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GEOGRAPHY

Unit - 1

Rocks and Soils


 Learning Objectives

- ▶ To understand the nature of rocks, their types and uses.
- ▶ To identify the different types of rocks.
- ▶ To study about the nature of soil and its composition
- ▶ To understand the importance of soil conservation



Introduction

Have you ever noticed any mountains or rocks nearby your location or during your travel? Have you ever been to any hill station during your vacation? Do you know how they originated on the earth surface? Do you know what kinds of material are used in the construction of temples, buildings, roads, flyovers etc. In this lesson, we will learn about rocks and soils.

In lower classes, we have studied about four realms of the earth, namely lithosphere, hydrosphere, atmosphere and biosphere. Lithosphere is the upper most and significant layer of the earth. It is composed of solid rocks and unconsolidated materials. The literal meaning of lithosphere is “**The sphere of rock**”.



Petrology is a branch of geology which deals with the study of rocks. ‘**Petrology**’ is derived from the Greek word “**Petrus**” refers to rock and “**Logos**” refers to study

Find out

What is the base of the house made up of ?

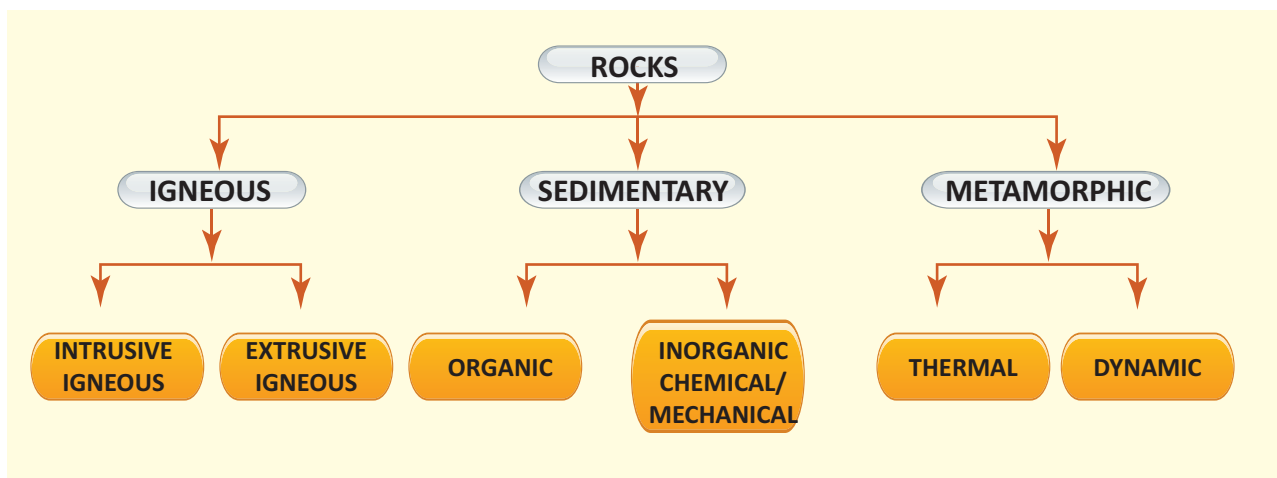
Rocks

The rocks are the solid mineral materials forming a part of the surface of the earth and other similar planets. The earth’s crust (Lithosphere) is composed of rocks. A rock is an aggregate of one or more minerals. Rock is an important natural resource and is found in solid state. It may be hard or soft in nature. An estimation reveals that there are 2,000 different types of minerals found on the earth surface out of which only 8 basic minerals commonly found all over the earth. Minerals are chemical substances which exist in nature. They may occur either in the form of elements or compounds.

Classification of Rocks

According to the mode of formation the rocks are classified into three types as follows.

1. **Igneous Rocks**
2. **Sedimentary Rocks and**
3. **Metamorphic Rocks**



Igneous Rocks

The igneous rocks are formed by the solidification of molten magma. These rocks are also called as the 'Primary Rocks' or 'Parent Rocks' as all other rocks are formed from these rocks.



Igneous rock

The word **Igneous** is derived from the Latin word 'Ignis' means 'fire'

Characteristics of Igneous Rocks

1. These rocks are hard in nature
2. These are impermeable
3. They do not contain fossils
4. They are associated with the volcanic activities
5. These rocks are useful for construction works

Types of Igneous Rocks

Igneous Rocks are of two types. They are:

1. Extrusive Igneous Rocks
2. Intrusive Igneous Rocks

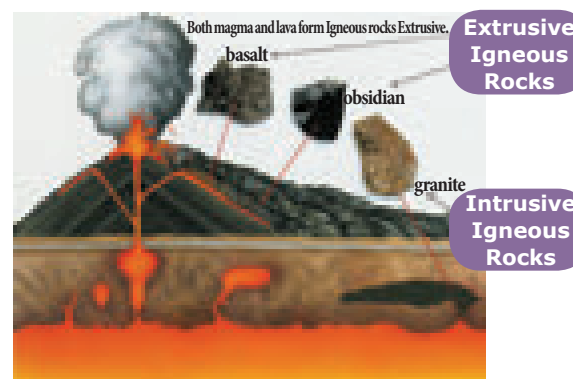
1. Extrusive Igneous Rocks

Can you visualize the lava comes out from a volcano? Lava is actually a fiery red molten magma comes out from the interior of the

earth on its surface. After reaching the earth surface the molten materials get solidified and form rocks. Rocks formed in such a way on the crust are called Extrusive igneous rocks. These rocks are fine grained and glassy in nature due to rapid solidification. Basalt found in the north western part of peninsular India is the example for this type of rock.

2. Intrusive Igneous Rocks

The molten magma sometimes cools down deep inside the earth's crust and becomes solid. The rocks formed this way is called 'Intrusive Igneous Rocks'. Since the cool down slowly and form crystals. Hence they are called 'crystalline rocks'. Intrusive Igneous rocks are two types. They are, 1. Plutonic rocks 2. Hypabysal rocks. The deep seated rocks are called 'Plutonic rocks' and the ones formed at shallow depths are called 'Hypabysal rocks'. Granite, Diorite and Gabbro are the example of plutonic rocks and dolerite is an example of hypabysal rocks.



Extrusive & Intrusive Igneous rocks

Some major **Active Volcanoes**: Mount Vesuvius, Mt. Stromboli and Mt. Etna in Italy and Mauna Loa and Mauna Kea in Hawaii Islands.

Sedimentary Rocks

The word 'Sedimentary' has been derived from Latin word 'Sedimentum' means settling down. The sedimentary



Sedimentary Rocks

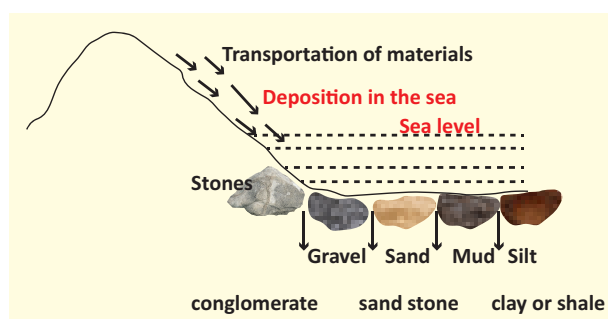
rocks are formed by the sediments derived and deposited by various agents. Due to high temperature and pressure, the undisturbed sediments of long period cemented to form sedimentary rocks. Sedimentary rocks consist of many layers which were formed by the sediments deposited at different periods. As it consists of many strata, it is also known as 'Stratified rocks'.



Sedimentary rocks are the important source of natural resources like coal, oil and natural gas.

Characteristics of Sedimentary rocks

1. They have many layers.
2. They are non-crystalline rocks.
3. They contain fossils.
4. They are soft and get eroded easily



Formation of Sedimentary Rocks



Oldest sedimentary rocks of the world has been identified in Greenland and estimated as 3.9 billion years old.

Types of Sedimentary Rocks

1. Organic Sedimentary Rocks

These rocks are formed as a result of the decomposition of dead plants and animals. It contains fossils. Chalk, Talc, Dolomite and Limestone rocks are of this category.

2. Mechanical Sedimentary Rocks

These rocks are formed due to the disintegration of igneous and metamorphic rocks. The natural agents erode and transport these rocks and deposit them at some places. After a long period of time, they cemented to form rocks. Sandstone, Shale and Clay are the examples of rocks of this type.

3. Chemical Sedimentary rocks

These are formed by precipitating of minerals from water. It is formed usually through evaporation of chemical rich solutions. These rocks are also called as evaporates. Gypsum is an example of this kind.

Metamorphic Rocks

The word Metamorphic is derived from two Greek words "Meta" and "Morpha", Meta means change and Morpha means shape. When Igneous and sedimentary rocks subject to high temperature and pressure, the original rocks get altered to form a new kind of rock called metamorphic rocks. Metamorphism is of two types. They are

1. Thermal Metamorphism
2. Dynamic Metamorphism

If the change in the rocks is mainly caused by high temperature, the process is called as 'Thermal Metamorphism'.

If the change in the rock is mainly caused by high pressure, the process is called as 'Dynamic Metamorphism'.



One of the world wonders Taj Mahal in India was built with White Marbles a metamorphic rock.



Metamorphic Rock

Formation of Metamorphic Rocks from Igneous rocks

1. Granite into gneiss caused by dynamic metamorphism.
2. Basalt into slate caused by thermal metamorphism.

Formation of Metamorphic Rocks from Sedimentary rocks

1. Sandstone into quartz caused by thermal metamorphism.
2. Shale into slate caused by thermal metamorphism.

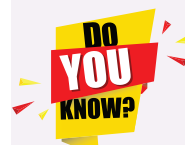
Characteristics of Metamorphic Rocks

1. Metamorphic rocks are mostly crystalline in nature.
2. They consist of alternate bands of light and dark minerals.

Rock cycle

Igneous rocks are the primary rocks formed first on the earth. These rocks are weathered, eroded, transported and deposited at some places to form sedimentary rocks. The Igneous and Sedimentary rocks are changed into metamorphic rocks under the

influence of temperature and pressure. The metamorphic rocks are also get disintegrated and deposited to form sedimentary rocks. Formation of igneous rocks take place when there is an outflow of molten materials. Like this, the rocks of the earth crust keeps on changing from one form to another form under various natural forces and agents. The endless process is referred as **Rock Cycle**.



Quartzite and Marble are the rocks commonly used for construction and sculpture works. Marbles are widely used for making beautiful statues and decorative items such as vase, tiny gift articles and grinded marble is used to produce plastics, paper etc.,

Uses of rocks

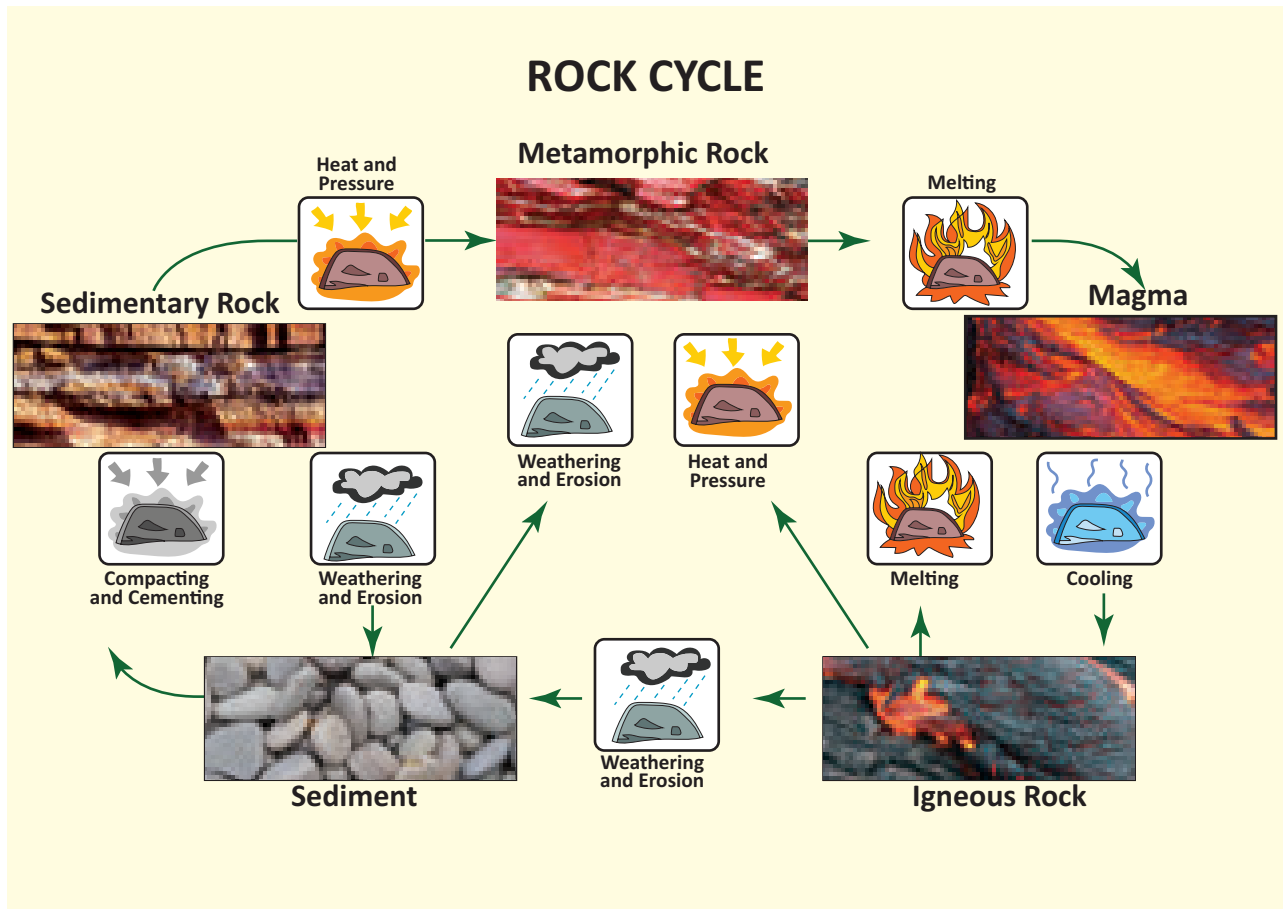
Rocks have been used by mankind throughout the history. Rocks are highly valuable and important to almost all aspects of our economy. The minerals and metals in rocks have been found essential to human civilization. Rocks are used for many purposes in our life and some of them are given below

Rocks are useful for making

1. Cement
2. Writing chalk
3. Fire
4. Building materials
5. Bath scrub
6. Kerb stone
7. Ornament
8. Roofing materials
9. Decorative materials
10. These are valuable source of minerals such as gold, diamond, sapphire etc.

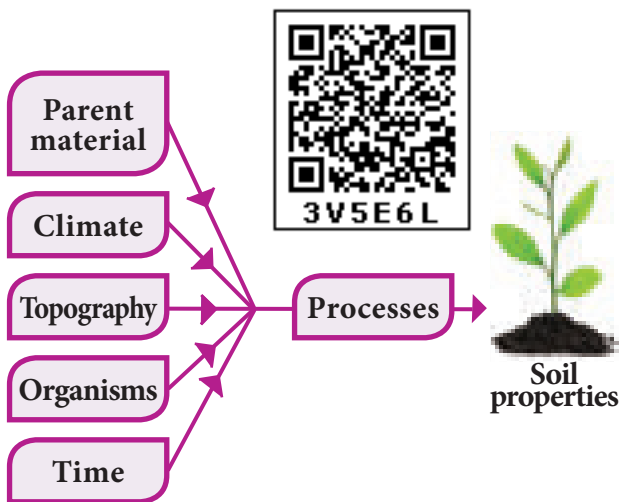
ACTIVITY

Collect different types of rocks and display them in the class room



Rock Cycle

Soil and its Formation



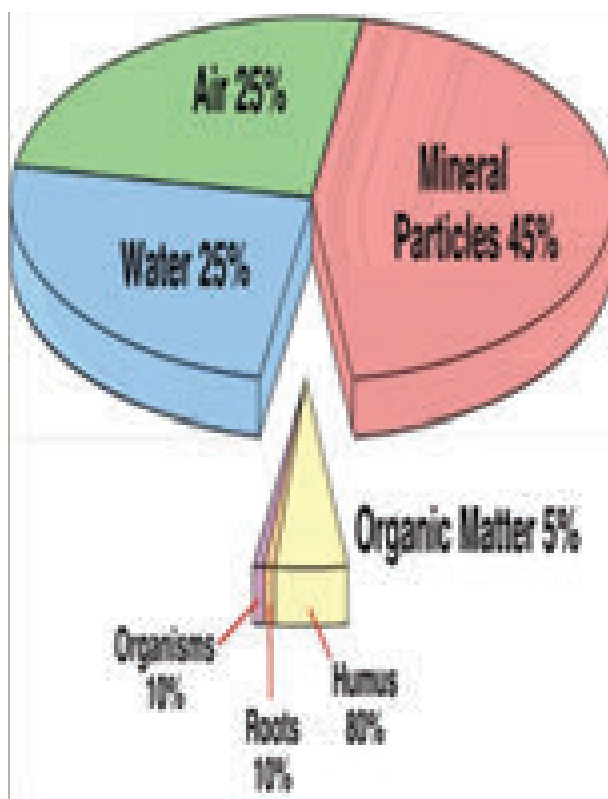
Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together support life. **Soil** minerals form the basis of soil. It forms on the surface of the earth. It is known as the '**skin of the earth**'. Soils are formed from rocks (parent material) through the **processes** of weathering and natural erosion. Water, wind, temperature change, gravity, chemical

interaction, living organisms and pressure differences all help break down parent material. It leads to the formation of loose material. In course of time, they further break down into fine particles. This process release the minerals locked in the rock fragments. Later on, the vegetative cover which develop in that region forms humus content in the soil. This way the soil gets matured gradually.

World Soil Day is observed on 5th December, every year

Soil Composition

The basic components of soil are mineral, organic matter, water and air. It consists of about 45% mineral, 5% organic matter, 25% of water and 25% air. It is only a generalized fact. The composition of soil varies from place to place and time to time.



Soil Composition

Soil profile

The soil profile is defined as the vertical section of the soil from the ground surface and extends downwards.

ACTIVITY

Collect sample of soils from your place and exhibit in the class room.

Classification of soils

Soils are classified on the basis of their formation, colour, physical and chemical properties. Based on these, soil is classified into six major types. They are: Alluvial soil, Black soil, Red soil, Laterite soil, Mountain soil, Desert soil

Alluvial soils

These soils are found in the regions of river valleys, flood plains and coastal regions. These are formed by the deposition of silt by the running water. It is the most productive of all soils. It is suitable for the cultivation of sugarcane, jute, rice, wheat and other food crops.

Black soils

These soils are formed by weathering of igneous rocks. Black soil is clayey in nature. It is retentive of moisture. It is ideal for growing cotton.

Red Soils

These soils are formed by weathering of metamorphic rocks and crystalline rocks. The presence of iron oxide makes this soil brown to red in colour. It is usually found in semi-arid regions. It is not a fertile soil. It is suitable for millet cultivation.

Laterite soils

These are the typical soils of tropical regions. These soils are found in the regions which experienced alternate wet and dry condition. As these soils are formed by the process of leaching, it is infertile. It is suitable for plantation crops like tea and coffee.

Mountain soils

These soils are found over the slopes of mountain. Soils in these regions are thin and acidic. However characteristic of soil differs from region to region based on the altitude.

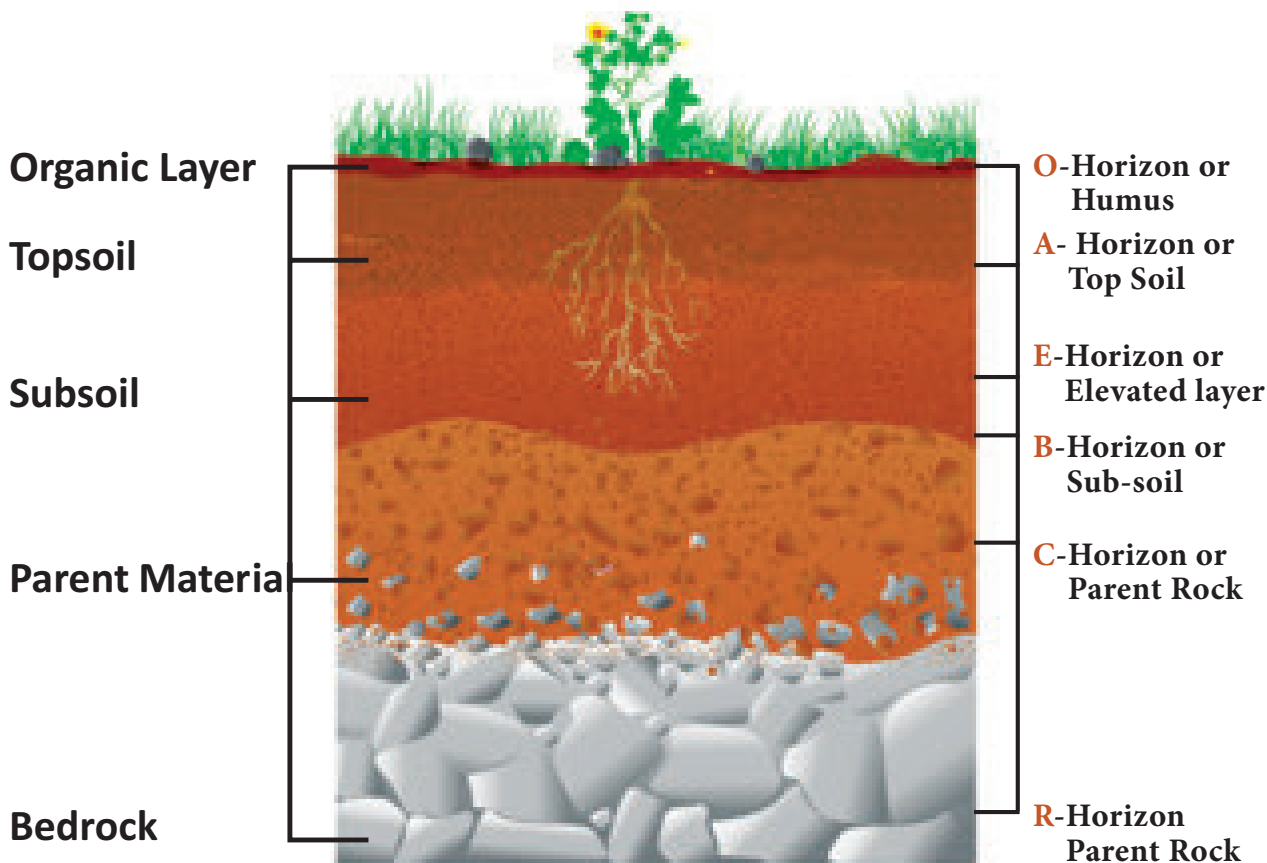
Desert soils

These are sandy soil found in the hot desert regions. These soils are porous and saline. Since it is infertile agriculture in these soils are not so successful.

Soil Erosion

Soil erosion is the removal or destruction of the top layer of soil by natural forces and human activities. Soil erosion reduces the fertility of soil which in turn reduces the agricultural productivity. Running water and wind are the major agents of soil erosion. Sheet erosion, Rill erosion and Gully erosion are the major types of soil erosion.

LAYERS OF SOIL



Layers of Soil

Layers of soil	
O-Horizon or Humus	This layer is dominated by organic material (leaves, needles, twigs, moss and lichens).
A- Horizon or Top Soil	It is a part of top soil, composed of organic matter mixed with mineral matter.
E- Horizon or Elevated layer	E-Stands for elevated layer. This layer is significantly leached of clay, iron, and aluminum oxides, which leaves a concentration of ore
B- Horizon or Sub-soil	This layer reflects the chemical or physical alteration of parent material. Thus iron, clay, aluminum and organic compounds are found accumulated in this horizon.
C- Horizon or Parent Rock	Partially weathered parent material accumulates in this layer.
R- Horizon Parent Rock	This layer consists of unweathered part of bed rock.

Soil conservation

Soil conservation is the process of protecting the soil from erosion to maintain its fertility. The methods that are widely practiced for conserving soil are afforestation,

controlled grazing, construction of dams, Crop rotation, Strip farming, contour ploughing, terrace farming, checking shifting cultivation, wind break etc.,

How long does it take to form soil?

The time needed to form a soil depends on the Climate. The environments which is characterized by mild climate, takes 200-400 years to form one cm of soil and in wet tropical area, soil formation is faster and takes upto 200 years. To become a well matured soil, it takes about 3000 years.

Uses of soils

Soil is one of the important natural resource. It is a basic requirement for plant growth and supports various life forms on the earth.

- The minerals present in the soil enhance and nourishes the crops and plants.
- It is used in making of ceramics or pottery.

- It is a source of material for construction and handicraft works.
- It acts as natural filter of water and purifies it.
- Soil supports ecosystem and play an important role in land management.

Rocks and soils are the important renewable natural resources. Both of them play an important role in everyday life of human beings as well as economic development. Nowadays rock-based companies are in increase which provide employment to a sizeable population. Soils attract human settlement and other economic activities. As India is an agricultural country, the proper management of soil resource will lead to sustainable food production besides its use for various other purposes. So, the soil resources must be conserved.

Recap

- A rock is an aggregate of one or more minerals.
- The word '**Sedimentary**' has been derived from Latin word '**Sedimentum**' means settling down.
- Igneous rocks are the primary rocks formed first on the earth.
- Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together support life.

GLOSSARY

Crust	Outermost layer of the earth	புவியின் மேலோடு
Lava	Hot molten rock erupted from a volcano.	லாவா
Magma	Hot fluid or semi-fluid material found beneath the earth crust.	பாறைக் குழம்பு
Rock cycle	The continuous process of transformations of rocks from one form to another.	பாறை சுழற்சி



Evaluation

I Choose the correct answer

1. Which of the following is known as sphere of rocks
 - a) Atmosphere
 - b) Biosphere
 - c) Lithosphere
 - d) Hydrosphere

2. World soil day is observed on

- a) 15th August
- b) 12th January
- c) 15th October
- d) 5th December



3. Fossils are found in
- Sedimentary rocks
 - Igneous rocks
 - Metamorphic rocks
 - Plutonic rocks
4. The top layer of soil is called as
- organic layer or humas
 - topsoil
 - subsoil
 - bedrock
5. Ideal soil for growing cotton is
- Red soil
 - Black soil
 - Alluvial soil
 - Mountain soil
6. The major components of soil is
- Rocks
 - Minerals
 - Water
 - All the above
7. Which one of the following is the most widespread most and productive category of soil
- Alluvial soil
 - Black soil
 - Red soil
 - Mountain soil

II Fill in the blanks

- Scientific study of rocks is called _____.
- _____ soil is highly suitable for millets cultivation.
- The "skin of earth" is _____.
- _____ is the kind of metamorphic rock using which Taj Mahal was built.
- _____ is known as the primary rocks.

III State whether the following statements are true or false

- Igneous rocks are called primary rocks.
- Slate is formed from shale.
- Red soil is formed by the process of leaching.
- M-sand is used as alternative for natural sand in construction.
- Volcanic mountains are covered with sedimentary rocks.

IV Match the following

1)

A.	Granite	1.	Bed rock
B.	Soil layer	2.	Plutonic rock
C.	Barren island	3.	Strip farming
D.	Soil conservation	4.	Active Volcano

	A	B	C	D
a)	2	1	4	3
b)	2	1	3	4
c)	4	3	2	1
d)	3	4	2	1

2)

A.	Basalt	1.	Anthracite
B.	Limestone	2.	Extrusive igneous
C.	Coal	3.	Metamorphic rock
D.	Gneiss	4.	Sedimentary rock

	A	B	C	D
a)	2	4	3	1
b)	2	4	1	3
c)	3	1	2	4
d)	3	1	4	2

V Choose the incorrect statement from the following

- Igneous rocks are called the primary rocks.
 - Soil is the product of weathering of rocks.
 - Sedimentary rocks are the hardest ones.
 - Deccan plateau is the region of Igneous rocks.
- Soil erosion decreases its fertility.
 - Dynamic metamorphism is caused by high temperature.
 - Soil is a renewable source.
 - Humus is a part of the top layer of soil.

VI Consider the following statements and choose the right option from the given ones

- Statement (1):** Sedimentary rocks consist of many layers.

Statement (2): Sedimentary rocks are formed by the sediments deposited at different points of time.

 - 1 and 2 are correct and 2 explains 1
 - 1 and 2 are correct but, 2 does not explain 1

- c) 1 is correct but, 2 is incorrect
- d) 2 is correct but, 1 is incorrect.

VII Give reasons

1. Chemical sedimentary rocks are found in the beds of reservoirs.
2. Igneous rocks are found in the regions of volcanoes.

VIII Distinguish between

1. Metamorphic rock and sedimentary rock.
2. Soil conservation and Soil erosion.

IX Answer briefly

1. How are igneous rocks formed?
2. Describe about the composition of soil.
3. Define 'rock'.
4. State the types of soils.
5. What is soil conservation?

X Answer in a Paragraph

1. Explain the process of soil formation.
2. Classify and explain the rocks.
3. Give an account on different layers of soil.
4. Classify and explain the soil.

XI Activities

1. Complete the following table with the help of internet source

Rocks	Mode of formation	Characteristics	Examples	Uses

2. **Exhibition:** Collect the soil samples of different types and display them with their names in the classroom .
3. **Group Discussion:** Natural sand is replaced by M-sand in construction.

1. Status -
2. Advantages -
3. Disadvantages -



REFERENCE BOOKS

1. *Physical geography*-Dr.Shanti swaroop.
2. *Outlines of General Geography* - By E.O. Robinson, M.A.
3. Text book in Geography for class VIII-Social science Resource and development - NCERT-New Delhi.
4. Geography for UPSC Civil Service Preliminary Examination - By Surender Singh.
5. School Atlas Book - Tamilnadu Text Book Corporation.



INTERNET RESOURCES

- www.Fert.nic.in
- www.greathimalayannationalpark.org
- www.csmrs.gov.in



ICT CORNER

Rocks and Soils

Steps

- Open the Browser and type the URL given below (or) Scan the QR Code.
- Click the '**Begin**' button, start your rock collection
- Click '**Add to rock collection**' one by one
- Go to '**identify rock types**' and play the game

Website URL:

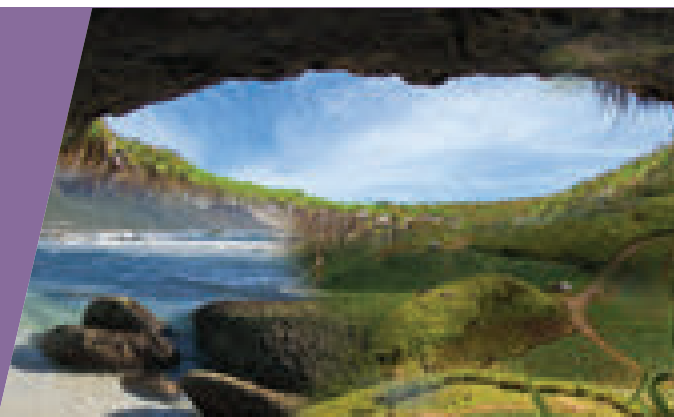
<http://www.learner.org/interactives/rockcycle/index.html>



B360_8_SOCIAL_EM

Unit - 2

Weather and Climate


 Learning Objectives

- ▶ To understand the importance of weather and climate
- ▶ To learn about the nature of the elements of weather and climate.
- ▶ To know the instruments used for measuring weather elements
- ▶ To be able to recognize the kind of weather and climate of a place



Introduction

Climate is one of the basic elements in the natural environment. It affects landforms, soil types, fauna and flora. It influences man to a large extent.

In a small village in Dharmapuri district, Tamil nadu, in the month of May, Yuktha enjoys her vacation with her brother and family. She always wears cotton cloths. Her mother makes food like porridge, buttermilk, lemonade, watermelon etc which suits to summer. At the same time (In May month) Tiya who lives in Auckland, New Zealand with her father and mother wear fleece jacket, jeans, gloves and socks. Her mother makes hot food like sandwich, salmon, oatmeal, soups etc. Yuktha celebrates Christmas with friends in winter, where as Tiya celebrates Christmas during summer. Can you think of why?

Yuktha and Tiya stay in two different hemispheres and have different way of life. This is because of the difference in weather condition of those places.

Weather and climate influence man's activities like what we eat, wear, the house

in which we live and work, farming, sailing, fishing, modern transport and even our play time etc. Hence one should have knowledge about the weather and climate. So, in this chapter we are going to learn about weather and climate, its elements and how they influence our lifestyle.

Weather

Weather is the day today conditions (state) of the atmosphere at any place as regards sunshine, temperature, cloud cover, wind fog condition, air pressure, humidity, precipitation and such other elements. It refers to short periods like a day, a week, a month or a little longer and as such the weather changes from time to time in a day and one period to the other in an year. In the



Earth's atmosphere is a layer of gases surrounding the planet earth and retained by the earth's gravity. It contains about 78% nitrogen, 21% oxygen, 0.97% argon, 0.03% carbon dioxide and 0.04% trace amounts of other gases and water vapour.

Find out

Do all the planets in the solar system have atmosphere?

morning the weather might be sunny with a clear sky in a place and evening there might be clouds and rain. Similarly the weather is cool in winter and hot in summer.

We often hear people saying “Today the climate is good or bad”. It is incorrect to say like that. Instead it has to be said that the weather is good or bad. We could observe the television news readers saying weather report and not the climate report for e.g. cricket match have been postponed due to bad weather etc.

Climate

Climate is generally defined as the average conditions (state) of the weather of a place or a region. The average atmospheric conditions are determined by measuring the weather elements for a long period of time which is usually for 35 years. The elements of weather and climate are the same. The climate does not change often like weather.



The word Climate is derived from the ancient Greek word "Klimo" which means "Inclination".

Controlling factors of weather and climate

Angle of the sun's rays, the length of daytime, altitude, distribution of land and water bodies, location and direction of mountain ranges, air pressure, winds and ocean currents are the major factors which affect the weather and climate of a region.

The earth is spherical in shape. So, the sun's rays fall unevenly on the earth's surface. The Polar regions receive slanting sun's rays. Hence there is little or no sunlight, thus there is an extreme cold winters. Vertical sun's ray's fall directly on regions around the equator,



Scientific study of weather is called **Meteorology** and the scientific study of climate is called **climatology**.

hence the climate is very hot and almost no winters. The difference in temperature makes the air and water move in currents. Warm air rises and creates more space for air beneath, while cool air settles down.

ACTIVITY

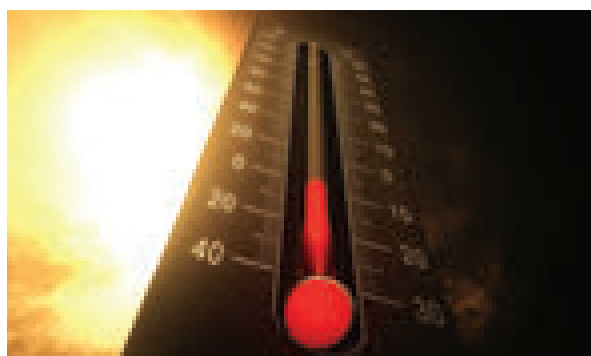
Discuss in the class room how altitude, distribution of land and water bodies, direction of mountain ranges, air pressure, winds and ocean currents affect weather/climate.

Elements of weather and climate

Temperature, rainfall, pressure, humidity and wind are the major elements of weather and climate.



a) Temperature



Thermometer

Temperature is one of the key elements of weather and climate. The earth and its atmosphere get heated from the sun through insolation. The degree of heat present in the air is termed as temperature. Apart from sun's rays, the heat in air also depends the atmospheric mass to a small extent.



Distribution of weather elements are shown by means of Isolines on maps. Isolines are those which join the places of equal values. Isolines are given different names based on the weather element they represent.

Isotherm	Equal temperature
Isocryme	Equal lowest mean temperature for a specified period
Isohel	Equal sunshine
Isolobar	Equal pressure tendency showing similar changes over a given time
Isobar	Equal atmospheric pressure
Isohyet	Equal amount of rainfall

Temperature varies with time due to changes in the level of radiation which reach the earth surface. This is due to motions of the earth (The rotation and revolution) and inclination of the earth's axis.

The temperature influences the level of humidity, the process of evaporation, condensation and precipitation.

Heat energy from solar radiation is received by the earth through three mechanisms. They are radiation, conduction and convection. The Earth's atmosphere is heated more by terrestrial radiation than insolation.

Temperature varies both horizontally and vertically. Temperature decreases with increasing height is known as Lapse rate which is 6.5 degree celsius per 1000 meters in troposphere .

b) Factors affecting the distribution of temperature

Latitude, altitude, nature of land, ocean currents, prevailing winds, slope, shelter and distance from the sea, natural vegetation and soil are the major factors which affect the distribution of temperature.

c) Measuring Temperature

The temperature of a unit volume of air at a given time is measured in scales like Celsius, Fahrenheit, and Kelvin. Meteorologist measures the temperature by the Thermometer, Stevenson screen and minimum and maximum Thermometer. The energy received by the earth through insolation is lost by outgoing radiation. Atmosphere is mainly heated by outgoing radiation from 2 to 4pm .So the maximum temperature is recorded between 2 and 4 pm regularly and minimum temperature is recorded around 4 am before sunrise.

Mean Temperature

The average of maximum and minimum temperatures within 24 hours is called **mean daily temperature** $[(87^{\circ}\text{F}+73^{\circ}\text{F})/2=80^{\circ}\text{F}]$. **Diurnal range of temperature** is the difference between the maximum and minimum temperatures of a day. **Annual range of temperature** is the difference between the highest and lowest mean monthly temperatures of a year. The distribution of temperature is shown by means of Isotherms. **Isotherms** are imaginary lines which connect the same temperatures of different places.

d) Heat zones of the earth

The fact that the earth is spherical in shape results in different parts of the earth

getting heated differently. Based on the heat received from the sun, Earth is divided into three heat zones. They are

Torrid Zone

It is a region between the tropic of cancer and the tropic of Capricorn. This region receives the direct rays of the sun and gets the maximum heat from the sun. This zone known as the torrid or the tropical zone

Temperate zone

This zone lies between the Tropic of cancer and the Arctic circle in the Northern Hemisphere and between the Tropic of Capricorn and the Antarctic circle in the southern Hemisphere. This zone gets the slanting rays of the sun and the angle of the sun's rays goes on decreasing towards the poles. Thus this zone experiences moderate temperature.

Frigid Zone

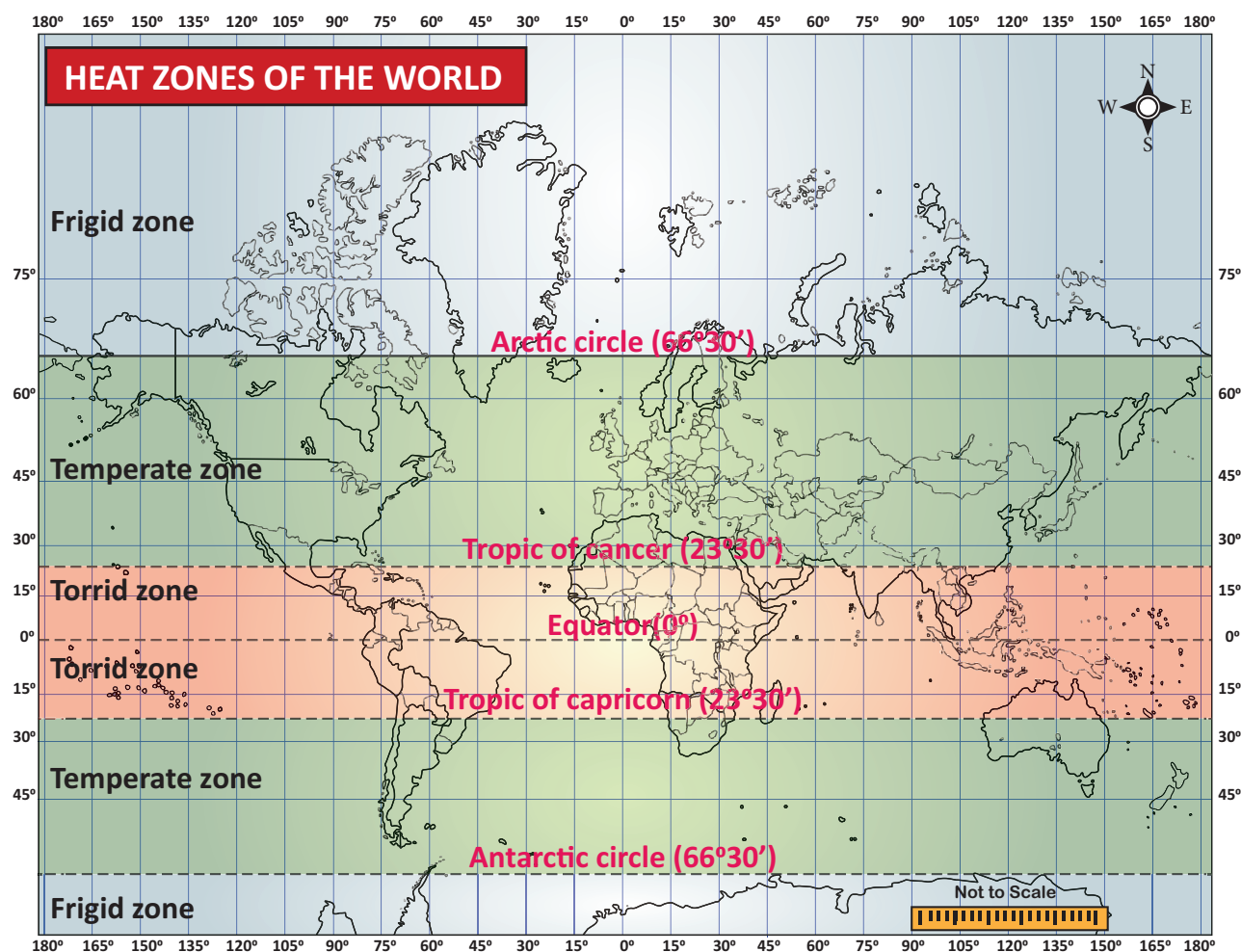
The frigid zone lies between the Arctic circle and the North Pole and between the Antarctic circle and the South Pole. This region also known as Polar region. Since it receives the extremely low temperature throughout the year, these regions are covered with snow.

Highest Temperature ever recorded

The highest temperature ever recorded on the earth is **56.7°C (134°F)**. It was recorded on 10th July 1913 at **Greenland Ranch of Death Valley, California, USA**.

Lowest Temperature ever recorded

The lowest temperature ever recorded on the earth is **-89.2 °C (-128.6 °F; 184.0 K)**. It was recorded on 21st July, 1983 at **Soviet Vostok Station in Antarctica**.



Rainfall

Rain is a liquid water in the form of droplets that have condensed from atmospheric water vapour and then become heavy enough to fall under gravity. Rain is a major component of the water cycle and is responsible for depositing most of the fresh water on the Earth. It is the source of water for all purposes. There is a close relationship between the temperature and rainfall distribution. Generally rainfall is high in the equatorial region and decreases gradually towards poles. Rainfall is measured by **Rain gauge**.



Rain gauge

Air Pressure



Aneroid Barometer

The weight of air above a given area on the earth's surface is called atmospheric pressure or air pressure. The air pressure is measured by Barometer. **The standard air pressure at sea level is 1013.25mb.** At the earth's surface the pressure is 1.03kg.per sq cm. The variation in standard atmospheric pressure is found both horizontally and vertically. Based on the level of pressure, it is categorised into low pressure and high pressure. Low pressure area is an area in the atmosphere where the pressure is lower than its surrounding areas. In this situation, the wind from the surroundings blow towards the centre of low pressure. High pressure is an area of atmosphere where the barometric pressure is higher than its surrounding areas. In this case, the wind from the centre of high pressure blows towards the surrounding low pressure areas. Low pressure system is marked as "L" on weather map, where as the high pressure system is marked as "H". Low pressure systems are also called as a **depression and cyclones**. High pressure system is called **anti cyclones**. **Low pressure leads** to cloudiness, wind, and precipitation. High pressure leads to fair and calm weather. **Isobar** is used to show the distribution of air pressure.



Highest pressure ever recorded.

The highest ever air pressure at sea level was recorded at Agata, Russia on 31st December, 1968. The pressure was 1083.8mb

Lowest pressure ever recorded

The lowest pressure of 870mb was recorded at Typhoon Tip, near Guam, Mariana Island in Pacific Ocean on 12th October, 1979.

Humans are not sensitive to small variation in air pressure. But the small variations in pressure that do exist largely determine the wind and storm patterns of the earth. The distribution of atmospheric pressure is controlled by altitude, atmospheric temperature, air circulation, earth rotation, water vapour, atmospheric storms etc.

Measuring air pressure

Meteorologist uses barometer/aneroid barometer to measure the air pressure. Barograms are used for recording continuous variation in atmospheric pressure.

Why Do Your Ears Pop in Airplanes?

As you go up in an airplane, the atmospheric pressure becomes lower than the pressure of the air inside your ears. Your ears pop because they are trying to equalize or match the pressure. The same thing happens when the plane is on the way down and your ears have to adjust to a higher atmospheric pressure.

Humidity

Humidity refers to the degree of water vapour present in the atmosphere in gaseous form in particular time and place. It ranges from 0-5 percent by volume in atmosphere. Climatically it is an important constituent of the atmosphere and its quantity depends on the level of temperature. So, the level of humidity decreases towards poles from equator. Humidity is expressed in different ways.



Hygrometer

Specific humidity is a ratio of the water vapor content of the mixture to the total air content on a mass basis. It is expressed in grams of vapour per kilogram of air.

Absolute Humidity is the mass or weight of water vapour present per unit volume of air. It is expressed usually in grams per cubic meter of air.

Relative humidity is a ratio between the actual amount of water vapour present in the air and the maximum amount of water vapour it can hold at a given temperature. It is expressed as a percentage.

Generally, warm air holds more water vapour than the cold air. When relative humidity reaches 100%, the air gets saturated. In this condition the temperature is said to be at dew-point. Further cooling will condense the water vapour into the clouds and rain. Relative humidity affects human health and comfortness. Very high and very low humidity are injurious to health. It also affects the stability of different objects, buildings and electrical applications.

Measurement of Humidity

Hygrometer is used to measure the humidity. (which comprises wet and dry bulb-plate side by side in the Stevenson screen)

Find out

The effect of low and high humidity over Human beings in particular.



With decreasing air pressure, the availability of oxygen to breathe also decreases. At very high altitudes, atmospheric pressure and available oxygen get so low that people can become sick and even die. Mountain climbers use bottled oxygen when they ascend very high peaks. They also take time to get used to the altitude as the quick move from high pressure to low pressure can cause decompression sickness. Aircraft create artificial pressure in the cabin which makes the passengers remain comfortable while flying.

Wind

The horizontal movement of air is called wind. Vertical movement of air is said as air current. The winds move from high pressure to low pressure. Unlike other elements a wind is made up of a series of gusts and eddies which can only be felt and not seen. Winds get their name from the direction from which they blow i.e, wind blows from south west is called southwest wind.

The wind systems are broadly categorized into three as follows.

- Planetary winds
- Seasonal winds
- Local winds

Planetary Winds are the ones which blow almost in the same direction throughout the year. So, they are called as Permanent or planetary winds. Trade winds, Westerlies and polar easterlies are the types of prevailing winds. **Seasonal winds are those** which change their direction according to season in a year. They are called as monsoon winds. These winds blow from sea to land during summer and land to sea during winter. **Local winds** are the winds blow over a small area only during a particular time of a day or a short period of a year. Land and sea breezes are example of these winds.

The Beaufort scale is a scale for measuring wind speed. It is based on observation rather than accurate measurement. It is the most widely used system to measure wind speed today. The scale was developed in 1805 by Francis Beaufort, an officer of the Royal Navy and first officially used by HMS Beagle.



Al-Balakhi, an Arab Geographer collected climatic data from the Arab travellers and prepared the First climatic Atlas of the world.

Measuring wind direction and speed

Meteorologist measures wind direction using **wind vane or weather cock**. Wind speed is measured by **anemometer**. Wind rose is a diagram used to depict the direction and periods (No. of days) of prevailing winds on map. **Meteorograph or triple register is an instrument** which records wind speed and direction, sunshine and precipitation. It also provides graphic representation.



Anemometer



Brazil has a large area where the average wind speed is low. Gabon, Congo and DR Congo in Africa, Sumatra, Indonesia and Malaysia are the least windy places on earth.

Recap

- **Weather** is the day today condition of the atmosphere at any place. **Climate** is the average weather condition (state) of a place for a long period and is usually for 35 years.
- Temperature, precipitation, pressure, humidity and wind are the major elements of weather and climate.
- Temperature is the degree of heat present in the air.
- The weight of air above a given area on the earth's surface is called atmospheric pressure or air pressure.
- Horizontal movement of air is called wind.

GLOSSARY

Conduction	Transfer of heat energy from one place to another through the substances that are in direct contact with each other	வெப்பக்கடத்தல்
Condensation	The process in which the water vapour changes into liquid form.	ஆவிசுருங்குதல்
Eddies	They are the wind circulation that develops when the wind blows over or adjacent to rough terrain, buildings, mountains or other obstructions.	சுழற்சாற்று
Humidity	The amount of water vapour in the air	ஈரப்பதம்
Insolation	Incoming solar radiation	சூரியக்கதிர்வீசல்
Radiation	The transmission of heat energy from one body to the other body without any medium is called radiation	கதிர்வீச்சு



Evaluation

I Choose the correct answer

- Earth's atmosphere contains about _____ percentage of nitrogen and oxygen.
 - 78% and 21%
 - 22% and 1%
 - 21% and 0.97%
 - 10% and 20%
- _____ is generally defined as the average conditions of the weather of a place or a region.
 - earth
 - atmosphere
 - climate
 - sun
- The earth receives energy from _____.
 - current
 - electro magnetic radiation
 - waves
 - heat
- Which one the following represents places with equal amount of rainfall
 - isotherm
 - isohel
 - isobar
 - isohytes
- _____ is used to measure the humidity.
 - anemometer
 - barometer
 - hygrometer
 - thermometer



II Fill in the blanks

- _____ refers to the condition of atmosphere for a short period of time.

- The scientific study of weather is called _____.
- The highest temperature ever recorded on the earth is _____.
- _____ is a ratio between the actual amount of water vapour and the maximum amount of water vapour the air can hold.
- _____ and _____ are measured by anemometer and wind vane respectively.
- _____ are imaginary lines which connect the same temperatures of different places.

III Match the following

1. Climate	Locating and Tracking Storms
2. Isonif	Cyclone
3. Hygrometer	Equal Snowfall
4. Radar	Long Term Changes
5. Low Pressure	Humidity

IV State whether the following statements are True or False

- The atmosphere is a layer of gases surrounding the planet.
- The Scientific study of weather is called Climatology.
- Isohel refers equal sunshine.
- Humidity is calculated by Aneroid Barometer.

V Answer briefly

1. Define 'weather'.
2. What is insolation?
3. What is meant by atmospheric pressure?
4. Write a short note on "Planetary winds"
5. What are "Isolines"?

VI Distinguish between

1. Weather and climate.
2. Absolute and relative humidity.
3. Permanent and seasonal winds.

VII Give reasons

1. The Weather and climate in different regions vary.
2. Temperature decreases with increase in altitude.
3. Mountain climbers carry oxygen cylinders while ascending peaks.

VIII Answer in a paragraph

1. How is temperature measured?
2. Write about the wind and its types.
3. List out the weather elements and associated measuring instruments.

IX 1. Give any three suggestions to reduce global warming

1. _____.
2. _____.
3. _____.

2. Map Activity

On the outline map of world mark the following

1. Heat zones of the world
2. Pressure belt and planetary winds

X Activities

1. Make weather instruments like wind vane and rain gauge using web resources.
2. Make mini-meteorological station model in your school.
3. Observe and record the weather condition of your place in the following table.

Date			
Place and Time			
Temperature			
Barometric pressure			
Precipitation type and amount			
Wind direction			
Wind speed			
Source of information-			



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2. Goh Cheng Lelong, *Certificate Physical and Human Geography*, Goh Cheng Lelong, oxford publication (india).
3. *Climatology*, Savindra Singh, 2005, Prayag pustak bhawan, Allahabad, India.



INTERNET RESOURCES

- <https://www.nationalgeographic.com/>
- <https://climatekids.nasa.gov/menu/atmosphere/>



ICT CORNER

Weather and Climate

- Step - 1 Open the Browser and type the URL given below (or) Scan the QR Code.
- Step - 2 Enter your location in search box (Ex.Tiruchirappalli)
- Step - 3 Use the Drag flag and zoom in your area.
- Step - 4 Go to menu in right side and select from the list to know the weather of your area (Ex.Temperature)

Website URL:

<https://www.windy.com>

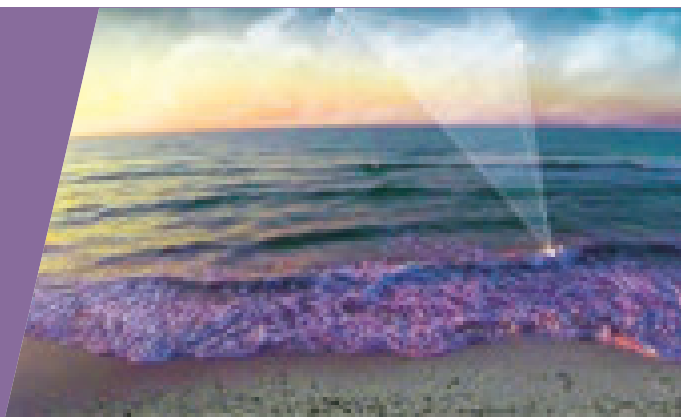
Mobile: <https://play.google.com/store/apps/details?id=com.windyty.android>



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Unit - 3

Hydrologic Cycle



Learning Objectives

- ▶ To understand the status of water on the earth
- ▶ To learn the basic concepts of Hydrologic cycle
- ▶ To study the different components of hydrologic cycle



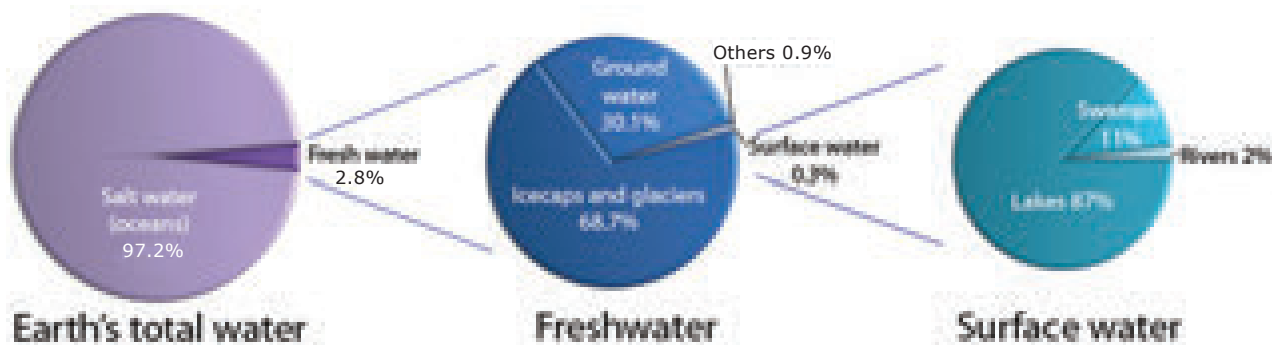
Introduction

Water is one of the most important elements on the earth. All plants and animals need water for survival. Apart from drinking, water is required for domestic, agriculture, industrial purposes etc. Water is very essential for carrying out almost all economic activities. So, water is an indispensable element without which life form on the earth is not possible.

Water on the Earth

About 71% of the earth's surface is covered by water. The quantity of water

present on the earth is about 326 million cubic miles. It is hard to visualise this massive quantity of water. Most of the water on the earth is saline and is found in seas and oceans. The salt water constitutes about 97.2% and the fresh water is only about 2.8%. Out of this 2.8%, about 2.2% is available as surface water and the remaining 0.6% as groundwater. From this 2.2% of surface water, 2.15% is available in the form of glaciers and icecaps, 0.01% in lakes and streams and the remaining 0.04% is in other forms. Only about 0.25% of the total ground water of 0.6% can be



Water on the Earth

economically extracted with the present drilling technology.

Water resources are useful or potentially useful to humans. Water in India is available in three sources. They are **precipitation**, **surface water** and **groundwater**.

Table 1: Estimated Volume of Water on the Earth's Surface

Water Source	Volume of water (Cubic Miles)	Percentage to Total Water
Oceans, Seas, & Bays	321,000,000	96.54
Ice caps, Glaciers, & Permanent Snow	5,773,000	1.74
Groundwater	5,614,000	1.69
Soil Moisture	3,959	0.001
Ground Ice & Permafrost	71,970	0.022
Lakes	42,320	0.013
Atmosphere	3,095	0.001
Swamp Water	2,752	0.0008
Rivers	509	0.0002
Biological Water	269	0.0001

(Source: Shiklomanov, 1993)

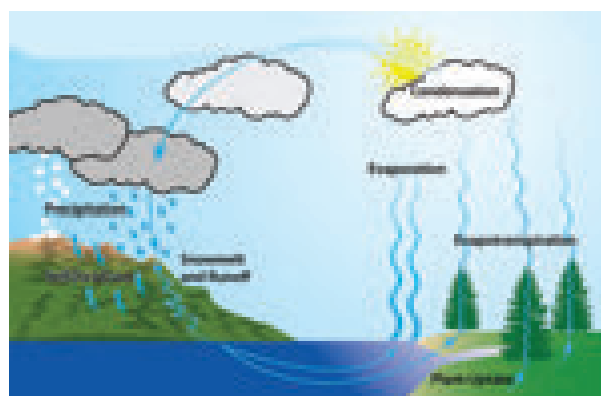
Hydrologic Cycle or Water Cycle

Hydrology is the science which deals with the various aspects of water such as its occurrence, distribution, movement and properties on the planet earth. Availability of water on the earth is not uniform. Some places are very rich and some places are poor in water resources.

Hydrologic cycle is a global sun-driven process where water is transported from oceans to atmosphere, from atmosphere to land and from land back to oceans. The water cycle can be considered as a closed system for the earth, as the quantity of water involved in the cycle is invariable, though its distribution varies over space and time.

Evaporation takes place from the surface water and transpiration from the plants. Water vapour gets condensed at higher altitudes by condensation nuclei and form clouds. The clouds melt and sometimes burst resulting in precipitation of different forms. A part of water from precipitation flows over the land is called runoff and the other part infiltrates into the soil which builds up the groundwater.

Hydrologic cycle is a circulation of water. It is a continuous process and takes place naturally. The three important phases of the hydrologic cycle are: 1) **Evapotranspiration**, 2) **Precipitation** and 3) **Runoff**.



Hydrologic Cycle

Components of Hydrologic Cycle

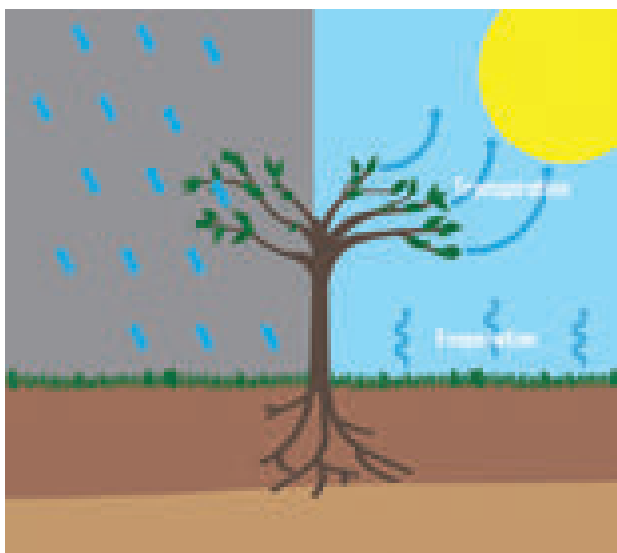
There are six main components in hydrologic cycle. They are: 1) Evapotranspiration, 2) Condensation, 3) Precipitation, 4) Infiltration, 5) Percolation, and 6) Runoff.

Evapotranspiration

It is defined as the total loss of water from the earth through evaporation from the surface water bodies and the transpiration from vegetation. In cropped



area, it is difficult to determine the evaporation and transpiration separately. Therefore it is collectively called as evapotranspiration. The following part explains the process of evaporation and transpiration separately.



Evapotranspiration

(a) Evaporation

Evaporation refers to the process in which the liquid form of water changes into gaseous form. Water boils at 100°C (212°F) temperature but, it actually begins to evaporate at 0°C (32°F); and the process takes place very slowly. Temperature is the prime element which affects the rate of evaporation. There is a positive relationship between these two variables. Areal extent of surface water, wind and the atmospheric humidity are the other variables which affect the rate of evaporation.

The atmosphere gets nearly 90% of moisture from the oceans, seas, lakes and rivers through evaporation and 10% of the moisture from plants through transpiration.

On a global scale, the amount of water gets evaporated is about the same as the amount of water delivered to earth as precipitation. This process varies geographically, as the evaporation is more prevalent over the oceans than precipitation, while over the land, precipitation routinely exceeds evaporation. The rate of evaporation is low during the periods of calm winds than during windy times. When the air is calm, evaporated water tends to stay close to the water body. During windy, the water vapour is driven away and is replaced by dry air which facilitates additional evaporation.



The rate of evaporation increases with

- Increase in wind speed
- Increase in temperature
- Decrease in humidity and
- Increase in areal extent of surface water bodies.

(b) Transpiration

Transpiration refers to the process by which the water content in the plants are released into the atmosphere in the form of water vapour. Much of the water taken up by plants is released through transpiration. The rate of transpiration is also affected by the temperature, wind and humidity. The rate of transpiration is also affected by nature of vegetation and the method of cultivation of crops

(c) Condensation

It refers to the process in which the gaseous form of water changes into liquid form. Condensation generally occurs in the atmosphere when warm air rises, cools and loses its capacity to hold water vapour. As a result, excess water vapour condenses to form cloud droplets. Condensation is responsible for the formation of clouds. These clouds produce precipitation which is the primary route for water to return to the earth's surface in the water cycle. Condensation is the opposite of evaporation.

Forms of Condensation

Dew, frost, fog, mist and clouds are the different forms of condensation.

- Dew:** It is a water droplet formed by the condensation of water vapour on a relatively cold surface of an object. It forms when the temperature of an object drops below the dew point temperature.
- Frost:** The ice crystals formed by deposition of water vapour on a relatively cold surface of an object is known as frost. It forms when the temperature of an object drops below the freezing point of temperature.

- c) **Fog:** Fog is the suspended tiny water droplets or ice crystals in an air layer next to the earth's surface that reduces the visibility to 1,000 m or lower. For aviation purposes, the criterion for fog is 10 km or less.
- d) **Mist:** Mist is the tiny droplets of water hanging in the air. These droplets form when the water vapour in the air is rapidly cooled, causing it to change from invisible gas to tiny visible water droplets. Mist is less dense than fog.
- e) **Clouds:** Clouds consist of tiny water droplets/ice particles which are so small and light in weight. Clouds are formed by microscopic drops of water or by small ice crystals. The size of the droplets generally range from a couple of microns to 100 microns. When the size of the water droplets exceeds 100 microns, it becomes rain drops.



- Condensation occurs when the air get saturated.
- Warm air can hold more water vapour than the cool air.
- Saturation occurs when the temperature drops down.

Precipitation

Precipitation refers to all forms of water that fall from clouds and reaches the earth's surface. For the occurrence of precipitation, cloud droplets or ice crystals must grow heavy enough to fall through the air. When the droplets grow large in size, they tend to fall. While moving down, by collecting some small droplets, they become heavy enough to fall out of the cloud as raindrops.

Forms of Precipitation

The form of precipitation in a region depends on the kind of weather or the climate of the region. The precipitation in the warmer parts of the world is always in the form of rain or drizzle. In colder regions, precipitation may fall as snow or ice. Common types of precipitation are rain, sleet, freezing rain, hail and snow.

Rain: The most common kind of precipitation is rain. The precipitation in the form of water droplets is called rain. The precipitation in which the size of rain drops are <0.5 mm in diameter is known as drizzle and the rain drops with >0.5 mm in diameter is known as rain. Generally drizzle takes place from stratus clouds.

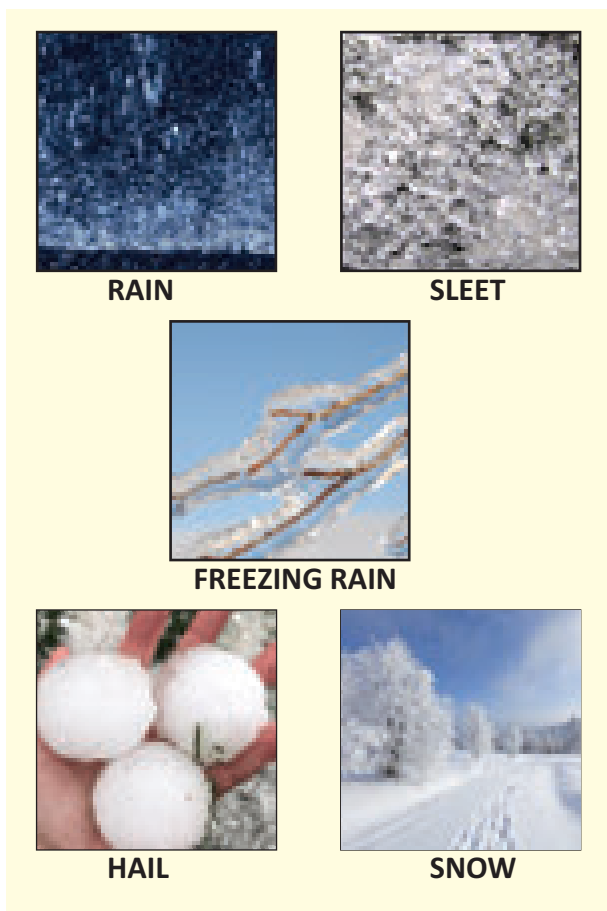
Sleet: The precipitation which takes place in the form of mixture of water droplets and tiny particles of ice (5mm in diameter) is known as sleet. Sometimes raindrops fall through a layer of air below 0°C , the freezing point of water. As they fall, the raindrops freeze into solid particles of ice. So, the mixture of water droplets and ice particles would fall on the earth surface.

Freezing Rain: Some times raindrops falling through cold air near the ground do not freeze in the air. Instead, the raindrops freeze when they touch a cold surface. This is called freezing rain and the drops of water are usually greater than 0.5 mm in diameter.

Hail: The precipitation which consists of round pellets of ice which are larger than 5 mm in diameter is called hail or hailstones. Hail forms only in cumulonimbus clouds during thunderstorms. A hailstone starts as an ice pellet inside a cold region of a cloud. Strong updrafts in the cloud carry the hailstone up and down through the cold region many times.

Snow: Often water vapour in a cloud is converted directly into snow pieces due to lowering of temperature. It appears like a

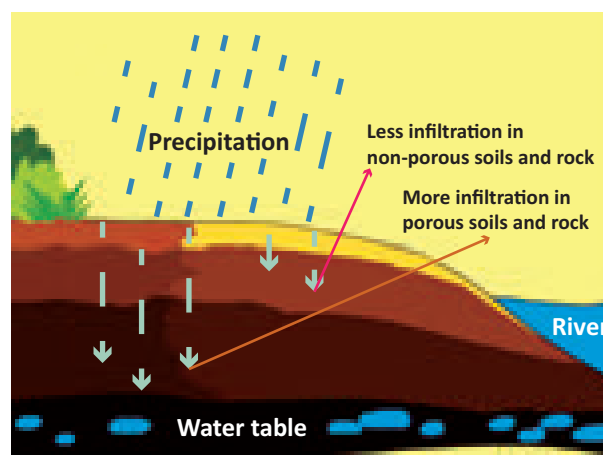
powdery mass of ice. The precipitation in the form of powdery mass of ice is known as snowfall. It is common in the polar and high mountainous regions.



Different forms of Precipitation

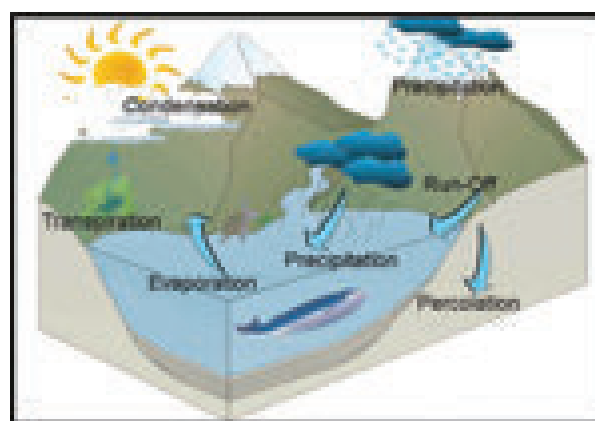
Infiltration

Water entering the soil at the surface of the ground is termed as infiltration. Infiltration allows the soil temporarily to store water, making it available for plants use and organisms in the soil. Infiltration is an important process where rain water soaks into the ground, through the soil and underlying rock layers. Some of this water ultimately returns to the surface through springs or low spots down hills. Some of the water remains underground and is called groundwater. The rate of infiltration is influenced by the physical characteristics of the soil, vegetative cover, moisture content of the soil, soil temperature and rainfall intensity. The terms infiltration and percolation are often used interchangeably.



Infiltration Process

Percolation



Percolation Process

Percolation is the downward movement of infiltrated water through soil and rock layers. Infiltration occurs near the surface of the soil and delivers water from the surface into the soil and plant root zones. Percolation moves the infiltrated water through the soil profile and rock layers which leads to the formation of ground water or become a part of sub-surface run-off process. Thus, the percolation process represents the flow of water from unsaturated zone to the saturated zone.

Runoff

Runoff is the water that is pulled by gravity across land's surface. It replenishes groundwater and surface water as it percolates into an aquifer (it is an underground layer of water-bearing rock) or moves into a river, stream or watershed. It comes from unabsorbed water from rain, snowmelt,

irrigation or other sources, comprising a significant element in the water cycle as well as the water supply when it drains into a watershed.

Runoff is also a major contributor to the erosion which carves out canyons, gorges and related landforms. The rate of runoff that can happen depends on the amount of rainfall, porosity of soil, vegetation and slope. Only about 35% of precipitation ends up in the sea or ocean and the other 65% is absorbed into the soil.



Runoff Process

Types of Runoff

Based on the time interval between the instance of rainfall and generation of runoff, the runoff may be classified into following three types

- i) **Surface Runoff:** It is the portion of rainfall, which enters the stream immediately after the rainfall. It occurs, when the rainfall is longer, heavier and exceeds the rate of infiltration. In this condition the excess water makes a head over the ground surface, which tends to move from one place to another following land gradient and is known as overland flow. When the overland flow joins the streams, channels or oceans, it is termed as surface runoff or surface flow.
- ii) **Sub-Surface Runoff:** The water that has entered the subsoil and moves laterally without joining the water-table to the streams, rivers or oceans is known as sub-

surface runoff. The sub-surface runoff is usually referred as interflow.

- iii) **Base Flow:** It is a flow of underground water from a saturated ground water zone to a water channel. It usually appears at a downstream location where the channel elevation is lower than the groundwater table. Groundwater provides the stream flow during dry periods of small or no precipitation.

DO YOU KNOW?

Units of the Measurement pertaining to Hydrology

- Evaporation /interception - inches (or) cm
- Infiltration - inches (or) cm / hour
- Precipitation - inches (or) mm (or) cm
- Run off - inches (or) mm (or) cm
- Run off rate - cubic feet per second
- Run off volume - acre feet (or) cubic feet
- Storage - cubic feet (or) acre feet

Recap

- Water is one of the most important elements on earth. All plants and animals need water for survival.
- About 71% of the earth's surface is covered by water. Out of this, only about 2.8% is fresh water and the remaining 97.2% is saltwater found in seas and oceans.
- Hydrological cycle is a global sun-driven process where water is transported from oceans to atmosphere, from atmosphere to land and from land back to oceans.
- There are six main components in hydrologic cycle. They are evapotranspiration, condensation, precipitation, infiltration, percolation, and runoff.
- The precipitation in the warmer parts of the world is in the form of rain or drizzle. The common types of precipitation include rain, sleet, freezing rain, hail, and snow.
- Infiltration occurs near the surface of the soil and delivers water from the surface into the soil and plant rooting zone. Percolation moves it through the soil profile and rock layers to form groundwater.

GLOSSARY

Aquifer	It is an underground layer of water - bearing permeable rocks, rock fractures or unconsolidated materials (gravel, sand or silt)	நீர்கொள்பாறை
Evapotranspiration	It refers to the water lost through evaporation from the water bodies and transpiration from vegetation	ஆவியீர்ப்பு
Infiltration	the seepage of water into soil or rock	நீர் ஊடுருவல்
Percolation	the slow movement of water through the pores in soil	நீர் உட்கசிதல்
Precipitation	falling products of condensation in the atmosphere, as rain, snow, or hail	பொழிவு
Runoff	overflow	நீர் வழிந்தோடல்



Evaluation

I Choose the Correct answer



- The process in which the water moves between the oceans, atmosphere and land is called
 - River Cycle
 - Hydrologic Cycle
 - Rock Cycle
 - Life Cycle
- The percentage of fresh water on the earth is
 - 71
 - 97
 - 2.8
 - 0.6
- The process of changing of water from gaseous to liquid form is known as
 - Condensation
 - Evaporation
 - Sublimation
 - Rainfall
- Water that flows in the sub-soil or through the ground into the streams, rivers, lakes and oceans is termed as
 - Condensation
 - Evaporation
 - Transpiration
 - Runoff
- The evaporation of water from the leaves of plants is called
 - Transpiration
 - Condensation
 - Water vapour
 - Precipitation

- Water that is good enough to drink is called
 - Groundwater
 - Surface water
 - Potable water
 - Artesian water

II Fill in the blanks

- The degree of water vapour present in the atmosphere is known as _____.
- There are _____ phases in the water cycle.
- The falling of water towards the earth surface from atmosphere in any form is known as _____.
- The precipitation with the rain drop size of <math><0.5\text{mm}</math> in diameter is known as _____.
- Mist is denser than _____.

III Match the following

1.	Vegetation	Clouds
2.	Condensation	Sleet
3.	Snow and rain drops	At the surface
4.	Infiltration	Transpiration

IV Choose the correct statement

- Evaporation refers to
 - The process in which the gaseous form of water changes in to liquid form.

- II. It refers to the process in which the liquid form of water changes into gaseous form.
- III. Water boils at 100°C temperature but, it actually begins to evaporate at 0°C.
- IV. It is responsible for the formation of clouds.
- a) I and IV are correct
b) II only correct
c) II and III are correct
d) All are correct

V State whether the following statements are True or False

- Water boils at 212°F temperature but, it begins to evaporate at 32°F.
- Mist is not the tiny droplets of water hanging in the air.
- The sub-surface runoff is usually referred as interflow.

VI Answer briefly

- Write a short note on aquifer.
- Define “hydrological cycle”.
- How is the dew formation takes place?
- Write a short note on surface run-off.

VII Give reasons

- Infiltration of water is low in the region of non-porous soil.
- Fresh water is less on the earth.
- Snowfall is common in the polar region and mountainous regions.

VIII Answer in a paragraph

- Explain the different stages involved in the hydrological cycle.
- Distinguish between evaporation and transpiration.
- Give a detailed explanation on different forms of precipitation.
- Explain the run-off and its types.

ACTIVITY

Find out the missing components of hydrologic cycle in the given diagram and fill it up appropriately.



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Unit - 4

Migration and Urbanisation



Learning Objectives

- ▶ To study the meaning, causes and consequences of migration
- ▶ To know the types of migration
- ▶ To describe the concept of Urbanisation
- ▶ To learn the origin and growth of Urbanisation
- ▶ To understand the problems of Urbanisation



Introduction

Rajesh and Suresh were new students joined in a school. They were allotted to Section – ‘A’ in VIII standard. The class teacher and other students of the class welcomed them. Teacher said, “You are going to have two new friends today. So, you all introduce yourselves to others; say your name and place from where you are coming, okay”. They started from the first bench. Rajesh and Suresh were sitting in the second bench. Rajesh had a turn to introduce himself. He said, “I am Rajesh, as my mother has been transferred to this school, we migrated from Chennai to Krishnagiri”. Now Suresh had a turn to introduce himself. He said, “I am Suresh, coming from the Village called Pudupatti, it is five kilometres away from the school; Madam, Please tell me the meaning of ‘migration’ the word used by Rajesh”. The teacher said, “yes, from this lesson you are going to learn in detail about it”.

MIGRATION

Migration has been defined differently by different experts. In general, migration is defined as the permanent or semi permanent

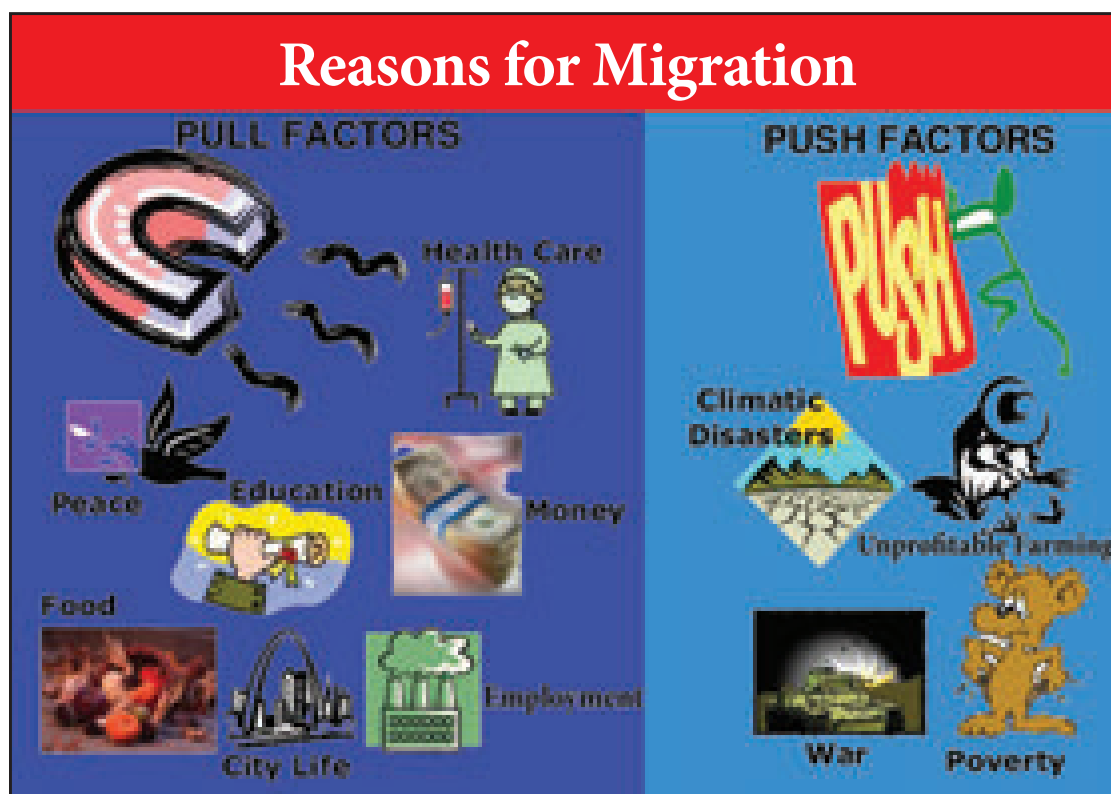
change of residence of an individual or group of people over a significant distance. So, the term migration refers to the movement of people from one place to another.



Migration

United Nations Organization Definition: Migration is a form of geographical mobility of population between a geographical unit to another, generally involving a permanent change of residence.

One of the most important aspects of social science is “**Human Migration**”. It has maintained a close relation with mankind from its earliest stage. Migration is one of the most



important dynamic human activities from the very beginning of human life. During the early days, people moved from one place to another in search of food. When most of the people ceased to live in forest and adopted civilized life, they developed relationship with domesticated animals and fertile land. As a result, mobility of mankind changed considerably. They almost left the nomadic life and started to live in permanent settlements. At this stage, people continued to move from one region to another in search of fertile land for cultivation. Afterwards, the nature of mobility frequently changed over a period of time.

Factors of Migration

There are a number of factors which are responsible for the migration of human population. These factors can be grouped under the heads of favourable and unfavourable factors.

1. The favourable factors which attract people towards a location are called pull factors.
2. The unfavourable factors which make the people to move out from a location are called push factors.

The various causes which are responsible for human migration is categorized under five groups as follows.

a) Ecological or Natural Causes of Migration

The causes operate under this category are natural ones. They include volcanic eruption, earthquake, flood, drought etc. These events force the people to leave their native places and settle in the new areas. The conditions like the availability of water resources, areas free from hazards, pollution etc., attract the migrants.

b) Economic causes of Migration

Economy is one of the most important causes of human migration from one area to another. Various economic causes determine the level and direction of migration. The availability of fertile agricultural land, employment opportunities, development of technology etc., are some of the economic causes that attract the migration. The mass poverty and unemployment force the people to move out from their native places to the places where the better employment opportunities are available.

c) Socio-Cultural causes of Migration

Socio-cultural causes also play some roles in the process of migration. Migration of women after marriage and migration associated with pilgrimage are based on the socio-cultural customs.



Socio-cultural causes of Migration

d) Demographic causes of Migration

In demographic sense, the population composition like age and sex, over population and under population are the major causes of migration. It is well known fact that adults are more migratory than any other age-groups. Women mostly migrate after their marriage.

Generally over population is considered as a push factor and under population to be pull factor in the context of migration.

e) Political causes of Migration

Various political causes like colonization, wars, government policies etc. have always been playing important role in human migration from time to time. Wars have been one of the significant causes of migration since ancient time.

Types of Migration

Migration can be classified in several ways. It is usually categorized as follows;

a) Based on the movement associated with administrative limits

(i) Internal migration: The movement of people within a country is known as internal migration.

Further, the internal migration is classified into four categories on the basis of the place of origin and destination of migrants.

Pull Factors	Push Factors
Natural Causes	
Least hazard prone zones	Hazard prone zones
Favourable climate	Climate change (including extreme weather events)
Abundance of natural resources and minerals (e.g.water,oil,uranium)	Crop failure and scarcity of food
Economic Cause	
Potential for employment	Unemployment
Socio-cultural Cause	
Social Unification	Social Discrimination
Demographic Cause	
Under population	Over population
Political Causes	
Political security	War, civil, unrest
Independence and freedom	Safety and security concerns (ethnic, religious, racial or cultural persecution)
Affordable and accessible urban services Eg: healthcare, education, transport and recreation etc	Inadequate or limited urban services and infrastructure Eg: healthcare, education, transport, water and recreation etc

DO YOU KNOW? Female migrants outnumber male migrants in Europe, Northern America, Oceania and Latin America and the Caribbean, while in Africa and Asia, particularly Western Asia, migrants are predominantly men. (International Migration Report, 2017).

1. **Rural to Urban Migration** is the movement of population from rural areas to growing towns and cities mainly in search of employment, education and recreation facilities.
2. **Urban to Urban Migration** is the migration between one urban centre to the other like in search of higher income.
3. **Rural to Rural Migration** is driven by fertile land for cultivation and other sociological factors like Marriage etc.
4. **Urban to Rural Migration** is the movement from urban centres to rural areas to get rid-off the urban problems and returning to native places after retirement from

jobs. Rural to urban migration is the most common one.

- (ii) **International Migration** – Migration that occurs across the national boundaries are known as International Migration.

DO YOU KNOW? In 2017, India was the largest country of origin of international migrants (17 million), followed by Mexico (13 million). (International Migration Report, 2017).

b) Based on the willingness of the migrants for migration

- (i) **Voluntary Migration:** If the migration takes place on person's free will, initiative and desire to live in a better place and to improve their financial status, the migration is said to be voluntary.
- (ii) **Involuntary or forced Migration:** If the migration takes place against the will of migrants, the migration is termed as involuntary migration. The push factors like war may force the people to emigrate from a place is of this type.

Share of Regions in World Population and International Migrants by Origin - 2017

S.No	Name of the Region	Total Population	Percentage of Global Population	International Migrants by origin	Percentage of International Migrants
1	Africa	1,256,268	16.6	36,266	14.1
2	Asia	4,504,428	59.7	105,684	41.0
3	Europe	742,074	9.8	61,191	23.7
4	Latin America and the Caribbean	645,593	8.6	37,720	14.6
5	North America	361,208	4.8	4,413	1.7
6	Oceania	40,691	0.5	1,880	0.7
7	Unknown	n/a	n/a	10,560	4.1
8	World	7,550,262	100.0	257,715	100.0

Source: International Migration Report, 2017, United Nations.

c) Based on the duration of stay of migrants in the place of destination

(i) **Short term migration:** In this kind of migration, the migrants stay outside only for a short duration before returning to the place of origin. The duration may be from a few days to few months.

(ii) **Long term migration:** It is a kind of migration in which the migrants stay outside at least for a few years.

(iii) **Seasonal migration:** In this type of migration usually a group of people migrates from their native places during a particular season and returns after end of that season. People migrating to hill stations during summer and the migration of agricultural workers during sowing seasons belong to this category. **Transhumance** is an another example of seasonal migration.

DO YOU KNOW? The number of international migrants worldwide has continued to grow rapidly in recent years, reaching 258 million in 2017, up from 220 million in 2010 and 173 million in 2000 (International Migration Report, 2017).

Consequences of Migration

Migration affects both the areas of origin of migration and the areas of destination. The following are the major consequences of migration.

a) **Demographic consequences:** It changes age and sex composition of population. Migration of females after their marriage leads to decline in sex ratio in the source regions and increase the sex ratio in the regions of destinations. The migration of male workers in search of jobs decreases the independent population of the source regions which increases the dependency ratio.

b) **Social consequences:** The migration of people from different regions towards an urban area leads to the formation of plural society.

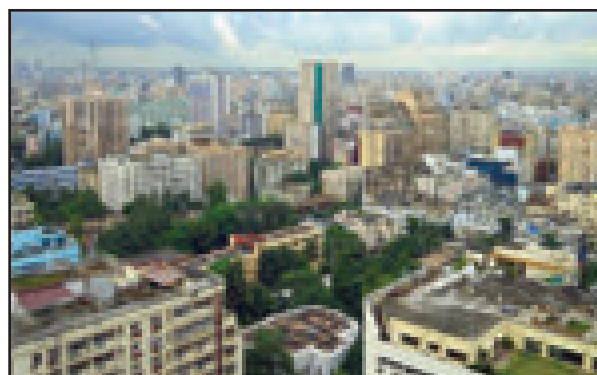
It helps the people to come out of narrow mindedness and people become generous.

c) **Economic consequences:** The migration of more people from over populated to under populated regions results the imbalance of the resource-population ratio. In some cases, the regions of over and under population may become the regions of optimum population. Migration may influence the occupational structure of the population of an area. Through this it will certainly affect the economy of the regions also. **Brain drain** is a consequence of migration. Brain drain refers to the migration in which skilled people from economically backward countries move to developed countries in search of better opportunities. Eventually, this leads to backwardness in source regions. This is called as “**backwash effect**”.

d) **Environmental consequences:** Large scale movement of people from rural to urban areas causes overcrowding in cities and puts heavy pressure on resources. It leads to rapid growth of cities. The over population in urban areas leads to the pollution of air, water and soil. Scarcity of drinking water, lack of space for housing, traffic congestions and poor drainage are the common environmental problems prevail in urban areas. The lack of space for housing and the rising of land cost lead to the formation of slums.

URBANISATION

Urbanisation refers to the process in which there is an increase in the proportion of population living in towns and cities.



Urbanisation

Causes of Urbanisation

Urbanisation is driven by three factors: natural population growth, rural to urban migration and the reclassification of rural areas into urban areas. Present day urbanisation includes changes in demographics, land cover, economic processes and characteristics of geographic area.



In 2007, for the first time in history, the global urban population exceeded the global rural population and the world population has remained predominantly urban thereafter. (World Urbanisation Prospects, 2014 Revision, Highlights).

Origin and Growth of World Urbanisation

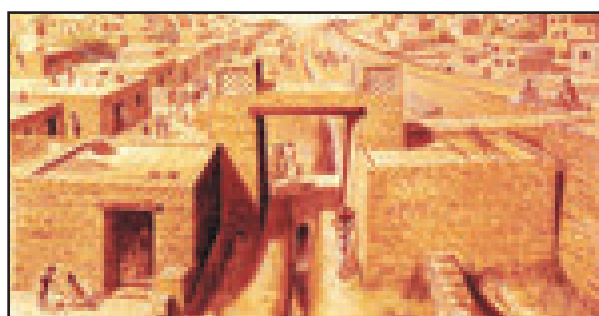
The process of urbanisation in the world has a long history.

Ancient Period: The urban centres started developing during the pre-historic period (before 10000 years). During this period primitive man started domestication of plants and animals. It was the period of development of permanent settlements. The river valley regions of the Egypt, Greece and India gave rise to agrarian communities which eventually formed the urban communities and urban centres. The excess production of food grains was the major reason for urbanisation. **Ur and Babylon in Mesopotamia, Thebes and Alexandria in Egypt, Athens in Greece, Harappa and Mohenjodaro in India were noted prehistoric cities of the world.**

In ancient period the increase in the number and size of urban centres occurred during the two great colonizing periods of the Greeks and Romans. During the beginning of the 7th century itself many cities were found near the Aegean Sea. During the Greek colonizing period, the expansion of trade promoted the growth of towns and cities.



India, China and Nigeria – together are expected to account for 35 % of the growth in the world's urban population between 2018 and 2050. India is projected to add 416 million urban dwellers, China 255 million and Nigeria 189 million (World Urbanisation Prospects, 2018, Key facts).



A City in Harappa

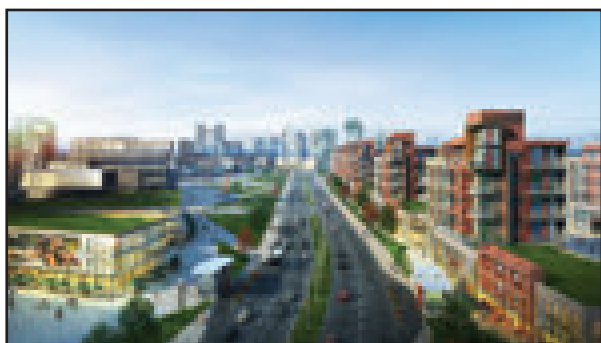
Medieval Period: It refers to the period after the 11th century. During this period, the European countries, increased their overseas trade which played an important role in the revival of European towns and cities after a period of low development. **At the end of the thirteenth century, Paris, London, Geneva, Milan and Venice were the important cities found in Europe.**



View of Carcassonne (France)

Modern Period: This period starts from 17th century. It marks the third phase of development in urbanisation. The industrial revolution in the 19th century accelerated the growth of towns and cities. The Europeans with urban civilization gave birth to a large number of new towns in North America and Soviet Union. The modern

means of transport and communication, the development of new trade routes during 19th century had strengthened the trade centres and urban areas. The latest development in urbanisation was noticed in the continent of Africa. Before 1930, Africa had towns only on its coasts but now it has 50 towns with population exceeding 10,00,000. Major cities in Africa are Cairo, Nairobi, Mombasa, Bulawayo, Duala, Abidjan, Logos, Accra, Addis Abba, Leopoldville, Luanda, Cape Town, Natal, Pretoria etc. Thus, in modern age, the accelerating urbanisation is resulting in a redistribution of population throughout the world.



Modern Urbanisation



In 1950, 30% of the world's population was urban, and by 2050, 68 % of the world's population is projected to be urban (World Urbanisation Prospects, 2018, Key facts).

World Urbanisation

S.No	Name of the Region	Urban Population in %
1	North America	82
2	Latin America and Caribbean	81
3	Europe	74
4	Oceania	68
5	Asia	50
6	Africa	43
World Average		55

Source: World Urbanisation Prospects, 2018, Revision, Key facts.

World Top Five Cities

S.No	Name of the City	Population in million
1	Tokyo (<i>Japan</i>)	37
2	Delhi (<i>India</i>)	29
3	Shanghai (<i>China</i>)	26
4	Mexico city (<i>Mexico</i>)	22
5	Sao Paulo (<i>Brazil</i>)	22

Source: World Urbanisation Prospects, 2018, Revision, Key facts

Consequences of Urbanisation

a) **Housing and Slums:** There is a lack of space for housing and a marked reduction in the quality of housing in the urban areas due to increase in population. This problem may increase in the years to come. Rapid rate of urbanisation results the development of slums.



Slums

b) **Over Crowding:** Over-crowding leads to unhealthy environment in the urban areas. It also the cause of many diseases and riots.

c) **Water supply, Drainage and Sanitation:** No city has round the clock water supply in the world. Drainage situation is equally bad. The removal of garbage is a Himalayan task for urban local bodies.

d) **Transportation and Traffic:** Lack of planned and adequate arrangements for traffic and transport is another problem in urban centres. The increasing number of two wheelers and cars make the traffic problem worse. They cause air pollution as well.

e) **Pollution:** Towns and cities are the major polluters of environment. Cities discharge their entire sewage and industrial effluents untreated into the nearby rivers. Industries in and around the urban centres pollute the atmosphere with smoke and toxic gases.

Recap

- Common pattern of migration is from rural to urban.
- Migration takes place due to natural, economic, socio-cultural, demographic and political causes.
- Urbanisation is the result of rural to urban migration, natural growth of population and reclassification of rural areas into urban areas.
- Problems of urbanisation are mainly owing to over population, inadequate infrastructure, industrial development and increase in number of vehicles.

GLOSSARY

Migrant	The person who migrates from one place to another.	இடம் பெயர்பவர்
Emigration	A migration in which an individual or a group move out from home country.	குடி பெயர்தல்
Emigrant	An International migrant departing to another country by crossing the International boundary	குடி பெயர்பவர்
Immigration	A migration in which a person or group of people move into a new country	குடியேற்றம்
Immigrant	An international migrant who enters into an area from a place outside the country	குடியேறுபவர்
Push factors	The factors which force the people to move out from their native places.	உந்து காரணிகள்
Pull factors	The factors which attract people from outside into a place.	இழு காரணிகள்
Transhumance	It is also called Seasonal Migration, where pastoral farmers move with their herds seasonally or periodically between plains and mountains.	கால்நடையுடன் இடம்பெயர்வு



Evaluation

I Choose the correct answer

- People move from _____ to _____ mainly in search of better jobs
 - Rural to Urban
 - Urban to Rural
 - Hills to plains
 - Plains to hills
- A person moves from his own country to another country is known as _____
 - Immigrant
 - Refugee
 - Emigrant
 - Asylum seeker
- The migration in search of fertile agricultural land is _____ migration
 - Rural to Rural
 - Rural to Urban
 - Urban to Rural
 - Urban to Urban
- War is one of the _____ causes of human migration
 - Demographic
 - Socio-Cultural
 - Political
 - Economic
- The main reason for the development of urbanisation in pre-historic period was _____
 - Excess Production of food grains
 - Domestication of cattle
 - Fishing
 - hunting



II Fill in the blanks

- Urbanisation is determined by _____ number of factors
- _____ is the major push factor operating in rural areas
- _____ Metropolitan city in India has the second highest urban population in the world
- The movement of a person based on his free will and desire to live in a better place is called _____ migration

- In modern time urban growth was accelerated by the development of _____

III Match the following

- Emigration - In migration
- Immigration - Out migration
- Pull factor - Unemployment
- Push factor - Socio- Cultural migration
- Marriage - Employment opportunity

IV State whether the following statements are true or false

- Slums are generally found in cities
- Mass migration is absent in the modern period
- The process of Urbanisation has a short history
- Cities and towns are the major polluters of environment
- Transhumance is also referred as seasonal migration

V Consider the given statements and choose the correct option from the given ones

Statement (A): Urbanisation is mainly due to the movement of people from rural to cities.

Reason (R): Rural to Urban migration is not a predominant one.

- A is correct but R is incorrect
- Both A and R are incorrect
- Both A and R are correct
- A is incorrect and R is correct

VI Answer briefly

- Define "Migration".
- What are the causes of rural to urban migration?
- State the causes of the ecological or natural migration.

- Name any two pull factors of migration.
- What is Urbanisation?
- List out any four most populous cities in the world.

- Collect the pictures and information regarding the effects of urbanisation and make an album.

VII Answer in Paragraph

- What are the different types of migration? Explain.
- Explain in detail about the various causes of migration.
- Discuss the problems of urbanisation.



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VIII Map Study

On the outline map of the world mark the following places

- | | |
|----------------|------------------|
| 1. Tokyo | 6. Oceania |
| 2. New Delhi | 7. Latin America |
| 3. Mexico city | 8. Paris |
| 4. Shanghai | 9. London |
| 5. Sao Paulo | 10. Cairo |

IX Activities

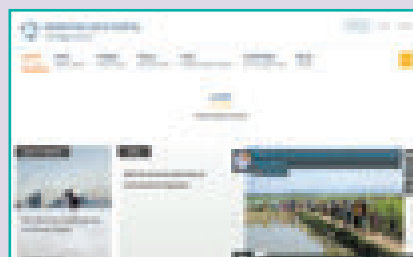
- List out and analyze the reason for migration of people in your locality.



ICT CORNER

Migration and Urbanisation

Through this activity you will know about total number of international migrations



- Step – 1** Open the Browser and type the URL given below (or) Scan the QR Code.
- Step – 2** Go to left side menu and Select any Country (Ex. India)
- Step – 3** Drag the Time line in left side menu to know about migration status of India

Web URL: <https://migrationdataportal.org/latest>

*Pictures are indicatives only.

*If browser requires, allow Flash Player or Java Script to load the pag



Unit - 5

Hazards


 Learning Objectives

- ▶ To learn the meanings of hazard, disaster and catastrophe
- ▶ To describe the major types of hazards, their causes and effects
- ▶ To develop awareness regarding hazards and related prevention measures



Introduction

- Teacher : Good morning students.
- Students : Good morning teacher.
- Teacher : Are all present today?
- Krithika : No teacher, Shruthi is absent today.
- Teacher : Why is she absent today?
- Pavithra : Teacher, don't you know what happened to her?
- Teacher : No my dear child, what happened to her?
- Theshmitha : Teacher, Yesterday, while returning home, she was struck by a big branch of a tree due to heavy rain and got injured.
- Teacher : Oh my God....what a pity? Students, you all must be very careful while moving around to avoid the problems from hazards.
- Kamalesh : Teacher, what do you mean by hazards? You mean the Belgian football player '**Hazard**'?
- Teacher : No...no, it is an event which can affect the living and non-living things of earth. I think today is the right day to get into the interesting chapter 'hazards'.

Hazards

In the beginning of twenty-first century, the earth supported a human population that was more numerous and found healthier and wealthier than ever before. At the same time, there were a lack of awareness on the risks that faced by the people. By keeping this in mind, the present lesson of hazards is intended to familiarise the different types of hazards to promote awareness among students regarding hazards.

Hazards are defined as a thing, person, event or factor that poses a threat to people, structures or economic assets and which may cause a disaster. They could be either human-made or naturally occurring in the environment. The word 'hazard' owes its origin to the word 'hasart' in old French meaning a game of dice (in Arabic – az-zahr; in Spanish – azar).

Though the society experiences several types of hazards, it is important for a region to be aware of those threats that are most likely to affect the community most severely.



A natural hazard is a natural process and event that is a potential threat to human life and property. The process and events themselves are not a hazard but become so because of human use of the land.

A disaster is a hazardous event that occurs over a limited time span in a defined area and causes great damage to property/loss of life, also needs assistance from others.

A catastrophe is a massive disaster that requires significant expenditure of money and a long time for recovery.

Types of Hazards

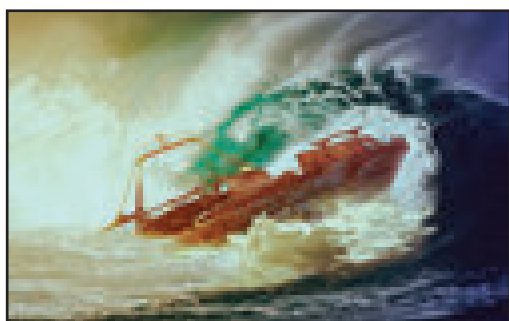
Some hazards occur frequently and threaten the people. Hazards are classified in different ways.

- I. Based on their causes of occurrence.
- II. Based on their origin.

I. Based on their causes of occurrence

Hazards can be broadly classified into three types: natural, human-made and socio-natural hazards.

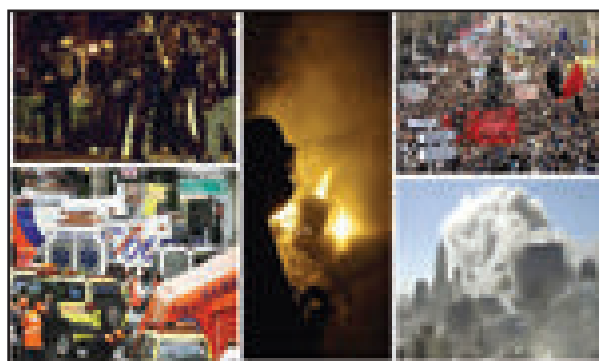
1. Natural hazards: These are the results of natural processes and man has no role to play in such hazards. The main examples of natural hazards are earthquakes, floods, cyclonic storms, droughts, landslides, tsunamis and volcanic eruptions.



Natural hazard

2. Human-made hazards: these are caused by undesirable activities of human. It can be the result of an accident, such as an industrial chemical leak or oil spill, or an intentional act. Such hazards can disturb the safety,

health, welfare of people and cause damage or destruction to property. The following are the examples of human-made hazards. They are explosions, hazardous wastes, pollution of air, water and land, dam failures, wars or civil conflicts and terrorism.



Human-made hazards

3. Socio-natural hazards (Quasi-natural hazards): these are caused by the combined effect of natural forces and misdeeds of human. Some of the examples are:

- The frequency and intensity of floods and droughts may increase due to indiscriminate felling of trees, particularly in the catchment areas of the rivers.
- Landslides are caused by natural forces and their frequency, and impact may be aggravated as a result of construction of roads, houses etc., in mountainous areas, excavating tunnels and by mining and quarrying.
- Storm surge hazards may be worsened by the destruction of mangroves.
- Smog is a serious problem in most big urban areas. The emissions from vehicles and industries, combustion of wood and coal together combined with fog leads to smog.

II. Based on their origin

Hazards can be grouped into eight categories

- 1. Atmospheric hazard** – Tropical storms, Thunderstorms, Lightning, Tornadoes, Avalanches, Heat waves, Fog and Forest fire.
- 2. Geologic/Seismic hazard** – Earthquakes, Tsunami, Landslide and Land subsidence.
- 3. Hydrologic hazard** – Floods, Droughts, Coastal erosion and Storm surges.

4. **Volcanic hazard** – Eruptions and Lava flows.
5. **Environmental hazard** – Pollution of soil/air/water, Desertification, Global warming and Deforestation.
6. **Biological hazard** – Chickenpox, Smallpox, AIDS [HIV] and Killer bees.
7. **Technological hazard** – Hazardous material incidents, Fires, Infrastructure failures [Bridges, Tunnels, Dams, Nuclear and Radiological accidents].
8. **Human-induced hazard** – Terrorism, Bomb blast, War, Transportation accidents and Civil disorder.

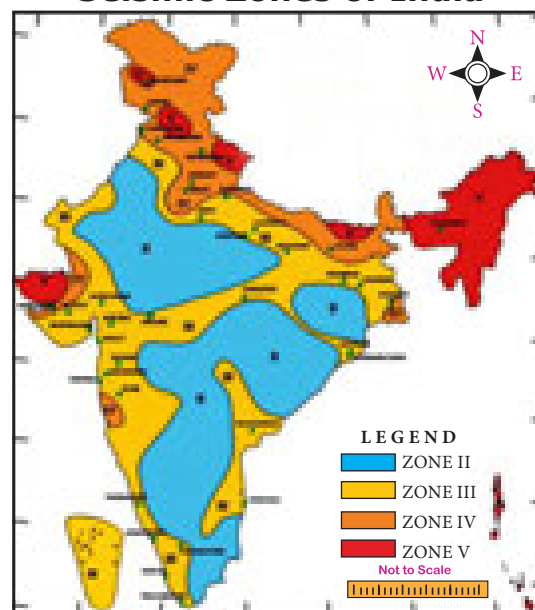
Major Hazards in India:

1) Earthquakes

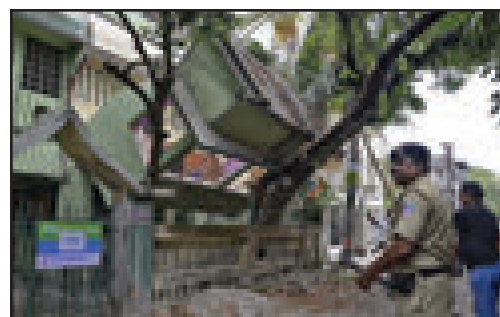
Earthquake is a violent tremor in the earth's crust, sending out a series of shock waves in all directions from its place of origin.

Earthquake prone regions of the country have been identified on the basis of scientific inputs relating to seismicity, earthquakes occurred in the past and tectonic setup of the region. Based on these inputs, Bureau of Indian Standards has grouped the country into four seismic zones: Zone II, Zone III, Zone IV and Zone V (No area of India is classified as Zone I).

Seismic Zones of India



(Source: National Institute of Disaster Management, New Delhi)



Earthquakes

Earthquake-prone Zones of India

Seismic Zones	Level of Risk	Regions
Zone V	Very High	Comprises entire northeastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands.
Zone IV	High	Covers remaining parts of Jammu and Kashmir and Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, northern parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and small portions of Maharashtra near the west coast and Rajasthan.
Zone III	Moderate	Comprises Kerala, Goa, Lakshadweep Islands, remaining parts of Uttar Pradesh, Gujarat and West Bengal, parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Odisha, Andhra Pradesh, Tamil Nadu and Karnataka.
Zone II	Low	Covers remaining parts of country.

2) Floods

Flood is an event in which a part of the earth's surface gets inundated. Heavy rainfall and large waves in seas are the common causes of flood.



Flood

The major causes of floods are:

A. Meteorological factors

- i) Heavy rainfall
- ii) Tropical cyclones
- iii) Cloud burst

B. Physical factors

- i) Large catchment area
- ii) Inadequate drainage arrangement

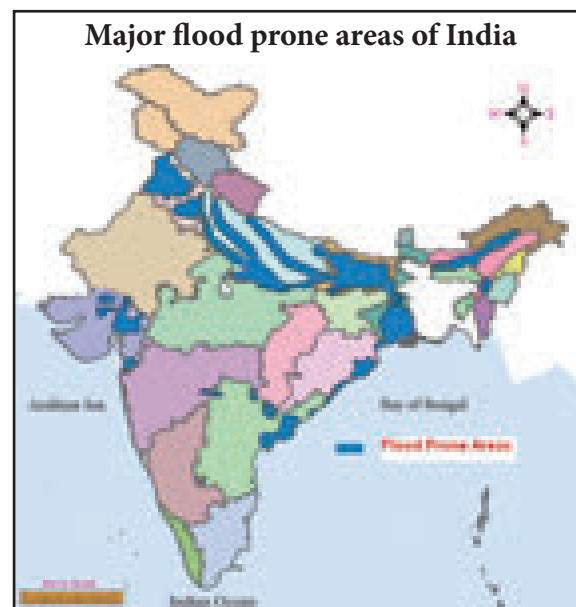
C. Human factors

- i) Deforestation
- ii) Siltation
- iii) Faulty agricultural practices
- iv) Faulty irrigation practices
- v) Collapse of dams
- vi) Accelerated urbanisation

ACTIVITY

Discuss in the classroom about the actions to be taken before, during and after flood.

The following map shows the major flood prone areas in India. Gangetic plains covering the states of Punjab, Haryana, Uttar Pradesh, North Bihar, West Bengal and Brahmaputra valley are the major flood prone areas in north and northeast India. Coastal Andhra Pradesh, Odisha and southern Gujarat are the other regions which are also prone to flood often.



(Source: National Institute of Hydrology, New Delhi)

3) Cyclonic Storms

A cyclonic storm is a strong wind circulating around a low pressure area in the atmosphere. It rotates in anti-clockwise direction in Northern Hemisphere and clockwise in the Southern Hemisphere.

Tropical cyclones are characterised by destructive winds, storm surges and exceptional levels of rainfall, which may cause flooding. Wind speed may reach upto 200 km/h and rainfall may record upto 50 cm/day for several consecutive days.

A sudden rise of seawater due to tropical cyclone is called storm surge. It is more common in the regions of shallow coastal water.

East coastal areas vulnerable to storm surges

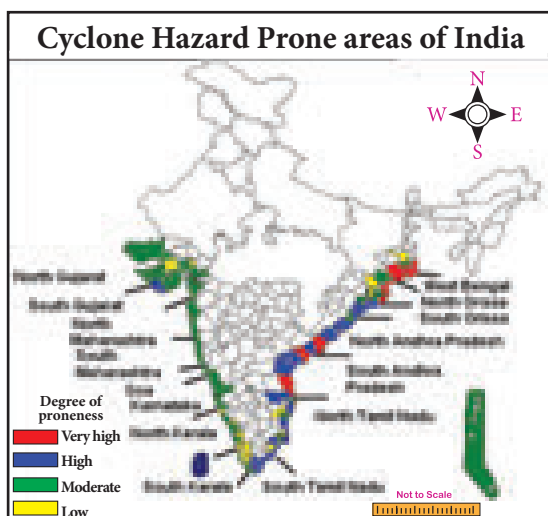
- i) North Odisha and West Bengal coasts.
- ii) Andhra Pradesh coast between Ongole and Machilipatnam.
- iii) Tamil Nadu coast (among 13 coastal districts, Nagapattinam and Cuddalore districts are frequently affected).

West coastal areas vulnerable to storm surges

The west coast of India is less vulnerable to storm surges than the east coast.

- i) Maharashtra coast, north of Harnai and adjoining south Gujarat coast and the coastal belt around the Gulf of Cambay.

ii) The coastal belt around the Gulf of Kutch.

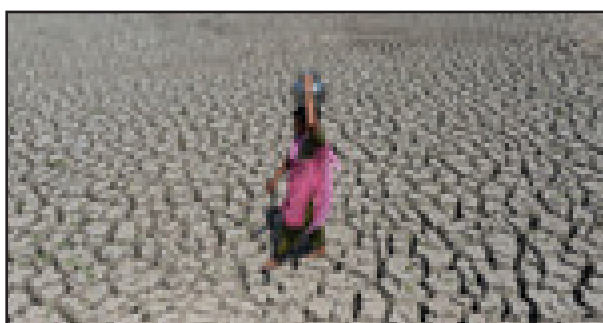


(Source: Mohapatra et al., 2015)

4) Droughts

Any lack of water to satisfy the normal needs of agriculture, livestock, industry or human population may be termed as a drought. Further, the drought could be classified into three major types as,

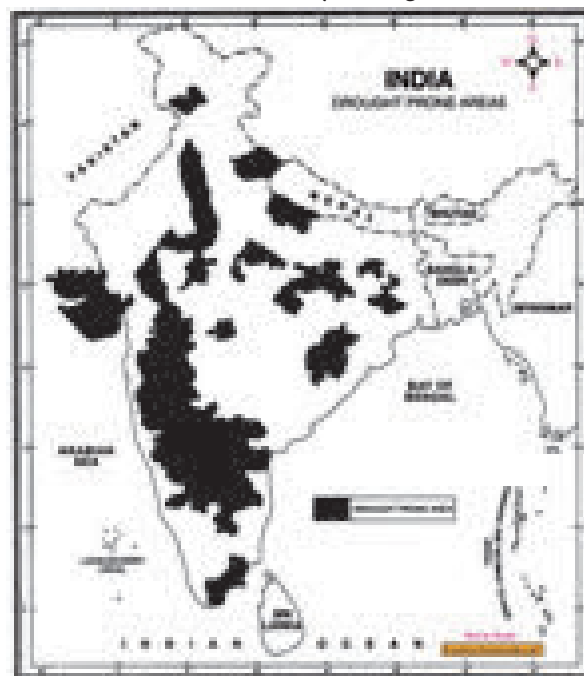
- i) **Meteorological drought:** it is a situation where there is a reduction in rainfall for a specific period below a specific level.
- ii) **Hydrological drought:** it is associated with reduction of water in streams, rivers and reservoirs. It is of two types, a) Surface water drought, and b) Groundwater drought.
- iii) **Agricultural drought:** it refers to the condition in which the agricultural crops get affected due to lack of rainfall.



Drought

Droughts in India occur in the event of a failure of monsoon. Generally monsoon rainfall is uneven in India. Some areas receive heavy rainfall while other regions get moderate to low

rainfall. The areas which experience low to very low rainfall are affected by drought.



(Source: Khullar, 2014)

Fact

About one third area of the country is affected by drought. It severely affects 16% of the land area and 12% of the total population of India. The areas that receive an annual rainfall of less than 60 cm are the drought prone regions of India.

The major areas highly prone to drought are:

- 1) The arid and semi-arid region from Ahmedabad to Kanpur on one side and from Kanpur to Jalandhar on the other.
- 2) The dry region lying in the leeward side of the Western Ghats.

5) Landslides

Landslide is a rapid downward movement of rock, soil and vegetation down the slope under the influence of gravity. Landslides are generally sudden and infrequent. Presence of steep slope and heavy rainfall are the major causes of landslides. Weak ground structure, deforestation, earthquakes, volcanic eruptions, mining, construction of roads and railways over the mountains are the other causes of landslides.

About 15% of India's landmass is prone to landslide hazard. Landslides are very common along the steep slopes of the Himalayas, the Western Ghats and along the river valleys. In Tamil Nadu, Kodaikanal (Dindigul district) and Ooty (The Nilgiris district) are frequently affected by landslides.

6) Tsunami

Tsunami refers to huge ocean waves caused by an earthquake, landslide or volcanic eruption. It is generally noticed in the coastal regions and travel between 640 and 960 km/h. Tsunami pose serious danger to the inhabitants of the coastal areas.



The word 'Tsunami' is derived from Japanese word 'tsu' meaning harbour and 'nami' meaning wave (Harbour wave).

Indian Ocean Tsunami of 2004

- On December 26, 2004, at 7:59 a.m. local time, an undersea earthquake with a magnitude of 9.1 struck off the coast of the Indonesian island of Sumatra.
- The tsunami killed at least 2,25,000 people across a dozen countries, with Indonesia, Sri Lanka, India, Thailand, Somalia and Maldives, sustaining massive damage.

7) Hazardous Wastes

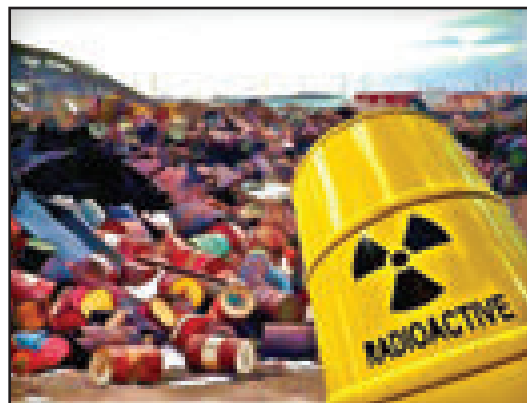
The wastes that may or tend to cause adverse health effects on the ecosystem and human beings are called hazardous wastes.

The following are the major hazardous wastes

- Radioactive substance:** tools and unused fuel pipe of nuclear power plants.
- Chemicals:** synthetic organics, inorganic metals, salts, acids and bases, and flammables and explosives.
- Medical wastes:** hypodermic needles, bandages and outdated drugs.
- Flammable wastes:** organic solvents, oils, plasticisers and organic sludges.

v) **Explosives:** the wastes resulting from ordnance manufacturing and some industrial gases.

vi) **Household hazardous wastes:** pesticides, waste oil, automobile battery and household battery.



hazardous wastes



Chernobyl nuclear disaster site (near Pripyat) to become an official tourist spot

Before:

- Chernobyl (then Soviet Union) nuclear accident was happened on 26th April, 1986.
- The radiation emitted was more than 400 times than that released by the atomic bomb dropped on Hiroshima (Japan) in 1945. This accident remains the largest nuclear accident in history.
- More than 3,50,000 people were evacuated from the area and severe restrictions on permanent human settlement are still in that place.

Now:

- 33 years after the accident, the Exclusion Zone, which covers an area now in Ukraine and Belarus is inhabited by numerous animals and more than 200 bird species.
- In 2016, the Ukraine part of this zone was declared as a radiological and environmental biosphere reserve by the government.

8) Pollution of Air

Air is a mixture of several gases. The main gases are nitrogen (78.09%) for forming products

such as, fertilisers for plants and for making the air inert, oxygen (20.95%) for breathing and carbon dioxide (0.03%) for photosynthesis. Some other gases like argon, neon, helium, krypton, hydrogen, ozone, xenon and methane are also present. Besides, water vapour and dust particles make their presence felt in one way or the other.

Air pollution is the contamination of the indoor or outdoor air by a range of gases and solids that modify its natural characteristics and percentage. Air pollutants can be categorised into primary and secondary pollutants.

A **primary pollutant** is an air pollutant emitted directly from a source. A **secondary pollutant** is not directly emitted as such, but forms when other pollutants (primary pollutants) react in the atmosphere.

Primary Pollutants

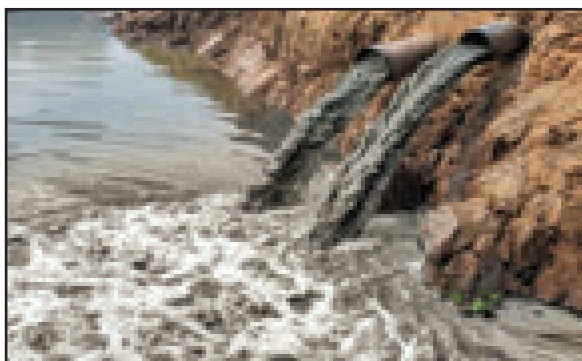
- i) Oxides of Sulphur
- ii) Oxides of Nitrogen
- iii) Oxides of Carbon
- iv) Particulate Matter
- v) Other Primary Pollutants

Secondary Pollutants

- i) Ground Level Ozone
- ii) Smog

9) Pollution of Water

Water pollution may be defined as alteration in the physical, chemical and biological characteristics of water, which may cause harmful effects in human and aquatic life.



Water pollution

In India, water pollution has been taking place on a large scale and since a long period. Both surface and groundwater bodies are polluted to a great extent. The major causes of water pollution in India are:

- i) Urbanisation
- ii) Industrial effluents
- iii) Sewages
- iv) Agricultural runoff and improper agricultural practices
- v) Seawater intrusion
- vi) Solid wastes

Need for Prevention Measures

Prevention is defined as the activities taken to prevent a natural calamity or potential hazard from having harmful effects on either people or economic assets.

- Prevention planning consists of i) hazard identification, and ii) vulnerability assessment.
- Delayed actions may increase the economic losses.
- For developing countries like India, prevention is perhaps the most critical components in managing disasters.

Nature is emerging as a new weapon of mass destruction, do you agree?

Around 22,000 people have died in India in 10 years until 2017 due to major environmental disasters – Indian Meteorology Department.

In the past two decades (1998-2017) over 5,00,000 people have died due to extreme weather events around the world – stated by Global Climate Risk Index Report Published by Germanwatch (German-based non-profit organisation).

Recap

- Hazards are defined as the phenomena that pose a threat to people, structures or economic assets and which may cause disaster.
- There are three types of hazards namely natural hazards, human-made hazards and Socio-natural hazards
- Natural hazards are earthquakes, floods, cyclonic storms, droughts, landslides, tsunamis, volcanic eruptions etc.
- Human-made hazards are explosions, hazardous wastes, pollution of air, land and water, dam collapses, wars or civil conflicts, terrorism etc.
- Socio- natural hazards are caused by the combined effect of natural forces and misdeeds of human.

GLOSSARY

Earthquake	It is a violent tremor in the earth's crust.	நிலஅதிர்வு
Floods	It is a state of high water level along a river channel or on coast that leads to inundation of land.	வெள்ளப்பெருக்கு
Drought	Any lack of water to satisfy the normal needs of agriculture, livestock, industry or human population may be termed as a drought.	வறட்சி
Tsunami	It is a series of waves caused by the earth movements under the sea.	ஆழிப் பேரலை



Evaluation

I Choose the correct answer

1. _____ percentage of nitrogen is present in the air.
- 78.09%
 - 74.08%
 - 80.07%
 - 76.63%



2. Tsunami in Indian Ocean took place in the year _____.
- 1990
 - 2004
 - 2005
 - 2008
3. The word Tsunami is derived from _____ language.
- Hindi
 - French
 - Japanese
 - German

4. The example of surface water is
- Artesian well
 - Groundwater
 - Subsurface water
 - Lake
5. Event that occurs due to the failure of monsoons.
- Condensation
 - Drought
 - Evaporation
 - Precipitation

II Fill in the blanks

- Hazards may lead to_____.
- Landslide is an example of _____ hazard.
- On the basis of origin, hazard can be grouped into _____ categories.
- Terrorism is an example of _____ hazard.
- Oxides of Nitrogen are _____ pollutants which affects the human beings.
- Chernobyl nuclear accident took place in _____ year.

III Match the following

- | | | |
|---------------------------|---|-----------------------|
| List I | | List II |
| 1. Primary pollutant | - | Terrorism |
| 2. Hazardous waste | - | Tsunami |
| 3. Earthquake | - | Outdated drugs |
| 4. Meteorological drought | - | Oxides of Sulphur |
| 5. Human induced hazard | - | Reduction in rainfall |

IV Answer briefly

1. Define 'hazard'.
2. What are the major types of hazards?
3. Write a brief note on hazardous wastes.
4. List out the major flood prone areas of our country.
5. Mention the types of drought.
6. Why should not we construct houses at foothill areas?

V Distinguish between

1. Hazards and disasters.
2. Natural hazard and human-made hazard.
3. Flood and drought.
4. Earthquake and Tsunami.

VI Answer in a paragraph

1. Write an essay on air pollution.
2. Define earthquake and list out its effects.
3. Give a detailed explanation on the causes of landslides.
4. Elaborately discuss the effects of water pollution.

VII Activities

1. Name the hazards which you have identified.

2. List out the hazards that occur frequently and occasionally in your place.

Frequent Hazards		Occasional Hazards	
1		1	
2		2	
3		3	
4		4	
5		5	

3. On the map of Tamil Nadu shade the 13 coastal districts in different colours.



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Item	In and around your school	In your residential environs	On the way to school from home
1. Hazardous factory / Industry			
2. Roads of heavy traffic			
3. Tall buildings			
4. Things which burn easily			
5. Open drainage / Septic tank			
6. Others			



INTERNET RESOURCES

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Unit - 6

Industries


 Learning Objectives

- ▶ To know about the nature and the importance of Industries
- ▶ To understand the general classification of economic activities
- ▶ To identify the factors responsible for location of Industries
- ▶ To study about the classification of Industries



Introduction

Anbu and Kabilan were studying in 8th standard like you. One day it was raining while they were playing in the school play ground. They started running towards the class room. Kabilan planned to stay under a nearby tree in the rain and called Anbu to accompany him. But he denied saying that lightning might strike the tree. Finally, they reached the class room. They saw an attractive new cotton towel in the class room. They used the towel for wiping their heads. Other students in the class room said to them, "The towel was brought by the teacher and you made it wet. So, she might shout at you". In order to please the teacher, Kabilan asked the teacher some questions. He said, "Madam this is so cute and colourful. From where did you buy this? How is it made?" The teacher was very happy and started explaining the raw materials used, the way it was manufactured and marketed.

Industry

Industry is a process by which the raw materials are changed into finished products. Many raw materials are not fit for human

consumption. Therefore, there is a need for conversion. This transformation of commodities from one form to another form is the essence of manufacturing industry or the secondary group of economic activities. Arrival of Science and Technology helped the man to fabricate raw materials into finished products. The economic strength of a country is always measured by the development of manufacturing industries. Therefore, any country in the world is basically depends on the effective growth of industries for its economic development.

Economic Activity

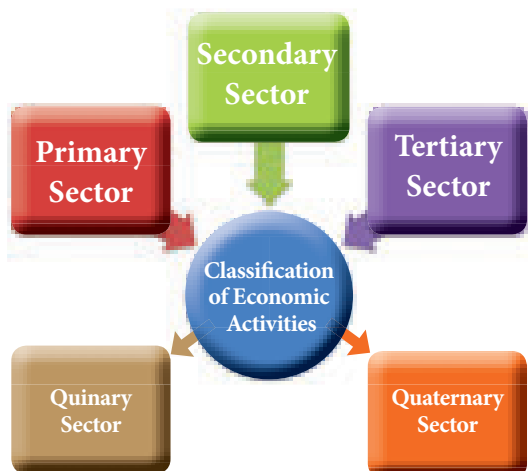
Any action that involves in the production, distribution, consumption or services is an economic activity.

Basics of Economic Activities

The following are the major and fundamental economic activities.

1. Primary Economic Activities
(e.g., Raw cotton production)
2. Secondary Economic Activities
(e.g., Spinning mill)
3. Tertiary Economic Activities
(e.g. Trade, Transport)

4. Quaternary Activities (e.g. Banking sector)
5. Quinary Activities (e.g. Judicial sector)

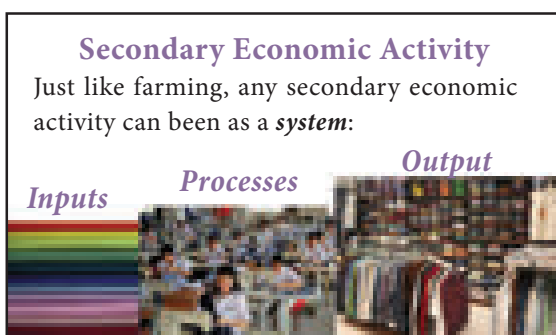


1) Primary Economic Activity: These are the economic activities which have been originated in the very beginning. It includes the activities such as, forestry, grazing, hunting, food gathering, fishing, agriculture, mining, and quarrying.



Primary economic activity

2) Secondary Economic Activity: Secondary activities are those that change raw materials into usable products through processing and manufacturing. Bakeries that make flour into bread and factories that change metals and plastics into vehicles are examples of secondary activities.



3) Tertiary Economic Activity: Tertiary economic activities are those that provide essential services and support the industries to function. Often it is called service industries, this level includes the transportation, finance, utilities, education, retail, housing, medical and other services. We are educated by school. Since, school is doing service, it comes under tertiary activity.

Tertiary Sector

The Tertiary Sector is a part of the economy where businesses produce **services**.

Services are non-physical products that cannot be touched or stored like a haircut or a train journey

4) Quaternary Economic Activity: Quaternary activities are associated with the creation and transfer of information, including research and training. Often called information industries, this level has been dramatic growth as a result of advancements in technology and electronic display and transmission of information. e.g., we watch television. The programs are telecasted from television stations. It is an example of quaternary activity.

Services sector is the one of the largest sectors of India. Currently this sector is the backbone of the Indian economy and contributing around 53% of the Indian Gross Domestic Product.

5) Quinary Economic Activity: Quinary economic activities refer to the high level decision making processes by executives in industries, business, education, and government. This sector include top executives or officials in the fields of science and technology, universities, health care etc. In our house, our parents

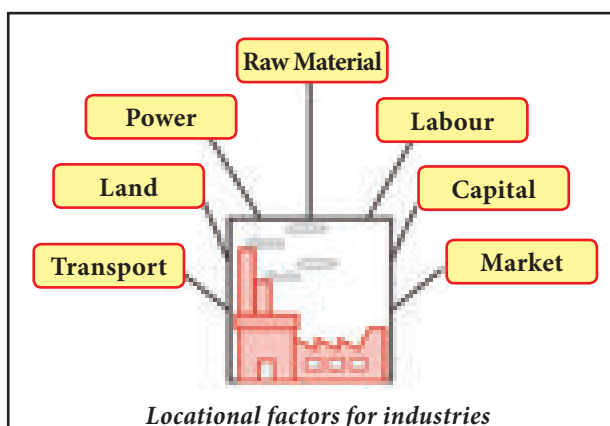
purchase household articles and make decisions by themselves in some situations. Similarly, the council of ministers take decisions to introduce various people welfare schemes in the state. These two are examples of quinary activities.

ACTIVITY

Visit any factory and find out the favourable factors which are responsible for its location.

Factors responsible for location of Industries

Industrial locations are complex in nature. They are influenced by the availability of many factors. Some of them are: Raw Materials, Land, Water, Labour, Capital, Power, Transport, and Market. The locational factors of industries are grouped into: Geographical factors and Non-Geographical factors.



I. Geographical Factors

1. Raw Material: Bulky goods and weight losing materials cannot be transported for long distances. Therefore, industries like iron and steel and sugar industries are located near the place of availability of iron ore and sugar cane respectively. Steel Plant in Salem is located near Kanjamalai, where iron ore is available. Similarly, Sugar industries are located near the sugarcane growing areas.

2. Power: Power is base and essential to run the entire industry. Power is mostly generated from the conventional sources like coal, mineral oil,

and water. So, any one of these sources must be located near the industries to fulfil its power requirement.

3. Labour: Availability of cheap and skilled labour is another important requirement for labour intensive industries (e.g., Tea industry).

4. Transport: It is needed for transporting raw materials to the industries and also for sending the finished products to the market. Availability of easy transportation always influences the location of an industry. So, the junction points of waterways, roadways and railways become active centres of industrial activity.

5. Storage and Warehousing: The finished goods should reach the market at the end of the process of manufacturing. Hence, such finished products should be stored at suitable storage or warehouse till the goods are taken to the market.

6. Topography: The site that is selected for the establishment of an industry must be flat. So, it can be well served by different modes of transport.

7. Climate: Climate of the area selected for an industry is also one of the important factors of location of industries. Extreme climate condition is not suitable for the successful industrial growth. Moreover, there are certain industries which require a specific climate. Example: Cool- humid climate is ideal for cotton textile industry. As Coimbatore and Tiruppur have such type of climate, many cotton textile industries are located in this zone.

8. Water Resources: Availability of water is another important factor that influences the industrial location. Many industries are established near rivers, canals, and lakes for this reason. Iron and steel industries, textile industries and chemical industries require plenty of water, for their proper functioning.

Find out

Find out the reasons for uneven distribution of industries in India.

II. Non-Geographical Factors

1. Capital: Capital or huge investment is needed for the establishment of industries without which no industry can be established.

2. Availability of Loans: In most cases, it is not possible to start an industry with enough capital in hand. So, the investors seek loan to start the industries. Thus, the organizational set up which provides loan and insurance are required.

3. Government Policies/Regulations:

Government policies are another important factor that influences industrial location. The government sets certain restriction in the allocation of land for industries in order to reduce regional disparities, to control excessive pollution and to avoid the excessive clustering of industries in big cities. So, the policies also affect the industrial locations.

ACTIVITY

Think about Black Board and chalk piece

1. Name the raw materials used for production.
2. Find the places of their production.
3. Name the industrial category in which chinks are made.

Classification of Industries

Industries are classified on various basis in the following ways.

On the basis of Raw Materials



Agro Based Industries

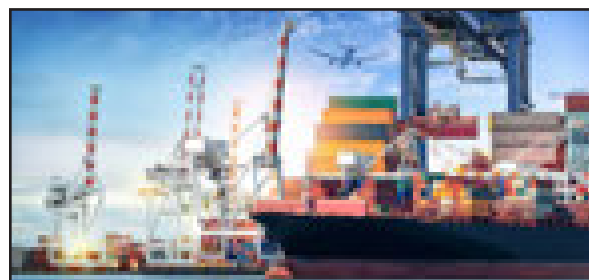
(i) Agro Based Industries: These industries use plant and animal based products as their raw materials. Example: Food Processing, Vegetable Oil, Cotton Textile, Dairy Products, etc.

(ii) Mineral Based Industries: These are the industries that use mineral ores as their raw materials. Iron made from iron ore is the product of mineral based industry. Cement, Machine Tools, etc. are the other examples of mineral based industries.



Mineral Based Industries

(iii) Marine Based Industries: These industries use products from the sea and oceans as raw materials. Example; Processed Sea Food, Fish Oil manufacturing units etc.



Marine Based Industries

(iv) Forest Based Industries: These industries use forest products as their raw materials. Example: Pulp & Paper, Furniture and Some Pharmaceuticals industries, etc.



Forest Based Industries

On the basis of Size and Capital

(i) **Large Scale Industries:** The capital required for the establishment of an industry is more than one crore the industry is called as large scale industry. Iron & steel, Oil refineries, Cement and Textile industries are the best examples for large scale industries.

(ii) **Small Scale Industries:** The capital required for the establishment of an industry is less than one crore, the industry is called as small scale industry. Silk weaving and household industries belong to this category.



Small Scale Industries



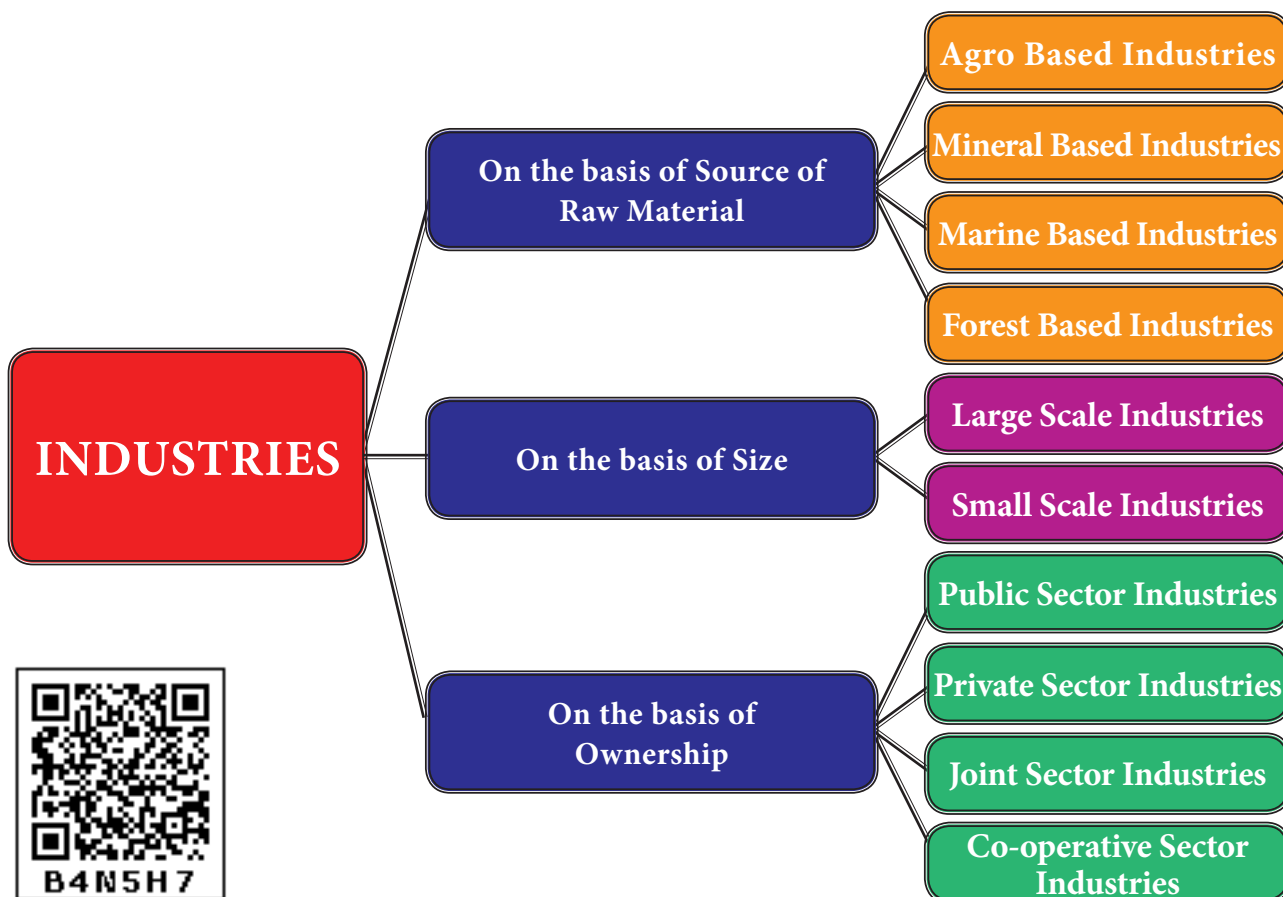
Detroit of India

Detroit city in Michigan State, USA is known as the world's traditional automotive centre. In India Chennai is known as 'Detroit of India'. It has the world famous automobile industries such as GM, Ford, Hyundai and Mahindra. The city accounts for 60% of the country's automotive exports.

Apart from the above cited industries, cottage or household industries are also a type of small scale industry where the products are manufactured by hand, by the artisans with the help of family members. These industries are also classified and grouped as miscellaneous categories. Example: Basket weaving, pot making, handicrafts etc.

On the basis of Ownership

(i) **Private Sector Industries:** These type of industries are owned and operated by individuals or a group of individuals. Example: Bajaj Auto, Reliance, etc.



(ii) **Public Sector Industries:** These type of industries are owned and operated by the Government. Hindustan Aeronautics Limited (HAL), Bharat Heavy Electricals Ltd (BHEL), Steel Authority of India Ltd (SAIL) are the examples of Public sector industries.

ACTIVITY

List out the ownership based industries which are located in your places.

(iii) **Joint Sector Industries:** These types of industries are owned and operated jointly by the Government and Individuals or a Group of Individuals. Example: Indian Oil Sky Tanking Ltd, Indian Synthetic Rubber Ltd, Mahanagar Gas Ltd, Maruti Udyog etc.,

(iv) **Co-operative Sector Industries:** Industries of this kind are owned and operated by the producers or suppliers of raw materials or

workers or both. Anand Milk Union Limited (AMUL) is the best example of the Co-operative sector.

Recap

- **Industry:** Industry is a place of process by which the raw materials are changed into finished products.
- **Economic Activity:** Any action that involves in the production, distribution, consumption or services in an activity.
- **Types of Economic Activities:** Primary economic activities, secondary economic activities and tertiary economic activities are the fundamental and major economic activities.
- **Factors affecting location of Industries:** Factors affecting location of industries are raw materials, capital, land, water, labour, power supply, transport and market.

GLOSSARY

Quaternary activities	Creation and transfer of information	நான்காம் நிலை தொழில்
Quinary activities	Decision making processes by Executives associated with industries, government, etc	ஐந்தாம் நிலை தொழில்
Private Sector	This industry is owned and operated by individuals or group of individuals.	தனியார்துறை
Co-operative Sector	This industry is owned by the producer or suppliers of raw materials or workers or both.	கூட்டுறவு துறை



Evaluation

I Choose the correct answer

1. Silk weaving and house hold industries come under the category of _____
 a) Small scale industry
 b) Large scale industry
 c) Marine based industry
 d) Capital intensive industry



2. On the basis of ownership the industry can be divided into _____ types
 a) 2 b) 3 c) 4 d) 5
3. Amul dairy industry is best example of _____ sector.
 a) Private Sector
 b) Public Sector
 c) Co-operative sector
 d) Joint sector

4. Iron and Steel and Cement Industries are the examples of _____ industries.
 - a) Agro based b) Mineral based
 - c) Forest based d) Marine based
5. Tertiary activity is divided into _____ types
 - a) 4 b) 3
 - c) 2 d) 5
3. Name the major economic activities.
4. What is Quinary activity? Elucidate with an example.
5. Name the factors responsible for the location of industries.
6. Write a short note on the following
 - a) Large scale industries
 - b) Small scale industries

II Fill in the blanks

1. Banking is a _____ economic activity.
2. Tertiary activity is divided into _____ and _____
3. Government decision making process comes under the _____ category of tertiary economic activity.
4. Raw material based perspective Cotton Textile industry is a _____ industry.
5. Capital required for establishing a large scale industry is more than _____

III Match the following

- | | |
|------------------------|---------------------------|
| 1. Judicial sector | - Private Sector |
| 2. TV telecasts | - Non Geographical factor |
| 3. Geographical factor | - Quaternary activity |
| 4. Capital | - Raw materials |
| 5. Bajaji Auto | - Quinary activity |

IV Distinguish between

1. Secondary economic activity and tertiary economic activity.
2. Agro based and marine based industries.
3. Large scale industries and small scale industries.

V Answer briefly

1. Define industry.
2. What is meant by economic activity?

VI Answer in Paragraph

1. Classify and explain the industries based on the source of raw materials.
2. Explain the Geographical factors which affect the location of industries?
3. Classify the industries through a flow chart.



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3. *Economic Geography* by K.K. Khanna and V.K.Gupta (1998)



INTERNET RESOURCES

- <http://ncert.nic.in>
- <https://www.edu.gov.mb.ca>
- <http://www.yourarticlelibrary.com/industries/industries-classification-of-industries>
- <https://www.clearias.com/factors-responsible-for-the-location-of-primary-secondary-and-tertiary-sector-industries-in-various-parts-of-the-world-including-india/>

Unit - 7

Exploring Continents

Africa, Australia and Antarctica


 Learning Objectives

- ▶ To study the Geographical location of the continents of Africa, Australia and Antarctica
- ▶ To learn the physical setting, climate and drainage of the continents
- ▶ To understand the nature of the flora and fauna of the continents
- ▶ To identify the major resources and economic activities
- ▶ To develop the mapping skill



Introduction

A teacher handling class VIII entered the classroom and asked the students what they were talking about. The class monitor told the teacher that the students were talking about the ODI match between Australia and South Africa. The teacher said to the students, “Well today we will learn many things about them in this lesson”.

Africa

Location and size

Africa is the second largest and second most populous continent after Asia. It stretches from 37°21' North latitude to 34° 51' South latitude and from 17°33' West longitude to 51°27' East longitude. It spreads over an area of about 30.36 million square kilometres (20.2% of the world's land area). The equator passes through the middle of Africa and cuts into two equal halves. It is the only continent through which the major latitudes such as Tropic of

Cancer, Equator and Tropic of Capricorn pass. Its north-south extent is 7623 km and east-west extent is 7260 km. The Prime Meridian passes near Accra the capital of Ghana in the West of this continent. Africa is located in all the four hemispheres.

The great explorers David Living Stone and H.M. Stanley were the first to explore the interior parts of this continent. The sources reveal that the early human ancestors have lived in Africa for more than 5 million years. Africa is nicknamed as the “**Mother Continent**” as it was the oldest inhabited continent on Earth. The diverse geographical condition of the Continent is the main reason for heterogeneous culture and home of several ethnic groups in Africa.



Africa is called a Dark Continent. In the beginning the interior of Africa was largely unknown to them. The European explorer Henry M. Stanley was the first to use the term the “**Dark Continent**” (1878).

Political Divisions



The continent of Africa consists of 54 countries. On the basis of their geographical location, the countries are grouped as a) West Africa b) North Africa c) Central Africa d) Eastern Africa e) Southern Africa.

DO YOU KNOW? The north-western African countries of Morocco, Algeria, Libya, Mauritania and Tunisia are collectively called 'Maghreb' which means west in Arabic language.

Physiographic Divisions

Africa consists of mixture of land forms such as mountains, plateaus and plains.

The following are the 8 major physical divisions of Africa. Madagascar is the major island of Africa.

1. Sahara

The world-famous Sahara Desert is located in the northern part of Africa. It is one of the largest hot deserts in the world. It has an area of 9.2 million sq km. The Sahara is bordered by the Atlantic Ocean in the west, the Red Sea in the east, the Mediterranean Sea in the north and Sahel in the south. This desert covers the areas of 11 countries: Algeria, Chad, Egypt, Libya, Mali, Mauritania, Morocco, Niger, Western Sahara, Sudan and Tunisia.

Physical Features of Africa



It consists of many topographical features such as mountains, plateaus, ergs, oases, sand- and gravel-covered plains, salt flats, basins and depressions. Mount Koussi, an extinct volcano in Chad, is the highest point in the Sahara with 3,445 m and the Qattara Depression in Egypt is the Sahara's deepest point (133 m below sea level). Nile and Niger rivers run through the desert.

Atlas Mountain lies in the north- west of Africa. It is a young fold mountain. It separates the Mediterranean sea and Atlantic ocean. The highest point is Mount Toubkal (4167m).

2. Sahel

Sahel means border or margin. Sahel is a semi-arid tropical Savanna region lies between the Sahara Desert in the north and Savanna

grassland in the south. It stretches east-west for a distance of 4000 km and covers an area of 3.0 million sq km. It is largely a semi-arid belt of barren, sandy and rocky land. This region marks the physical and cultural transition between the more fertile tropical regions in the south and desert in the north.

3. Savanna

Tropical dry grasslands with scattered trees are known as 'Savanna'. It is located near the equator and covers almost half of the area of Africa. This grassland is found in the regions just north and south of the rainforests that lie along the equator. Trees are the main features of the landscape in some parts of the savanna, while tall grass covers the other areas. Animals

of many species graze in this zone. The Serengeti Plain is one of the largest plains in Savanna. This is called the 'Open Air Zoo'.

4. The Great Rift Valley and the Great Lakes of Africa

A rift valley is a large crack in the earth's surface formed by the shifting of tectonic plates. One of the major geographical and geological features of Africa is the Great Rift Valley. It stretches from northern Syria in Asia to central Mozambique in Africa for a distance of 6400 kilometers. It runs through the eastern Africa and contains many lakes.

ACTIVITY

Find out-the Great Rift Valley and the lakes connected with it from the atlas and mention them on the map of Africa.

The African Great Lakes are a series of lakes found in the rift valley. The water in the Great lakes of Africa constitutes about 25% of the planet's unfrozen surface fresh water. There are seven major lakes in this region.

Lake Victoria of this region is the largest fresh water body in Africa and second largest in the world, next to Lake Superior in USA. It is the source of river Nile. The other lake in the valley is Tanganyika which is the longest and deepest fresh water lake in the world. Lake Albert, Lake Edward, Lake Kivu, Lake Malawi, and Lake Turkana are the other important lakes in Africa.



The glaciers on the top of Kilimanjaro have been disappearing since 20th centuries. If this trend continues, Kilimanjaro summit will be ice-free by 2025.

5. East African Highlands

Most African mountains are found in these high lands. It stretches from Ethiopia to Cape of Good Hope. Mt. Kilimanjaro (5895m)

is the highest peak located in these highlands. Mt. Kenya and Mt. Ruwenzori are the major mountains located in these high lands. This region is sparsely populated and covered with rich grassland, forests, streams and waterfalls of natural scenic beauty. It enjoys misty mornings and fresh mountain breezes which attract large number of tourists from other parts of the World.

6. Swahili Coast

Swahili coast is located along the shores of East Africa. It stretches about 1,610 kilometers along the Indian Ocean from Somalia to Mozambique. It was a region where the Africans and Arabs mixed to create a unique culture referred to as Swahili Culture. People of this coast are also called 'Swahili'.

7. The Congo Basin or Zaire Basin

Congo Basin lies on the both sides of the the equator in west Central Africa. It comprises an area of more than 3.4 million square kilometres and covered with dense evergreen forest. It provides food, shelter, medicine, water, and materials for over 7.5 million people. It is the world's second largest river basin next to Amazon.

8. Southern Africa

Most part of the Southern Africa is a plateau region. *Drakensberg Mountain* is found in the eastern portion of the escarpment. It extends from north east to south west for 1125 km. Its highest peak is Thabana Ntlenyana (3482m). This region is covered with grasslands known as 'Veld'. Kalahari Desert lies in the south and Namib Desert is along the south -west shore of Africa. Kalahari Desert in this region is not actually a desert, but a bushy scrubland situated between the Orange and Zambezi Rivers.



Sheep rearing in semi-arid region of South Africa is called 'Karoo'.

Drainage of Africa

1. River Nile

The Nile is the longest river in the world with a length of 6650 km. It has two main tributaries. They are the White Nile, which originates from Burundi, and the Blue Nile, which originates from Ethiopia. These two join and form the Nile River at Khartoum, in Sudan. It flows towards northward and drains into the Mediterranean-sea. Nile is known as the “Father of African Rivers”.



The country Egypt is called the “Gift of the Nile” as it is the lifeline of the Egypt. Without Nile the Egypt would have been a desert.

ACTIVITY

On the outline map of Africa draw the courses of main rivers and name them.

2. River Congo or Zaire

Congo is the second largest river of Africa after Nile. Its length is about 4700km. Congo rises in the highlands of North Eastern Zambia between lakes Tanganyika and Nyasa. It flows through West Central Africa and drains into the Atlantic Ocean.

3. River Niger

Niger is one of the major rivers in West Africa and rises from the highlands of Guinea. It flows for about 4184 km and finally drains into the Gulf of Guinea on the Atlantic Ocean.

4. River Zambezi

The Zambezi River is the fourth longest in Africa. It rises in the north western Zambia. It is about 2574 km long and drains into the Indian ocean. The world famous waterfall ‘Victoria’ is formed by this river at the height of 108 meters. It is called the Southern Africa’s “River of Life”.

River Limpopo and river Orange are the other important rivers of Africa.

Climate

Africa is divided into six major climatic zones. They are:

1. **Arid and semi-arid climate:** Northern Africa and Southern Africa have this climate. Rainfall is scanty in this part.
2. **Tropical savanna climate:** It is found from 10°-20° latitudes on either side of the equator. It is a tropical wet and dry climate.
3. **Equatorial climate:** It is found in the equatorial region covering the Congo River basin and east African highlands. Temperature and rainfall are high all the year round in this region
4. **Temperate climate:** It prevails in southern tip of South Africa. Since this part is located on the coast, the climate of this region is equable.
5. **Mediterranean climate:** It is found in the north-western and south western tips of Africa. These regions get rainfall in winters while in summers it is hot and dry.
6. **Tropical Monsoon climate:** It is found in the eastern shore of Africa. Summers are hot with monsoon winds bringing good rainfall while winters are cool and dry.

FACT

Tropical deserts are located between 20° and 30° north and south of the equator on the western margin of the continents. The deserts lie in the belt of the trade winds which blow from northeast in the northern hemisphere and southeast in the southern hemisphere. Therefore, the general direction of the trade winds is from east to west. These winds shed their moisture on the eastern margins of the continents and by the time they reach the west, they lose their moisture.

Flora and Fauna

African vegetation develops in direct response to the interacting effects of rainfall, temperature, topography and type of soil. Forests cover about 20% of the total land area of the continent. The flora and fauna currently found in Africa are descended from plant and animal species that were present in the continent when it was separated from other land masses during the break up of Gondwanaland.

Baobab, Fever tree and Sausage are the major trees of Africa. There are over one million species of animals in Africa, including both the heaviest (elephants) and the tallest (giraffes) land animals on the earth. White Rhinoceros, Western Green Mamba, Zebra, African Elephants, chimpanzee, gorilla, Wildebeest, Hippopotamus, and Giraffe are the major animals of Africa. Bonobo, Wild Dogs, hyena and Lemur are the typical animals of Africa.



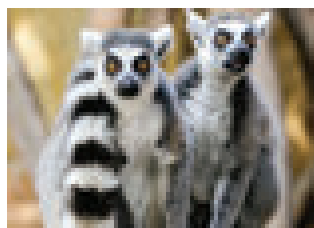
- A hot and dry dusty local wind blowing from the Sahara desert to Guinea coast is called '**Harmattan**'.
- A hot local wind blowing from Sahara to Mediterranean Sea is called '**Sirocco**'.
- Tropical rain forest is called the '**Jewel of the earth**' and the World's largest pharmacy.



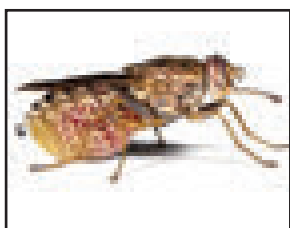
Baobab Tree



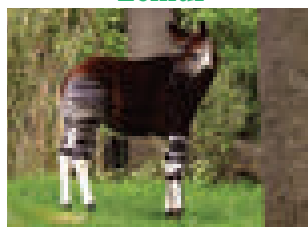
Rain Forest



Lemur



Tsetse Fly



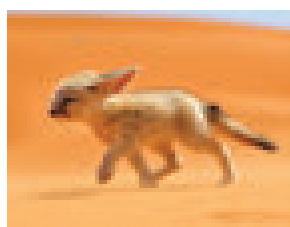
Okapi



Bonobo



Ostrich

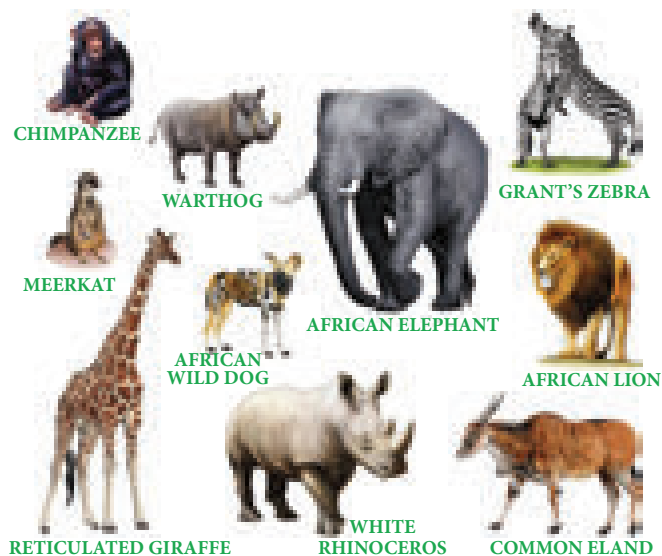


Fox In Sahara



Wildebeest

ANIMALS OF THE AFRICAN SAVANNA



Agriculture

Agriculture is a major economic activity of the African continent. Wheat is grown in the temperate grasslands, Mediterranean region and the Nile valley. Rice is cultivated in Guinea coast, Mozambique, Madagascar and Nile valley. Maize and millets are grown all over the plateau regions. Cotton is the chief cash crop of Africa. Egypt and Sudan cultivate the best quality long staple cotton in the world. Coffee is grown in Ethiopia. Ghana is the chief producer of cocoa. Oil palm is cultivated in West African countries. Sugarcane, rubber, sisal and tobacco are the other major crops and are mostly grown in East African countries.

Minerals

Africa is rich in few mineral deposits. The region at the south of Sahara and the plateaus of Africa are the major mineral regions of the continent. Diamonds are found in South Africa, Congo, Botswana, Sierra Leone and Angola. Kimberly in South Africa is the important producer of diamond. Angola, Nigeria, Gabon and Congo have more oil reserves. Gold is found in South Africa, Namibia, West Africa and Ghana. Chromium, cobalt, copper, iron ore, manganese. Zinc and nickel are scattered across the continent.

Transport

Transports play an important role in the economic development of a region. The physical features and slow economic growth hinder the transport system in many African countries.

1. Land ways

Roadways and Railways in Africa are poorly developed due to the presence of many barriers. It is very difficult to lay the roads and rails across the deserts and the dense forests. South Africa, Kenya, Egypt, Libya, Morocco and Nigeria have roadways and railways to some extent.

2. Waterways

Africa has trade routes between Asia and Australia in the east, Europe in the north and

America in the west. The major sea ports of Africa are Durban, Dar es Salaam and Mogadishu on the Indian Ocean, Port Said, and Alexandria, on the Mediterranean Sea, Cape Town, Algiers and Abidjan on the Atlantic Ocean.

3. Airways

They connect the capital cities of Africa and the other parts of the world. The major international airports of the continent are Cairo, Johannesburg, Nairobi, Dakar, Addis- Ababa, Casablanca, Durban, Douala and Logos.

Population

Africa is the world's second most populous continent. The United Nations estimated the population of Africa as 131 crores in 2019. The population is unevenly distributed due to physical barriers. The population density in Africa is 45 persons per sq km. 41% of the population lives in urban and 59% in rural areas. Nile delta region and South Africa are the densely populated regions of Africa. Nigeria is the most populous country of Africa followed by Ethiopia.



The major tribes of the world are called the first indigenous people. These people have a strong sense of their own identity as unique with their own lands, languages and cultures. Afar, Fatwa, Bushmen, Dinka, Masai, Pygmies, Zulu, Tswan, and Efe are the major tribes of Africa.

Australia

Australia was the last of all the continents to be discovered, and this was due to its remoteness.

Australia is the largest island and smallest continent in the world. It is the only continent that completely occupies a single country. It has diverse in unique flora and fauna. Now let us explore the continent.



Australia was discovered by Captain James Cook, an English Seaman in 1770.

Location and Size:

Australia extends from 10°4' south to 39° 08' south latitudes and 113° 09' east to 153°39' east longitudes. The Tropic of Capricorn cuts the continent almost into two equal halves. Area of the country is about 7.68 million sq km.

Political Divisions

There are six states and two Union Territory in Australia 1) New South Wales 2) Queensland 3) South Australia 4) Tasmania 5) Victoria 6) Western Australia 7) Northern Territory 8) Capital Territory (Canberra). Each state has its own state constitution. Canberra is the capital of Australia. Sydney, Brisbane, Adelaide, Hobart, Melbourne, Perth and Darwin are the other important cities of Australia.

Australia has 8,222 islands. Rottneest Island, Magnetic Island, Fitzroy Island, Fraser Island, Phillip Island, Lord Howe Island, Kangaroo Island and Whitsunday Islands are the major islands.



Physical Divisions

It is the continent with very low irregularities in topography. Based on the nature of topography, it can be divided into three physical divisions namely:

Physical Divisions of Australia



1. The Great Western Plateau
2. The Central Low lands
3. The Eastern High lands

The Great Western Plateau

The Western Plateau is Australia's largest physical division. It incorporates one third of the continent. Its area is about 2,700,000 square kilometers. It is an arid land covering large part of Western Australia, Southern Australia and the Northern Territory. The flat surface is covered by sandy and rocky features.

Ayers rock or Uluru is the largest monolith rock in the world. It is found in the central part of this arid region. It is 863 meters high above the sea level. It is one of the natural wonders of Australia. The pointed limestone pillars called Pinnacles are common in this region.



Ayers rock



Pinnacles

The McDonnell and Musgrave ranges are located in this plateau the treeless region of Nullarbor Plain is located in the southern part of this plateau. The Great Victoria Desert is the largest desert in Australia located in Western Australia and South Australia.

The Central Low lands

The central lowlands extend from the Gulf of Carpentaria in the north to Indian Ocean in the south. In the centre of these low lands lies

the large inland drainage basin of Australia. Lake Eyre is the largest salt lake lies in this region. The Murray–Darling River system lies in the south-eastern part of the central lowlands. Beneath the central lowlands, huge artesian basins are found.

The Eastern Highlands

The eastern highlands extend for about 3860 km along the eastern edge of Australia. It stretches from Cape York in the north to Tasmania in the south. They are also known as the 'Great Dividing Range' as it separates the west and east flowing rivers.

Australian Alps mountain range is the highest mountain range of Australia. It is covered with ice. The highest peak of this range is Mt. Kosciuszko (2230m) and is located in the New South Wales.

Australia has two important natural features that have enriched the country. They are

1. The Artesian Basin
2. The Great Barrier Reef.

The Great Artesian Basin

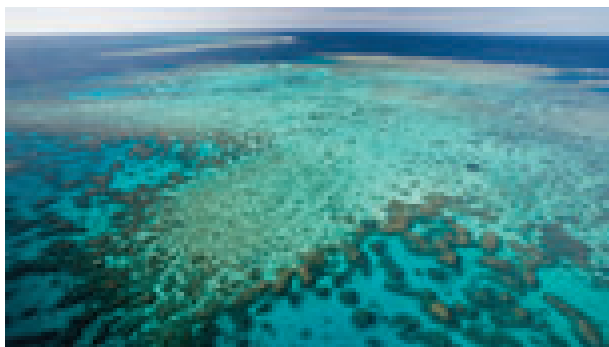
The Artesian Basins are regions on the earth's surface where water gushes out like a fountain. The great artesian basin in Australia is the largest and deepest basin in the world. The artesian basin is located in the west of the Great Dividing Range. It is found in the arid and semi-arid parts of Queensland, New South Wales, South Australia and Northern Territory. It extends for 1.7 million square km and it is also a major source of water in this region.



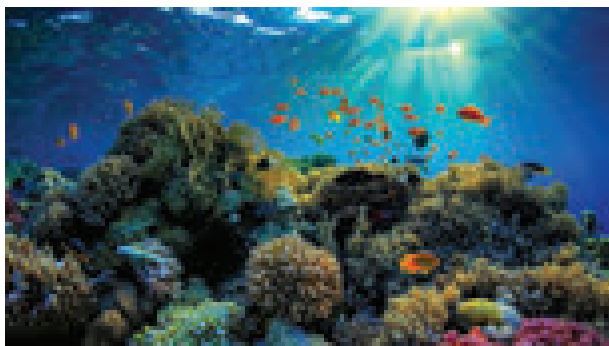
Artesian Well (Queens Land)

Great Barrier Reef

Great Barrier Reef is located in the North East of Australia along the East Coast of Queensland in the Pacific Ocean. It is formed by the tiny coral polyps. It is about 2300 kilometers long. It is one of the natural wonders of the world.



Great Barrier Reef



Coral Polyps

Drainage

Australia receives low average rainfall. Being a hot dry country, the rate of evaporation is high in this country. So, there is a very little amount of water left to flow as river to the seas. The River Murray and its tributary are the main rivers and a major drainage basin of Australia. This drainage basin is found in the interior part



Bourke is the place in Australia where the highest temperature is recorded (53°C). It is located in the central low lands. The lowest temperature of the country is recorded in Canberra, the capital of Australia (-22°C).

of the lowlands of Australia. It covers more than one million sq km which is about 14 per cent of area of Australia.

River Murray is the longest river in Australia. It runs 2508 km from Australian Alps to the Indian Ocean. Darling, Alexandria, Murrumbidgee, Lachlan and Swan are the other important rivers of this continent.

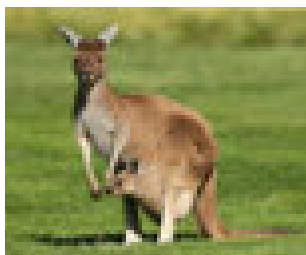
Climate

Australia contains the second largest area of extremely arid land in the world. The Tropic of Capricorn divides the Australia into two equal parts. The Northern half is in the warm tropical zone and the southern half is in the cool temperate zone. The north coastal region experiences monsoon type of climate and there is a heavy rainfall during summer. The east coastal region receives good rainfall from south east trade wind. The hot desert climate extends from central lowlands to western shores. The rainfall in this region is less than 25cm per annual. Mediterranean type of climate prevails in the southern tip of Australia in the region around Perth and Adelaide. Tasmania gets rain throughout the year from westerly winds.

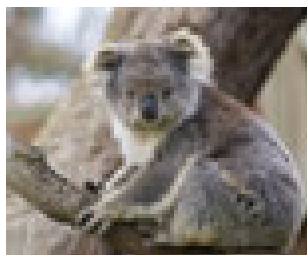
Flora and Fauna

Australia is a semi-arid region. Hence, the vegetative cover is not mainly composed of trees but of scattered shrubs and herbs. Bird's eye view of Australia would reveal a very simple vegetation pattern. The plants and trees in Australia are adapted to dry conditions and can survive for long period without water. They are called **Xerophytes**. Eucalyptus is the most common tree in the west as it can withstand long period of drought. Forests and woodlands together represent about 16 per cent of the area of Australian continent. Eucalyptus, Acacia and Melaleuca (swamp forests) are the major trees of Australia.

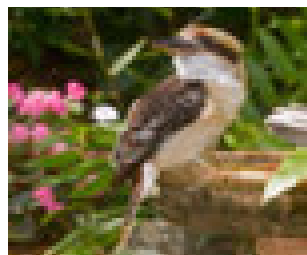
About 80 percent of animals in this country are not found in the other parts of the world. Australia has almost 400 mammal species and about 140 species of marsupials. These are the animals that carry their young ones in their



Kangaroo



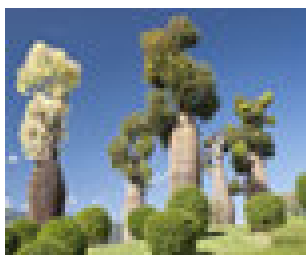
Koala



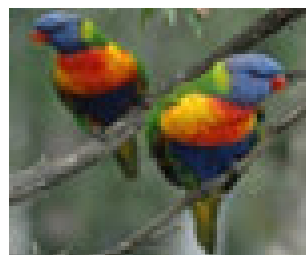
kookaburra



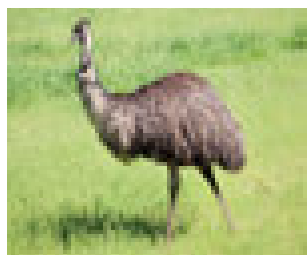
platypus



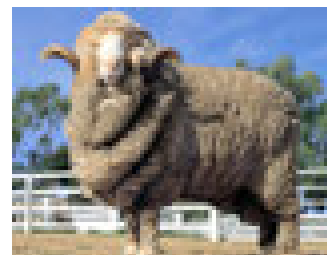
Bottle tree



Rainbow lorikeet



Emu



Merino sheep

pouches. Kangaroo is the national animal of Australia. Koala, platypus Wallaby and Dingo are the other important animals of Australia. The bird species like the laughing kookaburra, emu, and rainbow lorikeet are the major birds of Australia.

DO YOU KNOW? The people who work in the sheep stations in Australia are known as **Jackaroos**. **Aborigines** are the indigenous people of the Australia.

Economic Activities

Agriculture, forestry, fishing, mining, manufacturing, trade and services are the major economic activities of Australia. Wheat is the chief grain crop of Australia. Rice, sugarcane Mediterranean fruit like grapes, oranges and apricots are produced around Perth, Adelaide and Melbourne. Tasmania is known as the **Apple Island**. Rice, tobacco and cotton are grown in the northern parts of Tasmania. Sheep rearing is carried out along with cultivation in the regions of warm climate. Oats, maize and barley are also cultivated to some extent. Australia is well known for Vineyards and Orchards. Cattle rearing is common in the tropical savannas and sheep farming in the temperate grassland. **Merino sheep** are rearing

in southern Australia, Tasmania, Victoria and New South Wales. Dairy cattle are reared in farms close to the cities of east and south coast. Among dairy cows Illawarra, Jersey and Ayrshire are the most popular in Australia.

Fishing is also a major economic activity of Australia. Marine fishing is popular in the entire coastal regions of the country. Inland fishing is very limited. Forest resources are also very limited in the country.

DO YOU KNOW? The sheep industry is well developed in Australia. The wool is described as the '**Cash Crop**' of Australia.

Mineral Resources

Minerals are the largest export item of Australia. It contributes about 10 percent of country's GDP. Australia is the world's leading producer of bauxite, limonite, rutile and zircon, the second largest producer of gold, lead, lithium, manganese ore and zinc, the third largest producer of iron ore and uranium and the fourth largest producer of black coal. The coal belts of the country stretches from New Castle to Sydney on the south eastern coast. Iron ores are found mainly in southern and Western Australia.

Bauxite is mined around the gulf of Carpentaria, Perth and Tasmania. Petroleum and natural gas is obtained from Bass Strait and west of Brisbane. Uranium is mined in northern territory at Ram jungle and Queensland. Gold is mined in the western desert at Kalgoorlie and Koolgarlie. Lead, Zinc, Silver, Manganese, Tungsten, Nickel and copper are also mined in parts of Australia.

Industries

Food and beverage manufacturing industry is the primary industry in Australia. Finance, ship building, information and technology, mining, insurance, aviation and telecommunication industries are the other important industries.

ACTIVITY

There are eight deserts in Australia. List them out with the help of Atlas.



The temperate grass land of Australia is known as 'Downs'.

Transport

Many forms of transports are available in Australia. This country is highly dependent on road transport. There are more than 30 airports with paved runways. Passenger rail transport includes widespread commuter networks in the major cities with limited intercity and interstate networks.

Population

As of 2019 the population of Australia is about 25.2 million. It constitutes only 0.33% of the total world's population. The population density of Australia is 3 persons per sq km. Urban population of the country is about 85.7 percent. Southeastern part of Australia is the densely populated region.

Antarctica

Location and Size

Antarctica is a unique continent but it does not have a native population. There is no country in Antarctica. Antarctica is the southernmost and fifth-largest continent in the world. Since it is located in the polar region, it is the coldest continent with a permanent cover of ice. It is separated from the rest of the world by the icy water of the southern portions of the Indian, Atlantic and Pacific Oceans. It covers about 9.3% of the earth surface with an area of over 14 million sq km. This continent's landform consists of some mountain ranges, peaks, valleys, glaciers, plateau, ice shelf, lakes and volcanoes. The length of the Trans-Antarctic mountain is 3200 km which divides the entire continent into two halves:

1. West Antarctica
2. East Antarctica

The West Antarctica faces the Pacific Ocean. The Antarctic Peninsula which points towards the South America shows that it is the continuation of the Andes mountain range. The East Antarctica faces the Atlantic and the Indian Oceans. The Mt. Erebus in this region is an active volcano. It is located in the Ross Island.

It is the only continent called white continent. In some places its ice cap is 4,000 meters deep.



Scientists of any country are free to conduct experiments and collect data from Antarctica. Hence it is called 'continent of Science'.

Climate

The climate of Antarctica is freezing cold, because of its distance from the Equator. During the months of May, June and July (winter period of Antarctica) the sun never rises in this region. So, the temperature at the South Pole falls to -90°C . In the summer months of December, January



and February, the sun never sets and there is a continuous day light. The summer temperature is about 0°C. Extremely Cold and icy winds blow throughout the year.

DO YOU KNOW? Antarctica is the largest piece of ice on the surface of Earth. About 70% of Earth's fresh water is in the Antarctic ice cap.

Flora and Fauna

Since the temperature is below freezing point almost throughout the year, no major vegetation is found in this continent. Simple plants like algae, mosses, liverworts, lichens and microscopic fungi can survive and grow in Antarctica. Some algae live in the snow, while other plants grow on the coastal rocky land that is ice free. A few species of plants,

such as plankton, algae and mosses are seen in and around Antarctica's fresh and saltwater lakes.

Small red fish called krill are found in large shoals. It is the food for many warm blooded sea animals. The living creatures of this region include whales, seals, walrus and sea birds like penguins, albatross, polar Skua and Stout. The blue whale is the largest animal which feeds on plankton. All these animals and birds have a thick layer of fat called blubber which helps them to

DO YOU KNOW? Vinson Massif (5140m) is the highest peak in Antarctica. It is located in the southern part of Sentinel Range. Lambert glacier of this continent is the largest glacier in the world.



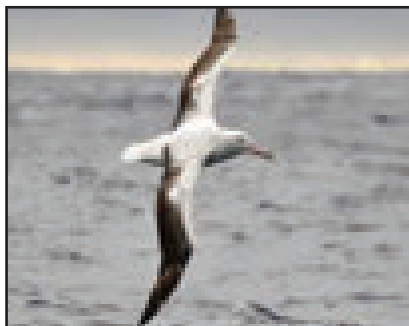
Penguin



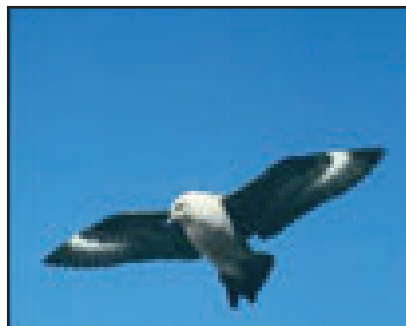
Seal



Walrus



Albatross



Polar Suka



Blue Whale

withstand the cold condition. Penguin birds in Antarctica cannot fly. They have webbed feet and flipper instead of wings. Small invertebrates are the only land animals which lives in the continent.

The international agreement on this continent does not permit the extraction of minerals. So, the extraction of minerals does not take place.

Minerals

Scientific studies show that the Antarctic continent is to be rich in gold, platinum, nickel, copper and petroleum. Traces of chromium, lead, molybdenum, tin, uranium, and zinc are also seen. The possible resources of this region also include silver, platinum, iron ore, cobalt, manganese and titanium. Coal and hydrocarbons have been explored in minimal non-commercial quantities.

Expedition to Antarctica



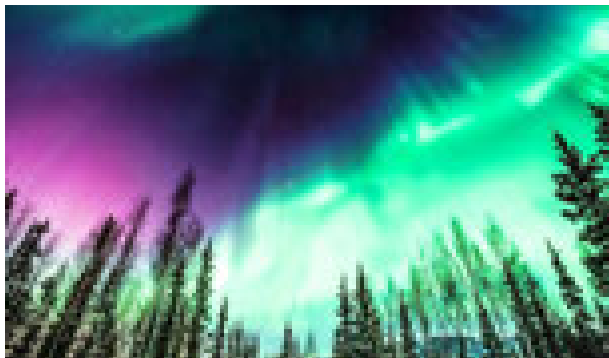
Maitri Research Station (Antarctica)



1. **Mcmurdo** is the largest research station in Antarctica. It was set up by the United States of America.
2. **Dakshin Gangotri** was the first Indian Scientific research base station in Antarctica

In 1912, British and Norwegian teams reached the South Pole. Indian expedition team to Antarctica had 21 members with Dr.S.Z.Quasim as its leader. The team left Goa on 6th December 1981 and landed in Antarctica on 9th January 1982. Dakshin Gangotri, the first Indian scientific research station was established in this continent. Maitri and Bharathi are the other research stations of India in Antarctica.

Aurora



Alaska (Aurora Borealis)

A natural Curtain of combination of bright pink, red and green colour light that appears in the sky near the north and south magnetic poles is called Aurora. The effect is caused



by the interaction of charged particles from the sun with atoms in the upper atmosphere. It is also called Aurora Australis or Southern Lights in the South Pole and Aurora Borealis or Northern Lights in the North Pole. These amazing colours appear in the earth's sky, especially in the high latitudinal countries like Alaska in the north and New Zealand of Falkland in the south.



New Zealand (Aurora Australis)

Recap

- Africa consists of a mixture of landforms such as mountains, plateaus and plains.
- Australia is the largest island and smallest continent in the world.
- Antarctica is the southernmost and fifth largest continent in the world.
- The interaction of charged particles from the sun with atoms in the upper atmosphere is called Aurora.

Glossary

Continent	A large land mass	கண்டம்
Strait	A narrow water channel which connect two large water bodies and separates two land masses.	நீர்ச்சந்தி
Isthmus	A narrow strip of land that connects two large land masses and separate two water bodies.	நிலச்சந்தி
Gulf	A deep inlet of the sea, surrounded by a narrow mouth.	வளைகுடா
Rift Valley	A linear shaped low land between the mountains.	பிளவு பள்ளத்தாக்கு
Reef	A thin layer of calcium carbonate	பவளப்பாறை
Cataracts	A fast flowing water falls over a cliff	சிறு அருவி
Pinnacles	Pointed limestone pillars found in Australian desert	சுண்ணாம்புப் பாறை தூண்
Regs	These are plains of sand and gravel in the arid regions	மணற்பாங்கான சமவெளி
Hamada	Elevated plateaus of rock and stones.	பாறை மற்றும் கற்களால் உயர்த்தப்பட்ட பீடபூமி
Oasis	A hub of water in the desert region.	பாலைவனச் சோலை



Evaluation

I Choose the correct answer

- The southernmost tip of Africa is _____.
 - Cape Blanca
 - Cape Agulhas
 - Cape of Good Hope
 - Cape Town
- The manmade canal through an isthmus between Egypt and Sinai Peninsula is
 - Panama Canal
 - Aswan Canal
 - Suez Canal
 - Albert Canel
- In respect of the Mediterranean climate, consider the following statements and choose the correct answer.
 - The average rainfall is 15cm
 - The summers are hot and dry; winters are rainy.
 - Winters are cool and dry; Summers are hot and wet
 - Citrus fruits are grown
 - 1 is correct
 - 2 and 4 are correct
 - 3 and 4 are correct
 - All are correct
- The range which separates the west and east flowing rivers in Australia is
 - Great Dividing Range
 - Himalayan range
 - Flinders range
 - Mac Donnell range
- Kaloorile is famous for _____ mining.
 - Diamond
 - Platinum
 - Silver
 - Gold



II Fill in the blanks

- Atlas Mountain is located in _____ continent.
- _____ is the highest peak of Africa.

- _____ is the most common tree in Australia.
- A temperate grass land of Australia is called _____.
- _____ is the first Indian research station in Antarctica.

III Match the following

- | | | |
|------------------------|---|---------------------------|
| 1. Pinnacle | - | Equatorial forest |
| 2. Krill | - | salt lake |
| 3. Ostrich | - | small red fish |
| 4. Lake Eyre | - | flightless bird |
| 5. Jewel of the earth- | | pointed limestone pillars |

IV Let us learn

- Assertion (A):** Aurora is a curtain of colour lights appear in the sky.
Reason (R): They are caused by magnetic storms in the upper atmosphere.
 - Both A and R are individually true and R is the correct explanation for A.
 - Both A and R are individually true but R is not the correct explanation for A
 - A is true but R is false.
 - R is true but A is false
- Assertion (A):** A geological feature of Africa is the Great Rift Valley.
Reason (R): A Rift valley is a large crack in the earth's surface formed by tectonic activity.
 - Both A and R is individually true and R is the correct explanation for A.
 - Both A and R are individually true but R is not the correct explanation for A
 - A is true but R is false.
 - R is true but, A is false

V Answer briefly

- Why Africa is called a "Mother Continent"?
- What are the important rivers of Africa?
- Name the physical division of Australia.
- Write about the nature of Antarctic continent.
- Mention any four economic activities of Australia.

VI Distinguish between

1. Sahel and Sahara
2. Western Antarctica and Eastern Antarctica
3. Great Barrier Reef and Artesian Basin.

VII Give reasons

1. Egypt is called the gift of the Nile.
2. Deserts are found in the western margins of continents.
3. Antarctica is called the continent of scientists

VIII Answer in a paragraph

1. Give an account on mineral wealth of Australia.
2. Describe the flora and fauna of Antarctica
3. Name the physical divisions of Africa and explain any one.

IX Map skill

Mark the following on the outline map of Africa and Australia

Africa: Equator, Atlas Mountain, Sahara, Eastern highlands, Mediterranean Sea, Atlantic Ocean, Indian Ocean, Suez Canal, Mount Kilimanjaro,

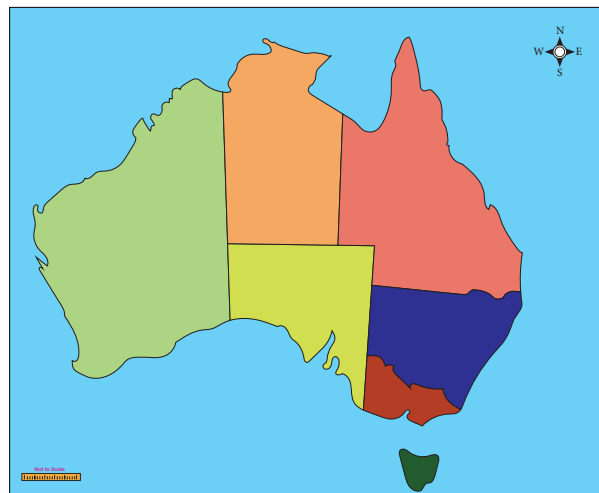
Australia: Great Dividing Range , Great barrier reef, Tasmania, tropic of Capricorn, pacific ocean, Great Australian Sandy Desert, Indian ocean, Sydney, Canberra

X Activities

1. Find out the hemisphere and season during December for the following countries

Country	Hemisphere	Season
South Africa		
Morocco		
Australia		
Niger		
Egypt		
Tasmania		
India		

2. Label the different states of Australia in the following map.



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2. Jojo Mathew (2017), *India and World Geography*, Wizard India private limited, New Delhi.
3. Majid Husain (2017) *India and World Geography*, McGraw Hill education series private India limited, New Delhi.



INTERNET RESOURCES

- <https://www.gph.gov.au>
- <https://www.worldatlas.com>
- <https://www.blogs.nasa.gov>
- <https://www.worldwildlife.org>
- <https://books.google.com.in>
- www.waterencyclopedia.com
- www.worldometers.info
- www.agriculture.gov.au
- <https://www.queensland.com>
- www.dk.com concise atlas of the world
- <https://www.earthobservatory.nasa.gov>

Unit - 8

Map Reading


 Learning Objectives

- ▶ Compare maps and globes
- ▶ Identify the components of maps
- ▶ Know the methods of representation of scale
- ▶ Describe how signs and symbols are used on maps
- ▶ Understand different types of maps



Introduction

Maps and globe are important tools for Geographers. Maps help geographers compare places and relate people's activities to the locations where they live. Cartographers use various methods to make maps as precise as possible. They design maps in a way that they can be read and understood by people throughout the world.

What is a map?

A map is a visual representation of an entire or a part of an area, typically represented on a flat surface. The work of a map is to illustrate specific and detailed features of a particular area, most frequently used to illustrate geography.

Map Reading

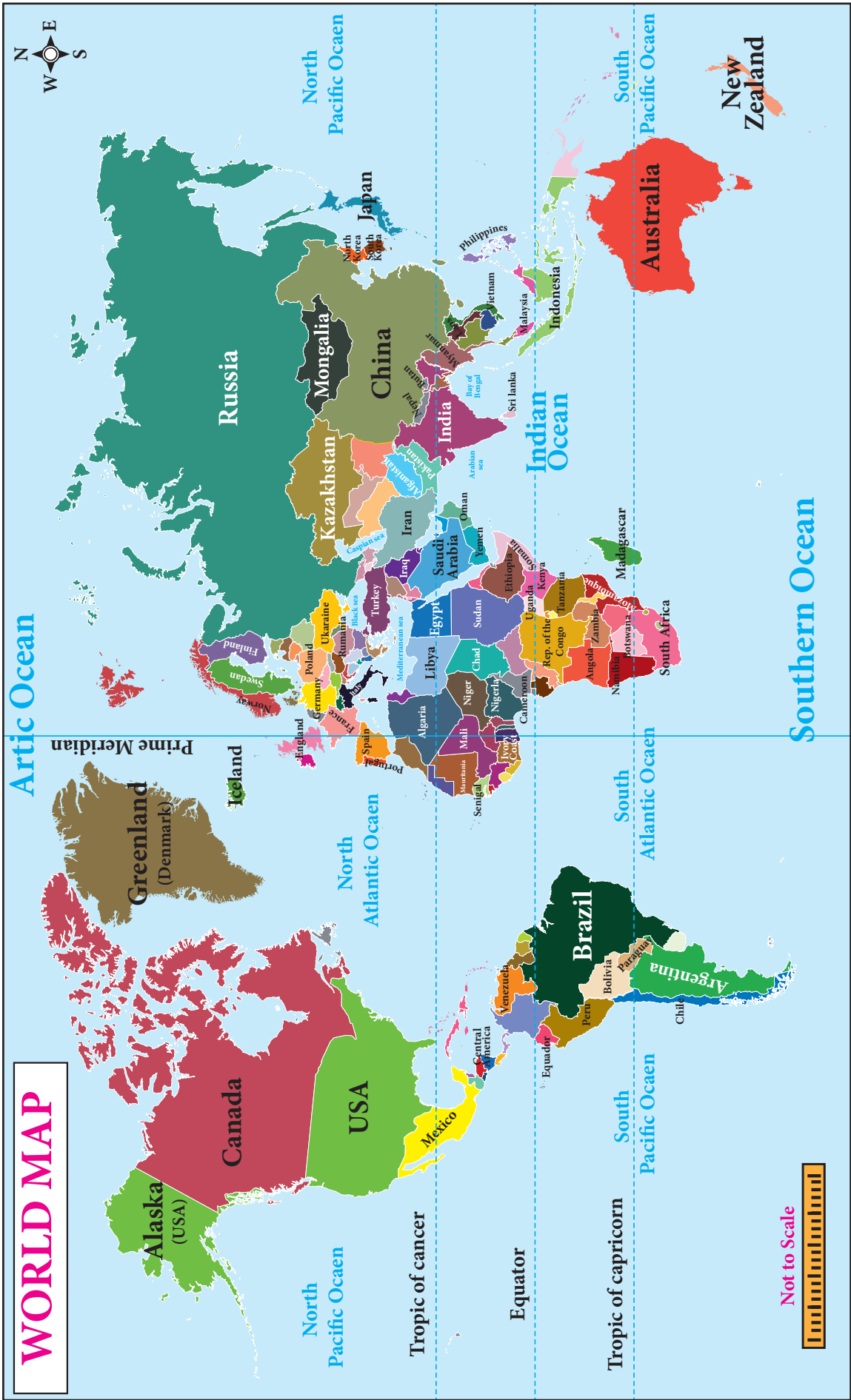
Map reading is an act of interpreting or understanding the geographic information portrayed on a map. By map reading, the reader could be able to develop a mental map of the real-world information by processing the symbolized information shown on maps.

Difference Between a Map and a Globe.

Map is different from the globe. Map gives a two dimensional Representation of certain regions or the entire world while a globe gives a three dimensional Representation of the entire world and it is a miniature form of the earth (model of the earth).



Globe





The study and practice of many facets of maps and map making is called Cartography. It can be described as the art and science of map making.

Components of a map

The basic components of a map are the 1. Title 2. Scale. 3. Legend or key. 4. Direction 5. Source 6. Map projection and locational information and 7. Conventional signs and symbols

a. Title

Title tells about the content of the map and is placed mostly at the top corner or at the bottom corner of the map

b. Scale

The scale is a ratio between the actual distance on the ground and the distance shown on the map. Generally the cartographers cannot draw maps the same size as the land. So, they reduce the size of land or features proportionally. For this purpose maps are drawn to scale. Each map has its own scale, which is indicated on the map. Often the scale is shown with a scale bar or a line and number and is placed just below the title or somewhere at the bottom of the map.

To show large areas like continents or countries small scale maps are used. Small scale maps can show only major features omitting the minor ones due to lack of space. For example physical map of the world will show us only the major physical features in the world. It represents more area of the earth but gives us less information.

To show a small area like a taluk or district large scale maps are used.

The large scale maps portray the information in detail than the small scale maps. For example physical map of India represents a small area of the earth but gives us more information. However, there is no criteria for

the classification of maps based on scale. It is only a comparative term.

ACTIVITY

Compare and find out the physical features of India which are omitted in the physical map of the world

Scales on maps can be represented in three different ways. They are:

1. Statement or Verbal scale
2. Representative Fraction (RF) or Ratio Scale
3. Graphical or Bar Scale

1. Statement or Verbal scale

In this method, the map scale is stated in words i.e., 1 cm to 1 km. It means 1 cm distance on the map corresponds to 1 km distance on the ground. Thus it is written on the map like 1 cm to 1 km, 1 inch to 1 mile etc.

Simple statement scale has the following characteristics.

- a. If the numerator is in centimeter, the denominator is either in meters or kilometers
- b. If the numerator is in inch, the denominator is in miles

2. Representative Fraction (RF) or Numerical Fraction or Ratio Scale

It shows the relationship between the map distance and the corresponding ground distance in the same units of length. R.F. is generally shown as a fraction.

For example, a fraction of 1: 50,000 shows that one unit of length on the map represents 50,000 of the same units on the ground i.e., 1 cm or 1 inch on the map represents 50,000 cm or 50,000 inches respectively on the ground.

RF is represented as $1/50,000$ or 1: 50,000

TAMIL NADU - POLITICAL



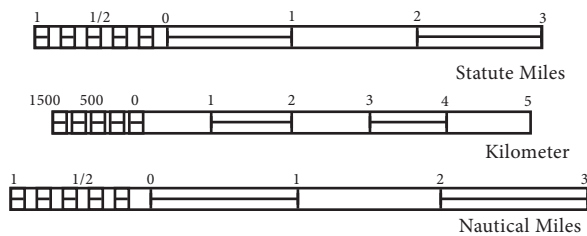
At present there are 37 districts in Tamil Nadu, including the newly created districts such as Kallakurichi, Tenkasi, Chengalpet, Ranipet and Tirupathur.



3. Graphical or Bar Scale or Linear Scale

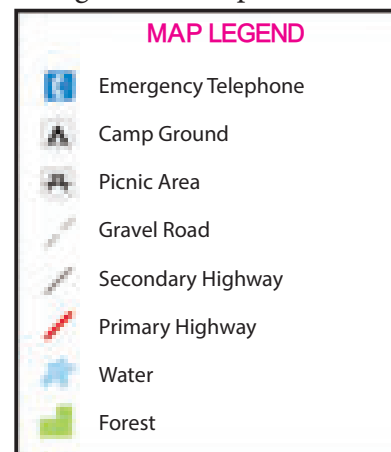
A graphic scale looks like a small ruler drawn at the bottom of the page. This line is divided and sub divided into lengths each of which represents a certain distance on the ground. In this way distances on the ground can directly be measured and read off from the map by using a piece of string or dividers. This scale has added advantage for taking copies of maps as the measurement does not change.

GRAPHIC SCALE



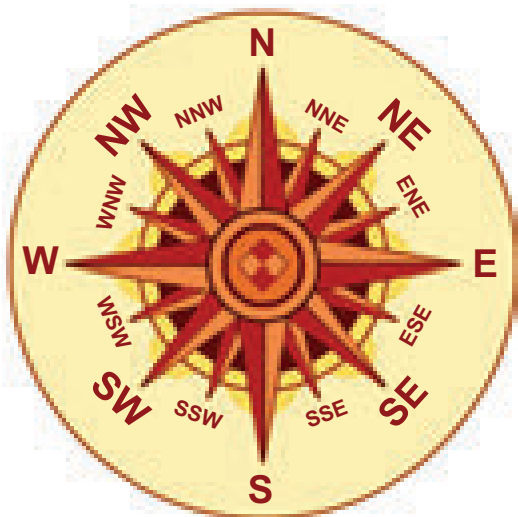
c. Legend or key

A map key or legend is included in a map to unlock it. It gives you the information needed for the map to make sense. Maps often use symbols or colours to represent things, and the map key explains what they mean. Symbols in the key might be pictures or icons that represent different things on the map.



d. Direction

A map must indicate direction. This is done by means of an arrow pointing to the north. Once the north is located, it is easy to find the rest of the directions. Directions on a map are often given with symbol called a compass rose, which always shows north. Sometimes all the Cardinal directions such as north, south, east and west are shown. In addition the Intermediate directions of north east, north west, south east and south west may be given.



e. Source

All maps must show the source of the data used in the respective maps. The source should normally be given outside the frame of the map on the bottom right. On the bottom left the name of the author, publisher, place of publication and year of publication must be given.

f. Map Projection and locational information

A map projection is a way of representing the spherical earth on a flat surface of a map. The curved surface of the earth cannot be shown accurately on a map. So, cartographers use map projections while mapping the earth surface which would help them to reduce distortions. Latitudes and longitudes marked on maps give the locational information of the area covered in the respective maps.

g. Coventional signs and symbols

Conventional signs are symbols used in maps to represent different features. The symbols are explained in the key of the map. These symbols give a lot of information



in a limited space. With the use of these symbols, maps can be drawn easily and the concept of the map can be understood well. There is an International agreement regarding the use of certain symbols. The symbols fall under this category are Called Conventional Symbols. Other category is called contextual symbols which are decided by the cartographers.

	Battlefield		Motorway Junction
	Bus Station		Railway Line
	Bridge		Public House
	Camp Site		Public Telephone
	Contour Lines		Radio or TV Mast
	Footpath		Power Line
	Lighthouse in Use		Scondary Road
	Helliport		View Point
	Information Centre		Windmill
	Main Road		Parking

Types of Maps

Maps are classified on several basis. Each basis gives a different types of maps. In this lesson, we will learn about the nature and characteristics of Relief maps, Cadastral maps and Thematic Maps

1. Relief or Physical Map

The map that shows the physical features of an area is usually called a Physical Map or a Relief Map. Their primary purpose is to show landforms like deserts, rivers, mountains, plains, plateaus etc. These maps present the overall picture of the local terrain. Different levels of altitudes and depths are also shown by these maps. Generally the sea is coloured blue and shallow waters are shown by light blue colours. For showing altitude, the following order is observed from low to high : light green, light brown, dark brown, crimson, red and finally white for the high altitudinal (ice covered) places.

2. Cadastral Map

A cadastral map refers to a map that shows the boundaries and ownership of land within a specified area. These maps are sometimes known as plans. As they are on large scale, they show full details of the boundaries and buildings. They are useful for local administration such as the city survey, taxation, management of estates and to define property in legal documents. Usually these maps are maintained by the government and they are a matter of public record.



The term 'Cadastral' is derived from the French word "Cadastre" meaning, 'Register of Territorial property'

Importance of Cadastral Maps

Cadastral surveys document the boundaries of land ownership, by the production of documents, diagrams, sketches, plans, charts and maps. They were originally used to ensure reliable facts for land valuation and taxation.

Scale of a Cadastral Map

Cadastral maps commonly range from scales of 1:500 to 1:10,000. Large scale diagrams or map shows more precise dimensions and

features (e.g. buildings, irrigation units, etc.) are often prepared by cadastral surveys.



Cadastral maps

ACTIVITY

Prepare a cadastral map to show your school building and premises with the guidance of your teacher.

3. Thematic Map

A thematic map is a map that focuses on a specific theme or subject area such as physical phenomena like temperature variation, rainfall distribution and population density in an area. Thematic maps emphasize spatial variation of human issues like population density or prevalence of diseases. This is in contrast to general reference maps, which just show natural features like landforms, lines of transportation, rivers, human settlements, political and administrative boundaries. General reference maps do not focus any specific theme.

Kinds of Thematic maps

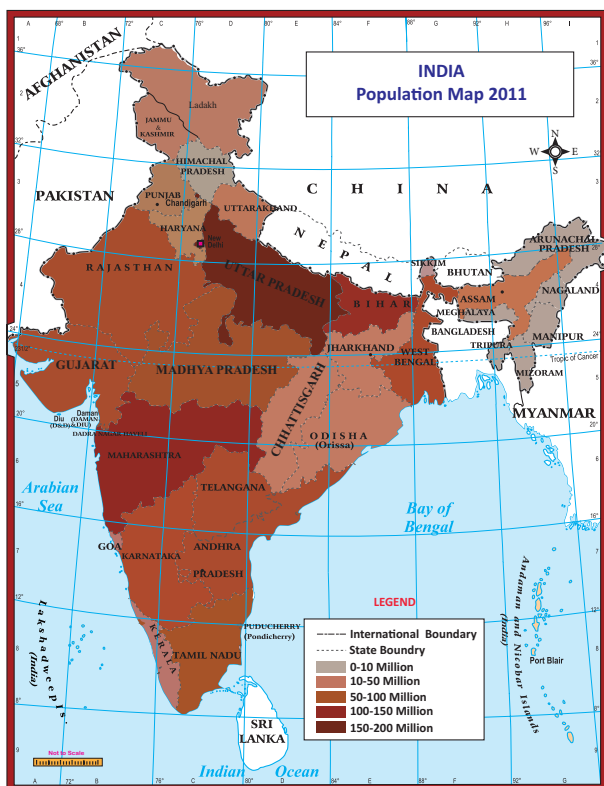
Thematic maps are classified into qualitative and quantitative thematic maps. Qualitative map is in the form of a quality and expresses the presence or absence of the object on a map,



like the kind of vegetation present or occupying a region. Map showing the distribution of soil types is also a qualitative map. Quantitative map expresses the information of numerical values, like elevation in meters, temperature in degrees Celsius etc. Choropleth map, isopleth map and dot density map are the common types of quantitative thematic maps.

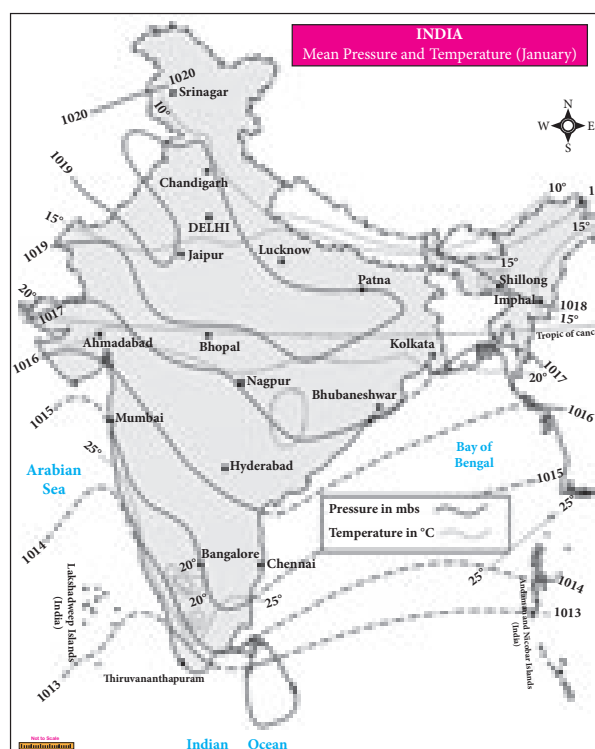
Choropleth Mapping

A choropleth map is a thematic map in which areas are shaded or patterned in proportion to the measurement of the statistical variable being displayed on the map, such as population density or per-capita income

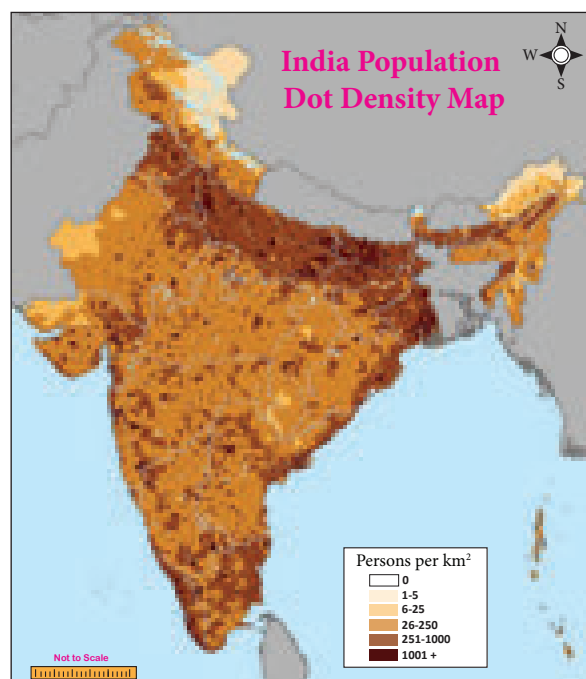


Isoline Maps

Isolines are lines drawn to link different places that share a common value. The prefix 'iso' is a Greek word meaning equal. So, an isoline is a line joining equal points. Isobars showing the distribution of atmospheric pressure and isotherms showing the distribution of temperature are the examples of isoline maps.



Dot Density Map



A dot-density map is a type of Thematic map that uses dots on the map to show the values of one or more numeric data fields. Each dot on a dot-density map represents some amount of data. In a dot-density map, areas with many dots indicate high concentration of values for the chosen field and fewer dots indicate lower concentrations.

Uses of maps

- To find the location of objects and places
- To find the transportation routes
- Maps showing strategic locations are useful for military
- Serve as tourist guide
- To find the spatial distribution of different phenomena
- Display weather conditions
- Highly helpful in learning geography
- Represent the real world on a small scale

Recap

- Map reading is an act of interpreting or understanding the geographic information portrayed on a map
- A cadastral map refers to a map that shows the boundaries and ownership of land within a specified area.
- A thematic map is a map that focuses on a specific theme or subject area.

GLOSSARY

Map	A map is a two dimensional representation of the earth as a whole or part of the earth drawn with a specific scale on a flat surface	புவிப்படம்
Cartography	Cartography is the science and art of map-making	நிலவரைபடவியல்
Map Scale	Map scale refers to the relationship (or ratio) between distance on a map and the corresponding distance on the ground.	புவிப்பட அளவை
Cadastre	'Register of Territorial property'	காணிப் புவிப்பட பதிவேடு



Evaluation

I Choose the correct answer

- The subject which deals with map making process is _____.
 a) Demography
 b) Cartography
 c) Physiography
 d) Topography
- A map that shows the physical features of an area is called _____.
 a) Cadastral map
 b) Relief map
 c) Climatic map
 d) Resource map
- Shallow water bodies are represented by _____ colour.
 a) Yellow
 b) Brown
 c) Light blue
 d) Dark blue



- The maps which are known as plans are.
 a) Cadastral maps
 b) Topographical maps
 c) Isoline maps
 d) Transport maps
- Actual distribution of population can be represented by _____.
 a) lines
 b) Shades
 c) Dots
 d) Contours

II Fill in the blanks

- The globe is the true representation of the _____.
- A way of representing the spherical earth on a flat surface is _____.
- A line that joins the points of equal elevation is _____.
- Cadastral maps are usually maintained by _____.
- _____ map is focused on a specific theme.

III Choose the option which matches the following correctly

- A. Legend - 1. 45°
 B. North East - 2. brown colour
 C. Contour Line - 3. thematic map
 D. Cadastral map - 4. key of a map
 E. Choropleth - 5. taxation
- a) 3,5,1,4,2 b) 4,1,2,5,3
 c) 2,5,1,3,4 d) 5,2,4,1,3

IV Match the statement with the reason and select the correct answer

1. **Statement :** Small scale maps can show only major features.

Reason : Due to lack of space ,it shows large areas like Continents and countries.

- a) Statement is true but reason is wrong.
 b) Statement is wrong and reason is correct.
 c) Both the statement and reasons are correct.
 d) Both the statement and reasons are wrong.
2. **Statement :** The conventional signs and symbols are the keys of map reading.
Reason : These symbols give a lots of information in a limited area.
- a) Both the statement and reasons are correct.
 b) Statement is wrong and reason is correct.
 c) Statement is true but reason is wrong.
 d) Both the statement and reasons are wrong.

V Answer the following in one or two sentences

- Define "Map scale".
- What is a physical map?
- Write a short note on map projection.
- Name the Intermediate directions.
- What are the uses of a cadastral map?

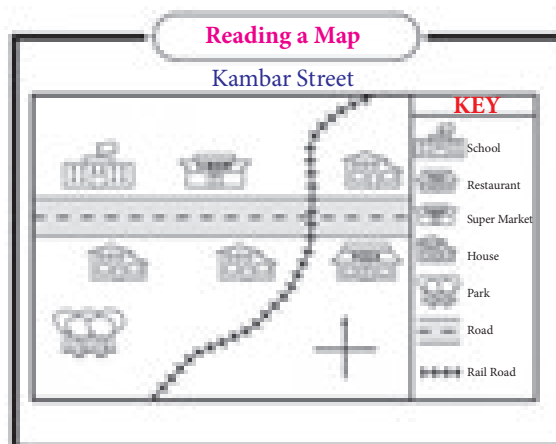
VI Distinguish between

- Relief map and thematic map.
- Large scale map and small scale map.
- Globe and Map.

VII Answer in a paragraph

- Explain the different types of scales in detail.
- Describe the Cadastral map and its importance.
- Write a paragraph about the conventional signs and symbols.

VIII Students Activity



- Underline the map title
- Show the direction of N,S,W & E on the map.
- The rail track runs from Southwest to _____.
- In which direction of the rail track, the park is located?
- Colour the school with red.
- Colour the supermarket with brown.
- Colour the restaurant with yellow.
- Colour the house east of the railroad with orange.



REFERENCE BOOKS

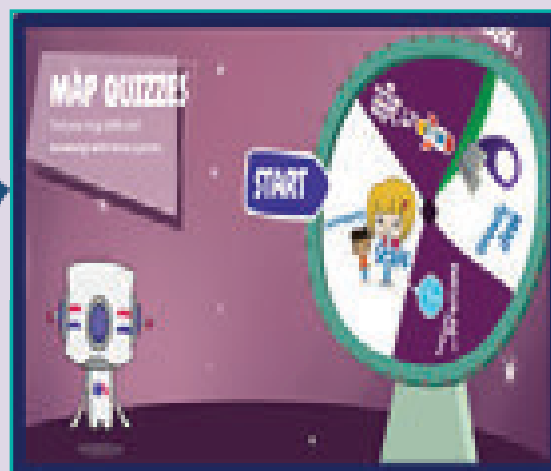
- T.P. Kanetkar and S.V.Kulkarni , *Surveying and leveling Part-I*, AVG Ptakashan – Poona-2.
- GRP Lawrence, *Cartographic methods*, Methuen and Co- Ltd. 1971.
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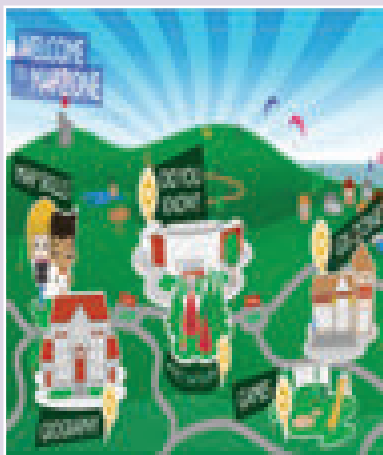
ICT CORNER

Map Reading

Through this activity you will know about map skills



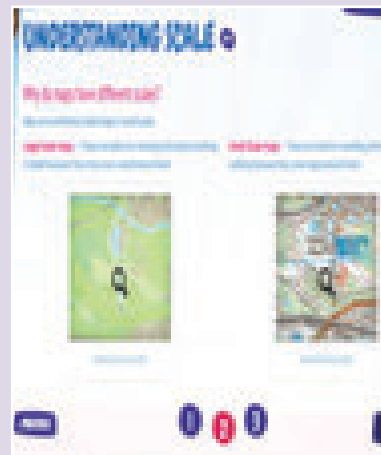
- Step – 1** Open the Browser and type the URL given below (or) Scan the QR Code.
- Step – 2** Click on “Map Skills” and select any topic (ex.Scale)
- Step – 3** Click on Next or previous button to know about mapping scale



Step – 1



Step – 2



Step – 3

Web URL: <http://www.ordnancesurvey.co.uk/mapzone>

*Pictures are indicatives only.

*If browser requires, allow Flash Player or Java Script to load the pag

