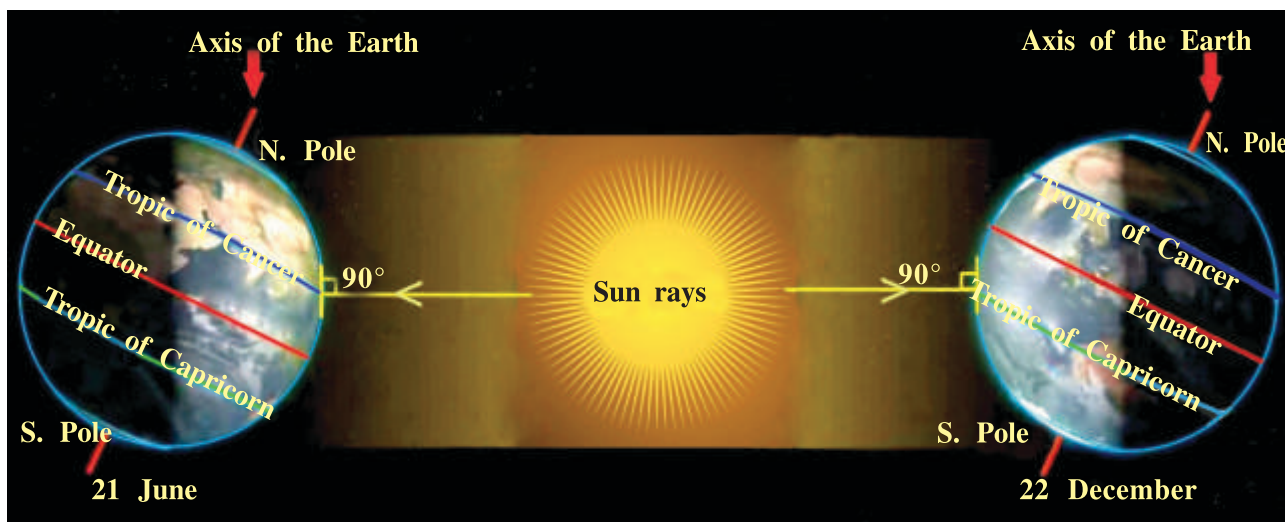
Climate is an average of atmospheric conditions over a long period. Generally, climate is determined from the average weather conditions of summer, winter and rainy season of a place for about 35 years or more. In short, climate is an average of long term atmospheric conditions.

Weather is an average of short term conditions of atmosphere. Weather can change at any time during a day. Change in weather conditions depends on air temperature, air pressure, humidity, rain, fog or amount of clouds etc. Weather affects our daily agricultural activities. Indian Meteorological Department publishes a daily weather map and a Report of the entire nation.

India shows a large diversity and characteristics in climatic conditions. Seasons change in some parts of the earth according to the wind direction. So the winds which change their direction according to the season are called 'Monsoon winds'. These winds are so named after the Arabic word '**Mausim**'. India, Sri Lanka, Bangladesh, Pakistan and Myanmar are Asian countries which experience monsoon climate.

Seasonal changes

Revolution of the earth around the sun and her axial tilt are major reasons for changes in seasons. The axis of the earth is tilted at 23.5° and makes an angle of 66.5° with the orbit. Seasons are caused due to the axial tilt. Regions receiving more sun light experience summer while regions receiving less sun light experience winter. Sun rays fall vertically over Tropic of Capricorn on 22nd December, so the southern hemisphere experiences summer and the northern hemisphere experiences winter. Nights in India are longer and colder in winter. Similarly, the sun rays are vertical over Tropic of Cancer on 21st June, so the days are longer.



16.1 Changing Seasons

Rotation and revolution of the earth have a direct impact on the food, clothing and residences of man. In monsoonal countries like India, the winter and summer monsoon winds which change direction according to the season, affect the seasonal weather, and give peculiar characteristics to the weather of every season. That is why the climate is called 'monsoonal climate'.

Variations in the climates of India

There are many variations in the climate of India. South India has a peninsular shape, hence it experiences moderate maritime climate, while the climate becomes more continental while going away from the sea shore. A large part of North India is away from the sea coast so it experiences continental climate. The Tropic of Cancer passes almost through middle of

India. Area to the south of it falls in torrid zone while the area to the north of it is in temperate zone. As a result, there is a large difference in the temperature and rainfall in different parts of the country, e.g. the temperature in Leh and Dras in north in Kashmir is as low as -45°C during winter. Sri Ganganagar and Alwar in Rajasthan record 51°C high temperature during summer. Similarly, Cherrapunji in Meghalaya in East India gets about 1200 cm rainfall annually which is maximum in the world. Mawsinram, about 16 km away from Cherrapunji, is famous for receiving maximum rainfall during twenty four hours. In the west, the deserts of Rajasthan receive only 10 to 12 cm rainfall annually. Contradicting climatic conditions are seen in our country when one region has devastating floods while the other faces drought due to intense heat and scanty or absence of rainfall. Some regions face devastating effects of thunderstorms, sandstorms and tropical cyclones. Thus seasonal weather has diversified effects.

Factors affecting the climate

There are some factors on the surface of the earth which control the distribution and amount of elements of climate. These are called climatic factors. Following factors affect the climate of India.

Latitude : Climatic type on the surface of the earth changes according to the latitude of the place concerned. There is a distance of about 111 kilometres between two successive latitudes. Sun rays fall vertically over equatorial region hence it is very hot throughout the year. India is divided into two zones of different climatic conditions, viz. torrid zone and temperate zone .

Distance from sea : The distance of landmass from sea is another important factor affecting the climate. Water and land have different capacity to conserve and release the solar heat. As a result, coastal regions experience temperate climate, while the climate becomes continental in the interior places away from sea coast. The climate of Mumbai in India is temperate as it is near the sea coast, while it is continental at Nagpur or Delhi as these places are far away from sea.

Altitude : As we go higher in the atmosphere from sea level , air pressure and air temperature decrease, while higher relief gets more rain. Due to the high altitude, the Himalayan peaks remain snow covered throughout the year. Moist air cools down when it rises and gives rain. With increasing altitude of the mountains in Meghalaya, the rainfall increases. In general, air temperature decreases @ 1°C for the ascent of 165 metres or by 6.5°C for an ascent of every 1000 metres from the surface of the earth.

Atmospheric pressure and winds : India falls in the path of north- east trade winds. These winds originate due to tropical high pressure belt in northern hemisphere. These winds deflect due to coriolis force and blow towards equator. In past, these winds were utilised for oceanic trade, so these are called ‘Trade Winds’. As these winds blow over landmass, they contain less moisture. The Indian Ocean is located to the south of India, Arabian Sea lies to the west and bay of Bengal is in the east. Due to this vast water mass, the winds passing over them absorb moisture and bring rain in India.

During winter, high pressure develops to the north of Himalayas. Cold and dry winds from this region blow towards the oceanic area where low pressure is created. During summer, low pressure develops due to high temperature over central Asia and Indian landmass. At this time, high pressure prevails over Indian Ocean in south, so winds tend to blow from the high pressure over Indian Ocean to low pressure in North India. These winds are known as ‘South-West Monsoon Winds’. They contain moisture and bring rain in India.

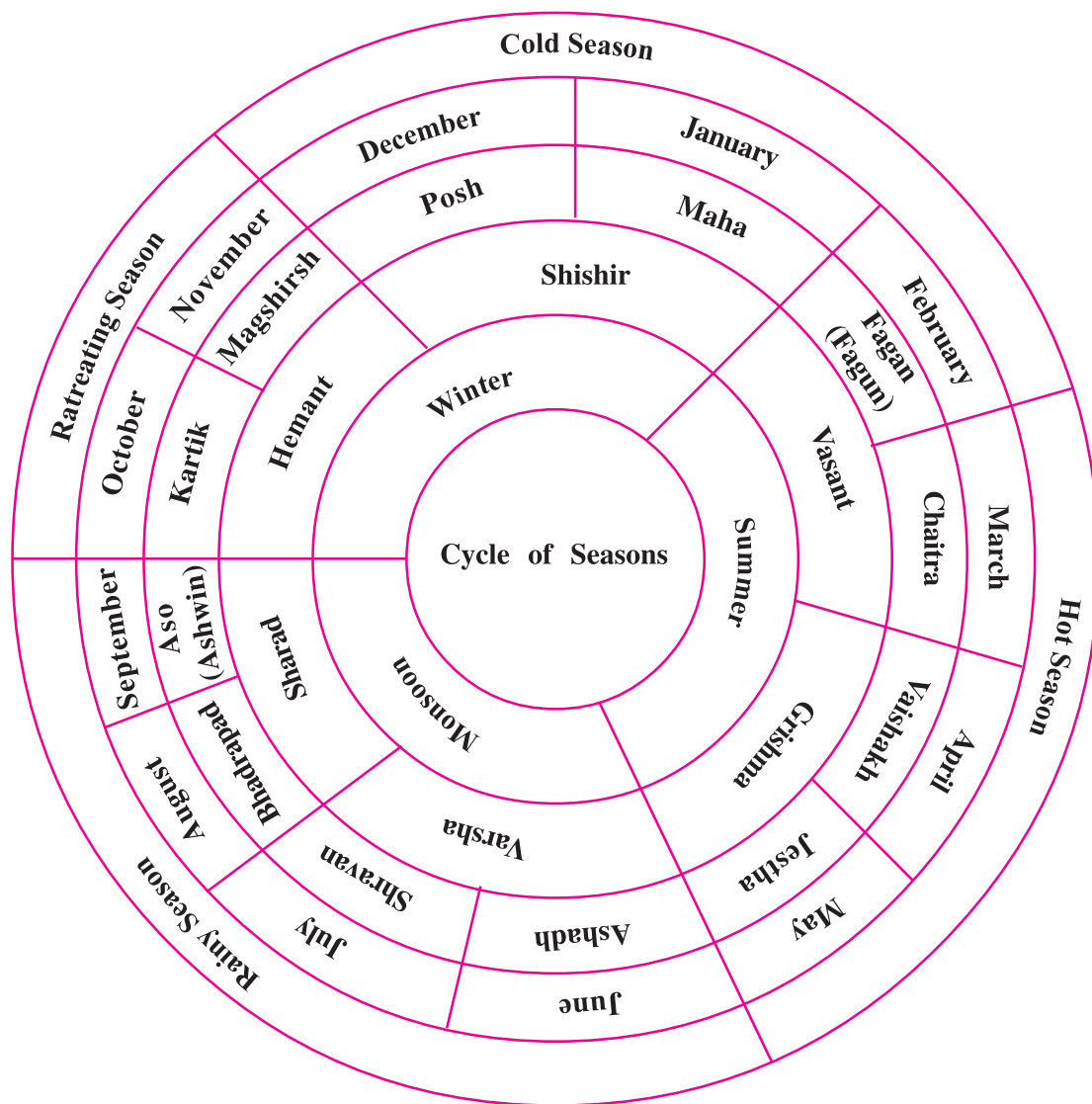
Sometimes a peculiar phenomena takes place over places located far from India which creates temporary changes in the long term climatic pattern. Phenomena like **Jet Stream, Western Disturbances, El- Nino, I.T.C.Z.** have affected the Indian weather to a great extent. However, the monsoonal characteristics of climate of India remain unaffected.

Seasons of India

Weather in our country remains almost the same for every two months. These two months duration is called 'season'. As per tradition, there are six seasons in India. These are : Hemant, Shishir, Vasant, Grishma, Varsha and Sharad. There is hardly any noticeable difference in the weather between two successive seasons. So if two seasons are taken simultaneously, then there would be only three seasons of the year : (1) Cold season (2) Hot season (3) Rainy season. Changes in seasons are experienced distinctly in India. Cold weather starts with the beginning of winter. Temperature gradually increases during summer. With the onset of monsoon, air gathers moisture and brings rain.

Indian Meteorological Department of Government of India at Delhi has divided the climate of India into four seasons :

- (1) Cold Weather season – Winter – December to February
- (2) Hot Weather season – Summer – March to May
- (3) Advancing Monsoon – Rainy season – June to September
- (4) Retreating Monsoon season – October to November



16.2 Seasons of India

Cold Weather season – Winter (December to February)

In India, the three months' duration from December to February is considered as winter. Sun shines vertically over the southern hemisphere between 22nd September to 21st March. India is situated in northern hemisphere, so it is under the influence of slant sun rays between December to February and low temperature prevails. Winds blow from north-east direction from Central Asia. These winds are dry and cold, so the weather also remains dry and cold. The sky during this season generally remains clear (cloudless).

North-East India remains comparatively cooler as it is far away from the sea and some part of it is a desert. During winter this region develops high pressure and this deflects the winds. Dry and cool winds are generated due to the high pressure. These winds reduce the temperature of the places over which they blow. In Delhi, temperature often goes below 10° c during winter and it remains around 16° c in Allahabad and 18° c in Kolkata. At this time the temperature in Himalayas is much less. The January temperature of Shimla, Darjeeling is around 5° c. After the snowfall in Himalayas, the cold and heavy winds rush towards the North Indian plains. As a result, this plain along with Gujarat and Rajasthan are under the grip of cold wave. Temperature decreases suddenly. Frost in some area destructs the cotton crop. Temperature does not fall below freezing point during winter except for the high mountainous regions, because the Central Himalayas obstruct the extremely cold winds coming from Central Asia and protects India from severe cold.

Like to know...

Let us know certain weather terms appearing frequently in the newspapers in India....

Jet Stream

In both hemispheres around 30° latitudes, very powerful winds in a pipe shaped belt blow with high speed in the atmosphere at an altitude of 8 to 15 km. These winds are known as 'Jet Streams'. Their average velocity is about 150 km/per hour and in the central part of this wind belt, their velocity is about 400 km. During winter these winds blow over the southern slopes of Himalayas and in summer, these are stationed over peninsular India. High altitude winds help to bring rain.

Western Disturbances

Jet Stream formed over West Asia blows towards east and affects West Asian countries, North-East India, Pakistan and Afghanistan. The dust storms accompanying these disturbances leave their effect up to Bangladesh. This often creates disturbances in the pleasant winter weather of North India. Very high mountains receive snowfall and the plains receive some rain which is useful to the Rabi crop. This may cause unseasonal rain, locally known as 'mavthu', in Gujarat which may damage crops.

Conditions in South India during winter are different from those in North India. South India is situated in torrid zone, near the equator and has a peninsular shape. Its inner area is not very far from sea coast. So this area does not feel severe cold as the Northern India during winter. There is no snowfall. Temperature also does not go down very low, e.g. the temperature at Kochi during January is around 26° C, Madurai is 25° C and Chennai is 24° C but the mountainous area in South India feel low temperature. Temperature decreases towards north. In India winter is considered to be very pleasant and healthy season. Due to longer and cooler nights, dew and fog are common in early morning. Day is shorter and night is longer. In winter, dry winds coming from over landmass generally do not bring rain, but North-East winds coming over from Bay of Bengal contain humidity. These winds give more rainfall over the Coromandel coast. North-east gets some rainfall due to the western disturbances and thunder storms. This rain is very useful for the Rabi crop in Punjab and Haryana. These winds give rain in Gujarat occasionally. This unseasonal rain in Gujarat is locally called 'mavthu'.

Like to know...

Let us know some frequently used words in the newspapers about Indian weather...

(El-Nino)

This is a Spanish word which literary means a 'small child'. The name was given by Peruvian fishermen after the child Jesus, because its impact is generally felt around Christmas. This warm current originates to the west of Peru along the Pacific coast in South America due to atmospheric and oceanic conditions. This current flows westwards and its impact is felt up to India. The El-Nino phenomena takes place occasionally. Whenever it takes place, changes occur in the duration of monsoon and amount of rainfall in India.

(ITCZ)

A large low pressure area develops over the equator where the Trade Winds converge. It is called Inter Tropical Convergence Zone (ITCZ). The Trade winds rise upwards in the form of air currents. In July this Convergence zone is stationed over 20° to 25° north latitude. In India, it is stable over Ganga plains. Due to the low pressure developed over this region, winds generated over the oceans in southern hemisphere blow towards this area, causing rain in few parts of North India. During colder season, the Convergence zone, shifts further south, so the winds change their direction to north-east.

Warm Weather season – summer (Grishma season)

In India the warm and dry season between March to May is called 'Summer'. During this period the sun rays fall vertically from south to north gradually and the landmass becomes warmer. Temperature increases continuously. The month of March is the hottest month in southern India. Temperature exceeds 40°C at many places. Central and North-East India experience maximum temperature during April and May. At some places, the temperature reaches around 45° C to 50° C. Thus, entire nation experiences very high temperature during summer. Due to the altitude of peninsula and the plateau, the summer in south India is little mild. Compared to North India, the temperature here remains low. While the temperature in Delhi and Allahabad is 34° C, it is 30° C at Madurai and 27° C at Bengaluru. Thus physical features and sea seem to have dominating effects on the temperature in south.

Like to know...

Norwester

The low pressure pocket over north and north-east India is spread up to Bihar due to which some parts of Odisha and Jharkhand become more hot occasionally. It is known as **Norwester**. These winds are known as '**kaal Baisakhi**' locally and cause much damage in eastern India.

Loo

In the arid regions of west and north-west India, sandstorms or thunderstorms are common. In summer, especially in May, very hot winds blow over North India which are known as 'Loo'. Due to the excessive heat many people and animals die.

During this season, tropical cyclones develop over Bay of Bengal and over Arabian Sea, advance towards coastal area and cause devastating effects over coastal regions. Most of the country experiences hot and dry weather during summer. Most of the places do not receive any rain in this season, but sometimes Malabar coast gets some rain which helps the mango crop. So it is called 'AmraVrushti'. This is useful to mango and coffee crops.

The Advancing Monsoon (Rainy season – June to September)

India is an agrarian country and so the rainy season is very important season for India. About 80 % of the rainfall country is received between June to September. Indian farmer is busy in farming from the beginning of the rainy season. South-West monsoon winds are responsible

for the rain in this season and the humid and cloudy weather. That is why this is also known as season of 'South-West Monsoon winds'. Almost entire India gets rainfall due to these winds.

By the end of May, a low pressure develops due to high temperature over India and Central Asia. At this time, Indian Ocean in the south develops high pressure, so winds blow towards northern low pressure pockets. The summer monsoon winds blow from the ocean towards India. As these winds are moisture laden, they bring rain.



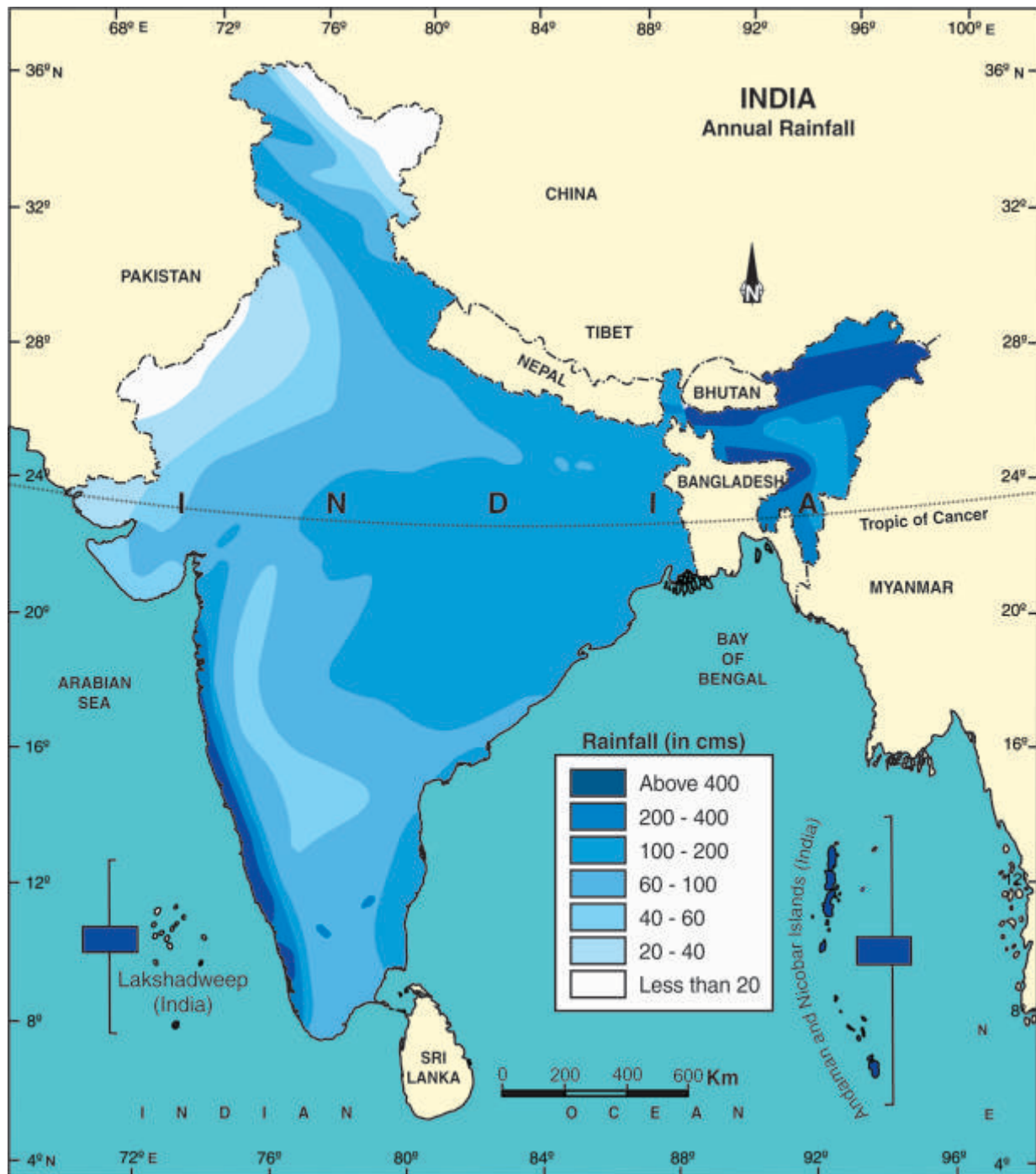
16.3 India : South-West Advancing Monsoon

Due to the peninsular shape of South India, the South-West monsoon winds are divided into two parts : (1) Arabian Sea Current, and (2) Bay of Bengal Current.

Arabian Sea Current

Generally the monsoon in India starts in the beginning of June at Kerala in South India. Western Ghats obstruct the south-west monsoon winds coming over from Arabian Sea. So the entire coast on western slopes of the Ghats receives heavy rain. When these winds cross Western Ghats and reach the peninsular plateau, most of its moisture is reduced. Hence this leeward region gets less rain. Mumbai gets more than 200 cm rain while Pune, which is little farther, gets about 75 cm rain.

Rain decreases northwards from Kerala to Karnataka, Goa and Maharashtra on western coast. One branch of this current enters Madhya Pradesh through the Narmada valley. This current further merges with the winds coming over from Bay of Bengal. One branch of this Arabian current passes over Gujarat, Saurashtra, and Kachchh and advances towards Rajasthan. There



16.4 India : Annual Rainfall

are no high mountains or dense forests in Gujarat, so there is less possibility of the condensation of their moisture in these winds. After giving rain in Gujarat, when these winds enter Rajasthan, they contain less moisture so Rajasthan gets less rain. Deserts get even less than 10 cm rainfall.

Bay of Bengal Current

Second branch of the south—west monsoon winds first enters West Bengal and then reaches up to Meghalaya. These winds contain maximum moisture which give heavy rain in Meghalaya. The slopes of Khasi, Garo and Jaintia hills receive heavy rainfall. Winds here deflect and blow from south-east. They cross over West Bengal, Bihar, Uttar Pradesh, Punjab and reach Haryana. Their moisture content decreases, so the regions which fall in its way first get more rainfall and gradually the last regions get less rainfall. Further, both these currents, coming from Arabian Sea and Bay of Bengal, merge giving good amount of rain in northern Himalayan region. Snowfall occurs there occasionally.

Along with the monsoon winds, cyclones originating over the Bay of Bengal and the Arabian Sea also enter India. Due to this, monsoon becomes more active in some area. During monsoon season, an average of five to six cyclones pass through India and help in bringing rainfall. India receives her rain through monsoon winds. But these winds do not blow throughout the year and from the same direction. The onset of these winds is also irregular. The phenomena of '**Rain Break**' is associated with the monsoon winds. The monsoon rain falls for many days, but there are few rainless days and again it is followed by a spell of rain. This phenomena is called Rain break. There is also a variation in the physical features in our country. All these factors affect the distribution of rainfall. These factors have made the amount and the distribution of rainfall unequal in India. Assam and Meghalaya receive very heavy rainfall while the deserts in Rajasthan and Leh in Kashmir receive insignificant rain.

Retreating Monsoon (October – November)

Duration between October and November is better known as Retreating Monsoon. The vertical sunrays gradually shift southwards and create low pressure over Indian Ocean in south. High pressure develops gradually over North India. By the end of September a fresh pressure system develops over Arabian Sea and Bay of Bengal which weakens the monsoon winds which have already reached the interior part of India. When the pressure conditions change afterwards, these winds start flowing back towards the sea during October – November. So this period is called season of '**Retreating Monsoon**'. At this time, a season of dry and cool winds starts instead of hot summer. Clear sky and increasing temperature are main characteristics of retreating monsoon winds. Soil contains moisture, day time temperature increases, night is cool and pleasant. Day time weather is very perplexing due to high temperature and humidity. This situation is known as '**October Heat**'. In Gujarat, it is locally known as '**Bhadarvi Taap**'.

Climate and Human Life

The climate of India is of monsoonal type. Irregularity and uncertainty are its characteristics which have a profound impact on climate and the food, life style, nature of people and agriculture. Besides being an agrarian country, India is under the total control of monsoon climate. So the impact of all the uncertainties of these monsoon winds is seen on the agriculture and human life in India. Following are the major impacts of climate on human life.

Due to high temperature during most of the year in India, a large variety of crops can be cultivated. But the uncertainty of rains has resulted into unpredictable production. Most of the rain falls between June and September. So where irrigation is not possible, only one crop can be taken depending on rainfall. The beginning as well as end of rainy season is uncertain, so many a

times, water is not available to crops at proper time. This delay causes destruction of seeds and crop production. Sometimes there is a heavy downpour of rain in shorter time. This also destroys crops. Rivers get flooded and cause soil erosion which in long term reduces crop production. When the rainy season is over, it creates employment problems for agricultural labourers. As the farming is not a year long work, many agricultural labourers migrate to cities. Due to irregular rain, some agro-based industries face problems as they do not get their raw material like cotton, sugarcane, tobacco etc. Problem of drinking water also becomes acute due to irregular rain. Life in desert or mountainous region becomes full of hardships, which directly affects people's food, clothing, occupation etc.

Like to know...

Indian Meteorological Department

The Indian Meteorological Department transmits the weather news of our country on radio, television and publishes them in newspapers as well as on websites. The Office was established in 1875 at Kolkata. Its main office was in Pune till 2005 and now it is shifted to New Delhi. Its other six regional offices are located at Chennai, Guwahati, Kolkata, Mumbai, Pune and Nagpur, and also in every state capital. IMD has established Observation stations from India up to Antarctica. A weather forecast is made based on the information collected from these stations.

Self study

1. Answer the following questions in brief :

- (1) Himalaya is a natural wall which protects India. How ?
- (2) Explain the 'Trade Winds'.
- (3) Into how many parts has the Indian Meteorological Department divided the seasons of India ? Which are they ?
- (4) Into how many branches are the North-West monsoon winds divided ? Which are they ?

2. Answer the following questions as directed :

- (1) What changes occur with the increase in altitude from sea level ?
- (2) What is meant by 'October Heat' ?
- (3) Over which regions do the monsoon winds coming over from the Bay of Bengal give rain ?
- (4) Which phenomena of far distant place affect the climate of India ?

3. Give a to-the-point answer of the following questions :

- (1) Due to which reasons does the phenomena of change in season occur ?
- (2) State briefly the factors affecting the climate.
- (3) Write notes on the cold weather season – winter – of India .
- (4) Describe the effects of climate on human life.

4. Select the correct option for the following questions and write its serial number in the given against them :

- (1) When the sunrays are vertical over the Tropic of Cancer in India, which season is experienced there ?
- (A) Cold season (B) Hot season
(C) Rainy season (D) Retreating monsoon
- (2) Which place near Cherrapunji is famous for heavy rains ?
- (A) Shillong (B) Guwahati (C) Imphal (D) Mawsynram
- (3) Which Himalayan phenomena affects more in creating cold wave over Gujarat and Rajasthan in winter ?
- (A) Snowfall (B) Sandstorm (C) Rainfall (D) Landslide
- (4) By which name are some showers along Malabar coast in May known as ?
- (A) Anarvarsha (B) Duststorms (C) Amravarsha (D) Snowfall
- (5) Which is the season of Retreating Monsoon in India ?
- (A) March – May (B) October – November
(C) January – February (D) July – August
- (6) Which of the following statements is true ?
- (A) Days are longer and nights are shorter in winter.
(B) Days are shorter and nights are longer in summer.
(C) Days are shorter and nights are longer in winter.
(D) Days are shorter and nights are longer in summer.

Activity

- Take a globe and try to understand the phenomena of changing seasons.
- Prepare a seasonwise chart of your food which you take during different seasons.
- Note the figures of temperature of different cities shown in news, and show them in the map of India.
- Discuss with your teacher as to why is there a small difference in the traditional six seasons of India every year with reference to English months ?
- Visit the website <http://www.imd.gov.in/> of Indian Meteorological Department and gather information about the maps of India.



Vegetation is an important part of human life. It is difficult to imagine life without vegetation. Its importance has been accepted by our ancient scriptures and by modern science.

India has a large diversity of natural vegetation. In terms of vegetation diversity, India holds tenth position in the world and fourth in Asia. A forest is a group of trees, and those trees which grow in natural condition without human help are called Forest.

Natural Vegetation

The diversity in natural vegetation of India is created due to the following reasons :

(1) Relief features (2) Soil (3) Temperature (4) Insolation (sunshine) (5) Rainfall (6) Humidity

Due to the diversified relief like mountains, plateaus, plains, deserts etc. a diverse pattern in vegetation is seen in India. There are different soils e.g. alluvial, black, mountain, desert type etc. in India. This variation in soils also creates differences in vegetation. The difference in temperature and humidity in cold Himalayan regions and in southern peninsular region also bring variations in vegetation. The insolation over any place depends on its latitude and altitude. Vegetation grows faster where there is more rain and insolation. Thus, there is a diversity in vegetation due to sunshine. Rainfall distribution in India is also unequal which in turn causes diversity in vegetation.

There are about 5000 varieties of trees in India, out of which 450 trees are useful commercially. Besides, about 15,000 flowering plants also grow which form about 6 % of the world. Non-flowering plants like fern, algae, moss etc. are also available in our country. India is famous since ancient times for the herbal plants. About 2000 medicinal plants are described in Ayurved. Thus it can be said that India has a diversity in vegetation.

Types of Natural Vegetation

Existence and growth of any vegetation depends on the climate of a region. In the regions of identical climate, the vegetation seen is mostly identical. Regions of such ecological similarities are called natural Vegetation Regions.

On the basis of altitude, soils, rainfall and differential temperature, the natural vegetation regions can be divided into five types :

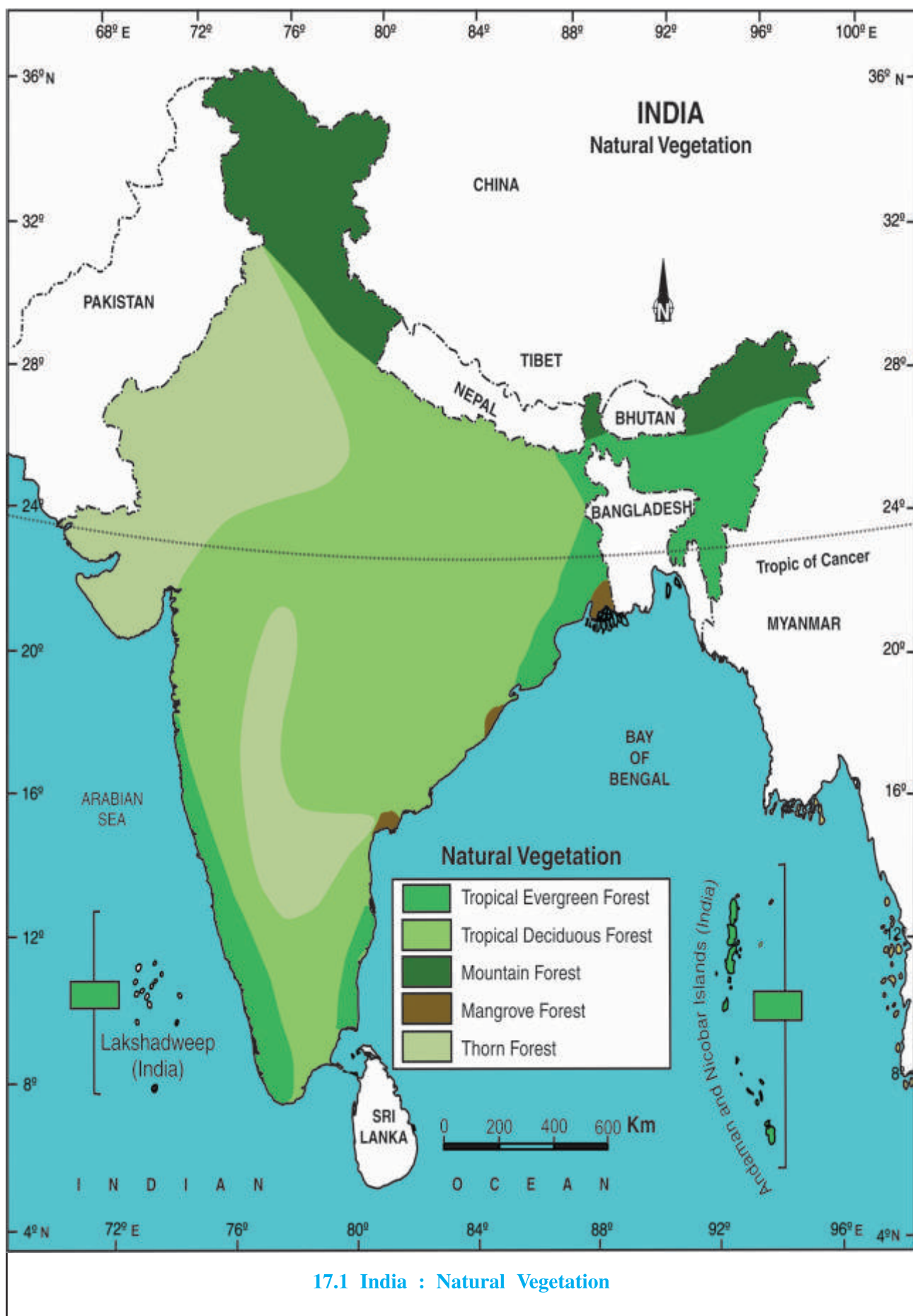
(1) Tropical Rain Forests (2) Tropical Deciduous Forests (3) Tropical Desert Vegetation
(4) Temperate Forests and Grasslands (5) Mangrove (Tidal) Forests.

(1) Tropical Rain Forests :

Distribution : Tropical Rain Forests are found in hot and humid regions where annual rainfall exceeds 200 cm and temperature is more than 22° C. Such forests are found in area of heavy rainfall of Western Ghats, Lakshadweep, Andaman – Nicobar Islands, upper regions of Assam, coastal Tamil Nadu.

Trees : Trees found here are Mahogany, Ebony, Rosewood, rubber etc.

Characteristics : Trees here are about 60 metres tall or even more. There is more humidity due to scrubs. There is no season here like autumn. As these trees are evergreen, the forests are also called Evergreen Forests.



(2) Tropical Deciduous Forests :

Distribution : Generally, such forests are found in the regions receiving about 70 to 200 cm rainfall. Such forests are found in North – Eastern States, Himalayan foothills. Western Odisha, Chhattisgarh, Jharkhand, eastern slopes of Eastern Ghats, Vindhya and Satpuda ranges. There is a large proportion of these forests in India.

Trees : Major trees found here are teak, saal, sesame, sandalwood, kher (acacia catechu) bamboo etc.

Characteristics : A major characteristic of the trees here is that the trees shed their leaves for 6 to 8 weeks during autumn. Every species has a different time to shed the leaves, so all the trees are never without leaves during any particular season. As these trees shed their leaves according to seasons, these are also called Monsoon forests.

(3) Tropical Desert Vegetation :

Distribution : Generally, such forests are found in the regions receiving less than 70 cm of rainfall. These are found in North-Western region, Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh etc.

Trees : Dates, jujube, acacia, cactus, khijdo etc. are common trees found here.

Characteristics : The roots of the trees and plants here are long, deep and widespread. Leaves are shorter which result in slower evapotranspiration process.

(4) Temperate Forests and Grasslands (Himalayan Vegetation) :

Vegetation on Himalayas

Height	Areal span	Forests	Trees
1000 to 2000 metres	High mountains of north-east, West Bengal and mountainous area of Uttarakhand	Tropical forests	Oak and chestnut
1500 to 3000 metres	Southern slopes of Himalayas, higher areas of south and North-East	Coniferous forests	Pine, saal, silver fir spruce
3600 metres and more	Higher altitude in Himalaya and near snow line	Alpine and short grass (Tundra vegetation)	Silver fir and birch

A major characteristic of the coniferous forests is that the trees have conical shape. Their branches lean towards the surface so that the snow would easily slide down towards the land. Tree leaves are long, pointed and sticky which can conserve humidity for longer time

(5) Tidal Forests (Mangroves) :

Distribution : Tidal forests are located in the delta regions of rivers along the coast. These forests are found along Gujarat coast and in the marshy lands along the Bay of Bengal coast.

Trees : Sundari and cher.

Forest products and their utility

Forests are useful to mankind in many ways. Timber wood from teak and saal is used for furniture making. Boats are prepared from the wood of sundari trees of Sundarvan. Sports goods and packing boxes are prepared from the wood of pine and chid trees. Turpentine is prepared from the liquid from chid trees. Sandalwood is used to prepare perfumed oil, cosmetics etc. Baskets, toys, goods of home decoration etc. are made from bamboo trees. Forests also provide lac (sealing wax), resin, gum, rubber, honey, cane etc. Amla (embellicmyrobalan), baheda, harde, ashvagandha etc. hold medicinal utility.

Medicinal Utility of Vegetation	
Vegetation	Medicinal Utility
Sarpagandha	In high blood pressure
Limdo	As bacterial resistant
Tulsi	Cold, cough and fever
ArjunSadam	Treatment for heart ailments
Bili	Gas and cough impurities
Galo	Diabetes, fever, joint pain
Harde	Constipation, hair diseases
Amla	Cures gas, acidity, digestive
Karanj	Skin and dental - gum diseases

Besides leaf plates from khakhro leaves, catechu from kher tree, bidi from timru leaves are also prepared. Forests provide livelihood and food to forest dwellers. This way, forests contribute into the social and economic development of mankind.

Environmental Importance of Forests :

The environmental importance of forests is as follows :

- Forests are useful to bring rain.
- They controls the atmosphere from becoming adverse.
- They provide life saving oxygen.
- Forests control the floods.
- They absorb harmful gases like carbon dioxide.
- Forests prevent soil erosion.
- Forests maintain ground water.
- Forests restrict the advancing deserts.
- Forests are useful in reducing air pollution.
- Forests enhance the natural beauty.
- Forests purify the air.
- Forests are ideal places for adventurous, tourism activities.
- Some forests are reserved with reference to National Parks and Sanctuaries and bio diversity.

Forest conservation

Ecosystem is formed due to the interrelation of biosphere and mankind. But due to the anti-environmental activities and selfishness of man, the ecosystem is disturbed. Man's insatiable

desire to procure land is responsible for the destruction of forests. Forests are destroyed also by increasing population, policy of establishing industrial units away from residential areas, urbanization, multi-purpose projects, construction of roads, jhoom cultivation, to get timber and fuel wood, forest fire etc. Ecological balance is disrupted due to the destruction of forests.

Adverse effects are noticed due to forest destruction. These include decrease in rainfall, drought, global warming, green house effects, advancing deserts, homelessness of wild animals etc.

According to the National Policy of 1952, there must be forests over 33 % of the total geographical area of the nation. In India, forests are spread over about 23 % area while forests occupy only about 10 % of land in Gujarat. Thus, it is necessary to prevent destruction of forests, and so protection and conservation of forests is necessary.

Like to know ...

In Gujarat, white khakhro, gugal, nilsoti, sesame, amli, attak, harde etc. are placed in Red data Book of I.U.C.N. (International Union for Conservation of Nature) in 'on verge of extinction' category.

Remedies to conserve forests :

In order to protect and conserve forests, The Government of India implemented a National Forest Policy in 1952. In 1980, the parliament passed Legislative Act and in 1988 a new National Policy was announced. Following steps should be taken to preserve forests.

- (1) Forests are our nation's resource. Take it as our moral duty to protect them.
- (2) Tree felling should be stopped. Heavy punishment must be inflicted to those who cut trees illegally.
- (3) To increase public participation in Van Mahotsav and Social Forestry, trees must be planted on either sides of waste land, river, railway tracks and roads and raise them.
- (4) Create awareness about environment through environmental education and school syllabus, celebrate environment related days.

Like to know...

Environment related days

21 March	-	World Forest Day
22 April	-	Earth Day
5 June	-	World Environment Day
July (month)	-	Van Mahotsav
16 September	-	World Ozone Day

- (5) Take precautions to avoid forest fire, and in case of fire it must be doused immediately.
- (6) Use renewable energy resources such as solar energy, bio energy, wind energy etc. in place of traditional resources like wood used to get energy.
- (7) Explain the importance of forests to people through broadcasting media, and bring public awareness about it.

Like to know...

- The year 2011 was declared as “**World Forest Year**” in order to bring global awareness.
- Social Forestry means to manage forests to help environment, society and rural development, to conserve forests and plant trees.
- F.R.I.(Forest Research Institute) undertakes forest related research.

Self study

1. Answer the following questions in brief :

- (1) Why a diversity of vegetation is seen in India ?
- (2) What is the environmental importance of forests ?
- (3) What are the reasons for forest destruction ?
- (4) What are the effects of forest destruction ?
- (5) “Tropical Forests are also called Evergreen Forests” – Give reasons.

2. Answer the following questions in details :

- (1) State the types of forests in India.
- (2) Write about the utility of forests.
- (3) Elaborate the remedies for forest conservation.

3. Select a correct option for the following questions and write answer :

- (1) Which place does India hold in world with respect to vegetation diversity ?
(A) First (B) Fourth (C) Tenth (D) Fifth
- (2) Which of the following statement is incorrect ?
(A) Tidal forest is located in Ganga delta.
(B) Turpentine is prepared from liquid of chid tree.
(C) Sundari wood is used to prepare boats.
(D) Thorny bush occur in mountainous area of Himalayan.
- (3) Join the pairs :

A

- (A) Tropical Rain forests
- (B) Tropical Desert Vegetation
- (C) Tidal Forests
- (D) Coniferous Forests

- (A) A-3 B-4 C-1
- (B) A-4 B-3 C-1
- (C) A-4 B-3 C-2
- (D) A-4 B-2 C-3

B

- 1. Cher
- 2. Pine
- 3. Acacia
- 4. Mahogany

- (4) What is prepared out of the liquid of chid ?
(A) Catechu (B) Turpentine (C) Lac (D) Gum

Activity

- Collect photographs of different vegetation and prepare a bulletin explaining its utility.
- Celebrate Van Mahotsav in the school. Let the students plant the trees and name the trees after them.
- On students' birthday, make them take an oath, plant a sapling and encourage them to rear it.
- Arrange drawing, essay and elocution competitions about forest protection and conservation.
- Visit a Van Chetna Kendra located near your village / town.

India has a diversified relief and climate. Similar diversity is seen here in the wild life. In the entire world, about 15 lakh species of wild life are recorded of which 81,251 species are found in India. These include reptiles, mammals, fish and other insects. Explorations continue to identify other animals found in different forests. India is at sixth position among the countries rich in bio-diversity.

India has less forest cover. Compared to that its wild life diversity is noticeable.

Zoo – Geographic Regions of India

Natural vegetation Regions have been devised on the basis of their characteristics. Similarly, a spatial distribution can be made for animals. The wild life of India is divided into 9 zones according to the similarities in their characteristics and their existence in any region : These are as follows :

(1) Himalayas (2) Ladakh and dry cold area (3) Forest cover in lower Himalayas (4) High lands without forest cover in Upper Himalayas (5) Northern Plain (6) Desert of Rajasthan (7) Peninsular Plateau (8) Sea coast and (9) Nilgiri Hills

Bio – diversity is studied according to these Zoo – Geographical regions.

The diversified Wild Life of India

The vast alluvial plains of rivers, peninsular plateau, mountainous regions, swampy areas, sea coasts, dense rain forests, deciduous forests, coniferous forests in Himalayas and other higher regions form a vast background for the habitation of wild life in India. The animals seen are Asian elephant in peninsular rain forests, one horned rhino in swampy Brahmaputra river, snow leopards in higher Himalayas, wild goats and musk deer in Jammu – Kashmir, wild buffalo (Indian Bison), tiger in Central India and West Bengal, Ghudkhar (wild ass) in Little Rann of Kachchh and flamingo in water logged Greater Rann. Presence of Great Indian Bustard in the grassland area is noted again. In the water logged area, migratory birds from cold regions come down in great number. These include Siberian crane, pelican, Tibetan duck, kunj, karkara etc. Flying squirrels are seen in the dense forests of Western Ghats. Nicobar dove is a rare bird seen in Nicobar island. Rare species of corals are seen in the Gulf of Kachchh and Lakshadweep Islands. Along with mammals and many types of birds, notice should be taken of king cobra, snakes, python, iguana (patlagho) also. Along sea coasts and other water bodies, various fishes, sea snakes, dolphin, shark, dugong (sea cow), octopus, whale etc. form a part of animal world.

Besides forests, animals like fox, wolf, nilgai, deer, mongoose, rabbits, wild hog, hedgehog are seen in agricultural areas. Many birds such as nightingale, parrot, peacock, weaver bird, chibari, pilak, vulture, kabar, dhor bagla etc. are also seen roaming in these areas.

Like to know...

- Crane is the largest bird seen in India.
- Fulsunghano is the smallest bird seen in India.
- Birdwing is the largest butterfly seen in South India.
- Sirasjevel is the smallest butterfly seen in India.

Wild Life and the need for conservation

While going through the past, it becomes evident that there is a danger to the existence of the wild life since last few decades. Before one hundred years thousands of tigers were seen in India. As per the figures of 2014 given by Forest and Environment Ministry, the figure is 2226. Tigers have grown in numbers which is evident from the imprints of their foot taken during last few years. This is a good sign. Vultures are on verge of becoming extinct due to eating the meat which becomes polluted by diclofenac drug used in the treatment of sick milch cattle. Leopards, seen in the forests in the beginning of twentieth century have become extinct from India. Once the Asiatic Lions of Gir which were seen even upto middle east, are now restricted to Gir forests only. With due steps taken for their protection, now their number is 523. Once cranes were seen in large number in Gujarat, but now their number is reduced. Wild life is an inseparable part of the living organisms, but the decrease in their numbers somewhere and for some years reduces the quality of environment, which is a matter of concern. Shyam Garud (eagle), a resident of mountainous forests in Gujarat is now rarely seen. Chiloptero, seen in the forests of Vijaynagar taluka, is rarely seen to-day.

It is obvious that endless human greed and the run for progress, have made environment imbalanced which would bring adverse results. Still there is time. If proper action is not taken then the next generation would see the wild life only in pictures.

Important National Parks and Sanctuaries of India.

Sr. No.	National Park	Sanctuary
1.	Kaziranga (Assam)	Rhino, wild buffalo, deer
2.	Thar Desert (Rajasthan)	Desert wolf, desert cat, bustard
3.	Kanha (Madhya Pradesh)	Tiger, antelope
4.	Gir National Park (Gujarat)	Lion, leopard, chittal
5.	Velavadar Kaliar National Park (Gujarat)	Black buck, wolf, peacock
6.	Kevladev (Bharatpur – Rajasthan)	Birds (migratory and local)
7.	Bandipur (Karnataka)	Elephant, bear, hog, wild cat
8.	Dachigam (Kashmir)	Hamur (Kashmiri deer), musk deer
9.	Corbett (Himalayan foothills)	Tiger, elephant, leopard, deer



18.1 India : National Parks and Sanctuaries

Dangers to Wild Life

A question mark has been put against the existence of entire wild life due to the human greed and development in recent times. On examining the reasons, it is understood that the wild life has become unprotected as they have lost their natural habitat due to continuously decreasing forests. Hunting, carried out to get skin, meat, teeth, hair and bones, is a big problem. Due to heavy grazing by domestic animals in the forests, herbivores are deprived of their food which results in decrease in their numbers. It will deprive carnivores of getting their food. So these carnivores reach human settlements in search of food and attack animals. As they approach human settlements, situation of conflict arises between wild animals and human settlements. This conflict leads the destruction of wild life. Besides, their effects on pollution is also very adverse due to human activities.

Like to know...

- There is a sharp decrease in the number of domestic sparrows.
- Lion is the State Animal and flamingo is State Bird of Gujarat.
- Asiatic Lion, Ghudkhar (wild ass) and Patti lizard are found only in Gujarat in India.
- Wild buffalo (Indian bison), elephant, cheetah, large Indian squirrel, tiger etc. have become extinct in Gujarat.
- Desert Sanctuary of Kachchh has the largest area among the sanctuaries in Gujarat.
- Porbandar Bird Sanctuary is the smallest sanctuary in Gujarat.

Due to the decrease in the forest area, the wild animals occasionally come within the human habitation. Human interference in areas of wild animal results into clashes with them. In such incidences, wild animals become victim of human rage and lose their lives. In South and South-Eastern India, elephants coming to search for food create havoc in the agricultural fields. Incidences of injuring or killing men by leopards take place in Saurashtra and South Gujarat and by wolf in the forests of north-eastern Gujarat. A precaution is necessary to prevent such disasters.

Remedies to conserve Wild Life

A long term planning is necessary to conserve and increase forest areas. We shall have to be more dedicated to implement strong legal provisions and their strict implementation for the conservation of forest areas and wild animals. Various social NGOs should give this a top priority and arrange public awareness programmes. These problems should be included in the school syllabus and make the future citizens aware. Before implementing any developmental project, its probable effects on environment and living organisms should be examined. Cutting of large trees outside the forests area should be stopped, because the hollow space within them and their branches are nesting place for birds. Ponds, farm ponds and wetlands, which are necessary for migratory birds and for those which are habited near any water body, should be protected. An active work is urgently needed to reduce pollution. To manage the forest fire an anticipatory planning should be made for patrolling and safety.

Steps taken to nurture the Wild Life

Since early times, laws have been framed in our country to protect the wild life. Laws were framed to protect wild life in the time of great Maurya King Ashok. Fundamental Duties of citizens and Directive Principles in the constitution also include these things. Parliament has passed a Wild Life Conservation Act according to the recommendations of Indian Wild Life Board. In 2014, there were 503 Sanctuaries, 102 National Parks and 14 bio – reserves. Of these, 22 sanctuaries, 4 national parks and 1 bio reserve zone happen to be in Gujarat. Some protection schemes are planned for those species which are on verge of extinction. Let us know about some of these projects.

Project Tiger : This Project was launched in 1973 against hunting and decreasing number of tigers. This was implemented for 9 reserved areas, under which now 48 areas are covered.

Lion Project : There was a time when Asiatic Lions were found up to Iran in the Asian subcontinent. Due to hunting and the reduction in forest area, these lions are now restricted to Gir forests of Saurashtra Peninsula. At one stage, their number had gone below 100. In 1972, a project was started in Gir to protect the Asiatic Lions. As a result of this Project and the timely taken steps, there are now 523 lions according to the Lion Census held in 2015.

In addition to this, there are other projects also. Major projects among them are **Hangool Project** for the rare species of Barasingha deer in Kashmir, **Crocodile Project** for saline water crocodiles, **Rhino Project** for the protection of Indian Rhino and **Snow Leopard Project**.

Wild life conservation is possible only if the society and the Government show firm determination to take steps in right direction. Along with the development, we shall have to be dedicated to confirm our motto of environment preservation.

Like to know...

National Parks of Gujarat

Sr. No.	National Park	Established	Area	District	Major animals
1.	Gir Nation Park	1975	258.71 Sq. km	Junagadh	Lion, leopard, chittal, hyena, antelope, chinkara, crocodile
2.	Black Buck National Park	1976	34.08 Sq. km	Bhavnagar	Black buck, wolf, khadmor, bustard
3.	Vansda National Park	1979	23.99 Sq. km	Navsari	Leopard, hyena, chittal, chausinga
4.	Marine National Park	1982	162.89 Sq. km	Gulf of Kachchh, Jamnagar	Sea horse, corals, jelly fish, octopus, oyster, dolphin, dugang

Self study

1. Answer the following questions as directed :

- (1) Give a list of Zoo – geographic regions of India.
- (2) Wild Life is in danger to-day – Explain.
- (3) Give brief information about different projects for wild life protection.

2. Answer the following questions in details :

- (1) Bio – diversity of India
- (2) Remedies for wild life conservation

3. Select a proper option and write the answer :

- (1) How many Zoo-geographic regions is India divided into ?
(A) Three (B) Four (C) Six (D) Nine
- (2) How many species of living organisms are recorded in the world ?
(A) 72 Lakhs (B) 15 Lakhs (C) 18 Lakhs (D) 19 Lakhs
- (3) Where are the flying squirrels seen ?
(A) Greater Rann of Kachchh (B) At higher altitude in Himalayas
(C) Marshy land (D) In Western Ghats forests

- (4) Which bird is rarely seen in the mountainous area of Vijaynagar Taluka ?
(A) Flamingo (B) Chilotro (C) Bustard (D) Parrot
- (5) Rare species of corals....
(A) Velavadar (B) Nal Sarovar (C) Lakshadweep Islands (D) Gir Sanctuary
- (6) Where are the bustards seen?
(A) Wet Land (B) Mountainous area
(C) Marshy Lands (D) Grasslands

Activity

- In the eco-club of your school, observe and prepare a list of the birds seen in your area under the direction of your teacher.
- Prepare a sparrow nest from a blank box and hang it at a proper place under your elders' direction, observe it over a period and keep a note at regular interval.
- Arrange a visit to a natural education centre during the tour of the school.
- Arrange a talk and a question-answer session by a forest officer in the school.
- Paste the cuttings of the news and articles about wild life appearing in the News Papers and Periodicals.
- Under the guidance of your teacher, visit the following websites and gather more information.

- (1) www.envforguj.in
- (2) www.gujaratforest.org
- (3) www.gemi_india.org
- (4) www.wcsindia.org
- (5) www.nationalgeographic.com



We are proud that we are born in India. Our country is situated on the southern side of Asia. It has been gifted by three seasons, cold season, warm season and rainy season with traditional sub divisions of these seasons. Earlier you studied that India is a diversified country with reference to relief features and climate. So many changes are seen in food, dressing, dwellings, language, dialects, festivals, holy days etc. Thus India is a multi-coloured nation showing unity in diversity.

Relief and climate have a clear impact on the food and dress, e.g. the staple food of people living near sea coast is rice and fish. Wheat is the main crop in Gujarat, Madhya Pradesh and Punjab. So people in these regions use wheat preparations. Similarly relief and climate have a strong impact on the dressing. The costume of people in colder and mountainous region is woollen and covers entire body. Similarly people living in a region experiencing high temperature throughout the year put on cotton dresses which are light in colour and are loose. Nowadays men put on pant and shirt and women put on salwar – kameez in every state.

India can be divided into four zones according to life style : Western India, Northern India, Southern India and Eastern India. Now we shall learn about the life style in respective regions.

Life style : Western India

Major states of Western India are Rajasthan, Gujarat, Maharashtra, Madhya Pradesh and Goa. It also includes Union Territories of Diu-Daman, Dadra and Nagar Haveli.

Food : Staple food in Rajasthan is millet and dal-bati. Marwadi kachori of Rajasthan is a famous item in breakfast. Rotli-bhakhari, vegetables, dal and rice, khichdi and kadhi are main items in the food of Gujarati people. Khaman and ganthia are more preferred as savoury item. Maharashtrians prefer sev-usal. People living along the sea coasts of Gujarat, Maharashtra and Goa eat mainly rice and fish.

Like to know...

Gujaratis are basically traders. As they are required to go to distant places for trading, so durable items for breakfast like thepla, ganthia, dry kachori, khakhro and sukhdhi are more common among them.

Dress : Rajasthan is a dry and desert area hence there is less diversity in vegetation. This defect is overcome by them through colourful dresses. Men generally wear dhoti, angarakhun and colourful head gear (Paghadi), while women put on sari, petticoat and blouse. Traditional dress of men in Maharashtra is dhoti and paheeran, and a cap or a head gear on the head. Women wear sari in Maharashtrian way. The traditional dress in Madhya Pradesh is similar to that of the neighbouring states of Gujarat and Maharashtra. In Goa also, men wear dhoti and paheeran, and women wear sari, petticoat and blouse. However, a strong western impact is seen in the dresses in Goa. Thus, every region has its own characteristics in their dresses.

Traditional dressing of Gujarat : Men put on dhoti, Kurta, white cap or headgear (turban) on head, while women put on sari, petticoat and blouse. The traditional attire for men in Maharashtra is dhoti and paheeran and cap or turban on head, while women put on sari in typical Maharashtrian style. The traditional dressing of people in Madhya Pradesh resembles very much to the neighbouring states Maharashtra and Gujarat. In Goa also, men put on dhoti and paheeran, while women put on sari, petticoat and blouse. However, a western effect is distinctly seen on dressing in Goa. Thus, every region has a traditional characteristics regarding its dressing.

Dwelling : There is less rainfall in Rajasthan due to deserts, so most of the houses have flat top. Rural people live in the houses made of grass and soil. People in Gujarat live in modern types of buildings made from brick – cement. In Maharashtra, Madhya Pradesh and Goa also, urban people live in well laid out houses with many modern amenities. In every state, the forest dwellers living in forests or mountainous area stay in scattered huts. Roofs of the buildings in Konkan, which receives heavy rainfall, are slant.

Like to know...

Dwellings in Kachchh (Gujarat) are known as Bhunga. These bhungas were least damaged during the earthquake of 26th January, 2001.

Language : Rajasthani people mainly speak Hindi while Marwadi language is spoken in Marwad. Gujarati is the main language of people in Gujarat, kachchhi dialect is spoken in Kachchh. Hindi is main language in Madhya Pradesh. Marathi and Konkani are also languages spoken in Maharashtra and Goa respectively. Regional dialects are spoken according to the area of respective states.

Festivals and Holy Days : Kalidas, the great poet, has said that human beings are fond of festivals. Indians celebrate many festivals and holydays. Rajasthan has peculiar type of folk songs and folk dances. Festivals of Holi and Ganagaur are celebrated with great pomp. Ghummar, Kachchighodi and Kalbelia are very famous folk dances of Rajasthan. Gujarat is world famous for her raas – garba. Maharashtra celebrates Ganesh Chaturthi festival with great pomp. Besides, its Lavni dance is also very famous. In Ujjain, Madhya Pradesh, the Shiv Ratri is celebrated with much enthusiasm. People in Western India celebrate festivals like Diwali, Navratri, Shivratri, Dashera, Ganesh Chaturthi, Eid, Moharram, Christmas, Mahavir Jayanti, Pateti, Chetti Chand, Buddha Jayanti etc.

Fairs : Pushkar in Rajasthan and Siddhpur in Gujarat are known for their camel trade on Kartik Purnima (Full moon day). A fair is conducted for trading donkeys at Vautha of Dholka taluka in Gujarat. Other famous fairs in Gujarat are Tarnetar Fair near Thangadh, Bhavnaath Fair in Junagadh and Dang Darbar Fair in Dangs. Ujjain in Madhya Pradesh and Nasik in Maharashtra are famous for holding Ardha Kumbha Fair and Goa for Carnivals.

Like to know...

In the Adhik (Additional) Bhadarvo month occurring after every 18 years, a fair is organised at Bhadbhut in Vagra taluka of Bharuch district.



19.1 Pushkar Fair (Rajasthan)

Life style – North India

North India includes the states of Punjab, Haryana, Jammu-Kashmir, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Delhi etc. Punjab is a land of five rivers. Due to its natural beauty, Jammu-Kashmir is considered to be the heaven of the earth. Uttarakhand is a mountainous region and also known as Devbhumi. Himachal Pradesh is also a mountainous state. Uttar Pradesh is a part of the fertile plain of Ganga-Yamuna. Delhi is the National Capital of India.

Food : Wheat is the staple food in Punjab and Haryana. Punjabi people use tandoori roti made from wheat and a variety of parathas very frequently. Panir based mixed vegetables is a special choice of Punjabis. Lassi is a well known drink in Punjab. Main food of people from Jammu-Kashmir is rice, meat and fish. Roti, daal and rice is the staple food of people in Uttar Pradesh.

Dressing : The dress which Punjabis and Haryanvis put on is known as Punjabi Dress. Women put on salwar and kameez. Men also wear loose shirt (jhabbho) and salwar. Men also put on Punjabi styled head gear. Some people also wear embroidered jacket over the loose shirt. Kashmiri people wear Kashmiri dress, and during winter, they put on clothes covering entire body. The dress in Himachal and Uttarakhand is similar to that of Jammu- Kashmir. Gents put on cap and ladies wear scarf on the head. People in Uttar Pradesh wear dhoti and paheran and tie a scarf on the head. Ladies wear sari, petticoat and blouse.

Dwelling : Punjab and Haryana get less rainfall, so the buildings there have flat roof tops. Urban people live in the buildings made of bricks and cement. Wood is used more in the construction of houses in Jammu-Kashmir. In Himachal and Uttarakhand, people live in two storeyed buildings. Animals are kept

in the ground floor so that their heat keeps the wooden first floor warmer. Such buildings are useful during snowfall. The roofs are sloppy. Smooth rocks are used as roof tiles so that the snow on the roof tops easily slides down. In Uttar Pradesh urban people live in houses made from bricks and cement.

Language : Punjabi people speak Punjabi language and Haryanvis speak Hariyani language. People in Uttar Pradesh use Hindi and Urdu languages. Urdu is major language in Jammu-Kashmir. Kashmiri and Dongari languages are also spoken there. Besides Hindi, Garhwali and Kumaun dialects are also spoken in Uttarakhand. The State language of Himachal Pradesh is Pahadi. More over, local dialects are spoken in remote area of each state.

Festivals and Holy Days : Baisakhi and Lahiri are major festivals in Punjab. Bhangda is a famous folk dance of Punjab. Eid and Moharram festivals are celebrated in Jamu-kashmir. Dashera is celebrated in a special way in Kullu of Himachal Pradesh. Holi is the major festival in Uttar Pradesh. Kathak is a well known dance style of Uttar Pradesh. Besides, festivals like Shiv Ratri, Ram Navami, Janmashtami, Dashera, Eid, Moharram, Christmas etc. are more celebrated festivals.

Fairs : Kullu's Dashera Fair is a well known fair. In Punjab, a Martyrs Fair is held. Kumbh Mela and Magh Mela are famous fairs of Allahabad in Uttar Pradesh. In Uttarakhand, Kumbh and Ardha Kumbh fairs are famous.

Life Style – South India

The states of Andhra Pradesh, Karnataka, Tamil Nadu, Kerala and Union Territory of Puducherry are included in South India. Southern India is a peninsula and each state has sea coast.

Food : In southern states, rice and fish form the main diet. Idli, dhosa, meduvada etc. along with the coconut chutney are famous rice preparation of South India. They eat 'Rasam' which is like daal (gravy) in their meal. Coconut leaves are used as dish in Kerala.

Dressing : Due to hot and humid weather in south, people wear loose garments. Lungi, paheran, khes on the shoulder and occasionally a head gear are common attire among men. Women wear sari in southern style, petticoat and blouse. Keralites wear lungi or short dhoti. Ladies put on flower strips (veni) on their head.

Dwellings : People live in houses of brick and cement. Modern housing is seen in Bengaluru and Chennai. People living near sea coast use coconut leaves in their huts. A rangoli is a daily routine in South India.

Language : Languages in South India belong to Dravid Family of languages. Kannad language is spoken in Karnataka. Other languages spoken are Telugu in Andhra Pradesh and Telangana, Tamil in Tami Nadu and Malayalam in Kerala.

Festivals and Holy Days : Andhra Pradesh is famous for its Kuchipudi Dance. Shiv Ratri, Makar Sankranti and Baisakhi festivals are celebrated there. Mysore in Karnataka celebrates Dashera, Eid and Navratri festivals. Kathakali is a well known dance of Kerala. Onam, Christmas, Eid, Shivratri are other festivals celebrated in Kerala. Bharat Natyam is very famous dance style of Tamil Nadu and Pongal is its main festival.



19.2 KumbhMela (Allahabad)



19.3 Kathakali

Life Style – Eastern India

The States of Bihar, Chhattisgarh, Jharkhand, Odisha, West Bengal, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Sikkim, Meghalaya etc. are included in Eastern India. Of these, Odisha and West Bengal have sea coast.

Food : People in Bihar, Jharkhand, Chhattisgarh and West Bengal take roti, vegetables, but use more rice in their meals. Rice is a staple diet in mountainous region. They also use pulses, green vegetables in their meals. 'Rosogulla' and 'Sandesh' are their favourite sweets.

Like to know...

Sathvo (satthu) is a special dish eaten in Bihar. Rea is a wide spread drink in Assam.

Dressing : Bihari people wear dhoti, zabbho, khes on shoulder and a Pagh (head gear). Women put on sari, petticoat and blouse. There is not much difference in the attire of people in Jharkhand, Assam and Odisha. Bengali ladies wear sari in Bengali style and gents put on plaited (with folds) dhoti and silken zabbho.

Dwellings : People in plain region live in houses made of bricks and cement. People in mountains use wood and bamboo in their houses. Slanting roofs are seen in the regions of heavy rainfall. In Bengal, there is a Pukur (small pond) in the rear of the house, fish is reared for daily use in their meals.

Language : Hindi is spoken in Jharkhand, Bihar and Chhattisgarh. Maithili, Bhojpuri and Magdhi are dialects spoken in Bihar. Assami in Assam, Udia in Odisha and Bengali in Bengal are other spoken languages in the respective states. Garo and Khasi languages are spoken in Meghalaya. Mizo dialect is used in Mizoram.

Festivals and Holy Days : Bihu of Assam and Odissi in Odisha are famous dance styles. The Chariot Procession of Jagannathpuri is world famous. Festivals of Chhath and Bhaiyaduj in Bihar and Durga Puja in Bengal are celebrated with great pomp. Thus, every state has its own festivals and holydays.

India is a secular country, so every state celebrates religious and national festivals. In India, festivals of all religions are celebrated without and partiality.



19.4 Chariot Procession (Jagannathpuri)

Like to know...

In different regions of India, people use the edible oil made from the oil seeds grown in that region; e.g. ground nut oil in Gujarat, mustard oil in North India and coconut oil in South India are used as edible oils.

Self Study

1. Answer the following questions in two – three sentences each :

- (1) What diversities are seen among the people of India ?
- (2) To which family do the languages of South India belong ?
- (3) State the major languages and dialects of Bihar.

2. Write short notes on the following :

- (1) Dresses of men and women in Bengal and in Eastern States.
- (2) Festivals and Holy Days of Western India.

3. Select proper options for the following questions and write answers :

- (1) People experiencing how much temperature put on cotton dresses with light colour ?
(A) More (B) Less
(C) Normal (D) Extreme
- (2) People of which state put on shoes made from camel's leather ?
(A) Gujarat (B) Rajasthan
(C) Maharashtra (D) Goa
- (3) Which language is spoken in Goa ?
(A) Marathi (B) Hindi
(C) Gujarati (D) Konkani
- (4) People of which state eat a variety of parothas ?
(A) Jammu - Kashmir (B) Tamil Nadu
(C) Assam (D) Punjab
- (5) Where is the Magh Fair held ?
(A) Pushkar (B) Nasik
(C) Allahabad (D) Ujjain
- (6) Of which state is 'Pongal' a main festival ?
(A) Andhra Pradesh (B) Tamil Nadu
(C) Meghalaya (D) Sikkim
- (7) Which type of relief is seen in Uttarakhand ?
(A) Fertile plain (B) Mountainous
(C) Coastal (D) None of these

Activity

- Arrange a regional dress competition.
- Prepare a bulletin by pasting pictures of dresses of every state.
- Collect books on recipes from the library and prepare a list of sweets of every state.
- Visit a fair held in your area with your guardian.

A disaster may be natural or man - induced, may be catastrophic or diastrophic, may have originated in the interior of the earth or in atmosphere, it is felt over extensive area on the earth and also results in devastation. If we examine a few phenomena, it will be clear that a disaster damages lives and property to a great extent. Some events like volcanic eruption, earthquake, tsunami etc. are the collective result of both natural as well as man – induced acts.

Some events bring pre-planned devastation and destruction, e.g. atomic attack by U.S. bombers over Hiroshima and Nagasaki cities of Japan in the second world war, whereas some events are results of human negligence or mistakes. e.g. Bhopal Gas Tragedy, Chernobyl Atomic Disaster of Russia.

Types of Disasters :

We are aware of the risks of disasters. To decide the strategy for relief work. it is necessary to know the reasons and responsible situations. It is important to know these with reference to overall preparation for relief work. Experts on Disaster Management have divided the disasters into two categories :

(1) Natural Disasters : These include flood, cyclone, tsunami, drought, earthquake, volcano, forest fire etc. Of these, a forecast is possible for floods, cyclone, tsunami and drought, while it is not possible to forecast earthquake, volcanic eruption, forest fire.

(2) Man - induced Disasters : Here fire, industrial accidents, bomb explosions, riots etc. are included.

(1) Natural Disasters :

Flood : By flood, we generally mean an extensive land area remaining submerged under water continuously for several days. People associate flood with river, when river water overflows its banks and the nearby land area comes under water. Flood is a natural event and is the result of continuous heavy rainfall. Floods become dangerous when some construction is carried out ignoring human activities, drainage pattern, slope of the land etc., and damage lives and property on a large scale.

What to do :

- Collect your precious and personal requirements and take refuge at a safer place.
- Put water, dry breakfast, candles, lanterns, matchbox in a plastic box so that they do not get wet, and they should be kept with you.
- Do not keep the children hungry.
- After the flood recedes, drink only boiled water.
- Radio, Mobile phone should be kept with you invariably.
- Be aware of snakes. They may come to dry places. Keep a bamboo stick to drive them away.

What not to do :

- Do not eat food prepared in flood water.
- Do not move out without collecting authentic information about the routes and situations before moving to a safer place.

Cyclone : Due to atmospheric disturbances, a sudden strike is made by severe storms. These storms are known as Cyclone in Indian sub-continent, Hurricane and Tornado in USA, as Typhoon along the coasts of china and Japan. These severe atmospheric storms are created due to unequal atmospheric pressure. Such storms, or cyclones, create devastation over the area over which they pass. Its devastating effects are felt along the coasts of eastern India and Kachchh-Saurashtra.

What to do :

- Keep viewing the news bulletins on TV - Radio to know the anticipated time of the on-coming storms.
- Those who have a radio should keep an extra battery ready.
- Mobile phone should be kept fully charged in advance. If you have a powerback instrument, it should also be charged fully in advance.
- Listen carefully to the instructions, warnings, broadcast over radio and implement them.
- Stay away from rumours.
- Store additional food, dry breakfast and drinking water as per need.
- Keep provision of food and medicines, necessary for children and old people.
- If the rescue team tells you to vacate your home, cooperated with them.
- Use pure and safe drinking water.

- If you have taken shelter in a shelterhome, created by the Government or any NGO, then follow their instructions and do not leave the premises without their instructions.
- Do not keep your domesticated animals tied up to their posts. If they are free, they can defend themselves in a better way.

What not to do :

- Do not pay any attention to gossips or rumours, except for the instructions issued by the Weather Department on Radio.
- If the atmosphere calms down suddenly, rain stops, wind becomes stand still, even then do not go in open area. Wind or rainfall, may strike suddenly.
- Do not touch electric poles or loose wires, stay away from them.
- Do not take shelter near bigger hoardings or large trees.

Earthquake : An earthquake in general means the shaking of the surface of the earth. Due to tectonic activities in the interior of the earth, an earthquake is felt. Its major areas are the regions with weaker relief on the surface of the earth. Probable earthquake regions can be identified, but an earthquake can not be forecast. Thus, much damage is caused in the absence of a forecast.

What to do :

- During an earthquake, stay beneath a large bench or a table.
- If you are in a school, sit beneath a bench.
- If you are in an open space, stay away from buildings, balcony, electric power lines and electric poles.
- If you are driving a vehicle, then bring your vehicle to a halt over or below a bridge, keep away from electric poles, power lines and traffic signals.
- Remain seated in your vehicle till the earthquake tremours are not over.
- Even after the earthquake tremours are over, few things like fridge, photographs on the wall, ceiling fans etc. may fall down afterwards, so keep away from them.
- For instructions or guidance about the event, listen to the local radio.
- New buildings under construction should be made earthquake proof.

What not to do :

- Do not shout or flee in panic.
- Do not attempt to prevent the things falling down after the earthquake tremours.
- Do not use elevators to go down.
- If you are in a house, do not stand near wooden cabinets (cupboard), safes, mirrors or a glass chandelier.
- Do not light a match stick or a Lighter, or do not switch on electric gadgets before confirming that the cooking gas is not leaking, because leaking gas may explode.
- Do not put a phone call unless for emergency medical help or fire. A prompt phone call may interrupt telephone network which may obstruct the relief work.

Tsunami : The destructive and powerful sea waves are called Tsunami. These are generated at the sea bottom due to earthquake having a rating of 7 or more on Richter scale, or by a volcanic eruption with in sea or by a large scale land slide on ocean floors. Tsunami means '**destructing waves**' in Japanese language. Tsunami occurs mostly due to earthquakes on ocean floors, so these are also known as oceanic earthquake waves. These waves travel very fast in circular pattern from the place of their origin. In deep sea, these waves are not seen distinctly due to their shorter wave heights, but when they approach coasts and shallow sea, they turn into devastating form. Its velocity reduces near coasts but height increases. So, these waves surge ahead in the form of a wall near sea coast and cause devastation.

More than 2 lakh people from Thailand, India, Indonesia, Sri Lanka and other South - Eastern countries became victim of highly destructive Tsunami on 26th December, 2004.

With modern equipments a forecast and a nearly exact time of the striking of a tsunami can be predicted. In future, more deaths can be prevented with due precautions.

What to do :

- With tsunami warning, move to a safer place away from sea coast.
- Keep a radio handy and act according to the instructions received from the authorities.
- Construction of new buildings and societies should be carried out considering the tsunami impact.
- Mangrove reduces the overall impact of tsunami, so attempts should be made to expand their span.

What not to do :

- Do not take shelter on tall buildings, because these buildings may collapse due to destructive waves.
- After the tsunami recedes, do not approach sea coast till the instructions are received from the authorities.

Drought : A drought is a highly destructive hazard, leaving a long lasting impact. It is connected with water and food which are very much needed for the existence of living organisms. The problem of drought occurs in regions of monsoon climate where the rainfall is irregular and is very scanty. This is so because the agricultural crops, food grains and living organisms depend completely on water. The shortage is created due to water crisis. Under such conditions, heavy damage is done to agriculture and natural vegetation. Earlier many people died of starvation during a drought, but now it could be reduced due to transportation and well planned management.

What to do :

- Drip irrigation in agriculture should be intensified.
- Food rationing and use of water should be planned after estimating their availability.
- Arrangement should be made for fair price distribution of food grains and relief work.
- Construction activity should be stopped except for the inevitable work.

What not to do :

- To prevent the food wastage, do not hold large scale dinner parties.
- Citizens should not hoard food grains or fodder.

Forest Fire : A forest fire is the fire which occurs in forests and creates devastation. Except for lightning, all other reasons for a forest fire are man - induced. Among them, throwing of burnt butts of cigarettes - bidies, or match sticks, burning things left by tourists, pilgrims or shepherds etc. are the major reasons. There are more probabilities of a forest fire occurring during a dry season after autumn. At that time, the dry grass and fallen tree leaves act as fuel. This situation is responsible for the spread of forest fire.

When both wind and inflammable fuel are dry, they form the basis of forest fire which spreads faster during windy days of more temperature and less humidity. Some trees ooze out oily and inflammable material, so the fire spreads faster.

Once the forest fire starts, it spreads in the directions of wind, advancing at a velocity of about 15 km per hour on all sides. Once it starts and if attempts are not made promptly to extinguish it, the forest fire would stop only under two situations : (i) the forest fire is extinguished completely by itself, or (ii) due to heavy rain.

Due to forest fire, smoke and spark, rising high with the warm air current, create a risk of fire among the nearby settlements.

What to do :

- Act according to the instructions from Forest Department.
- Arrange special patrolling in forests during dry seasons.
- Employees of forest department should be trained for extinguishing forest fire.

What not to do :

- While travelling through a forest, do not throw a burning bidi or other things.
- People living in settlements near the forest fire area, should not ignore the instructions from Forest Department.

(2) Man-induced Disasters :

Those events which take place due to direct or indirect, knowingly or unknowingly done by men, unawareness or ignorance and failure of human machinery etc. which cause heavy damage to human life and property, are called man - induced Disasters.

Industrial Accidents : In industrial townships, mills, factories etc. there is a chance of accidents even after enough precautions are taken. Such accidents result into deaths of people, live stock and damage to property. Besides, the environment is also affected. Human errors are at the base of industrial accidents. Men undertake the management and care of various machines of industrial processes, and collection, transfer and distribution of the manufactured goods. At every stage, an accident cannot be ruled out.

Bhopal Gas Tragedy : Union Carbide, located at Bhopal which is the capital of Madhya Pradesh, used to produce insecticides. In the process of production a poisonous gas Mic was used. This gas was stored in large tanks. In the early morning of 3rd December, 1984, this poisonous Mic gas started leaking from the tanks, which lasted for about 40 minutes. Due to this event, which took place in early morning, the gas very quickly spread over the densely populated area in Bhopal. According to official figures, about 2500 people died and thousands of residents in Bhopal were affected by this poisonous gas. Besides people, the gas also killed thousands of birds and animals. Drinking water, reservoirs, land, unborn babies, new born babies, pregnant women etc. were victims of its adverse effects. While 10,000 people became handicapped permanently, 1.5 lakh people were handicapped partially.

Rescue Operations during Gas Leakage :

What to do :

- Install modern warning system for getting advance information about gas leakage.
- Pre-determine the high level measures for safety in factories and support it.
- If the gas leaks during its transfer, the gas tanker should be driven away from human settlements.
- Observe the wind direction and run into its opposite direction.
- Do not treat breathlessness, burning eyes etc. by yourself, but seek medical guidance immediately.
- Fainted or weak people should be immediately shifted from the affected area.
- Inform fire Brigade and Police.
- Park the vehicles in such a way that they do not obstruct the vehicles of Rescue operations.

What not to do :

- During Rescue Operations, persons who are not associated with the work should not gather around.
- Do not enter the affected area till the area under gas leakage is declared totally safe by the authorities.
- Do not join the rescue operation without proper training in rescue operations and necessary equipments.

Viral Diseases : When a large number of people over much wider area become victim of any disease, it is called epidemic. People lose their lives due to the disease. There is a faster increase in the number of patients of viral diseases than the general diseases. Till to-day, thousands of people have been victims of diseases like dengue, ebola, swineflu, influenza etc. These diseases are very much feared. In earlier times, lakhs of people were victims of plague. However, such deadly diseases are controlled now with the help of scientific inventions and anti-viral vaccines for safety. Along with it, with new viral diseases, and those diseases which cannot be cured by traditional medicines, there is always a danger of widespread deaths on mankind.

During the plague epidemic of Surat in September 1994, and recently swine flue and dengue epidemics, many agencies took preventive steps to prevent deaths.

Safety Remedies for viral Diseases :

- An important step to be safe from viral diseases is to be vigilant about infection.
- People should be acquainted with the reasons, results and safety about diseases through propaganda and Transmissions.
- Take the anti - disease vaccines.
- Arrange for a special separate ward for patients' treatment.
- Take steps as per the guidelines and instructions, issued by World Health Organization (WHO), an International Institution, to curb the viral diseases.

Terrorist Attacks : We all know that since last decade of the last century, the terrorist activity in the entire world has become very much wicked. In reality, terrorism does not care for any race, community or a region. It is the enemy of mankind. The immoral destructive acts performed by a person or a group is called Terrorism. Inhuman acts like destruction of property, creating an atmosphere of fear and thereby draw attention towards their demands, genocide, abduction etc. are terrorists' weapons. Nowadays, the terrorism has spread in many countries of the world. In recent times, no country is safe from terrorism.

Some Terrorist Acts of the World : On 9th September, 2001, a series of suicidal attacks were made in U.S.A. by a terrorist organization. About 19 terrorists highjacked 4 passenger Jet planes of which 2 planes were dashed against the Twin Towers in New York city. Due to this, all passengers on board and many people working in these towers were killed within few minutes. Many people were injured as their houses collapsed. Of the other two planes, one dashed with the Pentagon and the other dashed into a farm in Pennsylvania. There was no survivor from these two planes. In this attack, about 3000 people were victimised and more than 6000 were injured.

On 13th December, 2001, five terrorists from one terrorist organisation attacked the Indian Parliament building and took the complex under its ban by firing without any restraint. Indian Army soldiers staked their lives and defied the plan of nation's enemies to dissolve the Parliament, which is like a holy Temple of Democracy. About 8 security guards became martyrs and 16 were wounded.

On the night of 26 November, 2008 a series of bomb blasts and firing took place near well known hotels and some important places in Mumbai at a regular interval. About 137 persons were injured. In some well known hotels, the terrorists kept many people under custody. The Central Government sent 200 NSG (National Security Guards) Commandos, 50 military commandos and 5 battalions to control the situation. After two day's of struggle, all the terrorists. equipped with modern armaments were killed.

In December 2014, about 141 persons, including 132 innocent students were killed in a terrorist attack on an Army school, located in the cantonment area of Peshawar in Pakistan.

What to do :

- Inform the police about any doubtful behaviour of any person.
- Do not touch any unclaimed thing in public places, such as shopping malls, cinemas, gardens, religious places etc.
- Cooperate in security check for safety reasons.
- If you rent your house, register it with the nearest police station. This is required under legal provisions.
- Public places should be well equipped with CCTV cameras.
- While travelling in a bus or train, if any person is noticed having left leaving his luggage behind, inform the responsible authorities immediately.
- If your neighbour is single, does not mingle with local people, is working on computer till late night, then inform the police about his/her behaviour.
- Inform Police about unclaimed vehicles.

What not to do :

- Do not accept any goods or parcel from any unknown person.

- Do not rent your house to an unknown person without thorough inquiry about him.
- Do not sell your home, mobile phone or a vehicle to any unknown person.

Riots : This problem is faced by many countries in the world. If we examine the general characteristics of any riot, it is noticed that most of the persons are not aware of its root cause or purpose. Their presence is only for crowding or for imitation. Such crowd which gathers without any common purpose or interest, seems to disturb the peace intentionally. Such riots make the administrative set-up, which is established by Law, unstable.

Sometimes when such riots take a political colour and turn into a revolt, or are transformed into a communal riot, the social well-being and harmony are at risk. Innocent citizens have to suffer a lot due to such riots. Life sustenance of labourers becomes very difficult. Moreover, a lot of life and property are damaged.

It creates a challenge to maintain the unity and integrity of the nation.

What to do :

- Prevent talks which spread rumours and violence.
- Form a peace committee in your residential area and be actively involved.
- Perform your civil duties by helping those affected by the riot.

What not to do :

- Do not be instrumental in spreading rumours.
- Do not violate the instructions or curfew declared by the authority to maintain Law and order.
- Do not believe and spread baseless talks appearing in social media.

Terrorists sometimes hijack a bus, train or a plane to get their demands met with for releasing their accomplices from jail or for other demands. They bring pressure by taking the passengers into custody. In such circumstances, the family members of the persons taken as hostages should maintain peace and support the working of the Administration. In such instances, plans are implemented to relieve the citizen either by commando operations or through the talks with the terrorists.

Traffic problems :

We have seen vehicles plying at a snail's speed and very close to each other on the roads of large cities. This situation is called Traffic Jam. When the means of transport come to a halt on the roads, the traffic problems occur. Such a situation occurs frequently on the busy roads of larger cities. The vehicular traffic comes almost to a stand still during peak hours of commuting. At Such though times, the vehicle drivers, travellers and pedestrians experience mental stress. It takes time to control the situation or to re-start the vehicular traffic. Smoke from vehicles and other dirty things create air and noise pollution. This affects the public hygiene of that region and also the growth of vegetation.

Growing urbanization has created the traffic jam problems in almost all large cities. There is a long queue of vehicles. When those vehicles which undertake relief work and rescue operations are stranded over the road, people lose their life, e.g. stranding of 108 ambulance.

Increase in traffic, negligence of drivers and due to the ignorance in understanding the signs and symbols put along the road, cause many accidents every year and many people lose their lives. Death-rate in India is very high due to the accidents on the roads. Some times, a victim of an accident may become invalid permanently.

Incidences occur in newspaper frequently about the accidents caused by minors driving a vehicle. On the highways, big disasters are caused due to heavy vehicular traffic and uncontrolled speedy vehicles. Accidents occur at unmanned railway crossings are the result of undue haste or ignoring the instructions shown there.

Heavy traffic causes loss of time as well as fuel. If timely effective steps are not taken, advanced planning for traffic management and dedication to observe them are not implemented, then it is going to create risks of lives in the days to follow without and doubt.

What to do ?

- Develop suburban townships near larger cities and connect them intensely by facilitating public transport systems.

- Separate tracks should be prepared for pedestrians and cyclists.
- Encroachments on the roads must be removed.
- Vehicles going at a very low speed or the vehicles pulled by men or by animals should be banned during peak hours.
- Information regarding the traffic rules should be conveyed to the citizen through the educational advertisements and public awareness programmes.
- People going to their job place or business at the same place during same time should arrange for 'car pool' instead of going by individual separate vehicles.
- Digging and repairing work along the roads should be completed immediately.
- A tradition should be developed to take out the processions, marriage processions or religious processions during lean period (hours) instead of peak hours of vehicular traffic.
- At the time of traffic jam, keep your vehicle in proper lane.
- In infrastructure like express high ways, overbridges, flyovers, ring roads and by pass roads should be developed.
- Every person, going for the job, should invariably use public transport at least once a week.
- Use seat belts while driving a car.
- Provision of heavy penalty should be made for the drivers who are drunk, who do not have their driving licence, who drive recklessly and for those who violate traffic rules.

What not to do ?

- Do not violate the traffic rules.
- Very old vehicles should not be used.
- Transportation of goods should not be carried out except for night time and early morning.
- Do not deface the instruction boards, signs or symbols on the roads. These are meant for vehicle drivers.
- Do not alter the design of the vehicle.
- Do not use cell phones (mobiles) while driving.
- Do not drive a vehicle without putting on the seat belt or the helmet.
- A wayfarer crossing rails or road should not use ear phones or cell phones (mobiles).
- Do not enter into arguments with persons who control the traffic regarding their instructions.
- Guardians should not allow their minor children to drive vehicles. It is prohibited by Law.
- Do not join a mob and obstruct the relief and safety work at the place of an accident due to your inquisitiveness.

Impact of Disasters on Human Life :

Disasters affect almost every body, but its maximum ill effects are felt by the poor and under privileged people. The effects of disasters can be grouped into four categories, as under.

Effects on Relief : There is a heavy damage or a total loss of movable and immovable property. Infrastructural facilities like roads, railways, bridge, electricity, gas, telecommunication facilities etc. are heavily damaged and cannot be restored immediately. Loss of fertile agricultural land due to floods is also a loss which cannot be compensated even after a prolonged time.

Effects on Human Life : Many people either die due to a disaster or become permanently handicapped. Health of common citizen deteriorates. Those who lose their relatives are in intense trauma or desperate. It is difficult to bring them out of the trauma. Situation of many orphan children and elderly people becomes very awkward when their support is lost. Their rehabilitation needs very intense efforts. People have to face many difficulties in life.

Effects on Economy : A huge capital has to be created for rehabilitation work after a disaster. It affects the routine developmental work. Due to shortage of capital, the completion of projects is delayed. A problem of unemployment emerges till the industrial units are re-activated. Economy of disaster affected area becomes weaker.

Social Effects of Disasters : Migration or fleeing away by people affects the social structure of the area affected by disaster. Social festivals and public celebrations become uninteresting compared to earlier time. It takes many years to restore the original charm. Social organizations become weaker due to the changes in social network.

Rehabilitation after the Disaster :

At the time of a disaster, first comes the rescue operation, followed by compensation or relief and lastly the rehabilitation, which differs according to disasters. Many buildings have to be re-constructed after an earthquake, flood or a cyclone. New employment has to be created after drought, and provision for farm implements has to be made in agricultural field. After viral epidemics, programmes of mass education and public awareness have to be arranged for safety in future. Rehabilitation work has to be carried out under many obstacles since infrastructural facilities are damaged. It is difficult to rehabilitate a family where there is one or two survivors. If the services of a psychiatrist is not provided timely to persons under trauma after witnessing a disaster, it may bring adverse results. Training and employment are necessary to those survivors who become handicapped permanently.

Thus, the rehabilitation work after a disaster is a very challenging one. It can be fulfilled only through proper planning, implemented step by step.

Self Study

1. Answer the following questions as directed :

- (1) What should be done during flood ?
- (2) Give a brief account of tsunami.
- (3) What should not be done at the time of gas leakage ?
- (4) Discuss the remedies to remain safe from viral diseases.

2. Answer the following questions in details :

- (1) Describe in details the effects of disaster on human life.
- (2) Describe the process of rehabilitation after a disaster - write notes.

3. Select a proper option and write answer :

- (1) Which of the following is a man - induced disaster ?
(A) Earthquake (B) Cyclone (C) Flood (D) Riot
- (2) With what event do people associate floods ?
(A) River (B) Ocean (C) Mountain (D) Island
- (3) After the flood recedes, which filtered water would you use to drink ?
(A) Twice filtered (B) Running current (C) Clean looking (D) Boiled
- (4) The stormy winds created due to atmospheric disturbances in USA...
(A) Typhoon (B) Hurricane (C) Willey - Willey (D) Tornado
- (5) Meaning of Tsunami in Japanese language...
(A) Tidal waves (B) Whirlpool Waves (C) Destructive waves (D) Earthquake Waves
- (6) The gas leaked during Bhopal Gas Tragedy...
(A) Ozone (B) Mic (C) Sulphur Dioxide (D) Mithane

Students Activity

- Collect books on Disaster management from the library and read.
- With teacher's help, prepare posters showing the precautions to be taken during a disaster and exhibit them on public places in the village.
- Arrange a mock-drill of an earthquake in the school.
- Under your teacher's guidance, visit the following websites and gather information.
 - www.ndma.gov.in
 - www.ndmindia.nic.in
 - www.disastermgmt.org
 - www.dmibhopal.nic.in
 - www.gsdma.org

Like to know : Annals of Earthquakes in India

Sr. No.	Date	Location	Intensity on Richter scale
1.	12 May, 2015	North & North - East India	7.3
2.	25 April, 2015	North & North - East India	7.8
3.	21 March, 2014	Andaman - Nicobar Is.	6.7
4.	25 April, 2012	Andaman - Nicobar Is.	6.2
5.	5 March, 2012	New Delhi	5.2
6.	18 September, 2011	Gangtok (Sikkim)	6.9
7.	10 August, 2009	Andaman Is.	7.7
8.	8 October, 2005	Kashmir	7.6
9.	26 December, 2004	Indian Ocean	9.1
10.	26 January, 2001	Kachchh (Gujarat)	7.6/7.7
11.	29 March, 1999	Chamoli (Uttarakhand)	6.8
12.	22 May, 1997	Jabalpur (Madhya Pradesh)	6.0
13.	30 September, 1993	Latur (Maharashtra)	6.2
14.	20 October, 1991	Uttarakhand	7.0
15.	20 August, 1988	Nepal - India Border	6.3/6.7
16.	19 January, 1975	Kinnaure (Himachal Pradesh)	6.8
17.	21 July, 1956	Anjar (Kachchh)	6.1
18.	15 August, 1950	Arunachal Pradesh	8.7
19.	26 June, 1941	Andaman Is.	8.1
20.	4 April, 1905	Himachal Pradesh	7.8
21.	12 June, 1897	Shillong	8.3
22.	31 December, 1881	Andaman Is.	7.9
23.	16 June, 1819	Kachchh (Gujarat)	8.2

