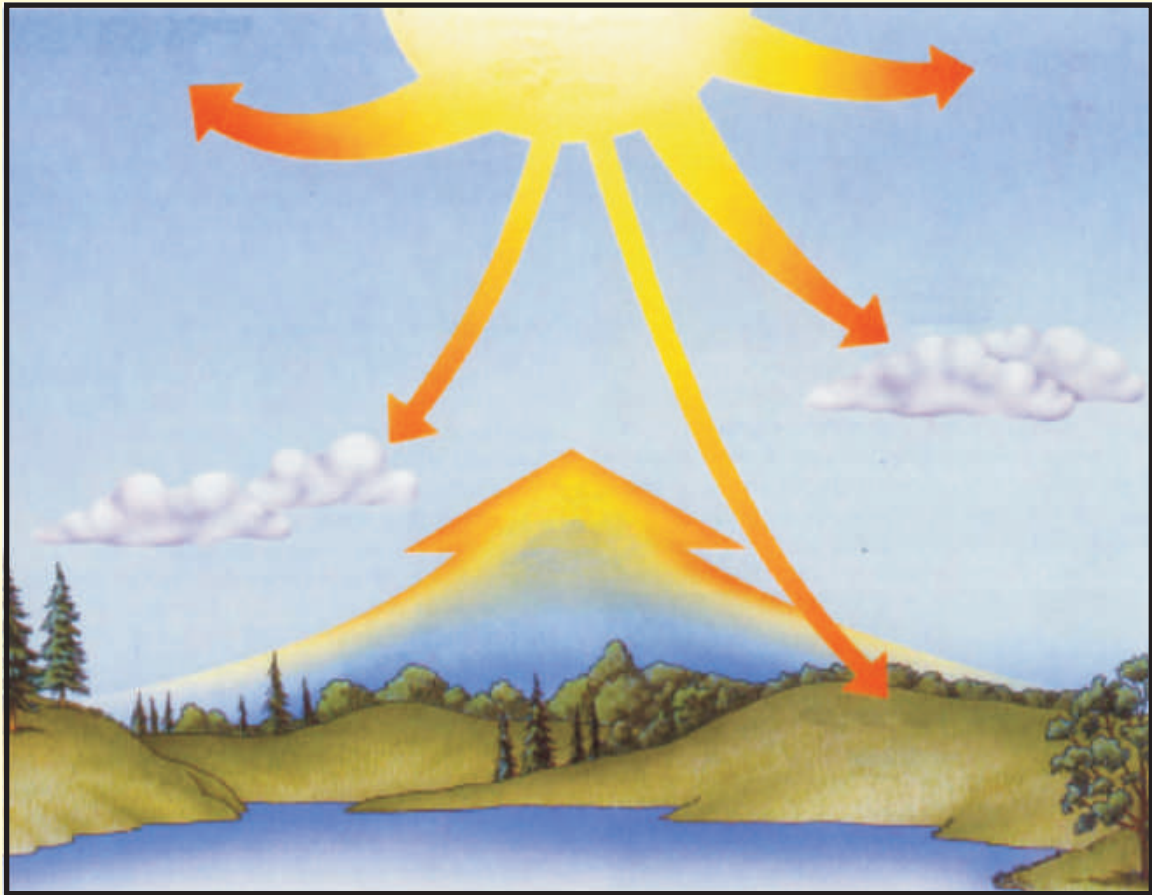


Unit - I Geography

Our Environment





Environment means the surroundings and the countless natural forces causing a variety of phenomena on the earth surface, due to which there is a variation in the environment of each place. Thus the relationship of man with his surroundings is not the same everywhere. It is due to the difference of relief, temperature and rainfall that there is difference in vegetation and agriculture. All these factors affect human occupations. The form of earth's surface determines human response. People living on the main land pursue agriculture, grazing or lumbering while people living near the sea and on island engage in fishing. On the basis of land, water and climate, a particular type of living kingdom of fauna (living beings) and flora takes shape. Like human beings, plants and animals are also products of their surroundings. Whole of this specturum & process is called **Habitat**.

Although the areas near the equator are known for their dense forests. While there is only grass in the interiors of dry regions. The polar areas of the earth which remain covered with snow throughout the year, are devoid of population and forests. It is the land, water, air and solar energy that help to grow a variety of living organisms. Life is possible only there, where all these agents interact with each other. This interacting sphere is known as '**Biosphere**'. The Biosphere and the physical surroundings of the place collectively are called, 'Ecology'.

The Changing Environment

The environment has always been changing on the surface of the Earth. Because of the change in the elements of environment, these changes occur both slowly as well as suddenly. The slow changes occur through degradation process of the earth i.e. through the erosional agents lake, river, glacier, wind, ocean, weathering etc. The sudden or abrupt

changes occur through the upheaval, result in folding and faulting of the earth surface. Similarly the earth has also been changed from gaseous to molten state. After cooling it has changed into solid form. This change occurred very slowly. The gaseous element formed as atmosphere, water elements are denoted by oceans and solid element formed as Lithosphere.

Human beings have also brought a big change on the surface of the earth by cutting trees and developing it for his own needs such as cities etc. By mounding the rivers and digging the canals, water is being utilized for irrigational purposes. In this way the deserts have been changed into green lands. By doing so ecology of the place has been changed altogether. Now, the Thar desert of India is no more a dry barren land. Same level of change happened in the other river valleys of the world, like in Indus Valley, Nile valley, Hwang-He-Valley and so on. Man has also brought changes on the earth surface by exploiting minerals and developing industries. It shows that there is great relation between physical and human elements. The existing civilization is the result of systematic & continuous co-ordination of the physical and human elements.

Elements of environment : To understand total environment, there is need to have more knowledge about three spheres of the earth i.e. **Atmosphere, Lithosphere** and **Hydrosphere**. We will study about these three spheres in detail in further lessons of the book. You have already studied in brief about these spheres in the previous class.

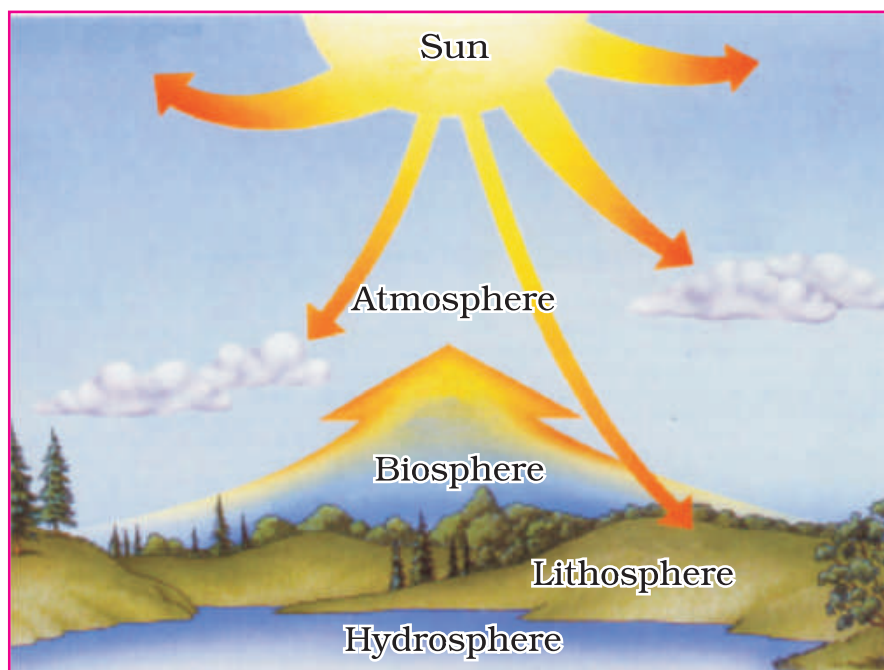
Major Spheres of the Environment

Atmosphere : The earth is enclosed (surrounded) by air and this airy cover is called Atmosphere. Every planet except mercury and satellites of the solar system, are enclosed by the cover of air. Although this air cover extends upto 1600km around the earth still 99% of the air is upto 32 km height only. On the earth's surface air, land and water are collectively responsible for creating and maintaining life of plants and animals. The temperature, humidity atmospheric pressure and other components of atmosphere affect the physical environment of the earth. Out of the elements of environment, the atmosphere experiences maximum changes.

Lithosphere : The surface of the earth is covered both by water and land. Water covers about 71% and land covers about 29% of the earth surface. Two third of the total land area lies in Northern Hemisphere.

The Earth's exterior thickness is approximately 80-100 km. This solid thickness of the earth's crust is not uniform every where. It is more on the land masses and less below the ocean beds. The crust of the earth is made up of different types of rocks. The earth as a whole towards its interior consists of three shells. Lithosphere, Mantle and the Core. The uppermost layer or shell is called SIAL because it mainly consists of Silicon and Aluminium and known as ; SIAL (SI+AL), where SI stands for Silicon and AL for Aluminium, that is why it is called as SIAL. The second layer is called SIMA, it consists of Silicon and Magnesium, SIMA (SI+MA), while SI for Silicon and MA for Magnesium. The third and the inner most layer is called NiFe, which consists of Nickel and Ferrous i.e. NiFe (Ni + Fe) where Ni is for Nickel, Fe is for Ferrous (iron elements). This inner most layer is in viscous form of the above metals.

Hydrosphere : The water covered region on the surface of earth is called Hydrosphere. It covers vast areas in the form of oceans, bays, gulfs and seas. The earth is called watery planet because 71% of the earth is covered with water. There are water bodies i.e. five oceans, numerous seas, rivers and lakes on the earth. The water areas are the deep areas that have been caused due to numerous forces acting on the



Design 1.1 The spheres of environment

surface of the earth. As the relief of the earth goes on rising above the sea level, similarly does the depth of oceans, from the coast to the interior of the oceans.

The oceans affect mostly from the climate point of view. These are the sources of water, after heating the water turns into the clouds which rain afterwards. The wind blowing over the oceans make a moderate type of climate of the place where they

blow. Ocean currents and tides affect the adjoining areas. These also affect the shipping and trade. Therefore, greater attention should be given to the oceans.

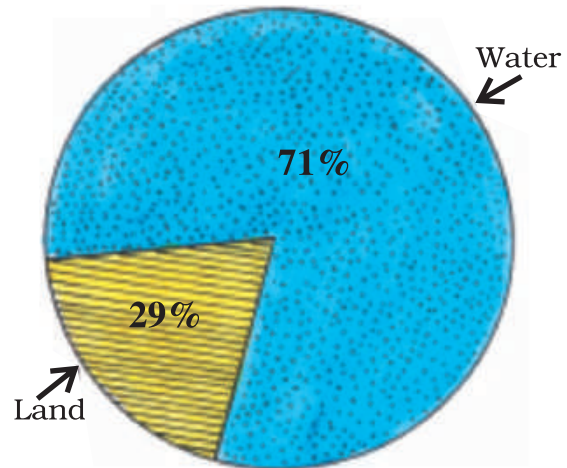
Biosphere : The sphere on the earth where collective effect of physical elements may be seen the maximum, is known as Biosphere. This sphere is the result of interaction of three spheres (Hydrosphere, Lithosphere and Atmosphere). There are different species of the plants and the animals which are known as **Animal Kingdom**.

Biosphere : It is the result of the collective effect of the atmosphere, Lithosphere and Hydrosphere.

Animal Kingdom : Various types of the species of plants and animals of the Biosphere is known as 'Animal Kingdom'.

Human Environment : The present landscape of the earth is not only due to natural forces of the earth but also due to the man's thought. With the technological development, man has made changes in the physical environment according to his need. Mankind has passed through four stages of its development. It means that primarily man was involved in hunting practices only. Afterwards it started animal rearing, then got into agricultural & mining practices. Nowadays man has involved itself in to industry and trade practices.

By clearing the dense equatorial type of forest, man has planted rubber producing trees, with the development of means of transportation,



Design 1.2 Distribution of water and land on the earth

agricultural products like Potato, Maize, Cotton, Sugarcane, Tea, Coffee are being cultivated and traded even to far off areas. Now the world is known as a 'Global Market'. It means if the production of any item is in plenty at one place, the consumer market can be established at that place easily. Similarly, with the import of good seeds and breeds, improvements have been made in quality of various products.

Man had made tunnels across the mountains, shipping through man made canals namely Panama & Suez, diverting the river water for irrigational purposes, exploiting the minerals, and establishing the industrial centres are examples which show that to some extent, man has controlled the natural forces of the earth according to his own requirements. Such attempts have made the world Global Village. It means, man has got skills developed to use resources according to his needs.

Points to Remember

1. Environment means surroundings of the Earth which includes constituents of relief and weather.
2. Constituents of Environment may be divided in four spheres i.e. Atmosphere, Lithosphere, Hydrosphere and Biosphere.
3. The world is looked upon as 'Global Village' as man has collectively moulded natural power to its service.



I. Give answer to the following questions approximately in 1-15 words

- i. What do you understand by environment ?
- ii. How many types of environment are there ? Give brief account.
- iii. By which name we call the sphere, that is product of interaction of three spheres, write in brief.
- iv. Which are the main spheres of environment ?
- v. What do you mean by the changing environment ?
- vi. How do man affects environment ?
- vii. Write down the names of layers of the earth.

II. Fill in the blanks

- i. Environment has been divided in _____ spheres.
- ii. The SIAL layer of the earth is made up of the material which is rich in _____ and _____.
- iii. NiFe is made up of the material which is rich in _____ and _____ elements.
- iv. The different types of species of animals is known as _____.
- v. _____ portion of Earth has been covered by hydrosphere.



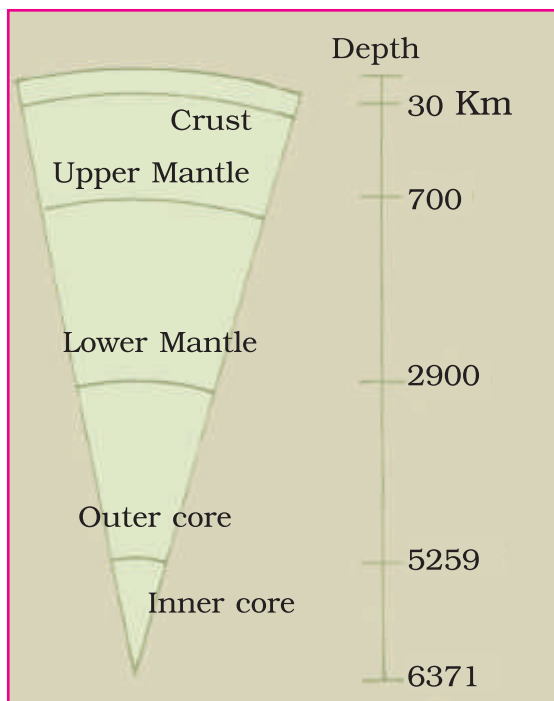
Make a list of factors which has effect over environment.



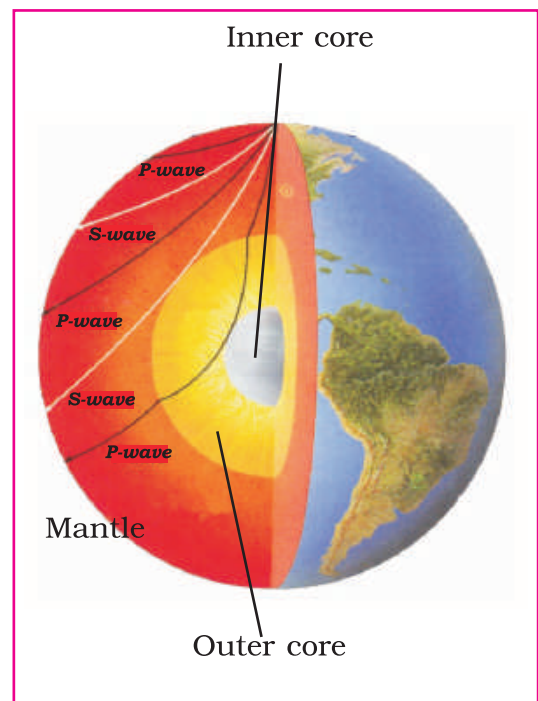
Lesson 2 The Internal and External face of the Earth

We have studied the earth as a member of the solar system in the previous class and have seen photographs of earth taken from the space. We already have some knowledge about the movements of the earth which tell us how the night changes to a day, summer changes to winter season etc. In this lesson we shall study about the surface of the earth and its interior part that bears so many minerals.

First of all, we will study about the interior of the earth. As we have studied in the previous chapter, that earth is made up of three shells, Lithosphere, mantle and inner most part. These are usually called as SIAL, SIMA, & NiFe Layers.



Design 2.1 The internal parts of the Earth



Design 2.2 A view of the internal parts of the Earth

Lithosphere : It is the rigid part of the earth's crust that is called as SIAL. The thickness of this part is about 100 km. This Layer contains mainly the elements, like, Silicon and Aluminium. That is why this layer is known as SIAL. SIAL means the synthesis of (SIAL) SI=Silicon, AL=Aluminium. The thickness of the earth's crust over ocean is 4 to 7 km. On the continent part of the earth, thickness is 35 km while On the mountains this layer is 70 kilometers thick. This is the upper most layer of the earth and consists of rocks and soil.

Mantle : Below the upper layers of earth is Mantle. The average thickness of this is 2900 km. It means it is 2900 km deep into the earth. The thickness of this Layer is not the same at all the places. This is again divided into two parts. The upper Mantle and the lower Mantle. The upper Mantle is 100 km deep into the earth. The Mantle is also known as SIMA. This layer of the earth is mainly made up of Silicon and Magnesium, that is why it is called SIMA. For example, SIMA is synthesis of two words, Silicon and Magnesium SIMA, where SI stands for Silicon while MA stands for Magnesium. Therefore, SI+MA=SIMA.

The Core : The innermost part of the earth is called 'Core'. The thickness of this part is approximately upto 3470 km. This is also divided into two sub parts i.e. Outer core, and Inner core. The core known as NiFe, mainly consists of two elements Nickel & Ferrous. As the NiFe is the synthesis of two words, Nickle & Ferrous. While Ni stands for Nickle and Fe stands for Ferrous. These elements are in molten and viscous state.

When we go deep into the Earth, the temperatures of the inner layers more than upper layers. Due to this heat of the Earth's surface earth ruptures and rifts. Through this ruptured surface, the molten material from the inner side of the earth, comes out in the form of lava. When this happens on the ocean shelves, a new layer is formed after cooling. But when it erupts on the surface of the earth it transforms into mountains. Fujiyama mountains of Japan are the specific example of such volcanic eruption.

The Earth's crust is made up of different types of rocks and minerals :
Let us understand the rocks.

Classification of rocks : There are different types of rocks. These are classified on the bases of several parameters.



Design 2.3 : Fujiyama Mountain (Japan)

- I. On the basis of the porosity, these are of two types.
 - A. Porous Rocks - excess of sand particles.
 - B. Non Porous Rocks - excess of clayey particles.
- II. On the basis of the penetrability of water.
 - A. Permeable Rocks : from where the water can easily pass.
 - B. Impermeable Rocks : Does not allow water to pass.
- III. On the basis of the chemical formation of rocks:
 - A. Alkaline Rocks
 - B. Acidic Rocks

The most important and conventional classification of rocks is on the basis of their formation.

- IV. On the basis of their formation, these are of three types.
 - A. Igneous Rocks
 - B. Sedimentary Rocks
 - C. Metamorphic Rocks

A. Igneous rocks : 'Igneous' means fire in Latin Language. The Igneous implies the highest temperature and such rocks are formed out of the cooling of the hot and liquid material from the interior of the Earth. The hot liquid is called as '**Magma**'. These rocks are of two types.

- a. Intrusive Igneous rocks.
- b. Extrusive Igneous Rocks.

- a. **Intrusive Igneous rocks.** Rocks formed by the cooling of the Magma, in the interior of the earth are called as Intrusive Rocks. Intrusive Rocks are of two types:
- i. Plutonic Igneous Rocks
 - ii. Hypabyssal Igneous Rocks
- i. **Plutonic Igneous Rocks :** The igneous rocks formed due to cooling of the hot magma into hard solid slowly in the deep interior of the earth. Granite and Gabro are the specific examples of these rocks. The plateau of Ranchi and rocks of Singhbhum are made up of Granite rocks.
- ii. **Hypabyssal Igneous Rocks :** Sometimes the internal magma does not come out on the surface but solidify in the cracks only after cooling. The rocks thus formed are known as Hypabyssal Igneous Rocks. i.e. Dike, Silt, Dolerite.
- b. **Extrusive Igneous Rocks :** Where there is large amount of internal magma accumulated, it starts gushing out of the soft surface. This magma starts cooling on the surface of the earth. The rocks formed in such a way are called as Extrusive Igneous rocks. **Deccan Plateau** is made out of these volcanic rocks.

All the igneous rocks are found in crystalline form and do not have layers. These rocks are called primary because these are initial rocks which formed the Earth. Containing no remains of vegetation or living organisms, these igneous rocks cover 2/3 part of the Earth's crust.

B. Sedimentary rocks : Sedimentary rocks are formed by the hardening of the layers of the matter brought by agents of denudation (like water, air and river etc.). This matter when deposited, in the low lands as sediments turns into rocks. Such deposits occur at low level on the floor of the oceans, lakes and rivers along the continents. The process of deposition continues for millions of years to constitute into rocks. As a result of mechanical or chemical action, it assumes the forms of sedimentary rocks.

c. Metamorphic Rocks : The word metamorphic is made up of the greek rooted word 'Meta', meaning change and 'morph' meaning form. Therefore this category of rocks include those rocks which have been transformed. As consequence of the effect of temperature or pressure or both the igneous rocks as well as sedimentary rocks undergo a change in their form, structure, hardness and other traits. Rocks so transformed are known as metamorphic rocks.

Some of the examples of metamorphic rocks are given below :

Original Igneous rock	Metamorphic rock
1 Mica	Schist
2 Granite	Gneiss
3 Bituminous coal	Anthracite coal
4 Gabbro	Serpentine

Original Sedimentary Rocks	Metamorphic Rocks
1 Sand Stone	Quartzite
2 Lime stone	Marble
3 Shale	Slate
4 Slate	Phyllite
5 Peat	Coal

Metamorphic rocks transformed from igneous rocks, have the characteristics similar to those of igneous rocks and those transformed from sedimentary rocks resemble the latter.

The upper most Layer of the earth's surface is made up of the rock material which is known as soil. Let us study soils.

Soil : Soil is a very important land resource, its significance lies in its fertility. Infertile soil is not a much use while fertile soil has always been more important, because of requirements met by it. Human beings have

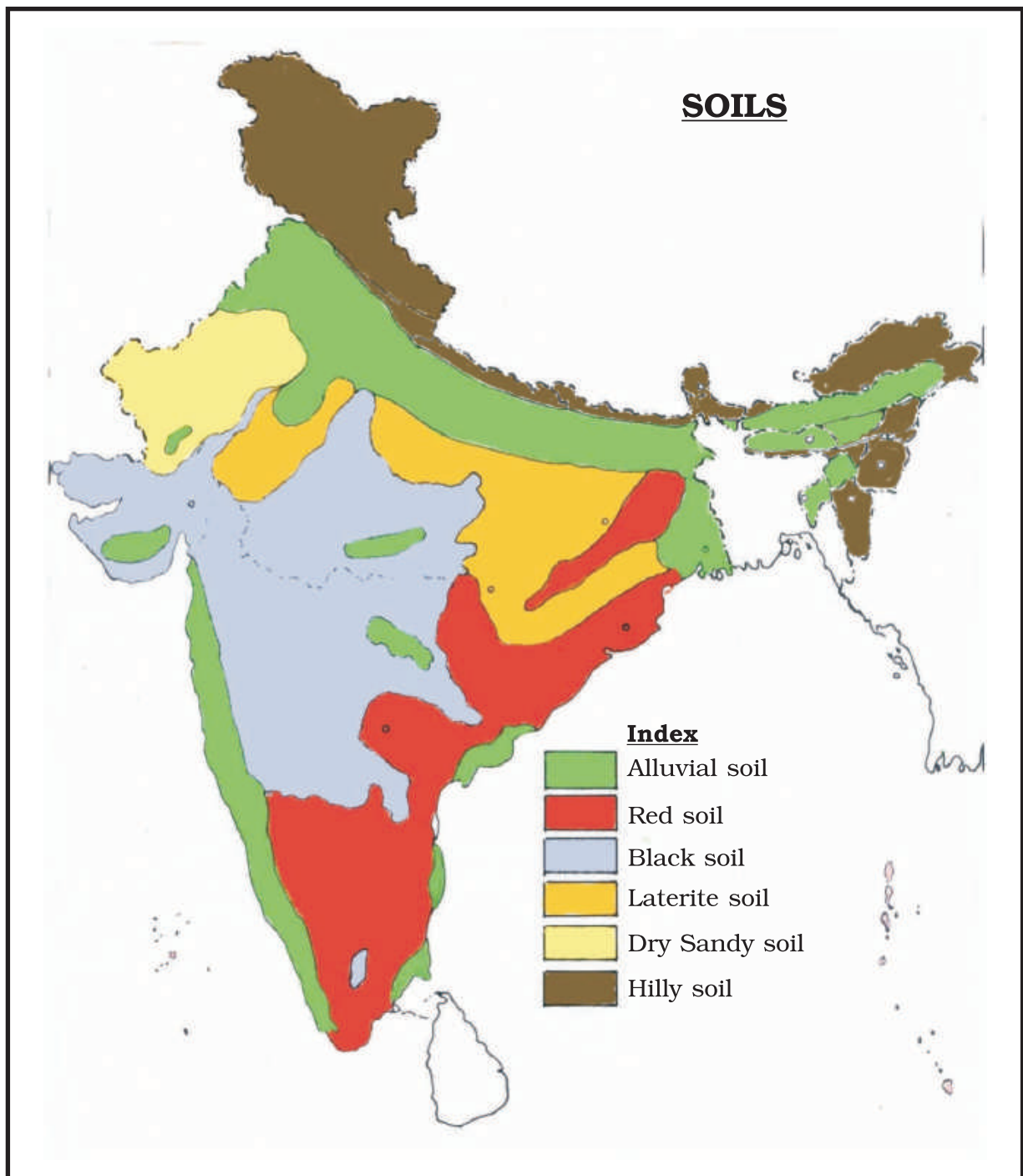
always been keen to live in fertile plains, since their origin. Ancient civilizations have also developed in fertile river valleys only. Can you name some river valley related to such ancient civilization ? The fertile soils of Indus, Nile, Tigris, Euphrates and Yangste, valleys led to the development of the civilizations. Even today high density of population is found in fertile river valleys and plains. It is because of its fertile soil that India has been able to produce food for its huge population.

Formation of soil : According to its definition, soil is that upper part of the surface which is formed as a result of the disintegration of rocks. Soil particles are fine, soft and disintegrated so that roots of the plants could spread easily. Soil is formed by physical, chemical and organic actions and changes. The soil formation process is slow and it may take thousands of years to form a thick upper layer suitable for cultivation. Besides rock material of the plants and animal wastes add to the fertility of the soil. This soil consist of two types of matter - one mineral matter and other is humus. Soil includes a number of minerals, which it obtains from the parent rock. Decayed organic matter is called humus.

Types of Soils : A variety of soil types is found in the world. Types of soil can be classified on a number of bases. Main classifications are made on the bases of their origin, texture and climate. Actually these are the elements that help in the formation of soil and its fertility. The parent rock from which the soil has been formed, transfers its characteristics to the soil.

Rivers, glaciers and winds also play an important role in the soil formation. Rivers, besides being an important source of water, play an important role in the soil formation also. World's fertile alluvial soil is found, in the rivers valleys and deltas of rivers which is a great resource for any country. This soil provides food for the major part of the world population.

You know with the change in climate, vegetation changes and vegetation type also affect the type of soils. Variation of humus as a result of change in climate is reflected in the texture of soil. On this basis main soil types are Tundra Soil, which remains under snow for most of the time. Podzol Soil of cold and humid area Chernozem or Black Soil of temperate dry lands, Desert soil of dry Sandy areas, brown forest soil of



Design 2.4 Soil in India

deciduous forest area, tropical red Soil etc. Black soil is very fertile. If water is made available in the desert areas, soil proves quite fertile in such areas. As a result of the provision of canal water in the Ganga Nagar area of Rajasthan, this desert land has become one of the fertile tracts of our country.

The land or soil has been an important source in Steppe of Eurasia, Prairies of North America and Pampas of Argentina, since they adopted mechanization of farming at a large scale. The vast grass lands are no more far cattle grazing ground but nowadays food grain Bowl of the world.

The following are the types of soils found in India :

Soils of India

- 1. Alluvial Soil :** Alluvial is formed due to the deposition of soil, carried out by rivers. This is one of the most fertile soil found on Earth. This soil is also called as deltaic soil, because it is mainly found in the delta regions of the rivers of northern plain. The soil spread over about 55% of such areas is renewed every year. The soil formed by the relatively new set of the delta regions of the Ganga or the relative new soil deposited in plains by rivers in flood is known as Khadar while the relatively older or silt which the rivers transport from the upper areas of valleys is known as Bangar.
- 2. Black Soil :** This is also called 'Regur'. The dark brown soil formed from volcanic rocks or the black soil consisting of fine particles, preserve moisture for a long time. Being useful for the cultivation of cotton, this is also known as cotton soil. It is found in hot dry areas like Maharashtra, Madhya Pradesh, Gujarat & Tamilnadu.
- 3. Red Soil :** Formed from igneous rocks, this soil is found in the hot and relatively hot areas of the eastern and southern parts of the Peninsula. Owing to the excess of iron oxide, it has red colour. Although less fertile, it yields good produce with the help of chemical fertilizers.
- 4. Laterite Soil :** This soil is found in hot and moist regions with a heavy seasonal rainfall on account of heavy rainfall and high temperature, the upper fertile layer of the soil gets dissolved and sinks down into the earth. This phenomenon is known as leaching owing to excess of iron oxide, this soil too has red colour. This soil is

unsuitable for cultivation, but is useful in house building purpose. It is found in the western ghat, Plateau of Chhota Nagpur and some parts of the eastern states.

5. **Dry Sandy Soil :** Found in the desert areas of Rajasthan and Gujrat, this soil is also known as desert soil. The quantity of the humus in the soil being less, it is not useful for cultivation.
6. **Hilly Soil :** Rich in the element of iron this soil is found mainly in the Himalyas. This is less deep and has a thin Layer. Tea is cultivated in such soil and at places where there is enough rainfall.

Soil Erosion : Soil Erosion is not only a problem in India, but it is so at global level. Non scientific cultivation, continuous cutting of trees, overgrazing of animal are some of the causes resulting in soil erosion. The rate of the soil erosion in India is amongst highest. Therefore, there is an essential need of conservation of soil. To save soil from further depletion, planting new trees, adopting better agricultural practices, checking over grazing etc. are some of the ways.

Minerals : We have studied the forces related with the origin and types of rocks. The material forming rocks is known as minerals. Minerals are yardstick of economic condition of a country.

Minerals are classified in three categories.

1. **Metallic Minerals :** The minerals that contain the metal contents i.e. Iron, Copper, Tin, Aluminum, Gold, Silver etc.
2. **Non-Metallic Minerals :** The minerals that do not contain the metal contents i.e. Sulphur, Mica, Gypsum, Phosphate, Potash etc.
3. **Energy-Minerals :** The minerals that produce fuel and energy. It means the minerals that are used in thermal plants, industries, vehicles etc. are called Energy Minerals. These include Coal, Petroleum, Natural gas and Electricity etc.

Iron : Iron is used in a smallest nail to the largest ships. The manufacturing of whole of the industrial machinery, vehicles, rails, machinery for agriculture, all is based on this mineral. Iron & Steel has brought a revolution in the industrial sector.

Iron deposits are found in approximately all the continents. In India it is mainly found in Orissa, Bihar, Madhya Pradesh, Chhattisgarh, Karnataka and Goa.

Copper : Copper is the first metal known in the human history. Copper comes next to the iron from industrial point of view. The metal era started with the use of copper, as utensils of different types are made out of copper. The importance of copper has increased nowadays. Being good conductor of heat, this is used in making electric appliances. Besides, cable wires, it is used in telephone, railway engines, aeroplanes and watches etc.

In Chile (South America) the production of copper is the highest in the world and United States of America stands second. Many copper producing regions lie in Africa while India, Japan, Australia also produce copper. In India, the deposits of copper are found in the states of Jharkhand, Madhya Pradesh, Andhra Pradesh and Rajasthan.

Bauxite : Aluminium is extracted from bauxite. Aluminium is a light weight metal which is mainly used in manufacturing of aeroplanes. Besides, it is used in manufacturing rails, motors, buses, cars and making electric wires. The goods made out of this metal are used for a long time because it is a rust free metal. Utensils are also made of this metal.

The extraction of bauxite is highest in Australia in the world. In India, bauxite is extracted in Maharashtra, Madhya Pradesh, Chhattisgarh and Jharkhand.

Manganese : Manganese is also an important mineral. It is mainly used in making steel from the iron ore. It is also used in making bleaching powder, pesticides, paint and mirrors.

The manganese deposits are found in Kazakhstan, Russia, Ukraine and Georgia. Besides these countries, South Africa, Brazil and India are the main producers of the manganese. In India, Madhya Pradesh, the production of manganese is highest. Manganese is found in the states of Andhra Pradesh, Karnataka, Orissa and Jharkhand also.

Mica : Mica is a non-metallic mineral. It is also very useful mineral that is why it is also of great importance. This mineral is used in making electric goods. It is also used in making lamps, chimneys, paints, radars, rubber, paper, aeroplanes, transparent sheets.

There are big deposits of fine mica in India. From this point of view India stands first in the world.

The main regions producing mica in India are; Jharkhand, Bihar, Andhra Pradesh, and Rajasthan. India exports mica in a large amount and earns foreign exchange. Besides India, Russia, United States of America, Brazil, Argentina, Canada are also mica producers.

Mineral fuel : Mineral fuels like, coal, mineral oil and natural gas, are found in abundance in the interior of the earth. Now a days the importance of mineral fuel has been increasing. Mineral fuel is used in almost every industry. Besides this, it is also used in homes, hotels, shops and means of transportation. The countries which have scarcity of this resource or use this resource in small amount lag behind on the development front.

Coal : Coal is also a major mineral fuel. The coal is not directly in much use now and is rather being used for producing thermal electricity. It is easy to transport electricity through wires from the place of production to the other places. For the purpose of thermal power, Lignite and Peat types of coal are used. The submergence of forests in deep layers of the crust in the long past and a result of heat and pressure of the upper layers has produced coal.

The coal reserves of world are mainly found in the areas between 35° to 65° latitudes. Around 90% of the coal of the world is explored in China, United States of America, Russia and European countries. Besides Southern America, Africa, North America and the continent of Asia also have large reserves of coal. Coal is found in Japan and Thailand also. India produces 5% of the coal of the world. Damoder valley is a main coal producing area of India. Besides, West Bengal and Madhya Pradesh states also have coal mines.

Mineral oil : It is known as Petroleum and also as mineral oil because it is extracted from the Earth.

Locomotive Energy : The energy by which locomotives move.

For its use at large scale and importance, it is also known as **liquid Gold**. Word petroleum is synthesis of two words 'Petro and Oleum'. In latin language 'Petra' means rock and 'Oleum' means oil. Therefore the literal meaning of oil extracted from rocks is petroleum. It is made out of the vegetation and animals trapped between layers of sedimentary rocks.

The petrol or diesel is not obtained in the same form from the earth, which we get from petrol pumps. It is obtained in an unrefined state. known as crude oil. Crude oil is refined in the refineries and converted into utility goods i.e. Petrol, diesel, kerosene oil, mobil oil, grease, wax, vaseline etc.

The largest oil reserves of the world is in South West Asia. In this area, include the Saudi Arabia, Iran, Iraq, Kuwait, UAE (United Arab Emirates) in which seven emirates Abu Dhabi, Dubai, Sharjah, Ajmer, Fuzera, Umar-Al-Quain and Russalkhema are included.

Points to Remember

1. Upper most layer of earth is known as crust which is made of Aluminium and Silicon primarily.
2. Central layer of earth is made of Silicon and Magnesium while inner most part is made of Nickel and iron particles.
3. Crust of the Earth consists of various rocks. Those rocks may be metamorphic, sedimentary or igneous.
4. Weathering of rocks provides us soil. Soils may be categorised according to their use and characteristics.
5. Minerals are wealth of any nation which are bases of development of any nation.



I. Give answer to the following questions approximately in 1-15 words.

- i. How many shells of the earth are there ? Name them.
- ii. How many types of Rocks are found on the earth.
- iii. Write down about the Mantle part of the earth.
- iv. Why the 'Sial' layer is known by this name ?
- v. By which name the inner most part of the earth called ? What are the components of this part ?
- vi. Write about the Mantle part of the earth.
- vii. How can we avoid soil erosion ?

II. Give answer to the following questions approximately in 50-60 words.

- i. What are igneous rocks ? How many types are there in these rocks ? Write about the Intrusive rocks.
- ii. What are the Sedimentary Rocks ? How many types are there of these rocks ?
- iii. Write about the Metamorphic Rocks, give specific example of these rocks.
- iv. Classify the minerals available in the earth's crust.
- v. In which category mica is classified, for what purpose is it used ?
- vi. Which mineral is called as 'Liquid Gold'. Give brief introduction.
- vii. Write down the importance of the soil on the earth.

III. Write the answer to the following questions approximately in 125-130 words.

- i. Write in detail about the rocks available on the earth.

- ii. What are minerals ? Which minerals are available on the earth ? Classify them and write about the metallic minerals.
- iii. What are mineral fuels ? Give details of any mineral fuel.
- iv. Write in detail about the soil available in India.



1. Make a model of the earth showing its layers.
2. Is soil erosion a serious problem ? Discuss it in your class.

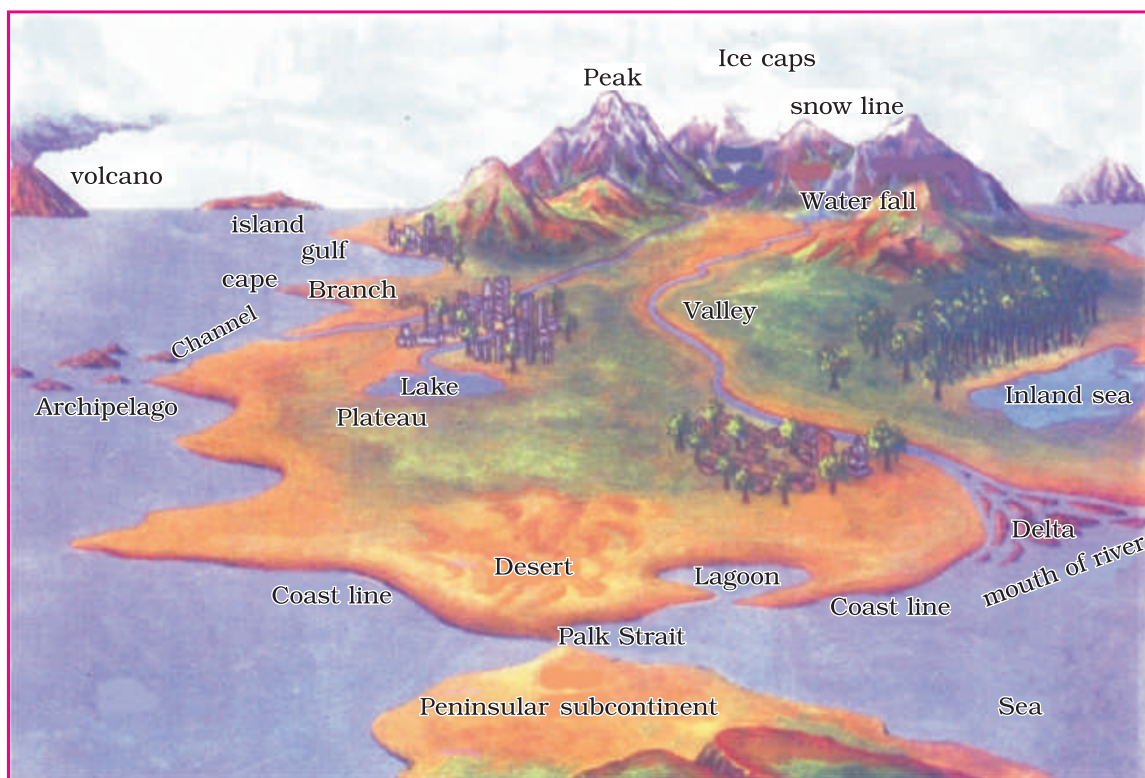


Lesson 3 The Changing face of the earth and land forms

Earth has been undergoing a continuous change which is to go on forever. The forces acting at the earth surface bring change internally and externally as well. These forces work collectively and can be classified in two categories :

1. Internal Forces : The endogenic forces bring change in the earth surface through earth quake and volcanic activities.

2. External Forces work through weathering, running water, river and nullahs, underground water, wind, glaciers, ocean waves, animals and plants and are known as exogonic forces also.



Design - 3.1 Land forms of the earth

Internal forces : These internal forces are called Tectonic forces also and act through folding and faulting. Our knowledge about the structures and physical conditions of the interior of the earth is inadequate. However their effect may be seen on the surface of the earth in the form of major land forms. While the endogenic forces give birth to broad relief at earth surface, Exogenic ones intend to smooth it. These two forces act on the earth's surface simultaneously, modifying its appearance and forming various landforms.

Since the origin of the earth, its surface has been experiencing changes at large scale. The relief features which we see today, never existed in the beginning when the earth's crust solidified from gaseous state. It means that there were no mountains, plains, plateaus or oceans and present land forms came into existence by the powerful forces operating from within the crust of the earth.

Land forms on the earth : According to the design no. 3.1 you will observe that the earth surface is not even every where. There are high mountains, plateaus, plains, seas, valleys, deserts etc. These different types of land forms are the result of internal/tectonic forces and external forces of the earth. Therefore the earth has been continuously changing. These changes occur on earth after long spans. It means some changes are due to very slow movements. It is very necessary to study these landforms as they also affect the human activities. These are mainly divided into three categories.

1. Mountains
2. Plateaus
3. Plains

Mountains : Approximately 26% of the earth surface is covered by mountains. These landforms have a height of 600 to 15000 mt. from the sea level. These are sloping to plains, sometimes make a sharp angle to the plane. There are different types of mountains on the earth and may be classified according to their origin, age, height, location and on the bases of their morphological activities. These classifications are :

- a. Fold Mountains
- b. Block Mountains
- c. Eroded or Dissected Mountains

On the basis of the action process, the forces which act under the crust of Earth can be divided into two following types :

- 1. Slow movements
- 2. Sudden movements

Slow Movements : Such movements take at quite long span of time to complete their action. Their effect may not be detected ever during whole of our life span. On the basis of their direction of operation these can be divided further into two types.

(i) Vertical Movements : The vertical movements are responsible for a rise or fall of a portion of the earth's crust, rise of earth's crust in relation to surrounding area is called uplift and the fall is called subsidence. The vertical earth movements on a large scale result in formation of plateaus on the continents. Hence they are called continent forming movements.

(ii) Horizontal Movements : The Horizontal movements are responsible for folding and faulting and disturbing the horizontal arrangement of the layers of rocks. In the process both the forces of compression as well as tension are involved. The compression lead the sediment into folds.

The upward rises are called as **Anticlines** (up fold) and the areas that subsidises (lower fold) are called as **syncline**. This is similarly as shown in the design 3.2.

Due to the horizontal force of tension, the earth crust displaced along the fault line. The land between the two parallel faults either rises or subsides. The uplift portion is called Horst or **Block mountain** and depression is termed as **rift valley**.

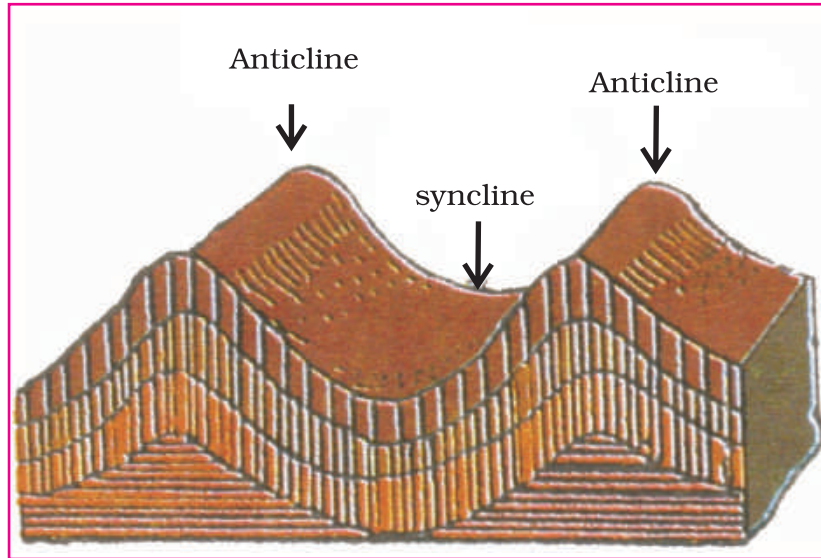
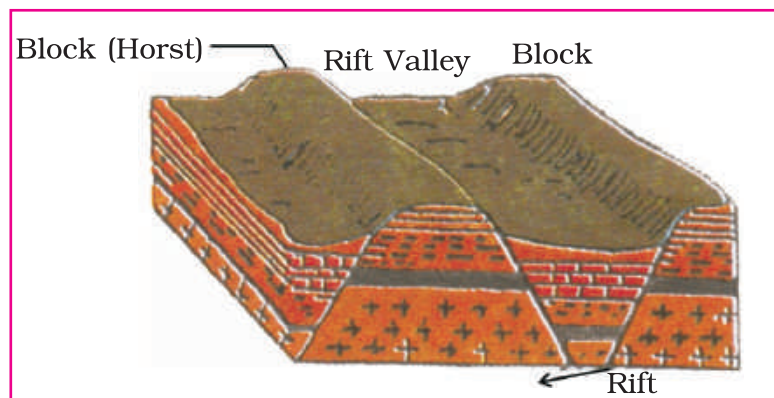


Diagram 3.2 Fold Mountains

The Black forest of Germany and the vosges in France are the typical examples of Block Mountains. The rift valley in East Africa and Vindhya mountain in India are the typical examples of these. Rhine river of Europe and Narmada & Tapti rivers of India flow through rift valleys.



Design 3.3 Block Mountain & Rift Valley

Large scale horizontal movements are responsible for mountains. Hence, they are called mountain forming movements.

Importance of Mountains

Mountains have special importance for human life. They play a special role in determining the climate of a country. For example, the Himalayas

protect India against the extremely cold winds blowing from the North. As a result, the temperature of North India does not fall much below in winters where as in China region, falling in the same latitudes, the temperature falls much lower. Rivers originating from the mountains, supply water for irrigation and generation of electricity. Forests along the mountains are a source of wood used for building and of herbs. Several mountainous regions have mines of various types. Mountains also have special importance from the view point of tourism, health resorts and beauties of nature.

All the major mountains of the world the Himalayas, The Rockies (North America), the Andes (South America), The Alps (Europe), are the fold mountains which owe their origin to these movements.

Sudden Movements : We study slow movements of the Earth previously, which have changed the face of earth. It means due to these movements, different types of mountain came into existence. The sudden movements are abrupt and quick. Sometimes within seconds they raise local area upwards or cause them sinking. These are mostly notice during earth quakes or volcanic activities.

Volcanoes : Among the endogenic forces the volcanoes is typical operation process. The process of volcanoes is related with the eruption of **magma**, the molten viscous rock material through the soft surface of the earth and accumulates on the earth surface. Due to process of earth quake, the cracks appear on the earth surface; which increase the activity of Volcanoes. Our scientists are not fully aware of the reasons of volcanic activity. It is essential to have knowledge about volcanic activity; as whenever there is eruption of volcanoes, these cause great loss of life and property. The krakatova- Volcanic eruption caused tidal waves about 16 metre high killing 3600 people in west Jawa. The Volcanic eruption in Mexico in 1943 depopulated an area of 750 sq. kilometers and caused huge loss.

The volcanoes are not only harmful, but they bring some good effects also. They produce valuable minerals and gases. The weathered and decomposed volcanic rocks yield very fertile soil. Crater lakes are formed in the crater of extinct volcanoes. Lake lonar in Maharashtra in an example of crater lake. Geysors and hot springs are found in volcanic activity

areas. Some of which are being utilized to generate power. The volcanic area also presents a great deal of scenic beauty and are the center of tourists' attraction.

Types of Volcanoes : These can be divided into three types

- i. Active Volcanoes
- ii. Extinct Volcanoes
- iii. Dormant Volcanoes

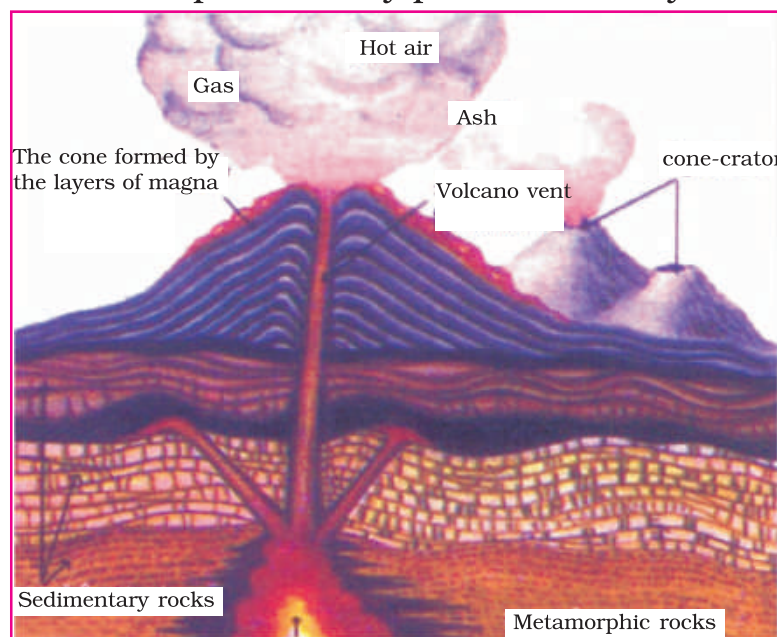
i. Active volcanoes : The Volcanoes, which erupt fairly frequently as compared to other or have erupted in the recent past are called active volcanoes. These are located in and around the Pacific Ocean, hence this belt is known as **Ring of Fire**.

ii. Extinct Volcanoes : Extinct volcanoes are those, which have not erupted in the historic periods. They are considered to be dead and are not expected to erupt in the near future.

But many a times a volcano thought to be extinct, may suddenly become active

Vesuvius volcano in Italy which was considered to be extinct erupted suddenly in 1979.

iii. Dormant Volcanoes : These are also sleeping volcanoes, Dormant Volcanoes have erupted in early period of history but are now quite



Design 3.4 - Volcanoes

extinct. The Barren Island volcanoes to the east of Andaman in India are dormant volcanoes.

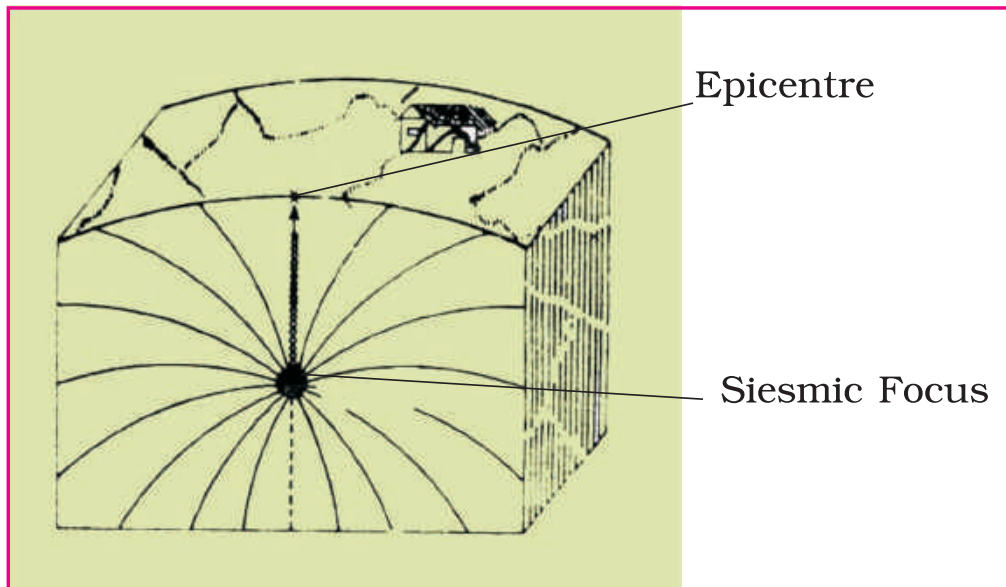
Volcanic Mountains : The mountains formed by volcanic activities called by volcanic Mountains. The vent or fissure on the earth surface, through which the hot liquid rock material, hot air and gas, ashes etc. other gushes out of the earth surface and accumulate in the surrounding area in the form of a cone as shown in fig. 3.4.

The volcano eruption can also occur on the surface of the earth through a narrow crack. This crack may be several kilometer long when the lava (magma) erupting out of the crack it spread to a large area. The Deccan trap is the typical example of this volcano in India.

Earthquake : In general, the trembling of the earth is known as earthquake. It is the synthesis of two words earth & quake, where quake means 'the trembling' therefore, it is a trembling of earth. Usually the earthquake are the mild tremors of the earth, sometimes change into strong and long, then to a severe tremor.

Why earthquake occurs : Our earth's surface is made up of many land masses, which are placed adjoining to one another. These are called Tectonic plates.

These tectonic plates has been floating on viscous liquid. As you have already studied in the previous chapter that the inner most part of the earth is made up of viscous rock material. While floating on the liquid, the plates strike with each other which make a pressure on the crust thus the cracks appear on it. With this movement the waves arise from the centre of the disturbance below the surface, which is called '**Seismic Focus**'. Vibration or earthquake waves travel in all directions. The point on the earth's surface vertically above the focus is called **epicentre**. The shaking is the strongest near the epicentre. As a result big destructions are caused near the epicenter and effect softens away from the epicenter. Records show that most of the earthquakes originate from the **seismic centre** which is at the depth ranging from 50-100 kilometres beneath the earth surface. If the focus is deep within the earth, the tremors are too weak to reach the surface or cause much damage.



3.5 The siesmic focus and epicentre of the earth

How the intensity of Earthquake can be measured

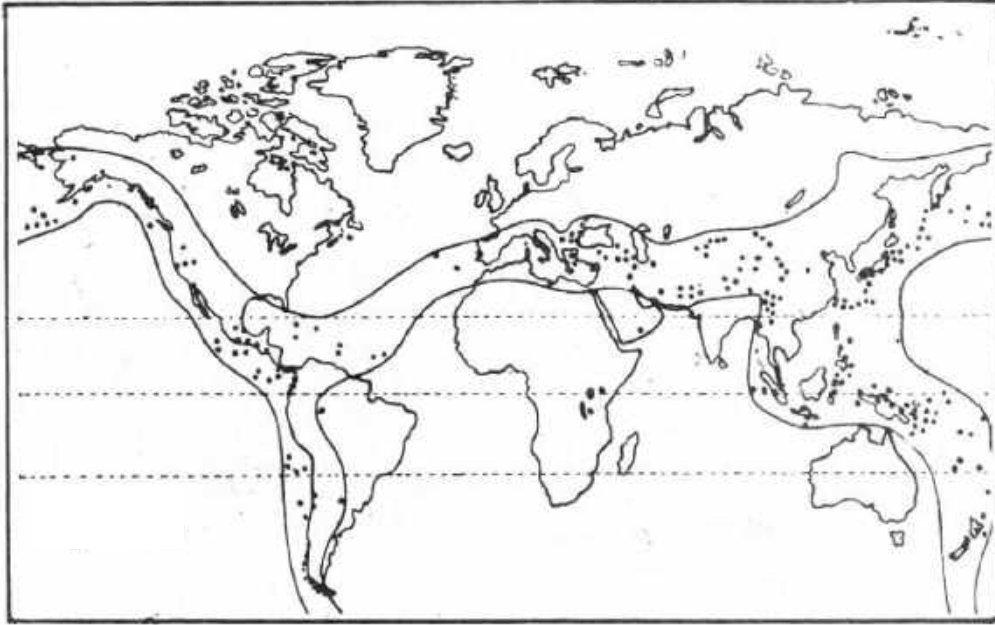
How much intense any earthquake is, depends upon the shock waves measured on a Siesmograph. It is also measured by estimating the destruction to wealth and animals, building and the man made and natural structures.

Siesmograph is an instrument recording the shock waves.

There are two methods of measuring the Earthquake.

- i. Richter's scale :** This is an open measurement of earthquake intensity i.e. how much intense was the earthquake. Therefore the earthquake at 8 Richter scale is stronger than that of earthquake with 4 Richter scale.
- ii. Mercali's scale :** It is classified into 12 class, the range vary from one with no destruction and 12 - is denoted by the highest destruction due to the earthquake.

Distribution of earthquake areas : About two third of the earthquake occurs in the world occur in the region of Pacific ocean, "ring of fire". Which is closely linked with the region of volcanic activity and crustal dislocation. Second belt, the mid world belt which accounts for about 20 percent of earthquakes run through mid Atlantic island. Alps mountains, Himalayas and Indonesia.



Design 3.6 The distribution of earthquake areas in the world

The earthquakes in India are mainly confined to the Himalayan region and its foot hills. The effect of these have also been felt in the plains of Ganga. There have been a number of violent earthquake in historic time causing large scale damages.



3.7 A scene after the earthquake

A case study of Gujarat earthquake : In Jan 26, 2001 a earthquake occurred in Gujarat. More than, 13000 people were killed, more than 15 Lacs people injured and more than 3.4 Lacs buildings were damaged. The epicentre of the earthquake was 'Bhuj'. During this earthquake a fault occurred from East to West. Due to this compression the Indian tectonic plate was displaced to northward towards Eurasia.

Plateaus

Plateau is an upland area with steep slopes and a levelled summit. Normally its height is between 300 and 600 metres above sea level. It is also known as tableland. However, plateaus are not distinguished from plains and mountains merely on the basis of height above sea level for example the plateau of Bolivia in Europe is 3660 metres high above sea level and the plateau of Tibet, the highest in the world is 6100 metres high above sea level. Its height is greater than even some mountains, for example, the piedmont plateau of Appalachian Mountain in North America is only 900 metres high above the sea level. Thus, the plateaus are distinguished from plains and mountains not on the basis of their height above sea level, but their shape, structure, origin and the height of the surface are also taken into account. The most important basis for the identification of a plateau is its situation. Plateaus are of three different types:

(a) Intermontane Plateaus

Plateaus surrounded by mountains on all sides, are known as intermontane plateaus. The Plateaus of Tibet, Anatolia and Bolivia belong to this class.

(b) Piedmont Plateaus

Plateaus which have a mountain on one side seem to be situated at the foot of the mountain. They are called piedmont plateaus. Piedmont plateau of the U.S. the plateau of Malwa in India and the plateau of Patagonia in Argentina are best examples of such plateaus.

(c) Continental Plateaus

Continental Plateaus are generally very extensive and are surrounded by ocean or the plains. Prominent examples are the plateaus of Southern

India, western Australia and Africa. Density of population on plateaus is less than on mountains.

The importance of Plateaus : Like mountains plateaus too are important for human life in various ways because they contain several minerals like iron, copper, silver, gold, valuable stones etc. The grasslands being plentiful in plateaus, the occupation of animal rearing is important. Lava generated plateaus have fertile soil, which is useful for agriculture. In most wet regions, plateaus have several waterfalls, which are important from the point of view of tourism and generation of hydroelectricity.

External forces : These forces are generated by the solar energy. These are also called as Gradational forces and bring down the angularities or smoothing of the relief of the earth by operating through natural agencies of weathering; wind, running water, glaciers marine waves and animals and plants. They are permanently engaged in conjunction with forces of gravity in transforming the face of the earth. With the aim of bringing the earth's face uniform. The agents of the gradation accomplish this task through four stages.

- a. Weathering - Preparation of the rock material by erosion.
- b. Picking up the rock material.
- c. Transporting the materials by different modes.
- d. Deposition of the materials.

Weathering (Erosion) : The process of lowering down the high standing relief and their transportation ultimately to be deposited in the depression on the earth's surface. Cutting down of the high feature is known as **degradation**. Depositing of broken and transported rock material by different agents in the depressions is called as **aggradation**. In this process plains occurred on the earth surface.

Plains : Plains are the low lying and even features on the earth's surface. Their average height above the sea level is approximately 300 metres. They are gentle or have no sloping areas.

These processes help in making two types of plains :

1. The plains formed by degradation
2. The plains formed by aggradation

1. **The plains formed by degradation :** The plains are formed by the different agents of weathering i.e. rivers, glaciers, under ground water, wind etc. The highlands like mountains or plains undergo erosional processes for millions of years, lowering down and result in the formation of plains or almost a plain like features on the earth surface. These plains are also called **Pene-plains**. The Amazon basin of South America which is **eroded by river** Amazon, the plains of North Canada, North Europe, Western Siberia are weathered by the erosional processes of **glaciers**. The Sahara plains in Africa are formed by **wind erosion** processes, are some of the typical examples of these weathered plains.
2. **The Plains Formed by aggradation or Depositional Processes :** These plains come in to existence through the depositional activities of the different agents of deposition: i.e. by deposition of the materials brought by the Rivers, Glaciers, Underground water and Wind. The plains formed by depositing the silt brought by the rivers and Glaciers are called Alluvial Plains. The Plains like Ganges Plain in India, Hwang-He river plains in northern China, Young Tse Kiang of central China are the typical examples of Alluvial Plains.

When the flow of water in the rivers slows down, the rivers start leaving behind the material brought by it. In this way a triangular type of plain comes into existence which is called **Delta Plain**.

Delta of Ganga in India, Delta of Hwang-He-in China, delta of Mississippi in United States of America are the typical example of deltaic plains. The plains of **North America** and **Northern Europe** are formed by the **deposition by glacier**.

The Plains formed by wind deposition : The plains include the 'Loess Plain' of china which are formed by the deposition of powdery type of soil brought by wind from the dry areas.

Lacustrine Plain : The plains formed by the deposition of sand/silt on the ground areas of lakes, and other stagnant water bodies. For example Kashmir valley plain in India, Imphal basin in Manipur are the some of the typical examples of this type of plains.

Coastal plain : The plains formed by eroding, picking and depositing the rock material by the sea waves along the continental shelf are called, coastal plains. For example the coastal plain of Kerala in India is formed similarly.

The Importance of plains : Plains are very useful for human beings. Almost even relief, fertile soil, appropriate level of underground water make them unique example from the economic point of view. Due to these reasons, the activities like agriculture, industry, means of transport and communication are more developed in these plains. Eighty out of hundred people (80%) of the world population live in plains. These are known by the name of **Food Grain Bowl** of the world.

Points to Remember

1. Changes occur continuously on the surface of Earth which may be due to internal or external forces of Earth. These forces may act vertically or horizontally and slow or fast.
2. Three types of physical features are found on Earth, namely Mountains, Plateaus and Plains.
3. Mountains are generally of four types, namely; Fold, Block, Dissected and Volcanic.
4. Plateaus are of three types mainly, Intermontane, Piedmont, Continental.
5. Plains may be formed by erosion or deposition of soil.



I. Give answer approximately in 1-15 words to the following questions.

1. In how many categories can we classify the forces which have changed the face of the earth?
2. Name the main land-forms of the earth.
3. On the basis of action process in how many types can we divide the internal forces of the earth.

4. On the basis of direction effect classify these internal forces.
5. What is a Puzzle ?
6. How does a sudden movement affect the earth ?
7. Name the two scales which are used to measure the intensity of the earthquake.
8. Which are the two processes that involve in making of Plains?
9. Write about the coastal plains.

II. Give answer to the following question in approximately 50-60 words.

1. How did the fold mountain came into existence, Give examples.
2. What is the difference between Block mountain and Rift Valley.
3. Which are the processes involved in the plateaus forming on the earth ? What is their importance ?
4. How do the mountains affect us? How many types of mountains are there? Name them.
5. Explain the plain formed by the process of aggradations give example.
6. Give a case study regarding the earthquake occurred in Gujarat.
7. Write down the types of volcanoes.
8. Write down the distribution of earthquake areas and volcanic hit areas of the world.
9. Write about the following:
 - (a) Plains formed by wind deposition
 - (b) Lacustrine Plains

III. Write down the answer in approximately 125-130 words of the following questions.

1. How do the External and Internal Forces of earth change the face of the earth ? Throw light on the plains formed by the process of weathering.

2. How the internal forces worked out in changing the face of the earth.



1. Make a diagram/model of volcanic mountains.

2. **Make right pairs :**

- | | |
|-------------------------|-----------------------|
| (a) Pacific Ocean | 1. Himalyan Mountains |
| (b) Continental Plateau | 2. Earthquake |
| (c) Lonar Lake | 3. Ring of fire |
| (d) Fold Mountain | 4. Maharashtra |
| (e) Richter Scale | 5. Southern India |





The existence of mankind and other living beings have only been possible on the Earth because it is surrounded by a cover of air. This cover is known as Atmosphere and it extends upto 1600 km. in height while 99% of the air is found at height of upto 32 km only. This atmosphere interacting with Lithosphere (Land) and Hydrosphere (Water) is responsible for creating and maintaining of plants and animal life on the Earth. The elements of atmosphere, temperature, humidity, atmospheric pressure and winds affect the physical environment of the Earth. Out of all the elements of the environment, atmosphere experiences maximum changes.

Elements of physical Environment : Lithosphere (Land), Hydrosphere (Water) and Atmosphere (Air) are the main elements of the physical environment.

Elements of Atmosphere : Air, Temperature, Humidity (Water content in air), Atmospheric pressure (Weight of the air engulfing the Earth) etc. are the elements of the Atmosphere.

Composition of Atmosphere: The atmosphere consists of gases, water vapours and dust particles. Heavier components like dust particles and water vapours are found only in the lower layers of the atmosphere. As we go higher in the atmosphere the density of gases goes on decreasing. Nitrogen, Oxygen and Carbondioxide constitute 99% of the atmosphere. All other gases account for less than 1%. The contents of water vapours and dust particles vary from place to place as determined by the degree of temperature. A sample of pure dry air in the atmosphere contains gases in the following proportion :

Gas	No of Quantity
Nitrogen	78.03%
Oxygen	20.99%
Argon	00.94%
Carbon dioxide	00.03%
Hydrogen	00.01%

Nitrogen mostly circulates in the lower layers of the atmosphere and checks destruction of the plant life.

Oxygen is the second important gas that supports animal and human life.

Carbon dioxide is the third important gas and is as essential for plant life as oxygen is for animal life. It also acts as blanket and does not allow the heat to escape.

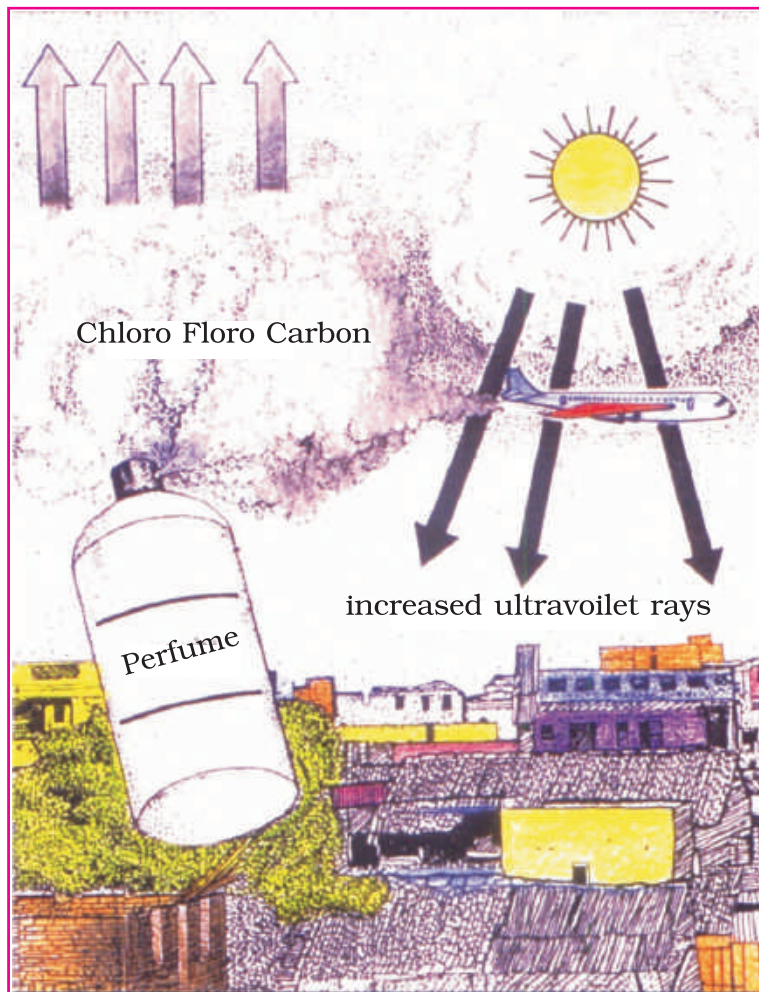
Water Vapour : The water vapours also have an important place in Atmosphere. They help in change of climate.

Convectional Current: As you know, by heating gas expands, the density of air reduces and it starts rising upwards in its turn the cool air due to high density comes in contact with earth surface. It means when the heated air rise upward and is replaced by the cool air. Thus the circulation of the air starts. This is the cycle of convection.

Pollution of Air : Every year millions of tons of substances are added to the atmosphere which are not natural compenents. These foreign substances in the atmosphere are called **air pollutants**. There are two kinds of air pollutants-solid and gaseous. Volcanoes are most common source of pollution in the atmosphere. Human activities also add large amount to solid pollutants to the air, particularly in cities smoke from the burning of fuels release carbon particles (Coal) and other solids into the air. Industries release dust particles in the air on a large scale through various operations. Asbestos is a dangerous form of solid pollution.

One of the most dangerous sources of gaseous pollution is exhaust

materials of the automobiles. It add carbon monoxide to the air in areas of heavy traffic and is very poisonous. Now a days we also talk about some, combination of natural fog and smoke called as **Smog** which is a mixture of substances that cause serious health problems. Low level ozone is an effect of air pollution, caused by heavy traffic and industries, particularly in industrial areas where many people live and work. Laws have been passed to control the sources of air pollutants. But, we ourselves have to be aware in this regard to combat pollution of air.



4.1 Design - Air - Pollution

All these gases hold the suspended particles of dust, carbon, salt, pollen grains but only in the lower layers of atmosphere.

Structure of Atmosphere :

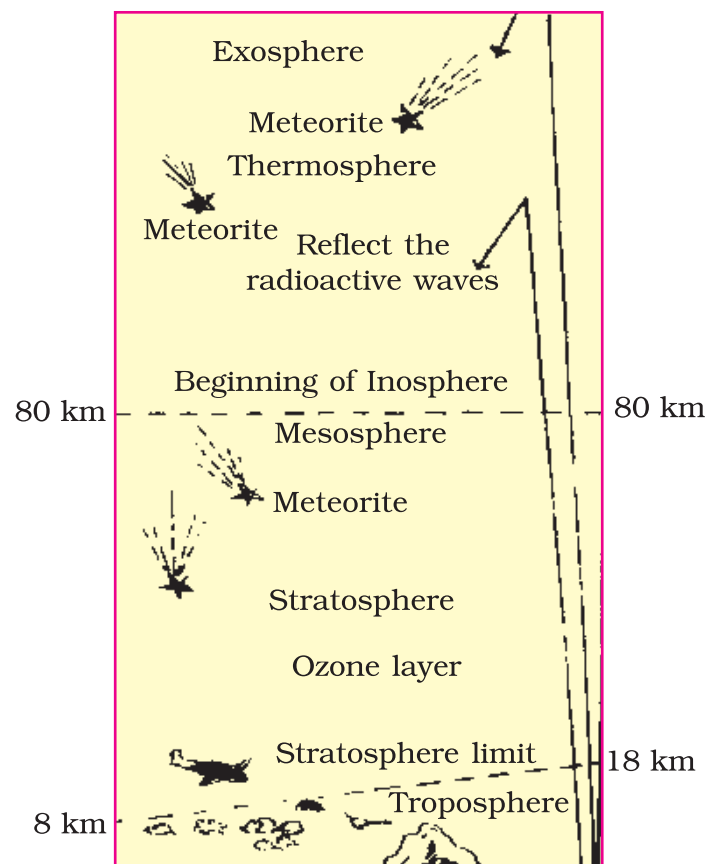
In the previous decades enormous knowledge has been collected

regarding atmosphere by sending satellites in the space. On the basis of this knowledge, atmosphere may be divided into following layers :

- i) Troposphere
- ii) Stratosphere
- iii) Mesosphere
- iv) Thermosphere

Troposphere :

The lowest layer of the atmosphere is called **Troposphere**. Atmosphere is oval in shape with average height of troposphere is 12 km. It is higher at the equator, i.e. 16-18 km and lower at the poles to 6-8 km. The entire weather phenomenon takes place only in this layer i.e. Rainfall, Storms, Clouds, Typhoon etc. The contents of water vapour are also high in this layer. As we go high up, the temperature decreases. The temperature decreases at the rate of 6-5 degree celsius per kilometer. The 75% of all the air, is present in this layer.



4.2 Layers of Atmosphere

Stratosphere : Above the troposphere layer, the second layer of the atmosphere is called **Stratosphere**. The height of this layer varies with seasons and latitudes. During summers it begins at a greater height than during the winters. Its height at the equator is about 15 kilometres. But above the 60° latitudes and beyond it is 10 kilometers. The main characteristics of this zone are rarified air, low but constant temperature and general absence of clouds. Therefore, there are no convectional current in this zone. The thickness of stratosphere is almost 50-55 km. This zone is ideal for flying of aircraft. The ozone gas in this layer absorbs the ultra violet rays of the sun which are harmful to the human life on the earth surface.

The upper limit of this layer is known as **tropopause**, this usually begins at 50 km height of the atmosphere. The temperature in the layer neither increases nor decreases. It remains constant.

Mesosphere : The layer above the tropopause is **mesosphere**. This layer extends upto 50 km. to 60 km. The temperature in this layer goes on decreasing with the rise in height. The temperature at 80 km height is -90° Celsius.

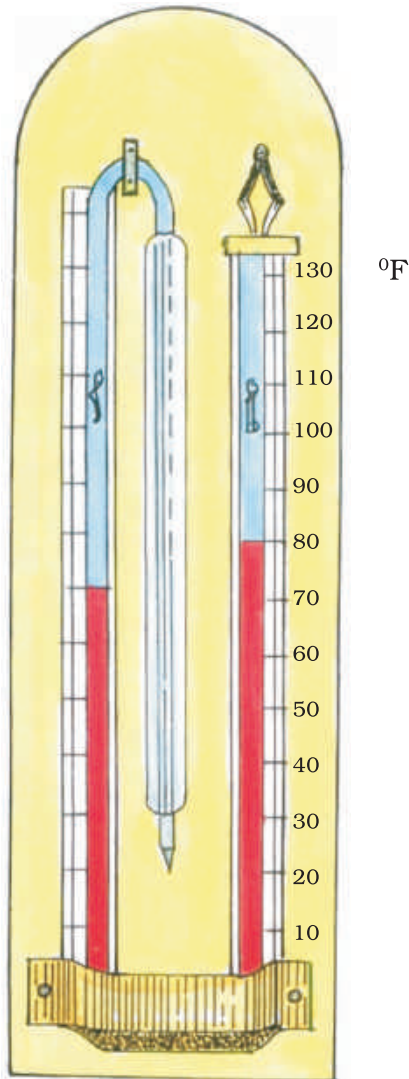
The upper layer of the mesosphere is called as Mesosphere limit. Beyond this limit of atmosphere the temperature starts rising.

Thermosphere : Beyond the mesosphere, the layer of atmosphere is called as **thermosphere**. Temperature starts rising as we go high. There are much less contents of gases in this layer.

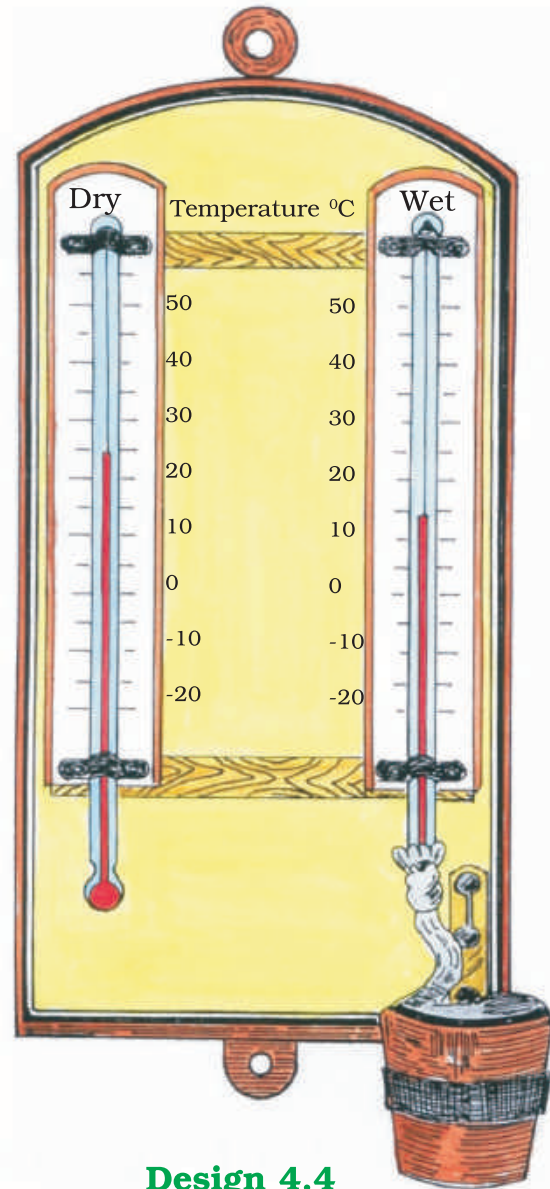
The lowest limit of thermosphere is known as **Ionosphere** which extends upto 100 km.to 300 km. It contains electrically charged particles which help in the reflection of radio waves back to the earth and are much of value for wireless communication. The upper limit of this layer is called **exosphere**. We do not have much knowledge about this layer but it is considered to have the gases with low density like Hydrogen & Helium.

Weather : By weather of a place is meant by the condition of the temperature, atmospheric pressure, rainfall, speed and direction of the wind of a place for about 24 hours. These conditions change from day to day.

Climate: It is the average of weather conditions of a place over a long period generally of 30 to 35 years. It depends upon various factors, as the latitudes, altitude, distance from the sea, prevailing winds, ocean currents, cloudiness, rainfall and slope of the land and other geographic conditions.



Design 4.3
Maximum & Minimum
Thermometer



Design 4.4
Dry & wet bulb
Thermometer

Temperature : The heat of the air is called temperature. Similarly the internal heat of a good or living being is also called temperature. The temperature increases or decreases and same type of variation in day

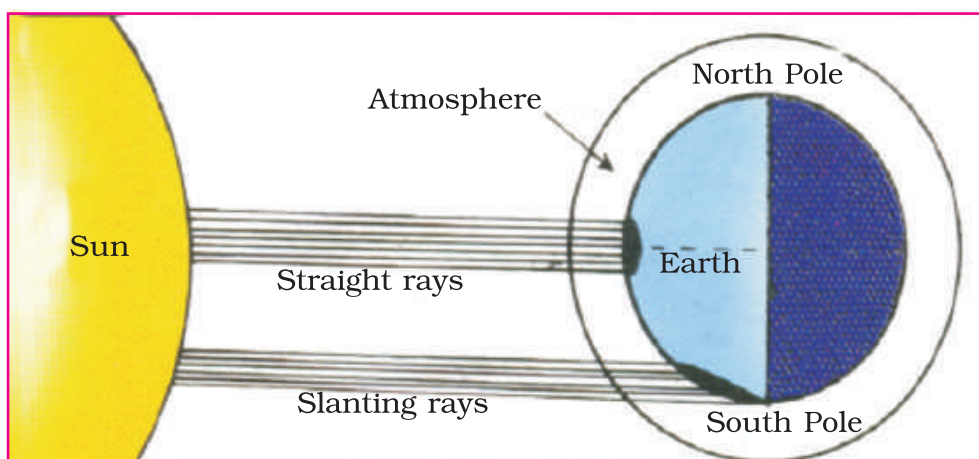
and night temperature is also there. Similarly the temperature varies with change of season. The temperature differs from place to place hence the weather conditions of one place differ to that of weather conditions of other place. Although there are so many factors that affect the weather of a place but temperature of the air is one of the main elements.

There are only two sources of temperature that heat the earth. Sun and internal part of the earth. Out of these, the sun is more important. The insolation (heat from the sun) primarily heat the surface of the earth then heat the atmosphere. There are so many factors that affect the insolation received at a place. Before knowing about the other factors, we must know how to measure the temperature.

The temperature is measured by **Thermometer**. It is demarcated in degrees. For measuring the temperature two units are used, one is Celsius and the other is Fahrenheit. According to the Celsius unit of measurement, water boils at 100°C & freezes at 0°C and according to Fahrenheit measurement water boils at 212°F and freezes at 32°F .

Factors affecting the temperature: Following are factors that affect the temperature of the earth.

- a) **Latitude :** The temperature of a place depends upon how much insolation it gets. The rays of the sun fall directly on the equator therefore the temperature is high over there. But as we slip away from the equator the temperature goes on decreasing because the rays of sun fall slanting on the poles.



Design 4.5 Inclination angle of sunrays

- b) **Height above the sea level :** When we go higher above the sea level. The temperature starts falling. Insolation that is received on the earth is primarily heat the surface of the earth. Then the atmosphere gets heated thus the places near the surface or lower in height are hotter than the places at higher in height. This is the reason, when we go up to hill side the temperature decreases.
- c) **Distance from the sea :** There is a moderate type of climate near the sea, it means that the temperature neither extremely high nor extremely low. But as we go away from the sea the range of temperature increases.
- d) **The texture of earth surface :** Which type of the vegetation is there, whether the earth's surface is covered by ice or is a dry desert. These are the factors that affect the distribution of temperature. Where the earth surface is covered by ice the reflection of sun rays occurs which causes the low temperature. In dry areas there is high temperature during the day time, because sand gets heated easily. Where there are dense forests, the temperature neither shoot up extremely high up nor fall down extremely low but it remains the moderate.
- e) **Slope of the Land:** Slopes facing the sun have higher temperature as they get the sun rays for a longer duration than those facing away from the sun. The sunny slopes have higher temperature.
- f) **Clouds and Rainfall:** Places having cloudy skies and rainfall have lower temperature than those without these. Clouds obstruct the free fall of sun rays thus lower the temperature. After rainfall the water vapours are present in the air. They absorb the heat of the air.
- g) **Ocean currents:** The areas where the hot water ocean current passes, that raises the temperature of the area. The temperature lowers down where the cold water current passes, you will study in detail regarding the oceans in the following chapter.

Points to Remember

1. There are three parts of natural environment namely; Hydrosphere, Lithosphere and Atmosphere. Air, Temperature and Moisture are parts of Atmosphere.
2. Principal gas in Atmosphere is Nitrogen constituting 78.03% part while Oxygen is 20.99% and rest in the mixture of Argon, Carbon dioxide and Hydrogen among others.
3. Lowest part of Atmosphere is Troposphere, preceded by Stratosphere, Mesosphere and Exosphere the top.
4. Minimum and Maximum thermometer is used to measure temperature while Dry and Wet bulb thermometer is used to measure humidity in air.
5. Temperature of a place depends upon factors like height from sea level, distance from sea, type of relief etc.



I. Answer the following questions in about 1-15 words.

1. What do you understand by the Atmosphere ?
2. Why do we study Atmosphere in Geography ?
3. Name the layers of Atmosphere.
4. Which is called Tropopause limit.
5. What do you understand by Exosphere ?
6. What are the elements other than the gases present in the atmosphere.
7. What is air pollution ?
8. What is temperature and what are the units of measuring the temperature.
9. Why is the temperature very high on the equator ?
10. Why is there a difference in day time and night time temperature ?
11. Why is the temperature of Shimla lower than that of Chandigarh ?

II. Give answers to the following question in about 50-60 words.

1. What are the main factors that cause air pollution.
2. What we call the lower layer of the atmosphere ?
3. Write the ratio of main gases in the air.
4. In which layer of the atmosphere the ozone gas exist. Why is it so important.

III. Give answer to the following question in approximately 125-130 words.

1. Explain in detail the layers of atmosphere.
2. Explain in detail the factors affecting the temperature of a place.

IV. Fill in the blanks.

1. As we go up to the hills the temperature _____.
2. The main sources of the temperature are _____ and _____.
3. The ozone gas absorbs _____ rays.
4. The electrically charged particles are found in _____ layer.
5. The wireless communication system works under _____ waves.
6. _____ gas is found in maximum quantity in atmosphere.



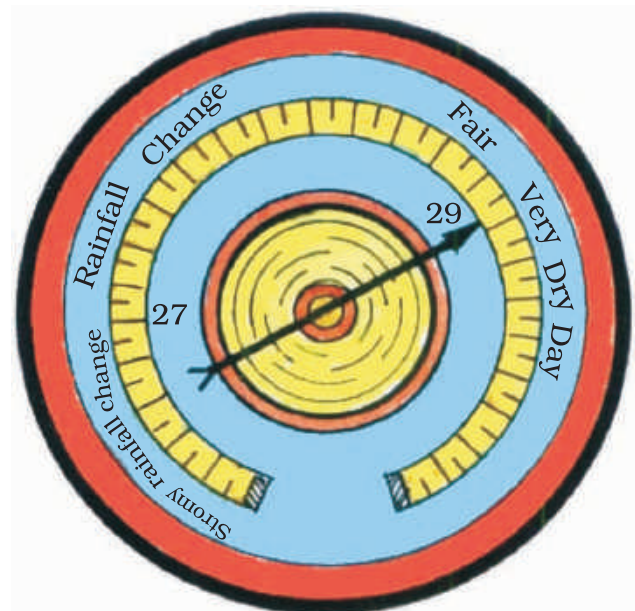
1. What rules should be followed to avoid air pollution, prepare a chart and put it in your classroom.
2. Draw a diagram of Atmosphere showing different layers.





In the previous chapters you have studied climate and temperature as elements of Atmosphere. In this chapter we will study other elements such as atmospheric pressure and winds. Many questions may arise in your minds like, what is atmospheric pressure ? How do the winds arise? What types of winds are there ? What is the geographic distribution of these winds and so on.

Atmospheric Pressure : As you already know that air is a physical good and a mixture of different gases, it contains some weight also. The weight of air is called atmospheric pressure. This is measured in terms of weight per unit area of the air. The Barometer is used to measure the atmospheric pressure of the earth. The atmospheric pressure of the air is 29.92 inches or 76 centimeters or 760 millimeter on the sea level.



Design 5.1 Aneroid Barameter

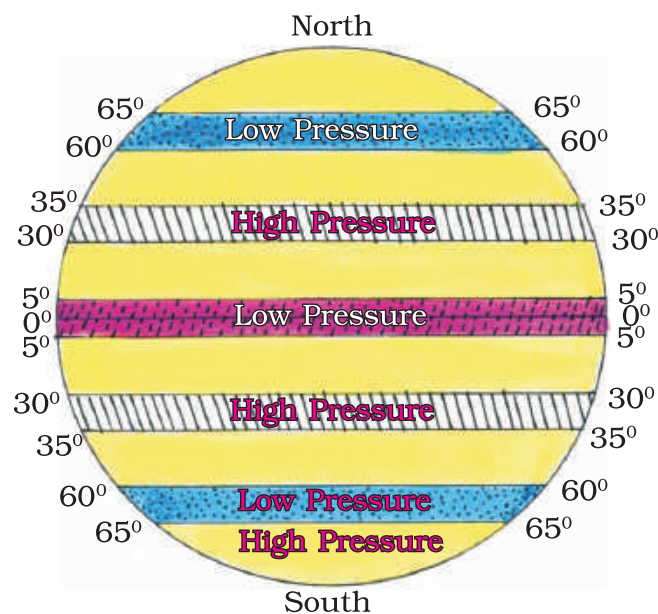
There is a close relation between atmospheric pressure and temperature. When the temperature is high the pressure is low and when the temperature is low the pressure is high. Because when the air gets heated, the per unit area air expands and rises above therefore pressure decreases. Similarly the air pressure decreases with the increase in height of a place.

Wind : Blowing air is called wind. The wind flows from high pressure area to low pressure area. On the map the pressure is shown by the Isobars.

Isobars are the lines that join the places of equal atmospheric pressure at a time.

The major pressure belts of the Earth and the Planetary wind:

The distribution of atmospheric pressure is quite systematic. You already know that there is close relation between temperature and air pressure. As the rays of sun fall directly on the equator the temperature is high on the equator. After heating, the air which is in contact with the earth, rises up. This flow is called **convictional current** of the air. As heated air rises up, at the equator 5° north and 5° south of the equator create a low pressure belt. This is also called as '**doldrums**'.



Design 5.2 Pressure Belts

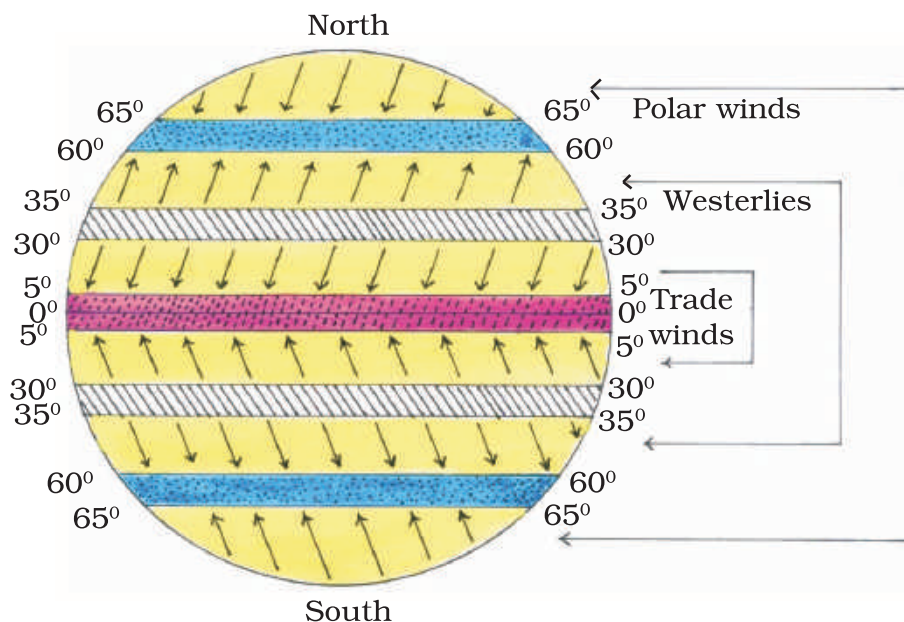
The hot air rising from the equator becomes colder on reaching at height and wind starts blowing towards poles. After reaching at 30° northern and southern latitudes these winds get cold and start descending, while density of these winds increases. This results into forming belt of high pressure at these latitudes. These are also known as **Horse Latitudes**.

At the 60° north and south Latitudes again, low pressure belts emerge. In the diagram no 5.2 the distribution of belts have been shown.

Planetary Winds : After understanding the pressure belts, it is not difficult to understand the Planetary winds. As these winds always blow from the area of high pressure to the low pressure areas. These winds generally blow from mid latitudes to the equator and towards the pole while blowing North to South, these wind do not go straight because the Earth rotates from west to east. Therefore, the flow of wind diverts. To, understand the deviation of winds, 'Ferrel's Law' should be understood essentially.

According to the Ferrel's Law, freely moving natural objects in the northern hemisphere divert to their right and in southern hemisphere these divert to their left Fig. 5.3.

Trade Winds : The winds blowing towards the equator are called **Trade winds**, in old days the winds helped the ships to move thus these winds derived their name. In the northern hemisphere, these are called north eastern trade winds, and in the southern hemisphere these are called south eastern trade winds.



Design 5.3 The Planetary-winds

The wind blowing towards poles are called as **westerlies**. In the northern hemisphere, these blow from south west to north east and in southern hemisphere these blow from north west to south east these winds blow in both the hemispheres between 30° to 65° latitudes.

Similarly the winds blow from poles toward 60°-65° latitudes are called **polar winds**.

Trade winds, westerlies and the polar winds are called the **planetary winds**. The speed and direction of Trade winds always remain the same. In olden times these winds helped ships to move in seas, between Europe and America therefore these winds derived their name.

The westerlies along with polar winds are helpful in creating cyclones in between 60°-65° latitudes.

Monsoon winds : There is difference of opinions among the Geographers and Meteorologists about their formation but monsoon winds are those winds that change their direction with the change in season. These seasonal winds affect East Asia, North East Australia, and on the small part of the East Africa. In summers these winds, blow from ocean to land and in winters these blow from land to the oceans. The summer monsoon winds bring rainfall because while moving over the oceans, these carry water vapours along with.

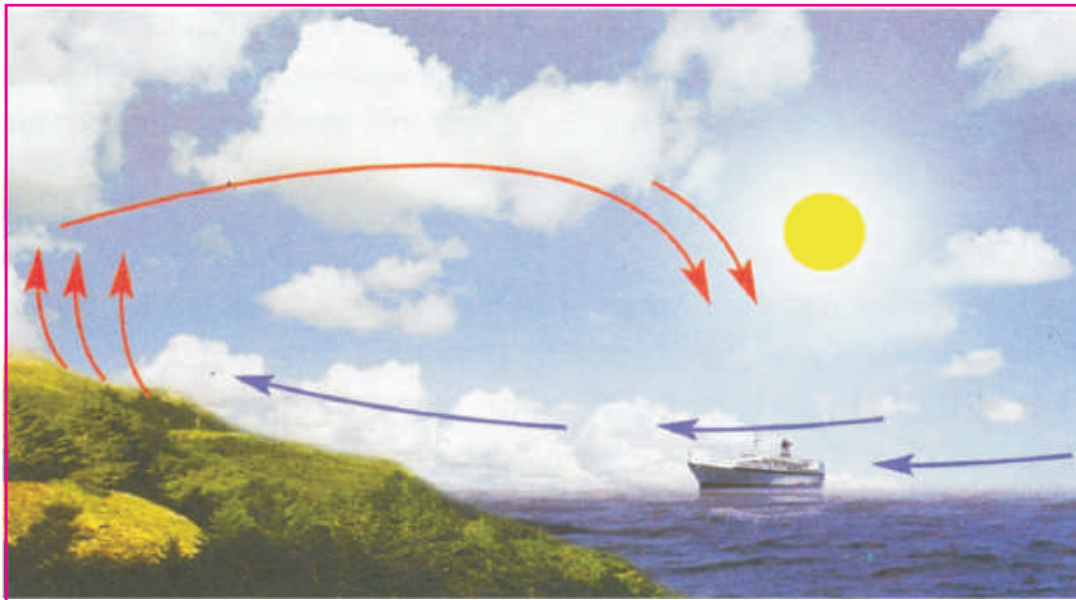
Summer Monsoon winds : Southern, South east and Eastern Asian countries get a large amount of rainfall through the summer season monsoon winds. In May-June, two areas of low pressure, in north east India and Pakistan and in mid Asia are formed. This is because the sun rays fall directly over the Tropic of Cancer and wind starts blowing from the high pressure area i.e. oceanic area to the low pressure areas.

The Monsoon of the Indian Sub-continent : In summers there is high pressure area over the Indian ocean, because of the difference of temperature over the land and water. The winds start moving from the equator to the low pressure area of the sub-continent of India. While the winds blow from oceans, these are laden with water vapours. Thus the Indian sub-continent get rain heavily. Usually it was considered, that the monsoons are related with the low pressure and the high pressure. But now-a-days a different natural law has been derived. According to this

law, the monsoons are related with the circulation of the air in the upper layer of the Atmosphere.

Monsoon of the Winter season: In winters in the northern hemisphere and the interiors of the Asian continent get colder thus there is high pressure as compared to the land near the oceans, where it is low pressure. Thus in winters the winds blow from land to the oceans. Usually the winds are dry winds, whenever they pass over the ocean they carry the humidity and they provide rain to the area they visit. For example the coastal area of western Japan and Chennai get rainfall from winter monsoon.

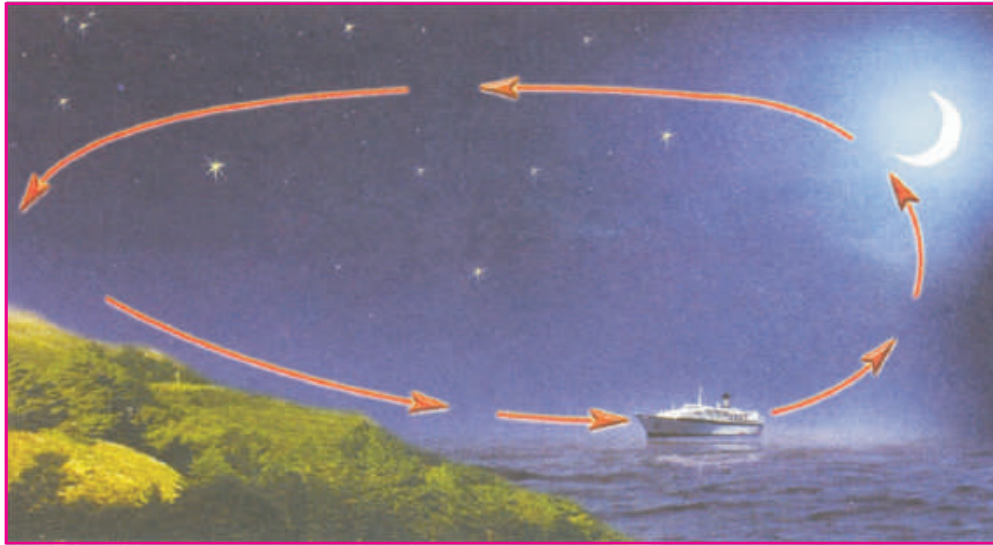
Local Winds : The local winds includes, Land Breeze, Sea Breeze, Mountain and Valley Winds, Fohn and Chinook.



Design 5.4 Sea Breeze

Sea Breeze : During the day time the land gets heated more than the oceans. Thus there is low pressure area in the land as compared to the oceans where it is high pressure. Thus during the day time the cold winds start blowing towards the land. This is called Sea Breeze.

Land Breeze : During the night, the opposite condition prevails the land gets cold as compared to the ocean. Thus there is low pressure area on the ocean, and high pressure in the lands. Winds blow from land to oceans during the night. Therefore, these are called Land Breeze.

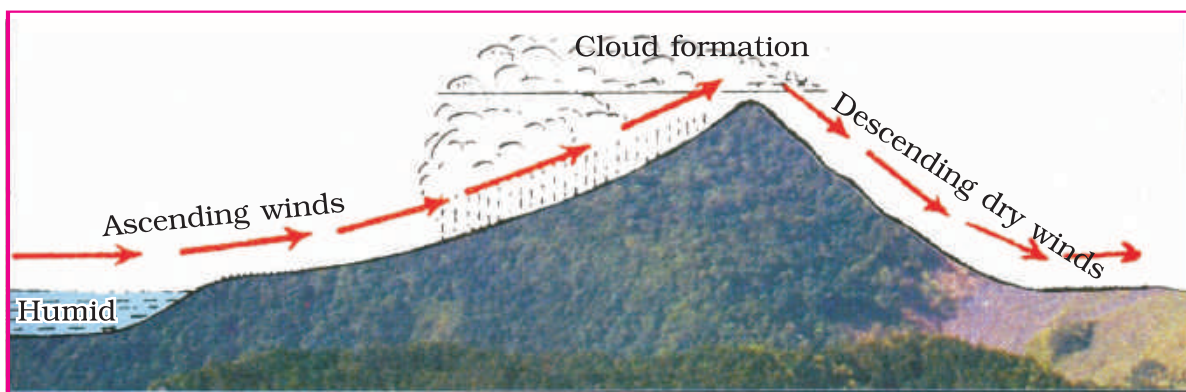


5.5 Land Breeze

Mountain and Valley Winds : During the night the wind over the peaks gets cold, and start moving towards valley. During the day the winds start moving upwards from the valley. These are called Mountain and Valley Winds.

Fohn and Chinook Winds: These are different from mountain and valley winds. These are common in Switzerland, here these are known as Fohn winds. In north America and Eastern sides of Rocky mountain these winds are called Chinook. In this case, the winds rise upward along the hills.

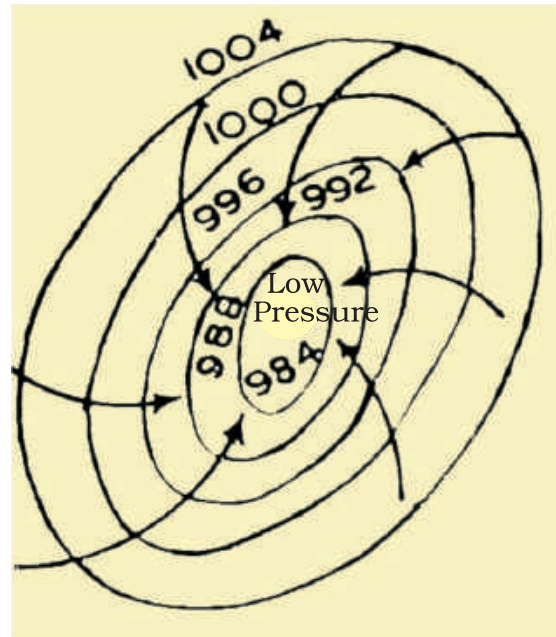
If there is humidity in it, it cools down after reaching the height and condensation starts. This causes formation of clouds. Still further higher



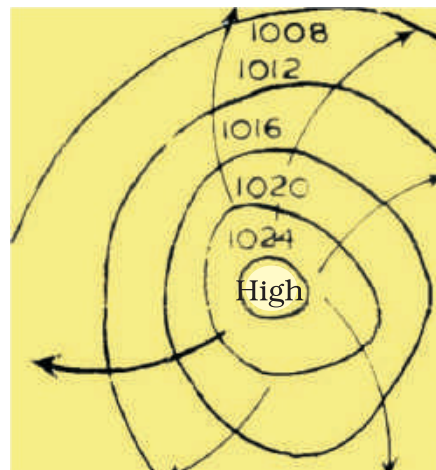
Design 5.6 - Fohn and Chinook Winds

they freeze into droplets and falls. And on the other side of slope of hills from where it starts descending it will turn into warm and dry

Cyclones : This is the circulation of the air. In the circulation, there is low pressure at the centre and high pressure on the exterior of the circle. The wind from the exterior side where there is high pressure starts blowing into the interior where there is low pressure. The direction of the circulation of the winds is anticlockwise direction in the northern hemisphere and clockwise direction in the southern hemisphere. Many European countries get rainfall through these cyclones. The north west of India gets rainfall through these cyclones in winters.



Design 5.7 - Cyclone



Design 5.8 - Anticyclone

A case study of destruction during cyclone:

In May 8, 1990, a cyclone with a speed of 240-250 Kilometer per hour struck to the coast of Andhra Pradesh. With this cyclone, the district of Guntur and Krishna affected the most. It brought a typhoon besides heavy rainfall. The adjoining area to these district are affected by flood. The nine out of twenty three districts were affected by this flood. Around

5923 villages affected by this cyclone, 928 people and 24000 animals were killed by this cyclone. 7.8 million people were affected by this cyclone. 827,100 houses were partially damaged and approximately 569,000 houses were completely damaged. The total loss of wealth was upto Rs 125 million (12.5 crore).



5.9 Design : Destruction due to Cyclone

Source: Press release, Govt. of Andhra Pradesh.

Humidity and Rainfall

We have studied how the winds blow from high pressure area to low pressure area. Some wind are dry, how speedy they may be, do not bring rain. But some of these winds are such that they blow fast still they rain heavily, what is the reason behind it ? Let us study these winds. What are the reasons that cause rainfall ?

There are water vapours present in the atmosphere but we cannot see them. These unseen water vapours are called Humidity. Due to the heat of the sun, the water of oceans, rivers, lakes, and ponds, etc. has been evaporating in the form of steam, after mixing with the wind, water vapour carrying wind starts circulating in the atmosphere. There is always a some quantity of water vapours present in the air. This is called the humidity of the wind. The quantity of water vapour present in the air, does not always remain same all the places.

There is close relation between humidity and the temperature. When the temperature of an area is high, then there is more capacity to absorb

the humidity as compared to the air which is colder. The cold air have less capacity to absorb more water. Humidity is of two types:

Absolute Humidity : It is the amount of humidity present in the air a place at a particular time. The absolute humidity changes with the change in time and place.

Relative Humidity : It is the ratio between the amount of humidity present in the air at a particular temperature and place and the capacity of the air to absorb more humidity at the same temperature of that place.

Saturated Air : When there is maximum amount of water vapour present in the air it is called as saturated air. There is no more capacity to absorb more humidity in the air.

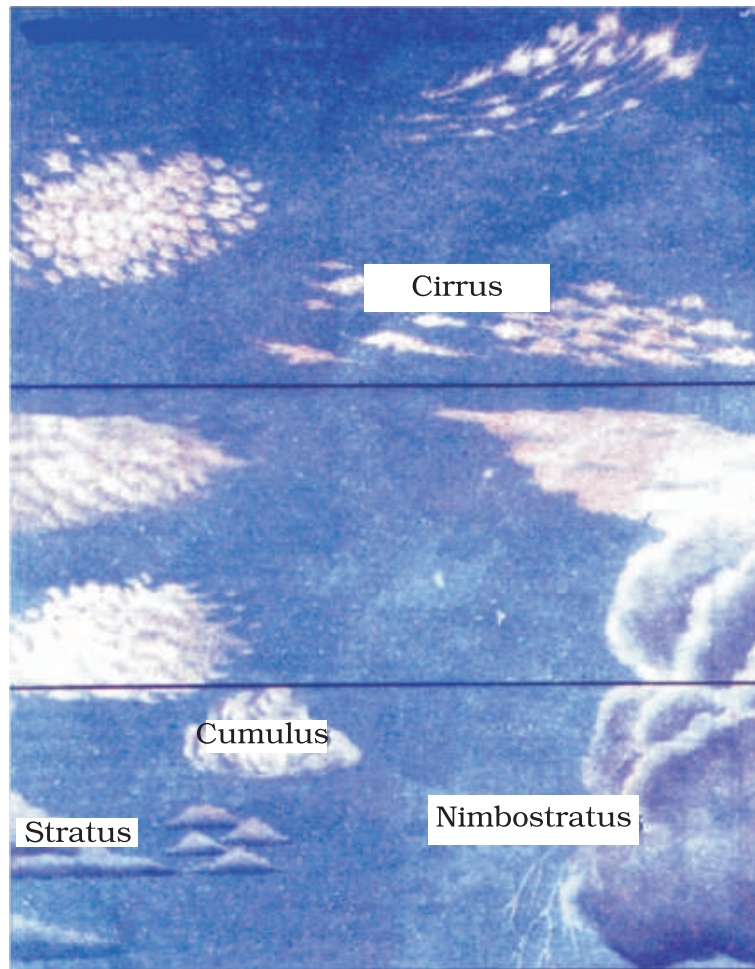
Evaporation : Due to heat, the water goes on changing into steam slowly. This is the reason when we dry the wet cloth in the sun, the water gets evaporated out of the clothes in the air. Thus the evaporation of water in the form of steam and mixing of the steam into the wind is called as Evaporation.

Condensation : Due to the heat of the sun the humid winds when rise up in the atmosphere the winds start cooling down. After cooling down, the winds are unable to carry water vapour in it and thus humidity mixed with air change into water from steam. This is called condensation.

Different forms of Humidity : The disguised humidity in the air, after undergoing the process of condensation, change into the forms of clouds, fog, dew, hails, snow and rain etc. these are the forms of condensation.

Cloud : In summers when temperature is high the water changes into steam. This steam after mixing with the wind rises above. After rising high, it expands and cools down. After cooling of winds it become saturated and are unable to hold the humidity. There are dust particles present in the atmosphere. The small water vapours cling to the dust particles, thus the clouds are formed.

Some clouds are very high in the sky and some are very lower in the sky. Some clouds are very thick and some are light, sometimes the clouds are brown or black in colour. Some clouds are white in colour. Some clouds bring rain heavily and some are only thundering clouds. There are different forms of clouds. Some of these are the following :



Design 5.10 Forms of clouds

1. **Cirrus** : These clouds are very high in the sky. These appear very light. These are like white feathers.
2. **Cumulus**: These clouds usually appear in summers. These appear as if bales of cotton lying at a place. The upper part of these clouds are dome shaped and have cauliflower heads. These clouds bring rainfall with thundering.
3. **Stratus**: These are also light in colour. They are spread throughout the sky. These are low clouds, which bring drizzle.
4. **Nimbostratus** : These clouds are dense having dark grey colour and are very near to the earth surface, which give us heavy and continuous rain falls.

Dew : At night, grass, leaves and other plants get cold when the cold wind comes across with these cold grass, it becomes even colder, as a

result it cannot hold their humidity anymore and the humidity changes into water droplets. The water droplets cling to the grass and leaves. This is called dew. In the cloudy day it does not happen so because clouds do not allow radiation of the earth. You have felt that the night temperature is also higher during the cloudy night.

Fog : The wind near the surface of the earth get cold as a result of the water vapour comes near to each other and a process of condensation starts. Humidity of the air resting on the dust particles can be seen moving in the atmosphere. The wind gets dusty and condensed. This is called fog. In industrial areas fog mixed with smoke to becomes **smog**.

Frost : It is similar to the fog. The formation of frost is similar to that of fog. The only difference is that when the Fog is more dense it is called Frost. For is formation of both Fog and Frost, it is essential the dust particles to be present in the air.

Snow: When the humid wind rises above in the colder areas, it does not change in water but freezes and falls down on the earth in the form of snow. The snow always fall on high mountains or very cold areas. Snow fall takes place only when there are clouds in the sky.

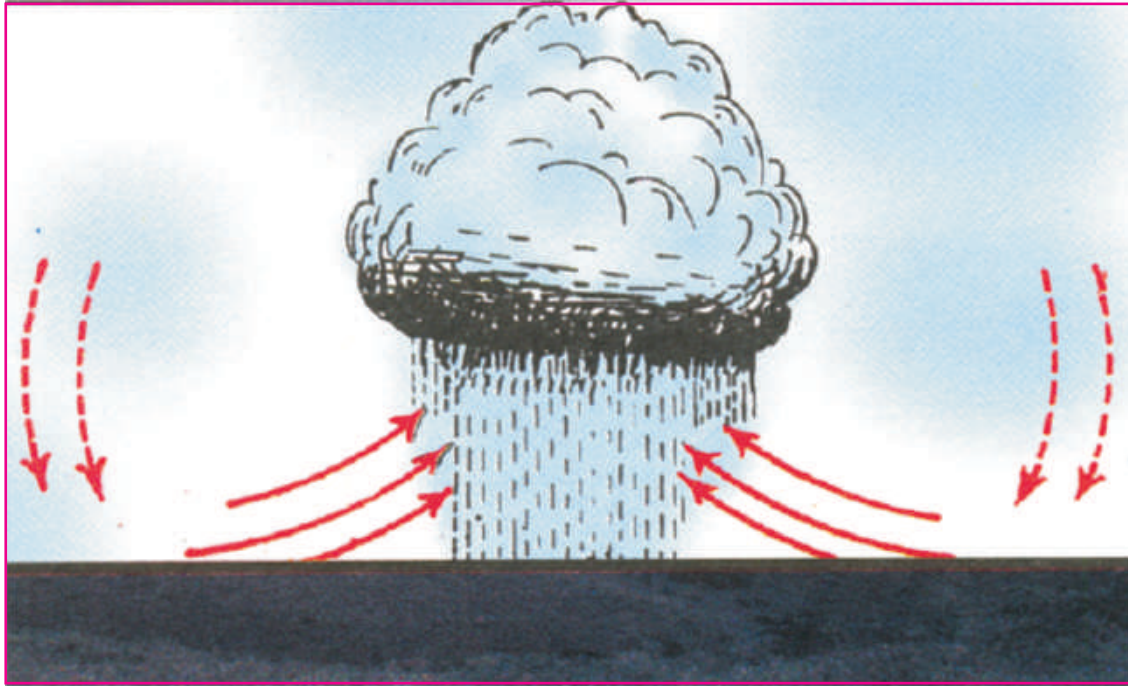
Hailstorm : Sometimes when rain passes through the very colder layer of atmosphere. At some places the temperature is below freezing point as a result this water droplets freezes and fall on the Earth in the form of Hails.

Rainfall (Precipitation): The process of rainfall is called precipitation. When the humid winds rise above they become colder and thus after condensation humidity change into the form of clouds. When the clouds become more colder then their water vapours become so large that these cannot be held up and changing in droplets fall on the earth. This is called rainfall.

Forms of Rainfall (Precipitation) :

1. Convectional Rainfall
2. Relief Rainfall
3. Cyclonic Rainfall

Convectional Rainfall : The sun rays fall directly on the earth surface.



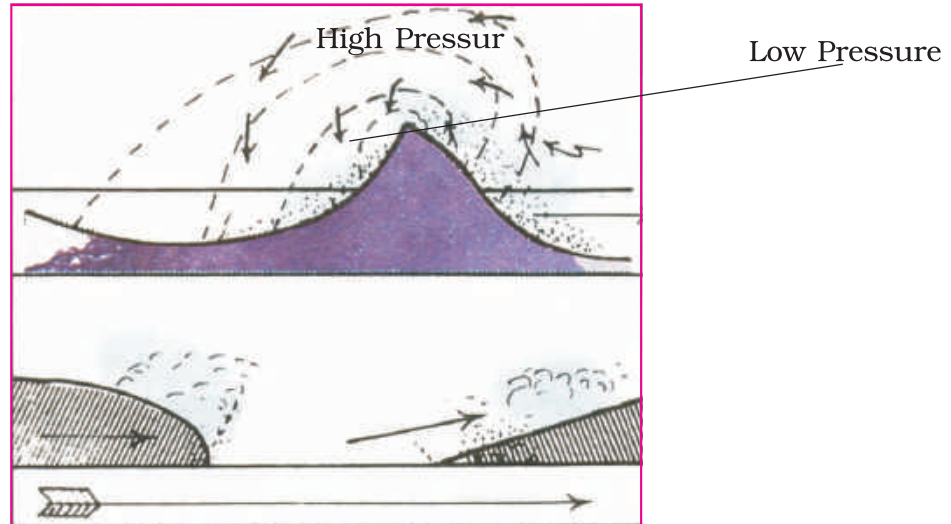
Design 5.11 - Convectional Rainfall

Due to high temperature the air pressure lowers down, winds start rising above after heating changes after rising above the winds become even colder. On changing into the water droplets, these falls in form of rainfall. The convectional rainfall in equatorial areas is a heavy rainfall along with thundering.

Orographic (Relief) Rainfall: Sometimes the mountain come across when the wind blows from the ocean towards the land. Due to the obstruction of mountains these wind rises upwards along the mountain. After reaching at a height the wind become cold and process of condensation starts. These fall in the form of rainfall on the ground.



Design 5.12 - Orographic Rainfall



Design 5.13 Cyclonic Rainfall

In India monsoon rainfall in summers is due to the obstruction caused by Himalayan mountains.

The side of the mountain from where the wind ascends and gets heavy rainfall known as **Windward** side and other side where the wind starts descending and do not rainfall are **leeward** side.

Cyclonic Rainfall: The rainfall which is due to cyclone is called Cyclonic rainfall. There is low pressure in the centre of cyclones.

Therefore wind arises upwards. After reaching at a height wind become colder the humidity of wind changes into clouds and they cause rainfall on the earth. European countries receive rainfall through the cyclonic type of rainfall. The rainfall in Punjab in winters is also of cyclonic type.

Points to Remember

1. Air pressure means, pressure of air at a point which is measured with the help of Barometer. Air flows from high pressure to low pressure.
2. Trade winds, Monsoons, Local Winds, Cyclones, Anti-cyclone etc. originate with flow of wind.
3. Geographic lines identifying and joining regions of same air pressure and same rainfall are called Isobars and Isohytes respectively.
4. Sea Breeze and Land Breeze, Mountain and Valley Winds, Fohn and Chinook are all forms of local winds.

5. Rainfall, Clouds, Dew, Fog, Frost, Snow etc. are forms of moisture found in air.
6. Clouds are generally by four types name; Cirrus, Cumulus, Stratus and Nimbostratus.
7. Percipitation (rainfall) is of three types; Convectional, Relief and Cyclonic.
8. Winter rainfall in Punjab is an example of cyclonic rainfall.



I. Write down the answer of the following question in about 1-15 words.

1. What do you understand by the atmosphere ?
2. What are winds ?
3. Name the instrument used to measure air pressure and temperature.
4. What is a Cyclone ?
5. What is humidity ?
6. What do you understand by evaporation and condensation.
7. How many types of rainfall are there ?

II. Answer the following question in approximately 50-60 words.

1. What do you understand by Air pressure belts on the earth? Why there is low pressure on the equator ?
2. Differentiate between the planetary and local winds ?
3. Write a case study of destruction caused due to the cyclone that hit in Andhra Pradesh.
4. How many forms of clouds are there. Explain the each type.
5. Give information about Fog, Frost, Dew, snow.

III. Answer the following questions in approximately 125-130 words

1. Explain in detail with illustration, the planetary winds.
2. Write in detail about the monsoon winds.
3. What is rainfall. How many types of rainfall are there ? Write in detail with illustrations.

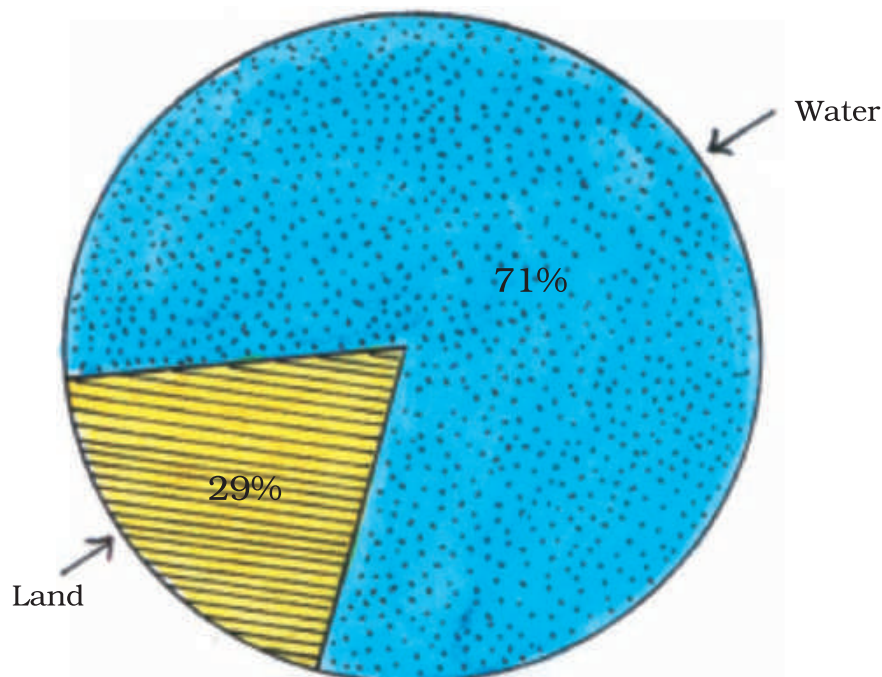


Make a list of the things that bears dew in the winter season.





There is unequal distribution of water and land on the Earth. The $\frac{2}{3}$ of the earth's surface is covered by saline water. It means that the 71% of the total area is covered by water and remaining 29% is only land area of the earth. The great water regions are called oceans. Small water bodies are called seas. It means a huge water body is called ocean, and sea are the limited portion of the water. Arabian sea and Bay of Bengal are two seas in Indian ocean.



Design 6.1 Distribution of land and water on the earth.

There are five oceans on the earth. The Pacific ocean the Atlantic ocean, the Indian ocean, the Arctic ocean and the Antarctic oceans. All these oceans are inter connected. Water of oceans mix with each other. The following is the areas under these oceans:

Oceans	Area (In crore Sq. Kilometers)
1. Pacific Ocean	16.6
2. Atlantic Ocean	8.2
3. Indian Ocean	7.3
4. Arctic Ocean	1.3
5. Antarctic Ocean	---

Pacific ocean is the largest and deepest ocean. It is so deep that world's highest peak, Mt. Everest can be dipped in this ocean. The Atlantic ocean is almost half the size of Pacific ocean.

The name of the **Indian Ocean** is named after our country India. India being a subcontinent and the ocean is in the south of India, the name of ocean is derived from the nation. The smallest ocean is the **Arctic Ocean**, the Ice Land. It remains frozen throughout the year because it is in the extreme north of the Earth around arctic circle. Around the south pole lies the **Antarctic Ocean** which is counted more as a continent.

The oceanic water is always saline because large quantity of mineral salt is dissolved in it.

Fresh and Saline Water

The water on the earth surface is found in the form of rivers, canals, lakes, seas and oceans. Several mineral salts get dissolved in natural water and make it saline. These minerals are very useful for the growth of living beings, plants and trees. The water bodies get water from the different sources like, rainfall and melting of snow etc. and flowing through the rivers it reaches to the plants and other living beings. This water is Fresh Water. Some of the water that seeps in the earth gets filtered in the process and is used for domestic purposes by extracting out of earth by means of tube-wells and hand pumps.

Fresh water

The water we get from, rainfall, melting of ice, rivers, canals, tube-wells etc. is fresh water.

The water on the earth evaporates due to the heat of the sun. The

stagnant water of Lakes, land locked water bodies, seas and oceans gets evaporated continuously and as a result, the amount of salt increase in this water. This is the reason, the common salt making is quite popular occupation along the banks of seas. The amount of salt remains more in oceans because of the carbonate consumed by fish and Marine Organism.

The Saline Water :

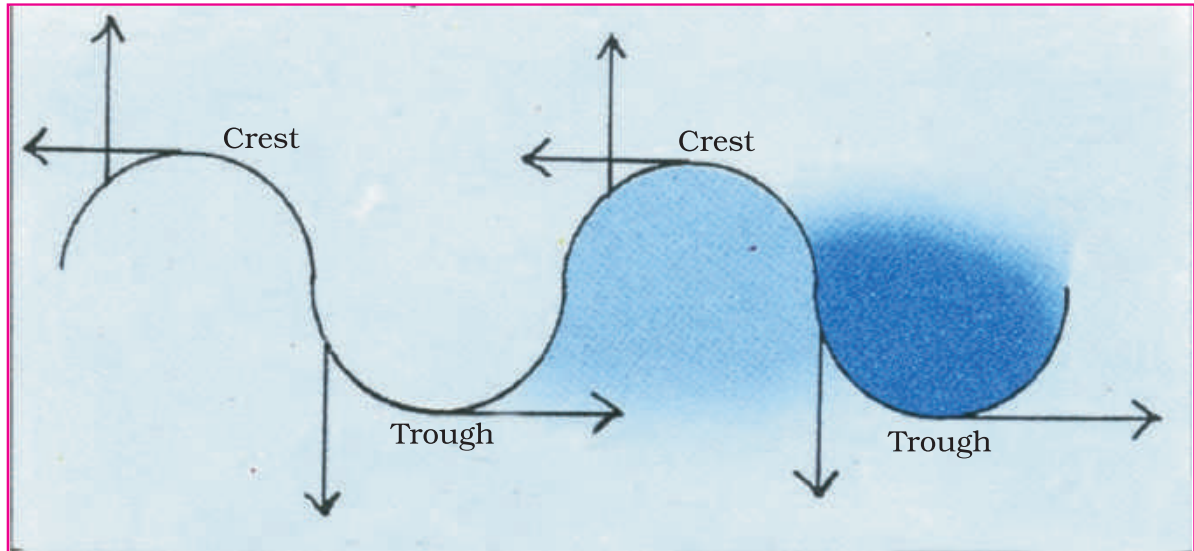
The water of lakes, land locked seas and open oceans is saline. The highest salinity is in the Dead Sea. This sea is land locked. The seas which have high rate of salinity do not let things and even human beings drown. How wonderful it is !

By standing near the bank of the ocean we can observe that the water in the oceans is always moving i.e. it is never calm and still. Its movement is its life. Ocean waters move in the form of ripples, waves, tides and Tsunami. By the wholesome movement of water, the waters of oceans mix with each other. There are three types of movements of water.

1) Waves 2) Ocean Currents 3) Tides

1) Waves : The water of oceans always ripples with the winds over the ocean surface. According to the change in weather, these ripples are high and sometimes these are low. At times the movement is faster and at times it is comparatively slow depending upon the waves arise in the ocean. The ripples or waves arise due to the speed of the wind blowing over the surface of oceans. The water vapours run up & down with which the water start rippling. As shown in design 6.2, upper surface of wave is called **crest** and the lower surface of wave or when the water returns almost to its original position is **trough**. When a cyclone occurs, these ocean waves turn into horrible water splashes. Sometimes they even destroy ships sailing in the oceans. The waves erode the coastal areas and transport the rock material to the ocean floors.

2) Ocean Currents: When the ocean water moves in a particular direction it is called ocean current. The water in the ocean moves very systematically from one place to the other. Due to these ocean currents



Design 6.2 Waves

the waters of all oceans mix up with each other. The speed of current can be slow or fast. Usually their speed is 2 kilometer to 10 kilometer per hour.

The ocean currents are of two types :

1. **Warm water currents**
2. **Cold water currents**

If a current flows from the equator, it carries warm effect along with. But if a current flows from polar area, it carries cold effect. In this way, warm water currents and cold water currents come into existence.

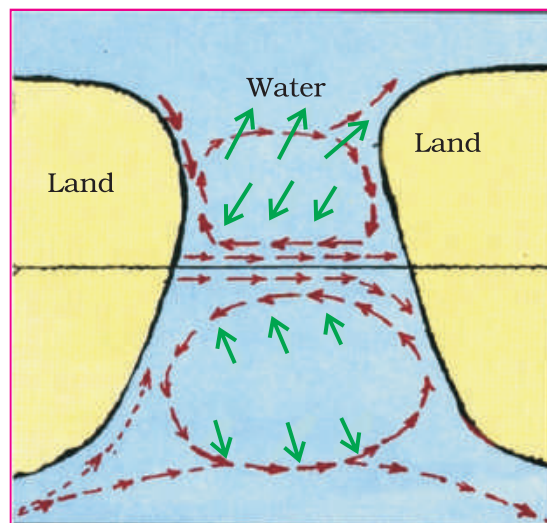
The currents going away from the equator are always warm, and coming towards equator are always cold.

It should always be kept in mind that water of warm current is slightly warmer than the water in adjoining areas. Similarly the water of cold currents is little bit colder than that of water of nearby areas. The warm water current always flow on the upper layer of the ocean where as the cold water current flows underneath.

Why these currents move ? Who gives the form of stream to the ocean water ? Answer to these questions is with the planetary winds, that blow in a particular direction throughout the year. The trade winds and westerlies while moving in the same direction throughout the year carry

with them the ocean water along with. Therefore, ocean water also moves in the direction of the planetary winds.

The insolation of the sun is not uniform on the whole of the globe. The temperature remains high through out the year in equatorial regions but as we move away towards the poles the temperature starts decreasing. Due to the difference of the temperature and direction of winds, ocean currents originate. As Warm water which is lighter and flows on the upper surface near the equatorial region, the water from the cold areas replaces it and thus starts movement of oceanic waters.



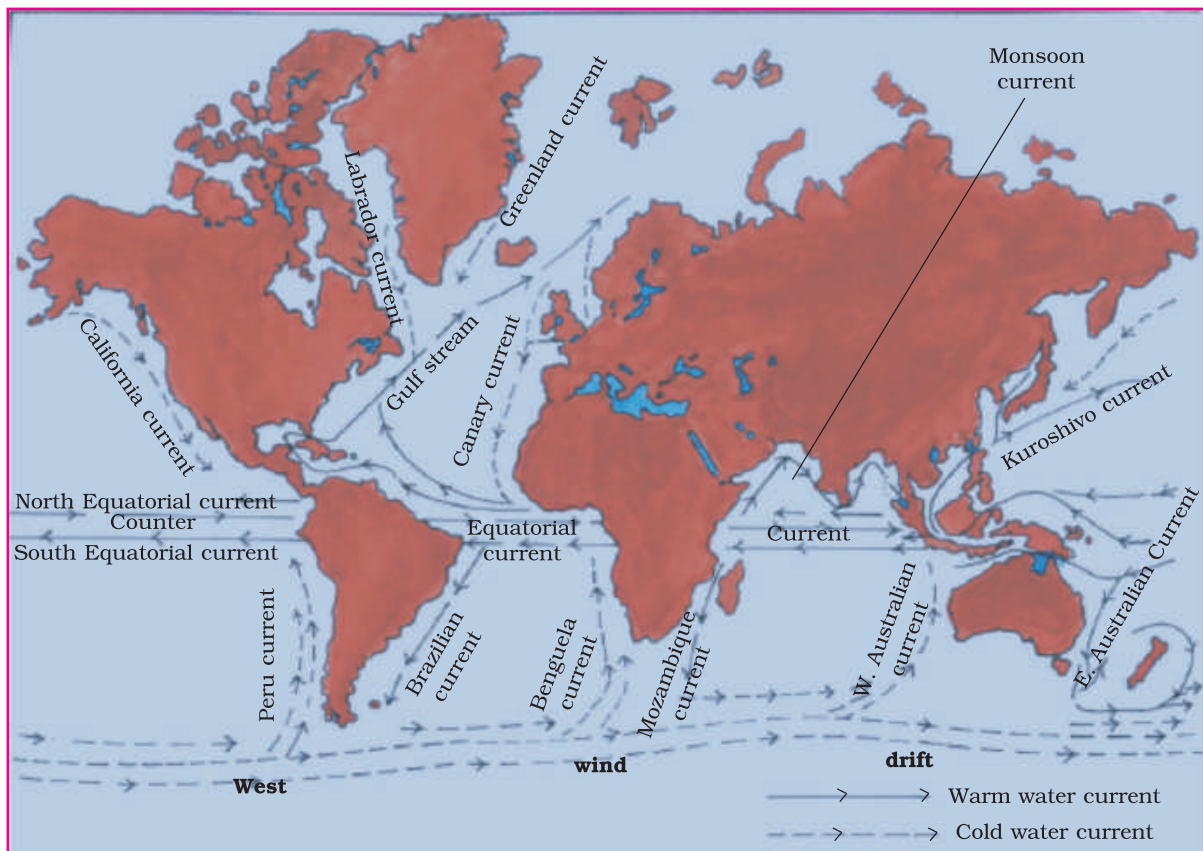
Note :- Green arrows stand for direction of wind while brown arrows show direction of water.

Design 6.3 How ocean currents originate.

Besides, the prevailing or planetary winds and the difference of temperature, salinity of water is also a cause of origin of ocean currents. As all the oceans do not have same quantity of salt. The oceans with higher amount of salt have heavy water and ocean with lesser amount of salt have light water, thus these two types of water came into existence. The lighter water comes up the surface whereas the heavier water tries to flow down the surface of water. Thus the movements of ocean currents originate.

These ocean currents move along the coasts of the continents. Therefore, the shape of the continents also give them directions. The rotation of the earth also affect the speed of these currents.

Look at the map of the world. All the oceans are having water currents. Now we will study these currents according to oceans.



Design 6.4 World map showing main ocean currents

Ocean currents of Atlantic Ocean: Look into the circulation of Atlantic ocean current. You will see that there are two specific circles one in the north of equator and other in the south of equator.

North Atlantic Oceanic Circle: The trade winds blow in equatorial regions. These winds always blow from east direction. Along with the water of ocean in north and south of equator starts moving in the same direction i.e. east to west. The equatorial warm water current flows from Africa to America. It appears to flows along the eastern coast of North America to the north west of north America. Here this is called as Gulf Stream.

The **Gulf Stream** starting from Gulf of Mexico to the Islands of Newfoundland. This is the most important warm water current of the world. Its width is 400 kilometer. Its water flows with a speed of 5 kilometer

per hour. Its warm effect affects the climate of the eastern coast of United States of America. After reaching near the islands of Newfoundland, a cold water current named as **Labrador** mixes with it. Due to the mixing of warm & cold water current a dense fog is formed over there. The Glaciers moving from the poles melt after reaching near the Gulf Stream. In this way they do not create obstruction to ships after reaching down. A cold water current from **Greenland** also mixes with it.

Now this current under the effect of westerlies moves eastward. Now it is called by the name north **Atlantic current**. This warm water current while flowing across north west of Britain reaches the cold areas of Norway and Sweden. Due to the warm effect of this current the fishermen of Norway go away for fishing. It is also due to the warm effect of this current the ports of European countries remain open even in winter season. If this current does not flow to this area, the ports would have been frozen. From Europe, **Canary** current flows to the southward. It is a cold water current which passes over the North-west coast of Africa. This current by mixing with the equatorial current, completes the cycle. In this way, this cycle is in a clockwise direction. The area enclosed by this cycle is called as '**Sargasso Sea**'.

b) Southern Atlantic Cycle : A definite cycle of ocean current similar to northern cycle is also on this side. This cycle flows in an anticlockwise direction. The Southern equatorial current when advances towards the east to west then it strikes against the elongated part of the north America and is divided into two parts. One of the parts joins with northern cycle but the other part flowing along with the coast of America and advances to the south. This is called as **Brazilian current**. A cold water current from the south comes to mix up with it. This is called as **Falkland current**. Now this current under the influence of westerlies. It is called **westwind drift**. This is a cold water current, which circulates around the whole of the Globe. The reason being from the southward there is an open ocean therefore there is no obstruction in between. A cold water current of South Africa flows northwardly along the western coast this is called **Benguela** current. In between the north equatorial ocean current and southern equatorial there is a **counter equatorial** current that flows from the west to the east.

Pacific ocean currents : These ocean currents also have two types of cycles. The Northern Cycle and Southern Cycle.

a) The Northern Cycle : Under the influence of trade winds along the equatorial line a current flows from east to west is a equatorial ocean current. After reaching near the eastern Archipelago. There this is called by **kuroshivo current**. This is also called **Japan current**.

A cold water, Kamachatka current from the north to the south and merges with kuroshivo current. All this oceanic drainage proceeds towards the east. This is called **north pacific ocean** current. After striking against



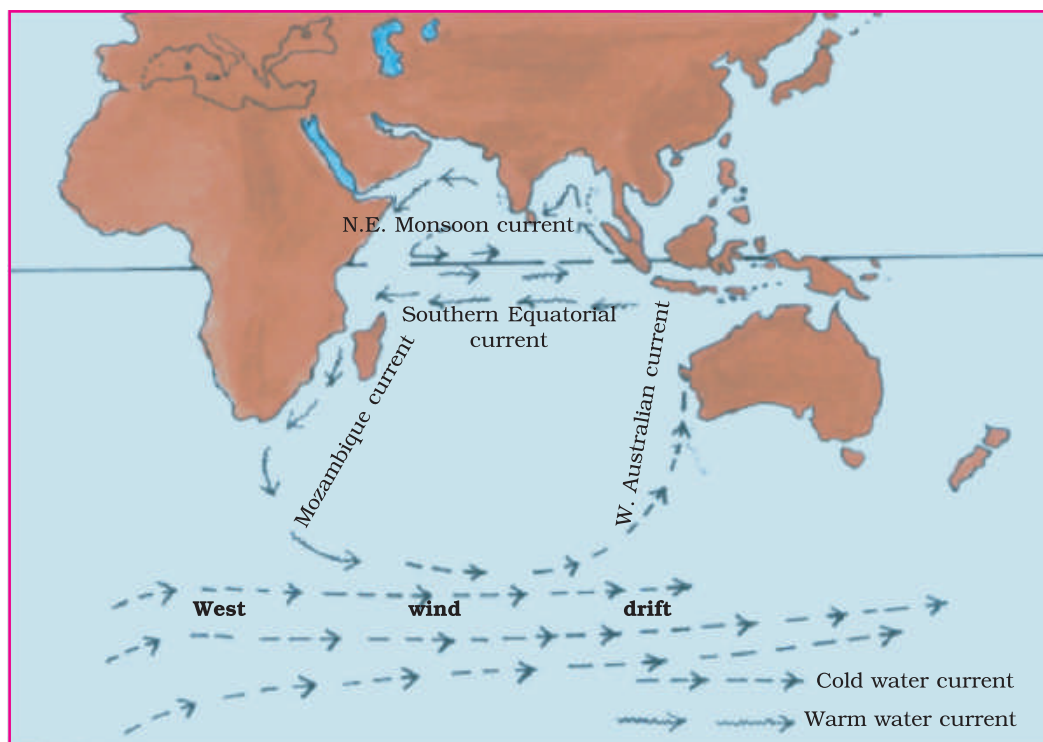
Design 6.5 Pacific Ocean Currents

the western coast of north America it turns southward. It is called as **California current**. As it comes from polar area it is cold water current.

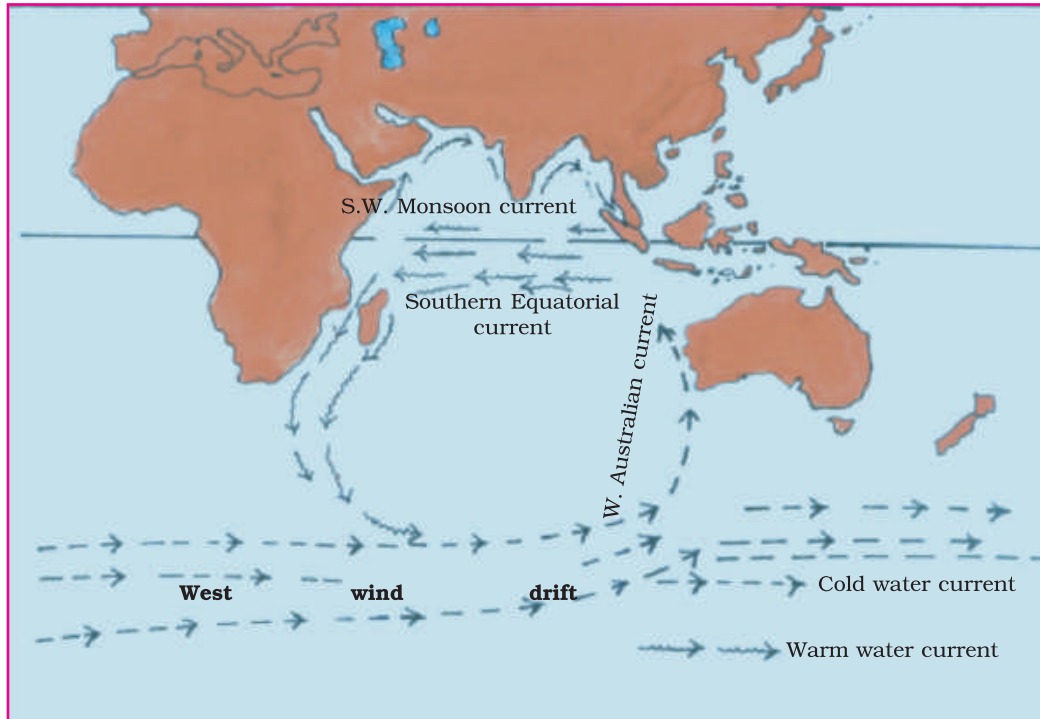
The Southern Cycle: The Southern equatorial current under the influence of trade winds proceeds from South America to the east of the Australia. This eastern Australian current when approaches to the Island of New-Zealand merges with west wind drift. Near South America one branch of this proceeds northward. Here it is called as current of **Peru**. This is also called **Humbolt current**. This is cold water current. This along with equatorial current completes its cycle. Counter equatorial current also flow in Pacific ocean.

Currents of Indian ocean

The Indian ocean currents are not so systematic and permanent as the Atlantic and Pacific ocean. The main reason of this is the seasonal winds that flow in Indian Ocean. These winds blow south west direction in summer season and north eastern direction in winter season. Due to this change the ocean currents also change their direction. In this southern hemisphere the currents are more permanent. The equatorial warm water from the eastern archipelago proceeds towards the eastern coast of Africa.



Design 6.6 - The Ocean currents of Indian ocean in winters



Design 6.7 - The Ocean Currents of Indian ocean in Summer

Along this coast, this current goes to southward. Here it is called **Mozambique current**. A branch of this flows from the east of Malagassi. This is known as **Agulahas current**. These two current along with west wind drift proceed toward the east from the west coast of Australia, the **western Australian cold current** after proceeding northward merges with equatorial currents.

Effects of Currents on Climate

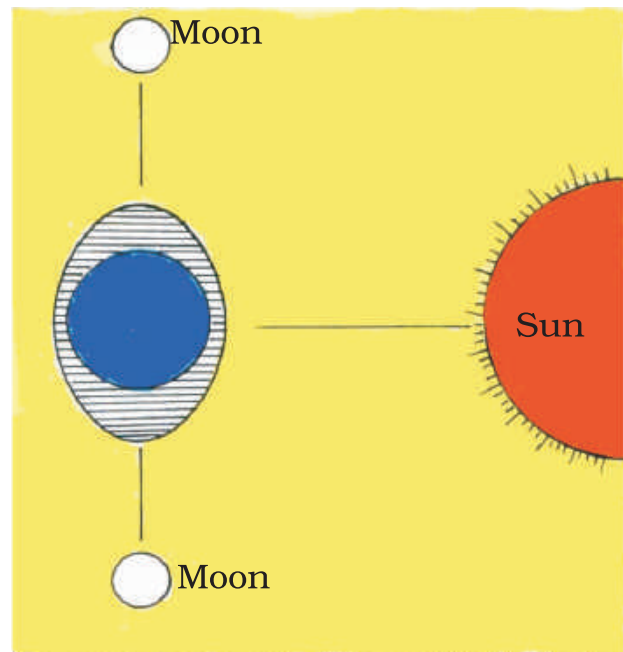
You have studied that there are two types of Ocean currents. Warm water currents and cold water currents. These currents flow along the continents and coastal areas. These currents affect the climate of the adjoining land. The warm current raise the temperature of the places adjoining them and the colder current lower down the temperature of the adjoining area.

When the warm current passes over the surface of water, these absorb enough humidity and when they approaches to the coastal areas these rain heavily. But when a cold currents pass over the water surface. It becomes more colder and dry. When it approaches to the coastal areas then it increases the coldness and dryness. Wherever in the world, the

cold currents flow their adjoining areas have been converted in to the deserts. Find out the name of these deserts. The place where the cold and warm current merges together, they produce dense fog over there. For example the cold water current of Labrador and warm water current of Gulf, merges at the east coast of the North America near Newfoundland to produce dense fog over there. In the design of ocean currents, find out the places where the warm water current and cold water current merges.

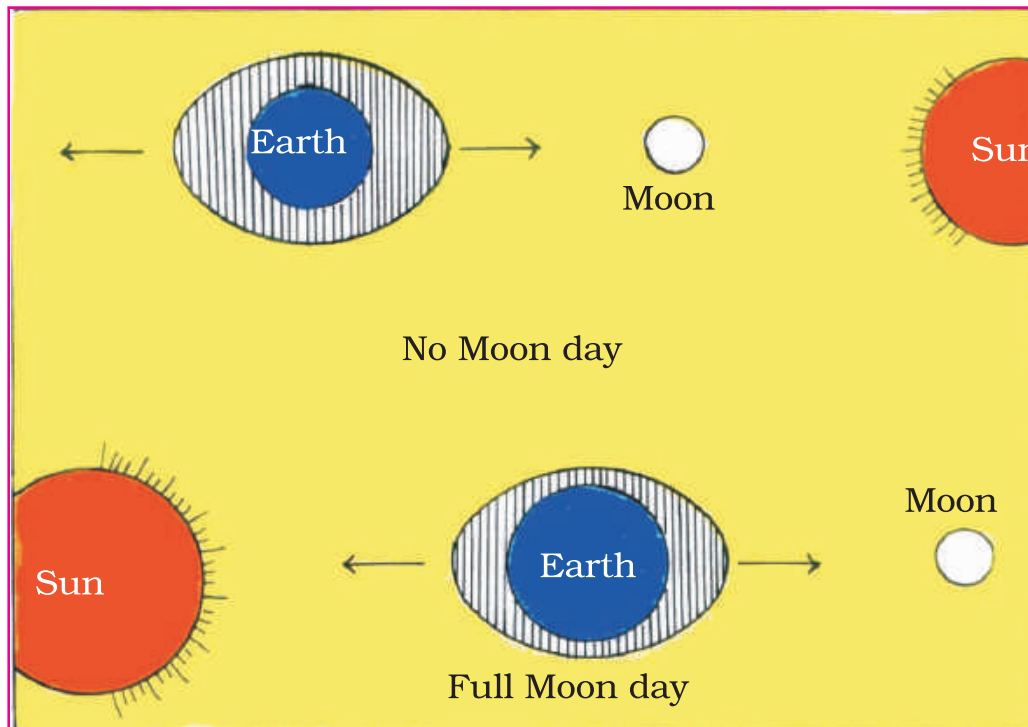
Besides climate these current also affect the oceanic shipping. The shipping is always in the direction of the currents with this their speed increase and thus less fuel is consumed. The warm water currents melts the glaciers in this way they do not create hindrance to ships.

3. Tides : The people living near the ocean observe that water rises and fall two times a day systematically. In the coastal areas water continuously rises for some hours. After reaching a definite height it starts falling down. This rise and fall of water repeats two times in 24 hours. The alternate rise and fall of water in oceans is called tides. When the water rises it is **high tide**, and when it falls, it is **low tide**.



Design 6.8 Tide

There are huge oceans on the earth surface. When the moon affects the oceans by its Gravitational pull. The water rises high towards the moon. According to the Geographers and the scientists the main cause of Tide is the gravitational force of moon. Although the sun also pulls water, but it is from a too long distance and it can not make rise in ocean water. But if the pull of moon joins with sun, then rise of water will be very high. The height of the tide is not always the same. Sometimes it is more than average and sometimes it is less than average. When the tide is maximum that is called **Spring Tide**. When the water rises less than average, it is '**Neap tide**.'



Design 6.9 Spring Tide

Spring Tide : During the **Spring Tide** the rise of water is maximum this happens during no moon day and Full moon day. The reason of this is that in both the phases of the sun, the moon and the earth all are in a line. In this phase the sun and the moon both pull the ocean water jointly. Due to their joint pull, the rise of water is very high. Which is called as **Spring Tide**.

Neap Tide : In the Neap Tide, the rise of water is lower than as usual. It is on the 7th and 21st day or the first or the last quarter phase of the moon. In this phase, the moon, earth and sun are right angles to that of the moon. The sun pulls water to its side and the moon pulls towards itself. Due to in nearness of the moon, the water rises towards moon only. But it is not as high, because the pull of sun is working on the opposite direction.

Man and Tide : Tides help us in many ways. Due to the tide the deposits of soil and the debris against the mouth of the river, washed away. Thus the soil do not get deposited on the harbours situated on the coastal areas, and ships can sail up to a great distance inside.

The big ships standing in the deep distant seas, keep on waiting for the high amplitude when there is rise in water, that sail into the harbours. After down loading the ships, cargo again wait for the rise, so that they move again to the seas.

The port of Kolkata on the banks of Hugali river is away from Bay of Bengal. If there were no tide in ocean, the ships could have not even reached in Kolkata harbour. Similarly the port of London is situated at the banks of Thames river. The ships also move in and out of the harbour when tide rise in the ocean.

Now it has been planned to utilize the energy of Tides to fulfill the over increasing demand of energy world over.

4. Tsunami : Tsunami is pronounced as soo-nah-mee. It is a Japanese word, made up of two parts **Tsu** meaning coastal and Nami means a long wave of water. The Tsunami means long waves of water striking to the coastal areas. The long waves arise due to the earthquake on the ocean floors. This is not only a single wave but a series of waves, better known as wave train. It comes one after the other, sometimes these are so intense that the water along the coast of ocean moves with a speed of 800 km per hour. At some places the water rises upto 100 feet and flows with highest speed. In coastal areas there is a great loss to man, animals and property, as things are washed away with Tsunami.



Design 6.10 Destruction due to Tsunami

Case Study of the Tsunami struck on 26th December 2004

On December 26, 2004, a most powerful Tsunami occurred on the coast of Indian ocean. This deadly Tsunami was caused by a severe earthquake of the of magnitude of 9.0 on the richter scale on ocean floor. The epicentre was west coast of Indonesia and with in hours the killer waves brought devastation in 11 countries falling in and around Indian ocean. Due to Tsunami many people drowned, washed away and many houses were illiminated. The beaches of Africa to Thailand were heavily affected.

According to the estimate of the Government of India, the loss due to this giant Tsunami was up to thousands of crores. Out of the states of India Tamilnadu suffered the most, followed by Kerela, Andhra Pradesh and Pudduchery. More than 200,000 (2 lakh) people were killed and many more were rendered homeless.



I. Answer the following question in approximately 1-15 words.

1. Why does the Ocean water salty?
2. Why there is a dense fog near Newfoundland?
3. Write down the main ocean currents of south Atlantic ocean cycle.
4. Explain the route of Gulf Stream current.
5. Write down the main ocean currents of North Atlantic Oceans cycle.
6. What do you understand by Tsunami ?

II. Answer the following question in approximately 50-60 words.

1. What is the difference between Spring Tide and Neap Tide ?
2. Differentiate between warm water ocean current and cold water ocean current.
3. Why are the ocean currents of Indian ocean not so definite and systematic ?

4. Give reasons, why are the western harbours of Britain remain open even in winter season where as the eastern harbours of north America situated at the same latitude are remain frozen ?
5. Tide is very useful for ships. How ?
6. Why a spring tide occurs in full moon and no moon days ?
7. How does the Gulf Stream affects the climate of Europe ?
8. What is 'Sargasso Sea' and how does it form ?
9. What is the difference between the ocean waves and the ocean currents.
10. Write down a case study of a place that is affected by Tsunami.

III. Answer the following question in approximateley in 125-130 words.

1. Why do the ocean currents flow ? How do they affect the climate of any country.
2. Explain with illustration on the world map, Atlantic ocean currents.
3. Explain with illustration on the world map, Pacific Ocean currents.
4. How does the Tide occur ? Justify with diagram.
5. What are ocean currents ? What are the causes of their origin.



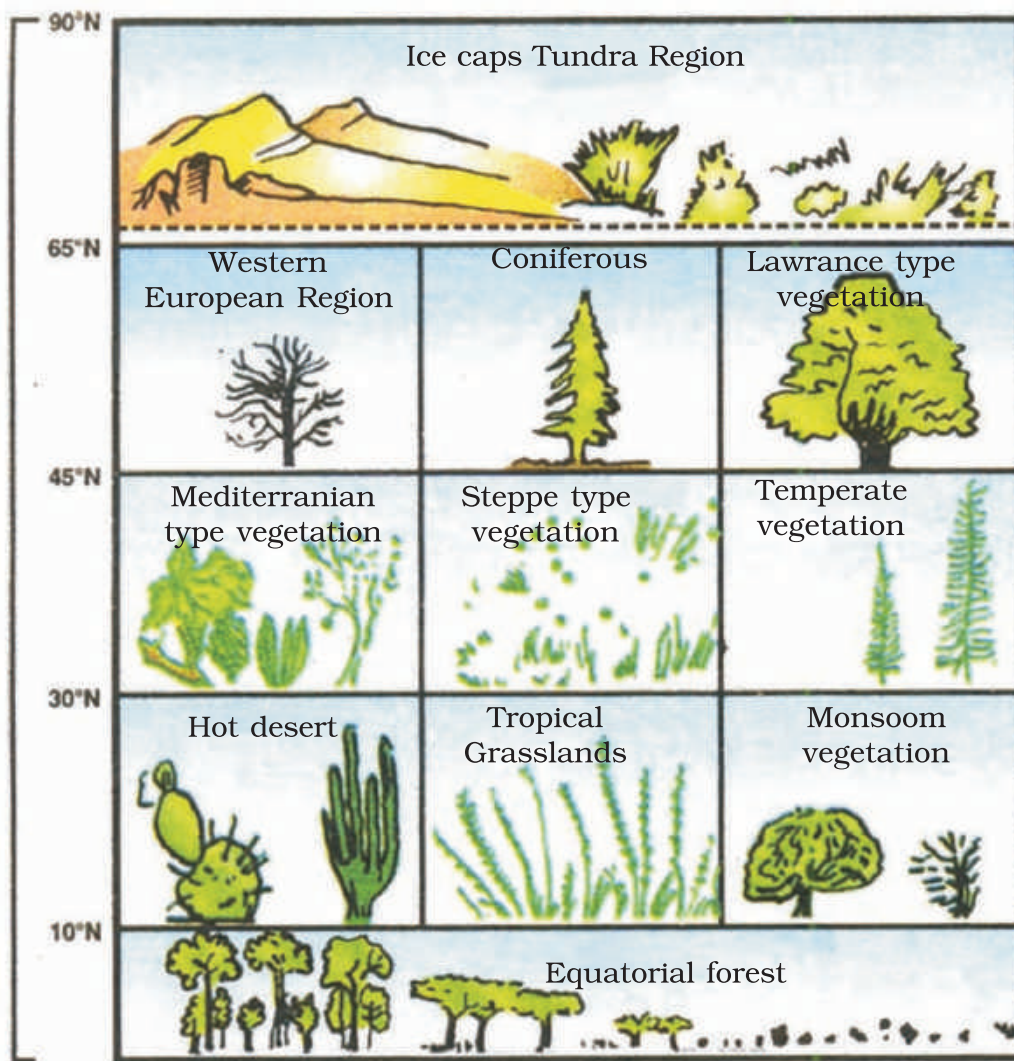


The natural vegetation of a place are the plants, trees and herbs that grow itself, without efforts of mankind. The natural vegetation shows the total effect of topography, type of soil and climate of a place. The natural vegetation is a most valuable resource, besides providing different types of wood. We get bamboos, grass for paper making, gum, resin, turpentine, lac, bark for leather colouring, medicinal plants and bushes from woods. A number of industries are based on forest wood, besides timber, it is used for making furniture, sports goods, ships, railway coaches, paper, plywood and boxes for packing purposes.

Forests are helpful to us indirectly also. Forests play a vital role in processes of atmosphere. Trees absorb carbon dioxide and release oxygen to the atmosphere. They help in occurrence of rainfall thus check the temperature rise, check floods and soil erosion and help in the seepage of rainwater into the ground. Forests also check the spread of deserts and provide habitat to birds and animals.

About 30 percent of land area of the world is under forests. Some countries are quite rich in this resource and forests play a vital role in their economy. North America, South America and Russia have vast areas under forests whereas Europe, Asia and Africa have lesser forest cover.

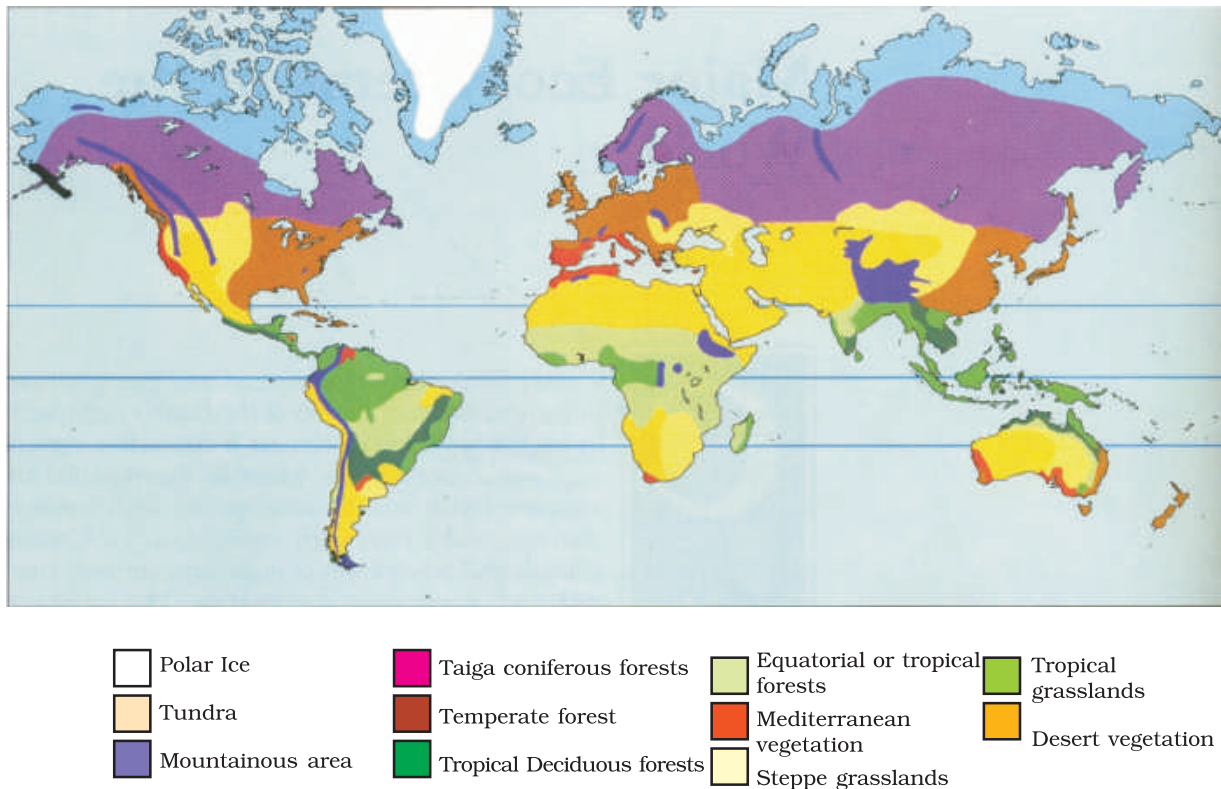
Increasing population of the world is adversely affecting the forests. Man has been cutting the forests to obtain land for cultivation since the pre-historic era. As a result, area under forests is decreasing drastically. If natural vegetation and forests are continuously destroyed with present speed, time will come soon when the whole world would turn into desert. It is therefore, urgent to conserve the forests and plan afforestation while checking deforestation.



Design 7.1 – The types of Vegetation on the earth according to the Latitudes.

After observing the above design, you will find that the distribution of natural vegetation is not the same through-out on the earth. There is a great variation in the distribution of vegetation. With the change in climate there is difference in the type of vegetation, type of trees, density and size of the forests. Due to the variation of climate at different latitudes the vegetation cover also varies. Natural vegetation of the world can be divided into three major types i.e.

1. Forests
2. Grasslands
3. Desert Shrubs



Design 7.2 - World map showing natural vegetation

Forests

Amount of annual rainfall, its seasonal distribution and temperature affect the types of forests. On the basis of the geographical conditions, the forests are further divided into three types.

I. Equatorial type of forests II. Monsoon Type of forest III. The Coniferous (conical) type of forests

1. Equatorial type of Forest

These forests cover approximately 10° north and 10° south of the Equator and are known as evergreen forests. Due to the continuous high temperature and rainfall, the dense forests grow in this area. The shoots of the tree are so much intermingled with each other that they form a canopy of trees which does not allow the sunlight to fall on the earth's surface. There are different types of trees in this region but these are not useful from economic point of view. The main reason is that it is not easy to pass through the forests and also they cannot be cut.

The large portion of South America, Central Africa, South East Asia, Madagaskar are covered with this type of forests. Small areas of Australia, Central America are covered under these forests. These type of forests are called as '**Selwas**' in the Amazon basin of Brazil in South America.

Lately this type of forests are considered to be **skyscrapers**. The uppermost layer of these forests comprise of 70 metres high trees. On this layer of the trees both light and thin trees are available. Below this is canopy type storey. Which is formed by the intermingling of shoots of trees with each other. A small amount of sunlight is available in this layer of forests, which is useful for fruits and flowers. Below this is a shadow area, in this vines are clinging around the trees and also interwoven with each other. The vines which cannot survive without sunlight grow high and come out to have sunlight. On the lowermost layer of the forest there is shadow area because sunlight does not reach the ground. Therefore the ground floor is covered with decaying leaves, insects and worms and forests are inaccessible. That is the reason that these forests are not economically useful while government efforts are on to develop and these regions and make use of forests.

II. Monsoon or Deciduous forests

These forests are found in sub-tropical latitudes where the rain is mostly confined to one season. These forests have broad leaved trees which grow at places where monsoon rainfall is sufficient. The season, in which there is no rainfall, these trees shed their leaves. That is why these forests are called Deciduous forests. Such forests are very useful economically, but simultaneously the land under these forests is being used for the cultivation of crops after clearing the forests. These forests are less dense as compared to equatorial type of forests and are more accessible also. We get timber from these forests for houses and for fuel.

III. The Coniferous type of forests

These forests are grown in temperate regions. The coniferous forests are also called evergreen forests. In Eurasia the forests are known as '**Taiga**'. From utility point of view these are the most important and precious trees. These forests includes soft wood of Chir, fir and spruce trees, which is used for making paper.

2. Grasslands

There are two types of grasslands : Tropical grasslands and Temperate grasslands.

i. Tropical grasslands

Tropical grasslands are found at 10⁰-30⁰ latitudes in Northern and Southern hemisphere. These grasslands are also called as '**Savanna**' grasslands. These are called by different names in different regions.

In Africa these are called Parkland. In Venezuela these are called Llanos. In Brazil these are called Campos.

This grass grows upto 5 metre high and after drying, it turns quite hard. There are also small sized trees scattered in these grasslands. Mostly herbivorous and carnivorous animals are reared on these grasslands.

ii. Temperate grasslands

Such grasslands are found in temperate zone. Because of low rainfall regions, the grass is not very high but it is soft and densely grown thus it is useful for animal grazing. The grasslands are also known by different names in different regions.

In Eurasia these are called as Steppes. In North America these are called as Prairies. In South America these are called as Pampas. In South Africa these are called as Veld. In Australia these are called Downs.

Desert Vegetation

There are two types of deserts on the earth : Hot Desert and Cold Desert.

i. Hot Deserts

Sahara and Kalahari in Africa, Arab Iran desert, Thar desert in Indo-Pakistan, Atacama in Southern America, Southern California and Mexico in North America, Eastern Australian desert in Australia are the hot deserts of the world.

Due to high temperature and low rainfall, the vegetation is scanty. Only thorny shrubs, cactus, small herbs and grass grow in such deserts. The nature has made this vegetation to adapt to the hot and dry weather of these areas. The roots of these plants are long and thick enough to secure water from the deep. The bark of the plant is thick and the leaves have thick foliage and are very smooth, so that minimum water may escape during the transpiration.

ii. Cold desert

These deserts are located mostly in the northern most latitude of Canada and Eurasia. (The combination of Europe and Asian continents is known as Eurasia).

Most of the times during a year, these areas are covered with snow. When the snow melts for a month or so colourful flowering plants grow. In the northern areas small grass i.e. lican is grown. The desert type of vegetation is not of great use economically.

Conservation of forest

The forests are of great importance to us because they fulfill our several needs. The great part of the timber from forests is used for fuel. Out of total usable timber 50% is used as fuel and 33% is used for housing purposes and rest of it is used for other purposes i.e. for making paper, railway boggies, sleeper, rayon etc. With the increase in population, The consumption of wood is also increasing, but on the other hand the area under forest is decreasing. Therefore the stress should be laid on the conservation of forests and planting new trees.

Sometimes fire causes great loss to forests. A specific attention should be given regarding the forests. Uncautiousness and carelessness regarding the forests should not be adopted. The cutting of trees should be systematically and besides new trees should be planted simultaneously. It should be kept in mind that the trees should not be destroyed due to mites and diseases. Maximum trees should be planted on the vacant space left along the footpaths, canals, rivers, roads and railway lines. The consumption of timber as fuel should be decreased and alternate

sources of fuel should be adopted i.e. LPG cylinder chullas, solar energy chullas, gobar gas etc. In housing alternate of wood should be encouraged.

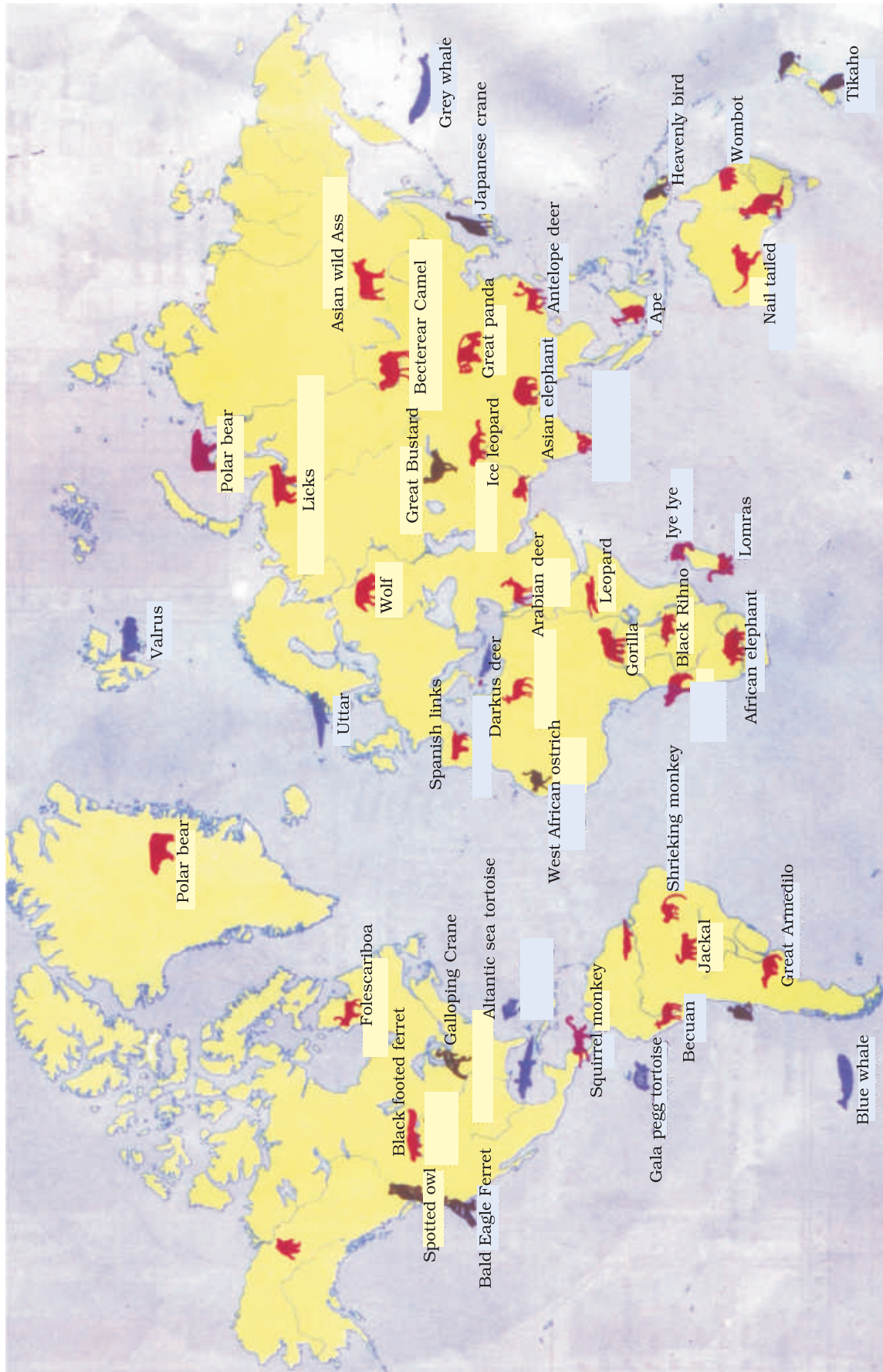
Wild Life

With the destruction of forests the number of wild animals are also decreasing at a great speed. The man has been hunting wild animals along with cutting the forests. Man has been hunting animals for the sake of meat, feathers and hides. As a result some of the species of wild animals have gone extinct and some of these are endangered to be extinct.

To maintain the ecological balance the survival of these animals is necessary. By clearing the forests and hunting of these animals, man has brought imbalance to the ecological balance. The nature has created biosphere in such a way that one animal depends upon the other, as small animal is a food for the big animal and the carnivorous depend upon herbivorous animals. In this way absence of even single particular species will create disorder of physical environment. Think a while, if the number of carnivorous animals like lion, leopard is more than the number of herbivorous animals, do you know what will be the result ? There would be an imbalance of ecological balance and the carnivorous would start eating human beings. If the situation is reversed the number of lions and leopards is less than the number of herbivorous animals. Due to over grazing of grass, a time will come when a lush green grasslands will turn into barren deserts. Therefore, soil erosion will be more, it means the disorder of balance. To maintain the ecological balance, efforts should be made.

Wild animals are also a wealth of a country. For this purpose, in many countries hunting is prohibited. There should be strict law to check hunting in India. It has been felt that it is very necessary to protect wild animals. As many of the species have been extincted earlier and many of the rest are endangered to be extincted.

The number of rhinoceros, leopard, lion etc. animals have been decreased. The national parks have been established in the United States of America, India and other countries. A natural environment has been provided to protect these wild animals in these parks. There are 20 national parks in India in different parts of the country Corbett, Shivpuri, Cannari,



Design 7.3 The animal species that are endangered to be extinct

Rajdevga, Gir etc. are some of the famous national parks of India. Besides there are reserved centres for the animals and birds. 'Chhatbir' is one of these centres in Punjab. The Savanna grasslands in Africa is one of the largest home of wild animals. The tourists from distant places in world come to visit these places. Zebra, giraffe, antelope, stag, deer, lion, leapard, tiger, elephants, wild buffalo, rhinoceros and different species of animals and insects are present in these regions.



I. Give answer to these questions in approximately 1-15 words.

1. What do you understand by natural vegetation ?
2. In how many types natural vegetation can be divided ?
3. Which are the goods we get from forests ?
4. How do the forest help us indirectly ?
5. What will be the effect of the development of forests ?
6. How man is disturbing the ecological balance ?
7. Name the local names of Tropical Grasslands.
8. Write about the vegetation of cold deserts

II. Answer the following questions in about 50-60 words.

1. Write about the equatorial type of forest.
2. Which are the forests that are economically useful ? Explain.
3. Why are the monsoon forests called deciduous forests.
4. Write about the temperate grasslands.
5. Write about the hot desert vegetation.
6. Why is it necessary to conserve forests ?

III. Answer the following questions in about 125-130 words.

1. Write in detail about the natural vegetation.
2. Write about the care and protection of wild animals. Describe the role of wild animals in ecological balance.

IV. Show the following on the world map

1. Sahara desert vegetation
2. Llanos Grasslands
3. Pampas Grasslands
4. Selwas Forests



Prepare a list of various types of trees grown in your school compound. Plant a few sapplings also, with help of your teacher.





Human environment is an important component of the whole environment. Only human beings have the quality to adapt according to the environment. Due to this quality man has access to the inaccessible places. During this, he has to pass through different stages. Previously man was not stuck to only one place, but he wandered forest to forest in search of fruits. That is why he did not have the permanent place to live. The man was like a nomad at that time. Slowly he started settling down on one place and started cultivating crops. He felt further need to settle down permanently with the industrial revolution and people started living at one place only. Man inculcated the habit of helping each other. In this way man learnt how to lit fire, started clothing himself and made houses to live in.

Previously man started living on the places where he could fulfill his day to day needs easily. For example, man started living along the river valley. There are many reasons, i.e. water for drinking is easily available in these areas. Secondly, due to fertile soil cultivation was very easy, as with a less effort one could have a good production. In this way man started living in from the thatched roof huts to mud houses, from mud houses to pucca houses. Multistoryed and sky scrapper have come in to existence now-a-days.

With the development of professional activities, the man has been shifting from river-valley side to industrial area where the facilities are more. People are also shifting from rural to urban areas. The following are the factors that affect the settlements.

1. **Availability of water :-** The people like to live on the places where the water is easily available. This is the reason the most of the civilizations developed along river-valley i.e. most of the people had

been living in Indus valley civilization. After excavation of some places, evidence of the Kachcha/Pucca houses are found by the archeologists.

2. **Topography** : Topography plays an important role in the establishment of settlements. The area with plain topography always act as a great facility of habilitation. In the rugged topography, there are less number of settlements because of the lack of transport and communication. It is difficult to cultivate crops in these areas. So far it is difficult to construct houses in these areas. On the plain area, it is easier to construct road and lay railway lines for transportation. Secondly it is easy to cultivate crops and it is easier to transport agricultural products to other places. This is the reason that big cities, metropolitans and cosmopolitans developed usually on plain areas. For example, many important cities developed in the plains of northern India.
3. **Natural beauty** : Many cities have been developed due to their natural beauty. These cities have been developed because of their importance as tourism point of view. Because tourism industry is one of the major industries now-a-days. Many people have been employed in this industry. The people from all over the world come to enjoy the beauty of the places like Kashmir, Goa etc. These are the places that have been developed because of their natural beauty.
4. **Means of Transportation and Communication** : The means of transportation and communication also plays an important role in the development of a place. By the the development of means of transportation and communication, it is easier to transport people and goods. Economic as well as social development is also possible due to efficient means of transport. Sometimes we feel, a product of neighbourhood is required far away and more profit can be earned. The areas which find more of such activities become major cultural and commercial centres. Besides, the cities that are located along the main roads, railway lines and ports also become important from cultural and commercial point of view. Technical advancement in means of transport and communication has also taken place. In the previous years people used pet animals as means of transport.

With the technical advancement, the transportation has become more technical and faster. The whole world has become a global village while various means of transport play diverse roles in economic and other types of development.

Road-ways : This facility has been provided from door to door. It is easier and cheaper to construct road than to lay railway lines. As far mountainous areas are concerned roads have also been constructed there but it is difficult to lay out railway lines.

Railways : The important aspect of railways is that these carry a large quantity of goods and large number of passengers. First of all, coal had been used in steam engines to run trains. At present trains are run by electric and diesel engines. The railway network is not only on the surface of the earth but it has been developed underground also, parts of railway network have been layed out over the bridges also. These are known as metro and sub-way railway services. In Delhi and Mumbai it has become popular recently.

In Europe and North America, railway network is widely spread. Now, railways have been layed out along the coastal areas of the continents. The railways of Soviet Union connect Leningrad to Valadivastic. This railway line is called as Trans-Siberian Railway'. This is the longest railway line in the world. There is great importance of rails in Japan, Maximum number of passengers travel on Japanese rails. High speed rails have been manufactured in Japan and France.

The bullet Train of Japan runs at the speed of 500 kilometer per hour.

Water ways : As we already know that man started living along the river side first of all. He got involved in fishing. Then he started travelling from one corner of the river to the other with the help of boats. It means he started transport practices through water. Now-a-days, the oceans, seas, rivers, canals lakes etc. are used by means of transport. The ships, steamer boats etc. are bowing through these and cargo and people are shipped through these. The adventurous people have completed their

voyages through these means of transport. Now, ships are engaged in large scale commercial activities.

Important water ways of the world :

- (i) **North Atlantic Ocean Water Way :** This water way is busiest one which connects western Europe with United States of America and Canada. The maximum trade is conducted through this water way. Dream ship Titanic also used this water way but could not reach its destination in 1912.
- (ii) **The Pacific Ocean Water Way :** This water way connects north and south America with Asia and Australia.
- (iii) **Cape – Water Way :** This water way was discovered by Vasco da Gama in 1498. This water way connects European countries and America with southern Asia, Australia and New Zealand. With the construction of Suez canal the importance of this water way in terms of traffic, has been decreased.
- (iv) **Suez Canal Water Way :** The Suez canal connects Mediterranean ocean sea and Red Sea. This water way connects the European countries with the countries of the southern Asia, Australia and West Africa.
- (v) **Panama Canal :** This canal has been constructed in Panama Republic. This canal connects the Atlantic ocean and Pacific ocean. This canal connects western Europe and Eastern United States of America with western United States of America and Eastern Asia.

The important ports : The North Atlantic ocean water way is the busiest waterway and constantly engaged in the shipping transportation. The important ports of India are – Kolkata, Chennai, Kochin, Mormugao, Kandla and Vishakhapatnam. These ports connect India with the rest of the world. Thus, we can say these oceans do not separate the continents from one another but actually these are the bridge between two continents that connects one continent with the other.

The Internal water ways : The large rivers and lakes also act as water ways. For example, Ganga-Brahmaputra river and lakes of Kerala in India work as water ways. The water ways are also used in the other

countries of the world i.e. the Danube river of Europe – Connects the middle and southern Europe to Black Sea. Yangtze Kiang river of China – connect places internally, Amazon river of Southern America, five lakes of Northern America that connects U.S.A. with Canada etc.

Airways : Aeroplanes are also an important means of transport. First of all the Wright Brothers of America made a flying machine in 1903. At last the Aeroplane came into existence.

Airways is the fastest means of transportation but costlier also. Now-a-days approximately all of the countries of world are inter connected through airways. Thus, world has become a 'Global Village'. Travelling through aeroplane saves a plenty of time. Therefore aeroplane have been very popular now-a-days. There are largest airports all over the world. London, Paris, Moscow, Tokio, Dubai etc. are the largest airports of the world.

Airways plays an important role in India. Many of the cities of India are inter-connected through Indian airlines. Vayudoot and some private airways connect. The International flights like, Air India and Indian Airlines of India are engaged in carrying passengers to the big cities of world, Amritsar, Delhi, Kolkata and Chennai are important airports of India.

Pipelines/Electric Grid : Through the pipelines, oil and gas is being transported and electricity is being transported through the electric Grid.

Means of Communication : Besides transportation communication network also played an important role in increasing great link between people. Through which a message of country can be conveyed to many people and country and all over the world at one time. For example, through internet we can be contacted to the world while sitting in one corner of the world. This is also a cheapest communication means. Through the Cyber network services, you can get knowledge about any corner of the world and get guidelines regarding education and any type of knowledge etc. Besides, postal services, telegram, telephone, mobile phone, radio, magazine, newspapers are also best means of communication.



I. Write down the answers of the following questions in approximately 1-15 words :

1. How does agriculture affect human settlement ?
2. Where did people live, first of all ?
3. How does a topography of a place affect the development of human settlement of a place ?
4. How are roadways important ?

II. Write down the answers of the following questions in approximately 50-60 words :

1. Write down the importance of railways while explaining them.
2. Write about the important waterways/ocean routes of the world.
3. Write about the internal waterways ?
4. World has become a Global Village with the development of Airways, illustrate the fact with example.
5. Explain various waterways of the world and name seaports of India.
6. Which are the means of communication, what is the advantage of their development.
7. Write in detail about Suez Canal.

III. Write the answer to these question in 125-130 words :

1. What are the factors that affect the development of human settlement ?
2. Explain in detail about the water ways.
3. What contribution has the means of transportation towards the development of human settlement.



With the help of Atlas and the Teacher :

1. Show the Suez canal and Panama canal on the world map.
2. Show important airways on the world map.





In this lesson we will study about the inter-relationship of man and environment. The changes in the elements of environment affect economic activities of man. In this lesson we will study each case of following physical regions :

- 1) Life in deserts
- 2) Life in tropical and subtropical regions
- 3) Life in warm temperate regions.

Life in Deserts : The deserts are the regions with less rainfall to no rainfall at all. It means the rainfall is not enough that can support vegetation, plants, trees and agriculture. There is extreme type of climate in these areas. There is great range of temperature between days and nights. The temperature rises upto 50°C during the day and falls to 15° celsius during night. Therefore the days are extremely hot and nights are pleasant during summer season. Some places in deserts are such that do not have rainfall for years together. Thus the earth crust or soil is fully dry. Thus no rainfall and dusty storms, With upper fertile crust eroded away. Therefore there is no vegetation. The deserts covers the $1/7^{\text{th}}$ part of the land area of the earth.

There are two types of deserts :

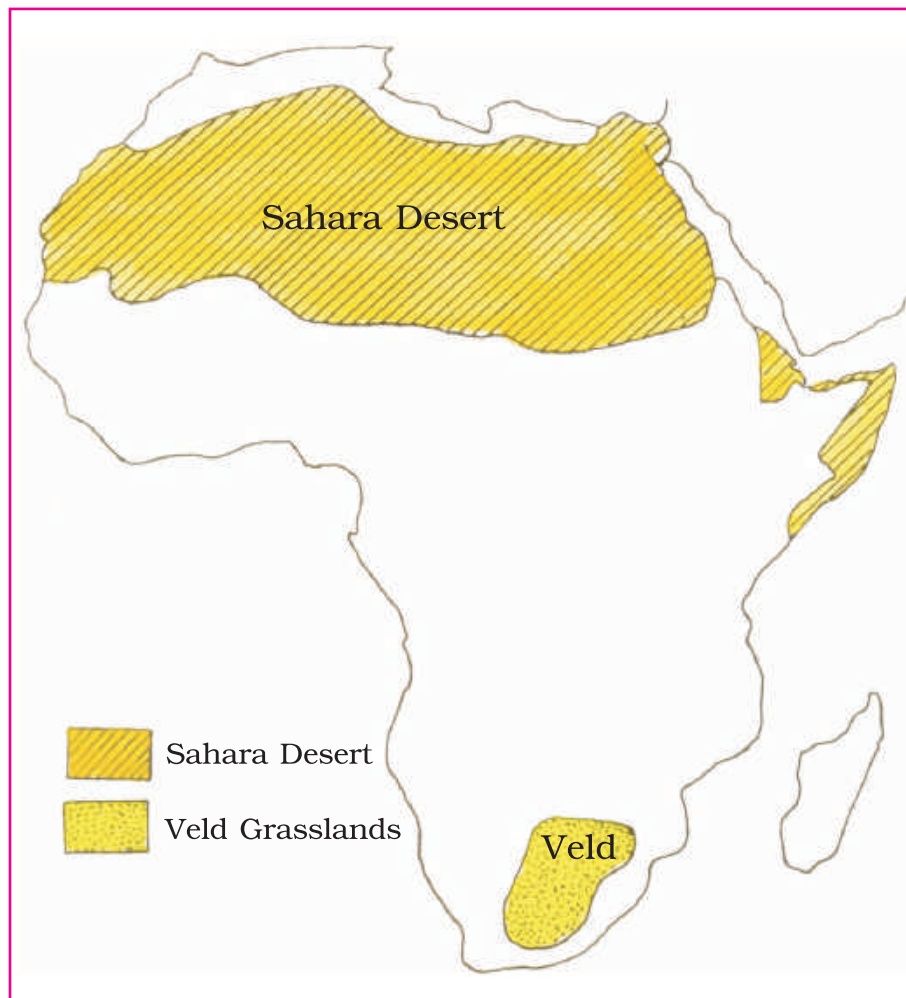
- (i) Hot deserts (ii) Cold deserts.

Hot deserts : These deserts extends upto 23° north and south latitudes of both the hemispheres. The hot deserts of northern hemisphere are: Sahara, Arab, Thar, California, Arizona, Mexico.

The deserts of southern hemisphere are : Atacama, Kalahari, Western Australia.

In this lesson we will study the biggest hot desert of the world Sahara.

Sahara Desert : This desert is located in Africa. Look at the extension of this desert, how big it is ! The length of this desert is 5600 kilometre from Red Sea to Atlantic Ocean and average width is 2000 kilometre. The sand dunes are the special physical feature of this region. The major part of this region is made up of shifting sand dunes. It means, this soil of these sand dunes is so dry and loose, the same dunes shift in the direction of the wind flow. That is why, these are called shifting sand dunes.



Design 9.1 Africa : Sahara desert and veld grasslands

1. Climate :

The climate of Sahara desert is extremely hot and dry. The temperature rises upto 40° to 45° celsius in summers. The highest temperature has been measured as 58° C at the place of Arizona in Sahara desert.

2. Vegetation :

The vegetation is scanty. Thorny plants (cactus), thorny bushes, date and palm trees etc. grow there. The date when ripe turns into dark brown colour. Both man and animal eat them. The leaves of these are used as fodder for animal. Sometime these are also used for making roofs of the houses. Date is the important tree of the region. The wine is prepared from their plants. Olive, apricot etc. are grown under the groves of date trees.

The deserts are known for their lifeless habitat. But it is not so. No doubt, the water is considered to be an important factor for living. Here we can understand the importance of relationship of landforms and water. As for example the high lands and on the slopes, the water table is very low. Therefore no particular type of vegetation is grown over there. Down the sloping area, where the water collects, plants and animals are available. Their adaptation to environment in desert area, is a conspicuous feature of plants and animals. As in deserts, the plants are deep rooted and with thin leaves, sometimes these leaves are in the form of spikes only. Due to their long deep root, it can absorb water from the deep underground water. Due to their thin leaves, the transpiration is much less.

3. Human Settlements :

The human settlements are also usually developed around the water bodies. These water bodies are called Oasis which may be very big and sometimes small also. In a small Oasis, there is a grove of date trees around a well, which act as rest houses for the travellers. In large oasis agriculture is done, wheat, sugar beat, maize, barley, beans, onion, tobacco etc. are grown. Now, the people have started constructing thick walled houses with small windows in desert regions. This is done so to avoid extreme heat. People have made caves in soft rocked area where animals and people live. For long travel people use tumblers that are made of goat or camel skin. The water remains cool in these containers.

4. Animal Life :

A camel is the most important animal of such regions. It is a thick skinned animal, which can tolerate bad weather. The special feature of

the camel is that they can store water for a long time and for days together they do not need to drink water. Feet of a camels are paddy which help them walk smoothly on the sand while the hump on their back is like store of water which helps them to walk for a long distance without water. Actually hump is made of hydroganic substances which reacting with oxygen, produce water. That is why camel is known as '**desert ship**'. Some carnivorous animals, fulfill their need of water through their food only. Whereas the bird find out water by flying to the distant regions.

Addax, is a big antelope animal of Sahara desert. The light brown colour of its skin reflect light and heat. It means the heat does not penetrate in its body. Its digestive system is such, that it can live on coarse grass and small quantity of water. Besides these jackal, sand rats, foxes, antelopes and different species, insects, crocodile etc. are the habitat of this area.



Design 9.2 Addax

As far as the people are concerned, nomads are the habitants of such regions. The nomads are the people who fulfill their daily needs from animals. By selling the animal product, milk etc. they get money to purchase other things of their daily needs. They do not stick to one place, but they wander where they get grass for their animal grazing. They are

called as the **Torring nomads** of Sahara. They rear camels, horses, sheep and goats.

The cold deserts : There are cold deserts also in the world. The temperature of these areas may fall to - 50° Celsius. In this lesson we will study about Ladakh as a cold desert of the world.

Ladakh –The cold desert : Ladakh is the coldest desert of the world. This is a part of Jammu and Kashmir. It disconnects from the world for approximately six months every year due to heavy snow fall. Ladakh is known as moon land. Because it is not so easy to reach there.

Ladakh is a vast sandy desert with naked stony slopes. Due to the severe weather, it is difficult to live there. The Indus river flows through Ladakh and Indus valley lies in the centre of Leh area. Shyok, Suru and Zaskar are other rivers which flow through Ladakh. They also have carved valleys in the area. There is scarcity of water in cold desert also as it is in hot deserts. The only difference is that the scarcity of the water is due to non availability of water in hot desert. But in cold deserts the scarcity of water because of frozen form of water due to extremely low temperature. Therefore there is dryness in both types the deserts. Natural vegetation does not grow due to dry weather.

There are many mountain-passes to enter Ladakh. Karakoram and Zojila are some of the important mountain passes. When the snow melts apple, walnut, apricot, mulberry trees are grown. In the lower part of the mountains, pencil cedar, Elm, few cypress and willow etc. trees are grown. In the domestic animals; cow, goats, sheep, dogs etc. are reared. In wild animals wild yak, wild sheep, hares, kiang which looks like pony etc. are found in this region. Only the lizard is the scrawling animal that is found in this region. Among the minerals, borax and sulphur is found in large quantities.

For last three decades, the Ladakh has risen to be a centre of attraction for tourists and tourism industry has developed in this area. About 400 hotels have been built in Leh. The opening of Srinagar-Leh roadway has been a doorstep to the other part of the world. Leh is also linked with other part of the world by airways. This development has brought major change in the life style of the people of Leh-Ladakh. The handicraft, particularly pashmina shawls of Leh are famous all over the world.

5. Life in Tropical and Sub-Tropical :

This area is extended on the 5° north and south of the equator. In some places this area extends upto 10° latitudes. Following are the areas that are included in this region.

1. The Amazon Basin of South America
2. Zaire Basin (Congo) in Africa, and Coastal area of western Africa along with the gulf of Guinea.
3. Malaysia in Asia and eastern archipelago.

In this lesson, we will study the life in Amazon valley. This is plain lowland and plain of southern America which is formed by the alluvial brought by Amazon river. The Amazon river is the largest river of the world next to the river **Nile**. From the volume of water flowing point, it is the largest river of the world. The river joins the southern Atlantic ocean after originating out of the snow covered Andes mountain of southern America.

The Amazon basin is consist of alluvial soil which is very fertile. As it is located near the Equator, it is hot and get rainfall throughout the year. That is why it is also known as equatorial rain forest. The life in this region is divided into three parts.

1. Life in rainforest canopy.
2. Life in Amazon river.
3. Human life near the coastal area of Amazon river.

1. Rainforest canopy : The life in upper forest part of the rain forest canopy. The shoots of trees are so intermingled with each other to form a canopy. The living beings, birds can never come down on the surface of the Earth. This animal kingdom includes insect eating animal, multicoloured birds like parrots and many species of animals. The habitat of this area, runs from one tree to the other with the help of shoots, they do not come down on the surface of the Earth.

2. The life in Amazon River : Amazon river is a huge river, it has thousand tributaries. Some of the channels are very deep and some are very much wide. These tributaries are covered with leaves shed by the trees, these are the home of many kinds of fish.

3. The coastal life of Amazon River : The tributaries of huge Amazon river flow through the forests which act as a natural ways of transportation. These forests are also a source of food for the inhabitants. Some of the people still live traditionally. As they live upon hunting, fishing and growing crops. Cannowing (Boating) by hand to move from one place to other. Some of these had made houses in these boats. Still some people join engines to the boats according to the new techniques.

Some people of this area shift to other place after living, hunting animal and taking primary crops for some time. They do so because, by leaving the soil vacant for sometime it may regain its fertility naturally. Now-a-days the rainforests are being cleared at great speed, which is of big concern. The cutting of trees is at high speed, for the sake of constructing buildings, for large farms (land holdings) and cattle rearing. It is not only this, but also the less fertile soil of this region is not fit for cattle rearing and growing crops for a long time. The people use a place for their needs and then move to another place after some time. Thus the cutting of forest is being done continuously and natural fabric is being destroyed.

3. Life in Subtropical Areas : The subtropical areas of world extend from latitude $23\frac{1}{2}^{\circ}$ north, tropic of cancer to $23\frac{1}{2}^{\circ}$ south, i.e. the tropic of Capricorn, from the equator. Out of these subtropical areas, we will study about the *plains formed by Ganga –Brahmaputra* rivers.

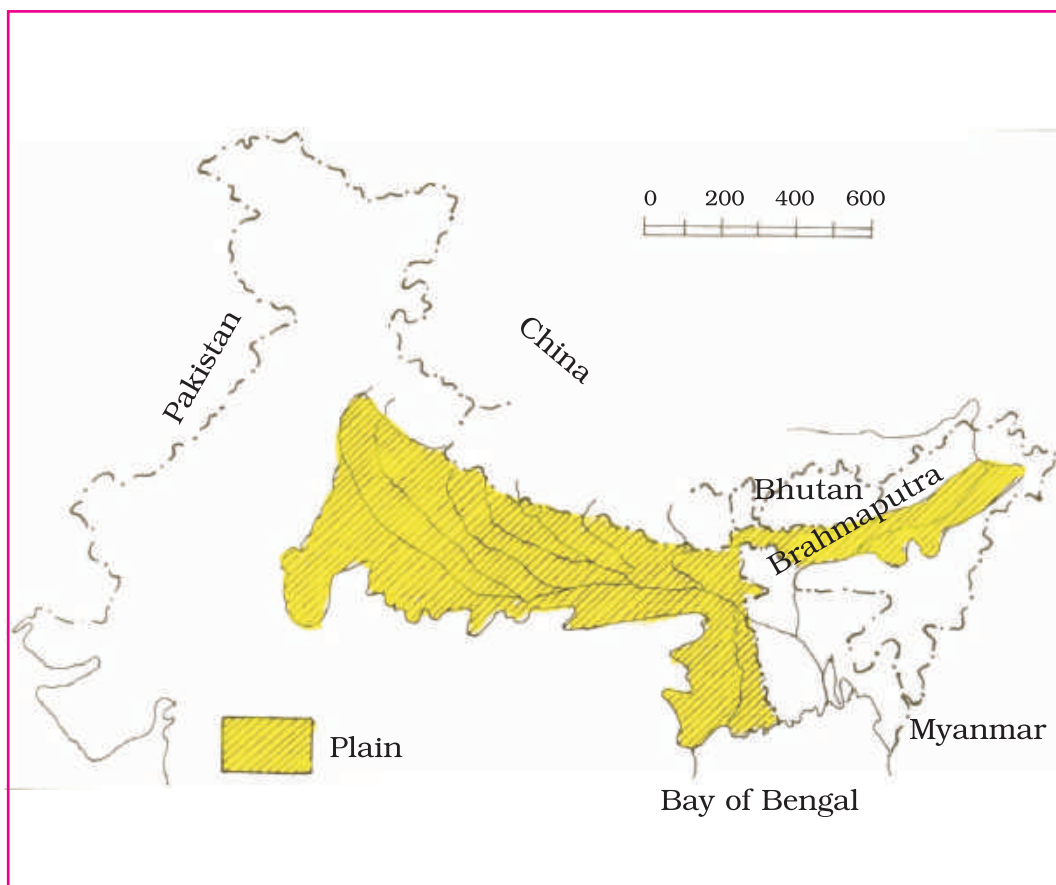
The plain extends upto 2500 km. to the south of Himaliyan mountains. These plains are formed by the two rivers. Ganga and Brahmputra. These are very important plains and high density of people like to live in this area. This region has seen last urban development and due to fertile soil, availability of water and developed means of transportation this has became India's developed region. On the basis of rivers it is divided into two parts.

Plain of Ganga – This includes the states of Uttar Pradesh, Bihar and West Bengal.

Plain of Brahmaputra – The major part of the plain is in the Assam State.

In this plain area there is not much variety of relief features. This area is characterised by the meandering paths because of river erosion. At some places the ox-bow lakes are found which are naturally made by the obstruction of water flow. This is the place where the speed of rivers slows down, it gets divided in to different branches while unloading the carried material. Thus the delta shaped (Δ) feature formed at its end. These rivers Ganga Brahmaputra form the biggest delta of the world i.e. Sunderban delta with area of 33000 Sq. Km. New Delhi which is capital of India is also lies in plains of Ganga.

The alluvial soil of Ganga-Brahmaputra plain is very fertile. It has been deposited by two rivers. Rice, wheat sugarcane, oil seeds, grains, fruit and tea are some of the important crops which are grown over here. Formerly the farmers used to depend on the monsoon showers for their crops. But in the recent years irrigation facilities have been extended to the farmers. Now two to three crops are raised from the same field annually.



Design 9.3 Plain of Ganga Brahmaputra

The rice is an important staple crop of the people of this area. Even fish form an important part of the diet of some areas. Primarily, being an agricultural region, some of the agro based industries have been developing. With the increase in growth of population, the most of the area is being used for building houses and towns. Thus the land under agriculture is reducing here continuously. The hundreds of cities are in this region. Varanasi is an ancient city which is located along the bank of Ganga river. Besides, Haridwar, Allahabad, Patna, Kolkata, Tezpur, Dispur are some the important cities, which are also located in this plain area.

With the rapidly increasing population the smoke emitting means of transport, industries, the water of river Ganga is being polluted. Union Government of India has initiated Ganga-Action Plan. With this plan the idea is to save river Ganga from pollution but lack of public support is causing big hurdle.

The life in Temperate Areas : The temperate areas are located in the middle Latitudes of the both of the hemispheres. These areas are situated to the interior of the continents and away from a maritime (oceanic) influences. There is great range of temperature between summers and winters. The temperature rises upto 20° celsius during the summers and falls down to 20° celsius in winters. The areas of southern hemisphere are not so far away from the ocean. Therefore, the temperature here, does not fall or rise so much as in northern hemisphere and rainfall is also scanty. Due to this reason only grass grows here. The following areas of the world are under these grasslands. These are called by different name in different continents.

- | | | |
|------------------|---|------------------|
| 1. North America | - | Prairies |
| 2. South America | - | Pampas |
| 3. Europe | - | Steppe |
| 4. South Africa | - | Veld |
| 5. China | - | Manchurian Plain |
| 6. Australia | - | Downs |

In this lesson we shall study only about the prairies of North America and veld of Africa.

The life in Prairies grasslands : The prairies are the grass lands of North America, which are away from maritime influence, extend into the interior of continents. The most of the area is in U.S.A. and Canada. The southern part of Prairies makes a boundary between U.S.A. and Mexico. In the north it merges with jungle-belt of Canada. Mostly there is no tree in the prairies. Where there are low lands the trees are found in river valleys, where the availability of ground water is sufficient. Because of the river flow the ground water table rises up. The main feature of the plains is that, the grass grows upto two meter high which covers the whole land of this region.



Design 9.5 Prairies of North America

Since people started living over here, the landscape and landuse has changed to a great extent. The human activities like agricultural practices, industries, making houses to live, developing means transportation etc. have changed the land-scape and landuse as well. Usually, the people

from Canada and snow covered areas of Europe have established over here primarily. Canada-Alberta, Saskechwan and lowland Manitoba, etc. are the some of the very fertile areas of this region. After clearing the grass, the agricultural practices have been adopted in these area.

With the construction of the Candian Pacific Railways the transportation has become easier over there. Laying of rails has been a centre of attraction for the people and many people are moving to live here. Most of people are dwelling in 25 km. radius of railways. As in India, cities formed after the towns and for connecting them with each other, railways came into existence. But in other way round, primarily the railways had been constructed and afterwards human settlements, towns and cities developed along the railways tracks in Canada and other regions.

Due to dry weather cattle rearing is very popular in western part of prairies. The cattle grazing is along the slopes of rocky mountains. The important animals, among the domesticated are bison, deer, antelopes and poultry. In winters, the dry wind blow from the west and melts the snow. The summers and autumn seasons the warm winds turns the grass into hay.

Wheat is the main crop of this area. The farms are very big and are not isolated. The mechanised agriculture with modern machines is possible. Besides wheat, barley and oats are also grown here. Wheat is sown in spring season, the showers of late spring and bright sunshine of the summer help wheat to grow quickly. In August, this crop is ready for harvesting. These machines are called cambines, look at the picture of stores of food grains in Prairies.

From these stores, the wheat is being transported through the rail to the other places.

The men had exploited the earth surface in these plains through numerous activities which result into soil erosion. This is mainly through wind. As a result many of the places came under the drought. Thus with the decrease in fertile area the production of crops have also been decreased. Therefore government started taking interest in the agriculture aspect of these areas. The cattle grazing is prohibited in some areas of Prairies.



Design 9.6 Stores of Food Grain in Prairies

The people of Prairies mainly speak French and English. Thick concentration of such people is found in Qubec province of Canda. This province is trying to attain status of independent nation.

Life in Veld Grasslands of Africa : Veld is an extensive grass land of southern Africa. Veld is in the east of South African plateau. It includes eastern part of Cape colony, entire Orange free State and most part of the transwal. As one goes away from the coast to the interior of the continents the climate becomes drier, because the moist winds from the ocean do not reach there. Therefore these regions are known as dry regions. As we go further west, these grasslands almost merges into the desert areas.

The area of high plateau is known as the high veld. Their height ranging from 1120 m to 1670 m. The middle veld is a plateau ranging from 610 m to 1120 m below this lies the low veld. The High veld is a central ridge which forms the water shed of the region. The Zambezi, Limpopo and Sabi rivers flow down the slopes and have created falls and rapids.

The maize is an important crop of this area. Large quantities of maize is being exported to other countries. The map of Africa, showing the veld region is provided in this lesson, study the map of natural vegetation of Africa in the Atlas. In some places, the maize grow naturally. Cattle rearing is also an important occupation in these parts. The wool of the sheep of this area is known throughout the world since earlier times. In many parts of the veld several minerals are found. Gold and Coal are mines are these near Johansberg. The diamond mines are found in Kimberley.

Veld, besides agriculture, is rich universal resources also. That is why, there are industries that are based on agriculture or other universal based. Therefore these industries have given, rise to the growth of towns. For example, Pretoria is an important town because of specified industry of iron and steel, railways and Pharmaceuticals. This development has reduced the grasslands to a considerable extent and has affected the natural environment.

Points to Remember

1. Deserts are of two types : Hot & Cold. Sahara, Arab, Atacama, Kalahari are hot deserts while Ladakh is cold desert.
2. Life in tropical and subtropical regions such as Amazon basin, Congo basin, Gulf of Guinea. Ganga-Brahmaputra plains and South eastern islands of Asia matches a lot.
3. In temperate regions, Prairies, Pampaz. Steppies, Vald and Downs have identical life styles.



I. Answer the following questions in about 1-15 words.

1. What are the deserts ? How many types of deserts are there ?
2. Write about the hot desert ?
3. What are cold deserts ?
4. Write down the extension of – Tropical and Subtropical region.

5. Describe the climate of warm temperate region ?
6. Why camel is known as ship of deserts ?
7. Name the rivers that flow in Ladakh ?
8. What do you understand by Oasis ?

II. Write the answer of the following questions in about 50-60 words :

1. Write in brief about the life of people in deserts.
2. Write down the natural vegetation of hot desert Sahara.
3. Write about the extension of Ganga-Brahmaputra Plain and also about the land forms of this region.
4. What type of climate is there in Ganga-Brahmaputra plain ? Write about the crops grown in this area ?
5. To what extent is the Amazon basin extended ? Write about the vegetation and main crops.
6. Write in brief about Prairies grass lands, what is the importance of railways in the development of this plan.
7. Write about the vegetation and animals of Sahara desert.
8. Why is Ladakh known as 'moonland' ? Write about the climate and vegetation of Ladakh.
9. Write in brief about Veld Grasslands of Africa.

III. Locate or show the following areas on the world map :

1. Hot deserts of the world.
2. Mid Latitude Grass lands.

