IASBABA

[ILP VAN-SET 1-BLOCK 2- GEOGRAPHY]

Integrated Learning Programme 2018 is a step towards 'Enabling a person located at the most remote destination a chance at cracking AIR 1 in UPSC/IAS'

Geography Value Add—NCERT

Please note:

- ✓ This is just a revision material—we've tried our best to help you get a thorough understanding of the concepts involved. But for you to excel, a minimum of 2-3 readings of NCERT coupled with this VAN is important over a course of time.
- ✓ Overlapping topics have been covered in one place—please go through the entire document patiently and look for it.
- ✓ Some topics like Physical Features, Climatology, Soil and others require an extra effort from our side. We will cover them elaborately in upcoming Blocks of Geography ☺

The Earth in the Solar System

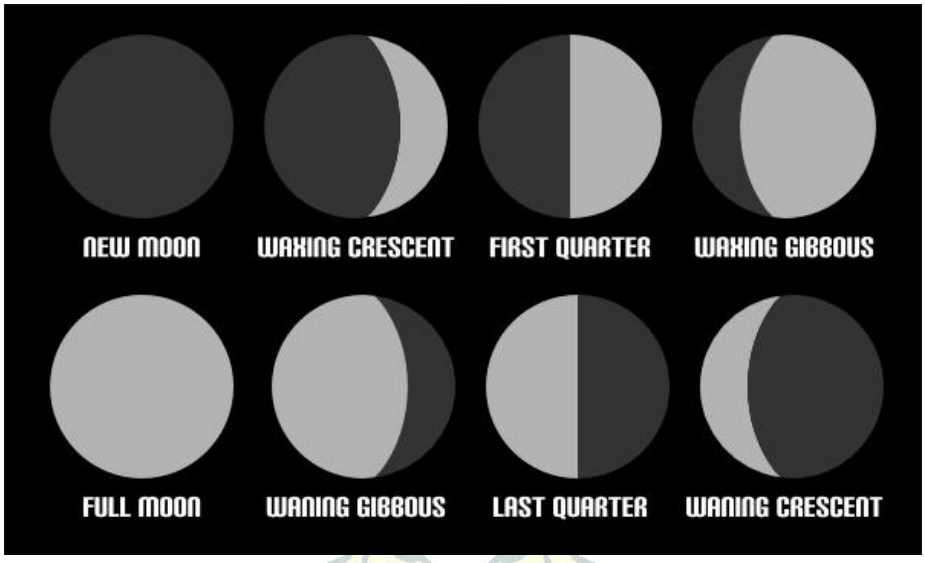
Stars

- Cosmic energy engines which produce heat, light, ultraviolet rays, x-rays, and other forms of radiation
- Composed largely of gas and plasma, a superheated state of matter composed of subatomic particles
- **Luminosity:** Brightness—a factor of how much energy they put out
- **Primary building block of stars:** Hydrogen

Moon

- The Earth's only natural satellite
- Was formed 4.6 billion years ago around some 30–50 million years after the formation of the solar system
- It is in synchronous rotation with Earth meaning the same side is always facing the Earth

- The **rise and fall of the tides** on Earth is caused by the Moon: There are two bulges in the Earth due to the gravitational pull that the Moon exerts; one on the side facing the Moon, and the other on the opposite side that faces away from the Moon, The bulges move around the oceans as the Earth rotates, causing high and low tides around the globe
- **A person would weigh much less on the Moon:** The Moon has much weaker gravity than Earth, due to its smaller mass, so you would weigh about one sixth of your weight on Earth.
- **The Moon has quakes**: These are caused by the gravitational pull of the Earth. Lunar astronauts used seismographs on their visits to the Moon, and found that small moonquakes occurred several kilometres beneath the surface, causing ruptures and cracks. Scientists think the Moon has a molten core, just like Earth.



Do you know?

The first unmanned mission to the Moon was in 1959 by the Soviet Lunar Program with the first manned landing being Apollo 11 in 1969.

Which spacecraft took the first picture of the Moon?- **Ranger 7**

This was in news recently

Click Here

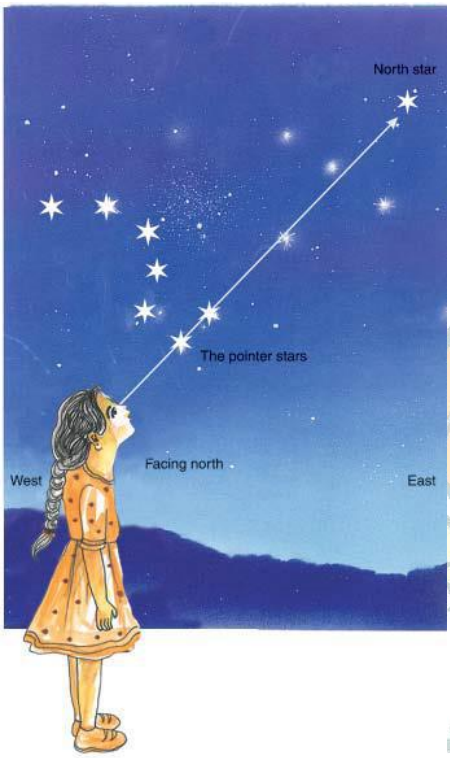
Q. Why can't we see the moon and all those bright tiny objects during day time?

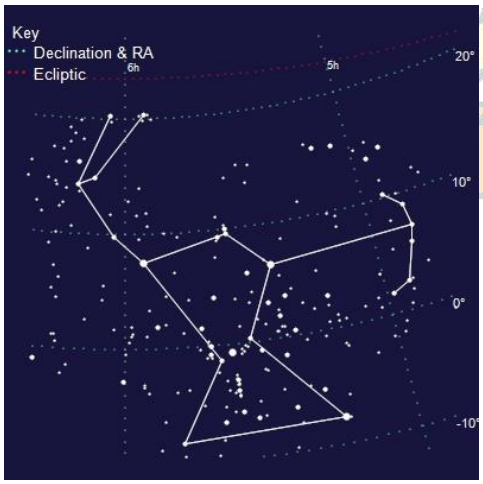
It is because the very bright light of the sun does not allow us to see all these bright objects of the night sky

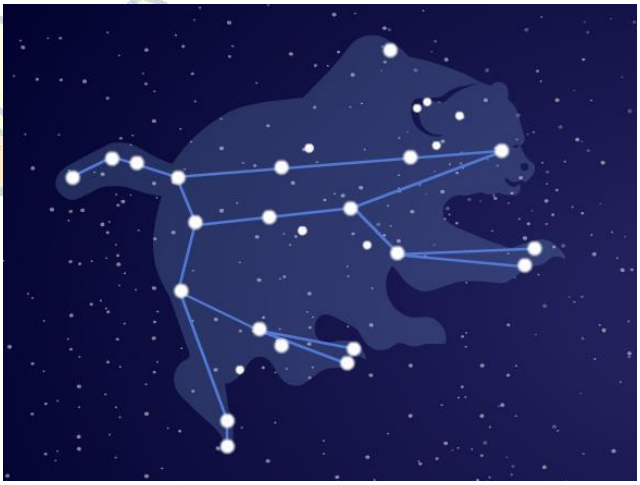
Constellation

A group of stars forming a recognizable pattern that is traditionally named after its apparent form or identified with a mythological figure

Pole Star/North Star: Indicates the north direction (Locate the position of the Pole Star with the help of the Saptarishi)







Solar System

Planets

Planets do not have their own heat and light and are lit by the light of the stars

A planet is a celestial body that

- is in orbit around the Sun
- has sufficient mass for its self-gravity to overcome rigid body forces so that it assumes a hydrostatic equilibrium (nearly round) shape, and
- Has cleared the neighbourhood around its orbit.

Planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

Pluto now falls into the dwarf planet category on account of its size and the fact that it resides within a zone of other similarly-sized objects known as the transneptunian region.

Planets with rings: Jupiter, Saturn and Uranus have rings around them→belts of small debris

Smallest planet: Mercury

Largest planet: Jupiter

Inner planets: Mercury, Venus, Earth and Mars

Outer planets: Jupiter, Saturn, Uranus and Neptune

Planet Orbit: An orbit is the path an object takes in space as it revolves around another object. While a planet travels in one direction, it is also affected by the Sun's gravity causing it to take a curved route that eventually brings it back to its starting point. This complete revolution equates to a single orbit.

THINK!

- Exoplanets
- Kuiper belt

Milky Way Galaxy

- Our solar system is a part of this galaxy
- **Ancient India:** Was imagined to be a river of light flowing in the sky and thus, named Akash Ganga.

Sun

- The centre of the solar system and is made up of extremely hot gases; is the ultimate source of heat and light for the solar system
- Provides the pulling force that binds the solar system
- Contains more than 99.8% of the total mass of the Solar System (Jupiter contains most of the rest)
- The Sun is, at present, about 70% hydrogen and 28% helium by mass everything else ("metals") amounts to less than 2%. This changes slowly over time as the Sun converts hydrogen to helium in its core.
- Light travels at the speed of about 300,000 km per second—the light of the sun takes about eight minutes to reach the earth.

Do you know?

The first total solar eclipse to sweep across the entire US since 1918 is happening on 21 August 2017. The eclipse center line will enter the US crossing Oregon between Lincoln City and Newport and will exit three hours later in South Carolina between Georgetown and Charleston.

Click Here

THINK!

- Solar Eclipse
- Do you remember any Indian Mission w.r.t SUN? Find it out!

Earth

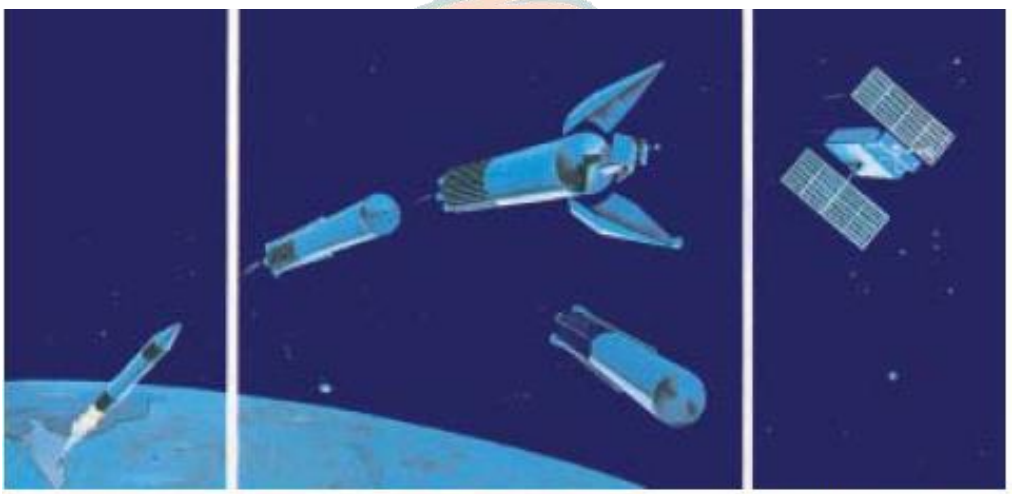
- Third nearest planet to the Sun
- Fifth largest planet

- **Geoid shaped:** It is slightly flattened at the poles and that is why, its shape is described as a Geoid (an earth-like shape)
- **Blue planet:** its two-thirds surface is covered by water

Satellite

Natural Satellite: A celestial body that moves around the planets in the same way as the planets move around the sun.

Human-made Satellite: An artificial body designed by scientists to gather information about the universe or for communication. It is carried by a rocket and placed in the orbit around the earth.



Rocket launch *Rocket falls back to the Earth* *Satellite enters orbit*

Asteroids

- Numerous tiny bodies moving around the sun
- Found between the orbits of Mars and Jupiter
- Largest asteroid: **Ceres**

Meteorites

- Small pieces of rocks moving around the sun
- Some meteors while entering the Earth's surface with a flash of light signifying the air getting heated up due to friction
- Sometimes these meteors without being completely burnt, falls on the earth and creates a hollow.

Globe: Latitudes and Longitudes

Earth is slightly flattened at the North and the South Poles and bulge in the middle—lending it a geoid shape.

Globe:

- A true model (miniature form) of the earth
- Not fixed
- Can be rotated the same way as a top spin or a potter's wheel is rotated
- Countries, continents and oceans are shown in their correct size

Axis: A needle is fixed through the globe in a tilted manner (called its axis). Two points on the globe through which the needle passes are two poles – North Pole and South Pole

Equator: An imaginary line running on the globe dividing the Earth into two equal parts

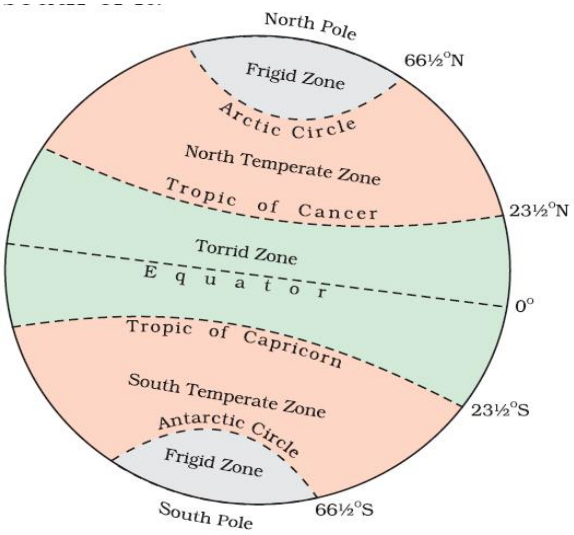
- Represents the zero degree latitude
- Distance from the equator to either of the poles is one-fourth of a circle round the earth, it will measure ¼th of 360 degrees, i.e. 90°--
  - 90 degrees north latitude marks the North Pole
  - 90 degrees south latitude marks the South Pole

Parallels of latitude: All parallel circles from the equator up to the poles

All parallels north of the equator are called 'north latitudes' and all parallels south of the equator are called 'south latitudes.'

Latitudes are measured in: Degrees

How to determine the latitude of your place: By measuring the angle of the Pole Star from your place



Parallels of Latitude

1. Tropic of Cancer (23½° N) in the Northern Hemisphere
2. Tropic of Capricorn (23½° S) in the Southern Hemisphere
3. Arctic Circle at 66½° north of the equator
4. Antarctic Circle at 66½° south of the equator

Heat Zones of Earth

Torrid Zone

- Also known as the Tropics; Receives the maximum heat
- Bounded on the north by the Tropic of Cancer and on the south by the Tropic of Capricorn; these latitudes mark the northern and southern extremes of regions in which the sun seasonally passes **directly overhead**.
- The mid-day sun is exactly overhead at least once a year on all latitudes in between the Tropic of Cancer and the Tropic of Capricorn

Temperate Zones

- The Sun is never directly overhead
- Climate is mild, generally ranging from warm to cool
- Occurrence of four annual seasons, spring, summer, autumn and winter

Frigid Zones

- **Very cold:** Areas lying between the Arctic Circle and the North Pole in the Northern Hemisphere and the Antarctic Circle and the South Pole in the Southern Hemisphere
- Slanting rays

Longitudes

Used to find out how far east or west these places are from a given line of reference running from the North Pole to the South Pole. These lines of references are called the **meridians of longitude**

Distances between them are measured in **'degrees of longitude'**; each degree is further divided into minutes, and minutes into seconds

They are semi-circles and **the distance between them decreases steadily pole-wards until it becomes zero at the poles,** where all the meridians meet.

0° longitude:

Unlike parallels of latitude, all meridians are of equal length and therefore, it was difficult to number the meridians→ Decision to begin from the meridian which passed through Greenwich, where the British Royal Observatory is located→Prime Meridian

- Value is 0° longitude and from it we count 180° eastward as well as 180° westward
- Divides the earth into two equal halves, the Eastern Hemisphere and the Western Hemisphere
- **Note:** 180° East and 180° West meridians are on the same line

Longitude & Time

Earth: Divided into twenty-four time zones of one hour each

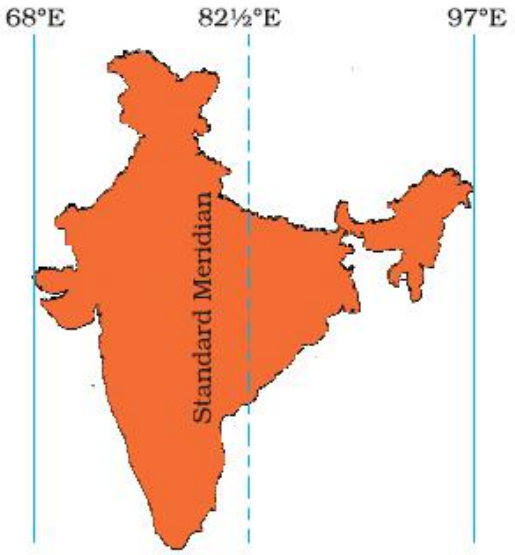
Each zone: Covers 15° of longitude

Best means to measure time: By observing the movement of the earth, the moon and the planets

- Regularly rises and sets every day
- Local time can be reckoned by the shadow cast by the sun, which is the shortest at noon and longest at sunrise and sunset.
- When the Prime Meridian of Greenwich has the sun at the highest point in the sky, all the places along this meridian will have mid-day or noon.
- As the earth rotates from west to east, those places east of Greenwich will be ahead of Greenwich Time and those to the west will be behind it
- **How to calculate the rate of difference:**
  - The earth rotates 360° in about 24 hours, which means 15° an hour or 1° in four minutes. Thus, when it is 12 noon at Greenwich, the time at 15° east of Greenwich

will be 15 × 4 = 60 minutes, i.e., 1 hour ahead of Greenwich Time, which means 1 p.m. But at 15° west of Greenwich, the time will be behind Greenwich time by one hour, i.e., it will be 11.00 a.m.

- Similarly, at 180°, it will be midnight when it is 12 noon at Greenwich.
- At any place a watch can be adjusted to read 12 o'clock when the sun is at the highest point in the sky, i.e., when it is mid-day. The time shown by such a watch will give the local time for that place.



Russia: Eleven Time Zones

Motions of the Earth

Earth has two types of motions—

Rotation: Movement of the earth on its axis

Revolution: Movement of the earth around the sun in a fixed path or orbit; It takes 365¼ days (one year) to revolve around the sun

Leap Year:

- Six hours saved every year are added to make one day (24 hours) over a span of four years
- This surplus day is added to the month of February
- Thus, every fourth year, February is of 29 days instead of 28 days and such a year with 366 days is known as a Leap Year.

Year: Divided into summer, winter, spring and autumn seasons; seasons change due to the change in the position of the earth around the sun

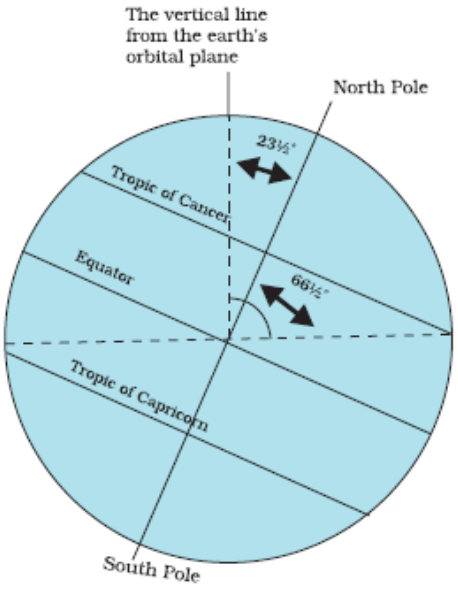
Orbital plane: Axis of the earth which is an imaginary line makes an angle of 66½° with its orbital plane. The plane formed by the orbit is known as the **orbital plane.**

Elliptical orbit: Earth is going around the sun

The earth is inclined in the same direction

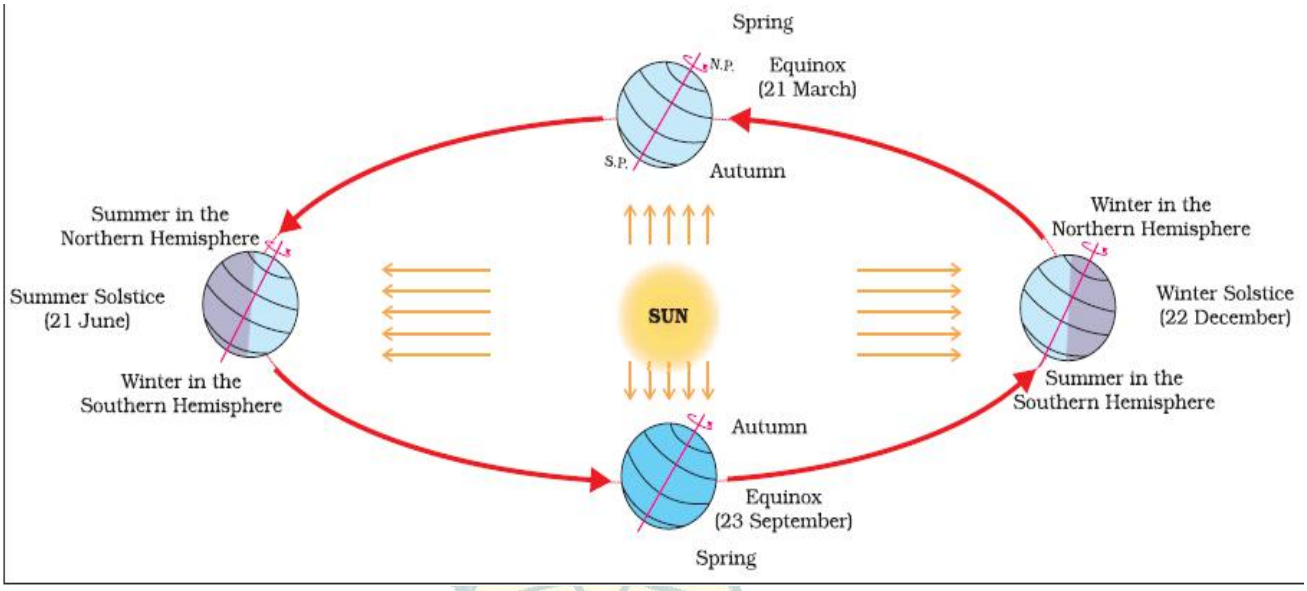
Circle of Illumination: The circle that divides the day from night on the globe

Earthday: The rotation period of the Earth (24 hours)



What would happen if the earth did not rotate?

The portion of the earth facing the sun would always experience day, thus bringing continuous warmth to the region. The other half would remain in darkness and be freezing cold all the time.



21st June/ Summer Solstice

- The Northern Hemisphere is tilted towards the sun and the rays of the sun fall directly on the Tropic of Cancer→ areas receive more heat
- Areas near the poles receive less heat as the rays of the sun are slanting
- North Pole is inclined towards the sun and the places beyond the Arctic Circle experience continuous daylight for about six months.
- Since a large portion of the Northern Hemisphere is getting light from the sun, it is summer in the regions north of the equator. The longest day and the shortest night at these places occur on 21st June.
- Southern Hemisphere: All these conditions are reversed (winter season- longer nights)

22nd December/ Winter Solstice

- The Tropic of Capricorn receives direct rays of the sun as the South Pole tilts towards it
- As the sun's rays fall vertically at the Tropic of Capricorn (23½° S), a larger portion of the Southern Hemisphere gets light. Therefore, it is summer in the Southern Hemisphere with longer days and shorter nights.
- The reverse happens in the Northern Hemisphere

Equinox

On 21st March and September 23rd, direct rays of the sun fall on the equator → neither of the poles is tilted towards the sun; so, the whole earth experiences equal days and equal nights

23rd September: Autumn season in the Northern Hemisphere and spring season in the Southern Hemisphere

21st March: Spring in the Northern Hemisphere and autumn in the Southern Hemisphere

Maps

Globe: When we want to study the earth as a whole

Map: When we want to study only a part of the earth; is a representation or a drawing of the earth's surface or a part of it drawn on a flat surface according to a scale

PHYSICAL MAPS	POLITICAL MAPS	THEMATIC MAPS
Maps showing natural features of the earth such as mountains, plateaus, plains, rivers, oceans etc. are called physical or relief maps	Maps showing cities, towns and villages, and different countries and states of the world with their boundaries are called political maps	Some maps focus on specific information; such as road maps, rainfall maps, maps showing distribution of forests, industries etc. are known as thematic maps

Components of Maps – Distance, Direction and Symbol

Scale: The ratio between the actual distance on the ground and the distance shown on the map

- **Small scale map:** To show large areas like continents or countries
- **Large scale map:** To show a small area like a village or town

Sketch: A drawing mainly based on memory and spot observation and not to scale

Plan: A drawing of a small area on a large scale

Major Domains of the Earth

Revise—

Lithosphere	The solid portion of the earth on which we live— • Comprises the rocks of the earth's crust and the thin layers of soil that contain nutrient elements which sustain organisms • Continents- large landmasses • Ocean basins- the huge water bodies
ATMOSPHERE	The gaseous layers that surround the earth— where oxygen, nitrogen, carbon dioxide and other gases are found and interact • Provides the air we breathe + Protects us from the harmful effects of sun's rays • The **changes in the atmosphere produce changes in the weather and climate** • Extends up to a height of about 1,600 kilometres • ***Gravitational force of the earth holds the atmosphere around it*** • Divided into five layers based on composition, temperature and other properties— troposphere, the stratosphere, the mesosphere, the thermosphere and the exosphere. • Composed mainly of— ➢ Nitrogen and oxygen, which make up about 99 per cent of clean, dry air. ➢ Nitrogen (helps in the growth of living organisms) 78 per cent, oxygen 21 per cent and other gases like carbon dioxide, argon and others comprise 1 per cent by volume ➢ Carbon dioxide: Present in minute amount but is important as it absorbs heat radiated by the earth, thereby keeping the planet warm and also essential for the growth of plants. • Density of the atmosphere: Maximum at the sea level and decreases rapidly as we go up • Wind: Moves from high pressure to low pressure

H Y D R O S P H E R E	Water-covered regions of Earth; comprises water in all its forms, that is, ice, water and water vapour • Earth: A blue planet • More than 97% of the Earth's water is found in the oceans and is too salty for human use • Oceans— Always mobile: the waves, the tides and the ocean currents **Pacific Ocean:** ➢ Largest- spread over one-third of the earth ➢ Deepest part of the earth: Mariana Trench ➢ Circular in shape ➢ Countries: Asia, Australia, North and South Americas **Atlantic Ocean**: ➢ Second largest Ocean; S-shaped ➢ North and South Americas on the eastern side ➢ Europe and Africa on the western side ➢ Coastline: highly indented; provides ideal location for natural harbours and ports ➢ The busiest Ocean **Indian Ocean:** ➢ Only ocean named after a country; triangular shaped ➢ Bound by Asia in the north, in the west by Africa and in the east by Australia **Arctic Ocean:** ➢ Located within the Arctic Circle and surrounds the North Pole Connected with the Pacific Ocean by a narrow stretch of shallow water known as **Berring strait** (Refer Map) ➢ Bound by northern coasts of North America and Eurasia

Biosphere	The narrow zone where we find land, water and air together, which contains all forms of life **Division:** Plant kingdom and the animal kingdom The three domains of the earth interact with each other and affect each other in some way or the other→Need to limit the use of resources of the earth to maintain the balance of nature between the domains of the lithosphere, the atmosphere and the hydrosphere

Strait: A narrow passage of water connecting two seas or two other large areas of water

Isthmus: A narrow strip of land with sea on either side, forming a link between two larger areas of land

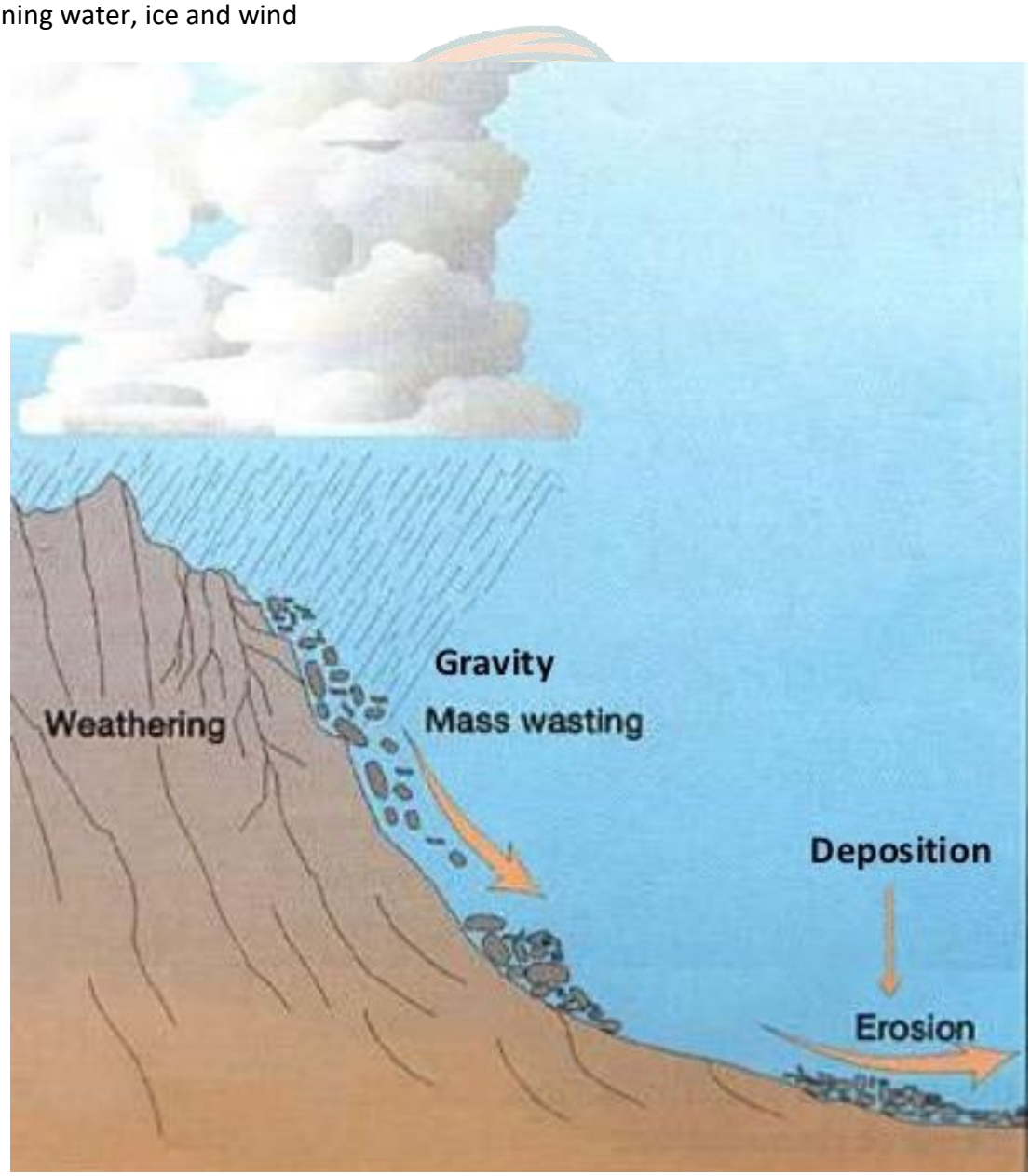
Major Landforms of the Earth

Our Earth possesses an infinite variety of landforms and we are going to discuss them for a better understanding—

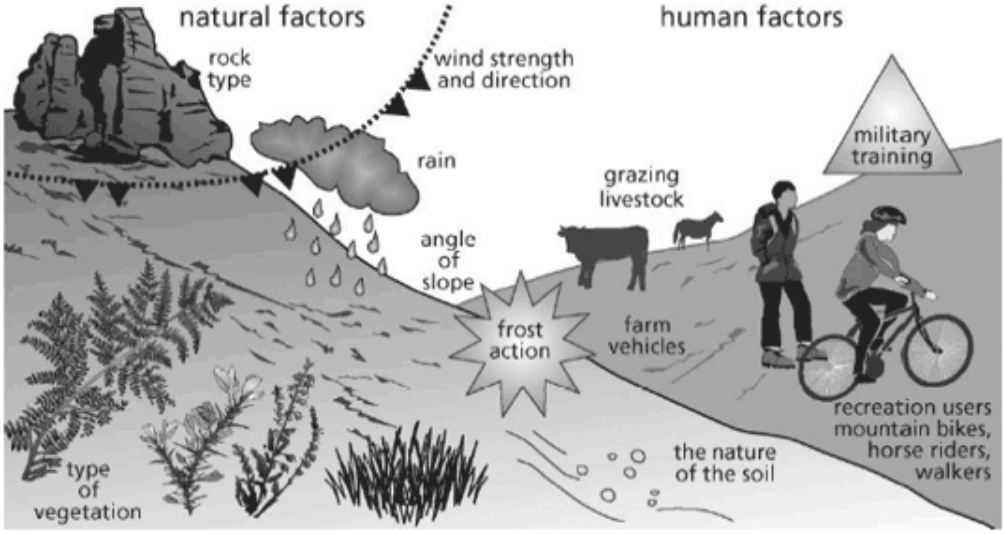
Existence of Landforms

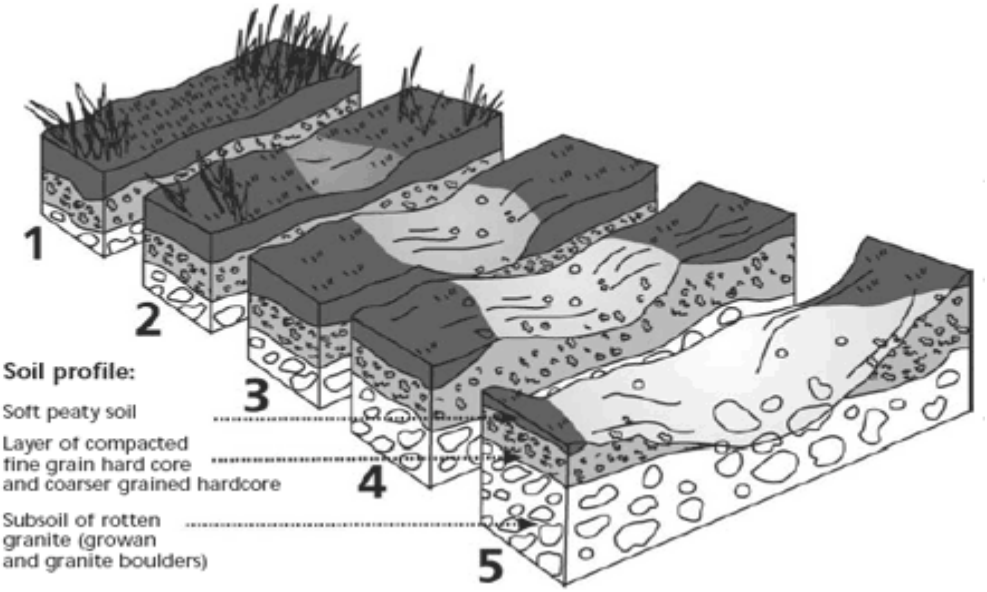
Internal process: Continuous movement that is taking place within the surface of Earth—leads to the upliftment and sinking of the earth's surface at several places

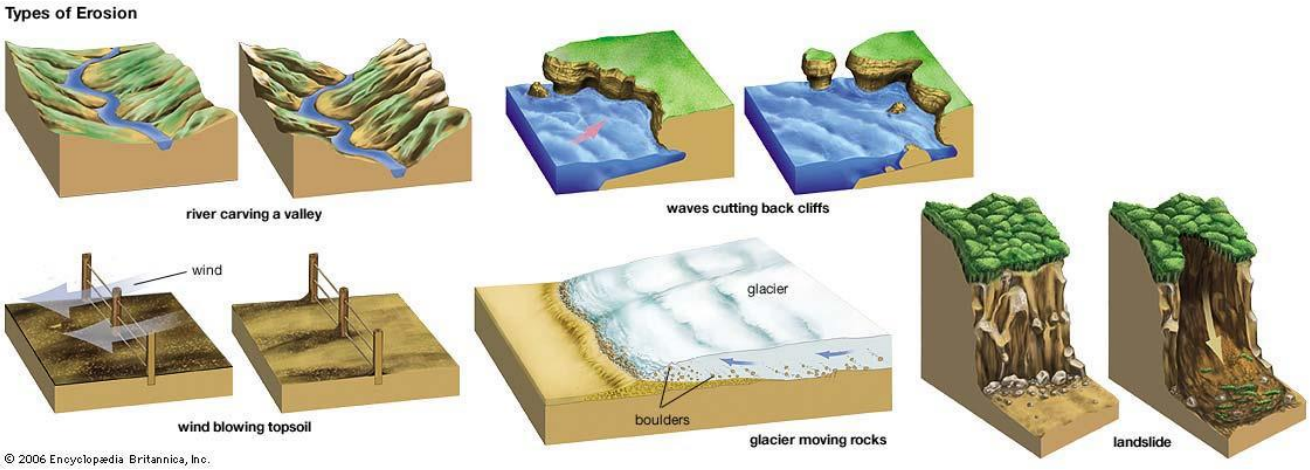
External process: The continuous wearing down and rebuilding of the land surface by running water, ice and wind

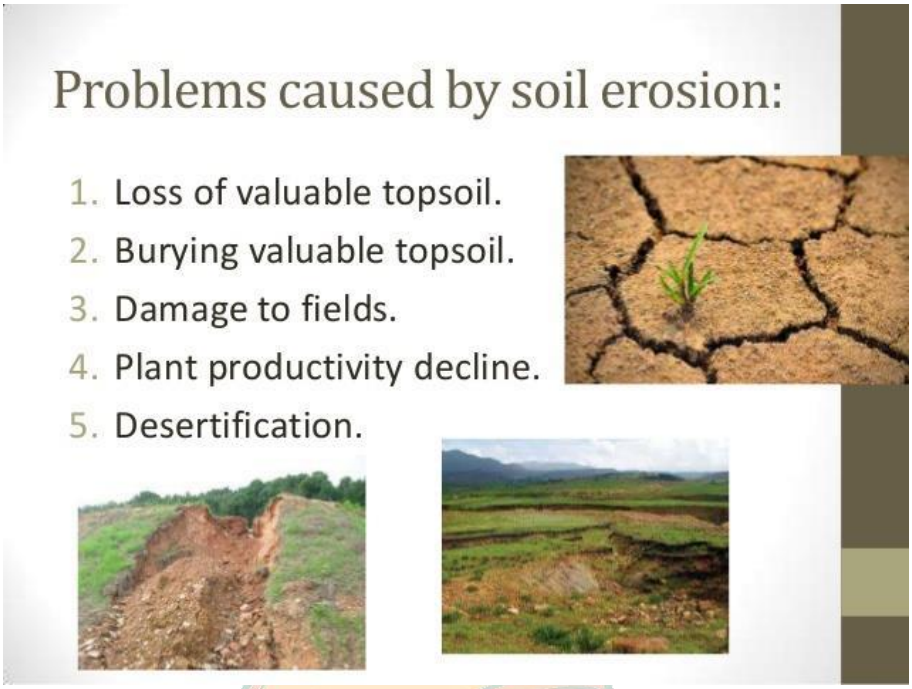


- **Erosion:** The wearing away of the earth's surface







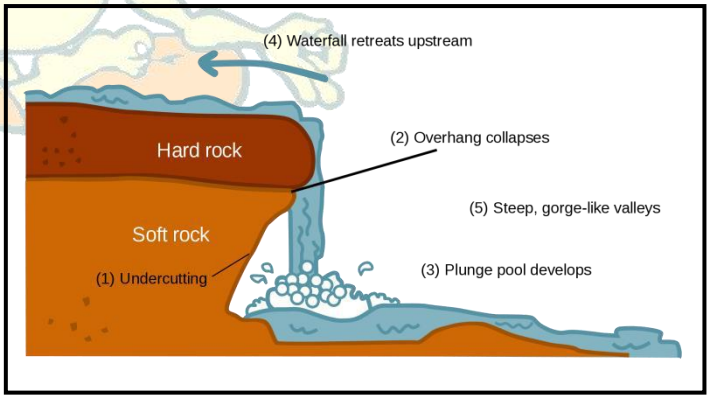


- **Deposition:** The surface is being lowered by the process of erosion and rebuilt by the process of deposition

The eroded material is carried away or transported by water, wind, etc. and eventually deposited. This **process of erosion and deposition create different landforms** on the surface of the earth.

For instance, let us consider different landforms as the results of work of rivers, sea waves, ice etc –

1. **<u>Landform made by running water:</u>**



<u>At upper course</u> (imagine a mountain/hill), the running water in the river erodes the landscape.

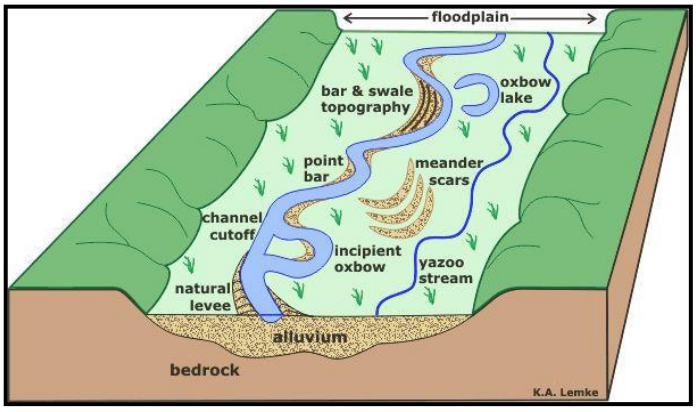
- When the river tumbles at steep angle over very hard rocks or down a steep valley side it forms a **waterfall.**

Do you know?

- Highest Waterfall - **Angel Falls** of **Venezuela**
- **Niagara Falls** - Canada and U.S Border

- **Victoria Fall** - Border of Zambia and Zimbabwe

As the river enters the plain (**middle course**) it twists and turns forming large bends known as **meanders**.



Meanders:

- A meander, in general, is a **bend in a sinuous watercourse or river**.
- Meanders are the **result of both erosional and depositional processes**. A meander forms when moving water in a stream erodes the outer banks and widens its valley, and the inner part of the river has less energy and deposits silt.
- They are typical of the **middle and lower course of a river**.

As the river flows in **lower course**, oxbow lakes, floodplains, levees, distributaries and deltas are formed.

Oxbow lake:

- An oxbow lake is a **U-shaped body of water** that forms when a wide meander from the main stem of a **river is cut off**, creating a free-standing body of water.
- This landform is so named for its distinctive curved shape, resembling the bow pin of an oxbow.

Floodplains and levees:

- At times the river overflows its banks. This leads to the flooding of the neighbouring areas.
- As it floods, it deposits layers of fine soil and other material called sediments along its banks. This leads to the formation of a flat fertile **floodplain**.
- The raised banks are called **levees.**

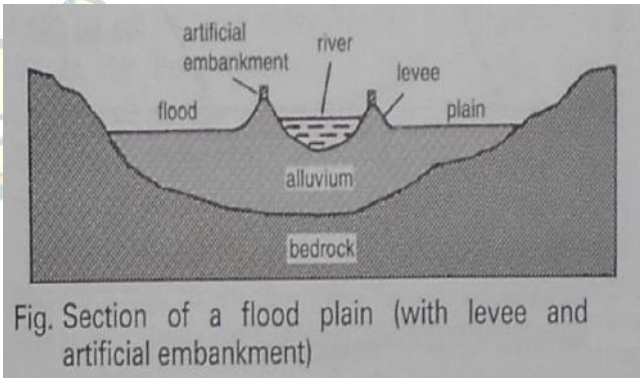
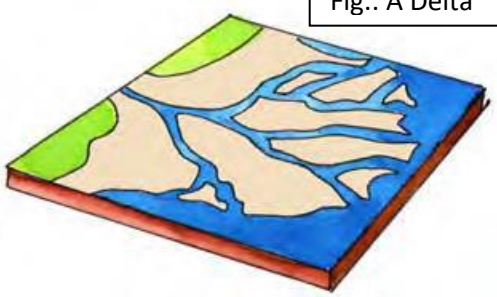


Fig. Section of a flood plain (with levee and artificial embankment)

Distributaries and deltas:

- As the river approaches the sea, the speed of the flowing water decreases and the river begins to break up into a number of streams called **distributaries**.

Fig.: A Delta



- The river becomes so slow that it begins to deposit its load. Each distributary forms its own mouth.
- The collection of sediments from all the mouths forms a **delta.**

2. <u>Coastal Landforms: Work of sea waves</u>

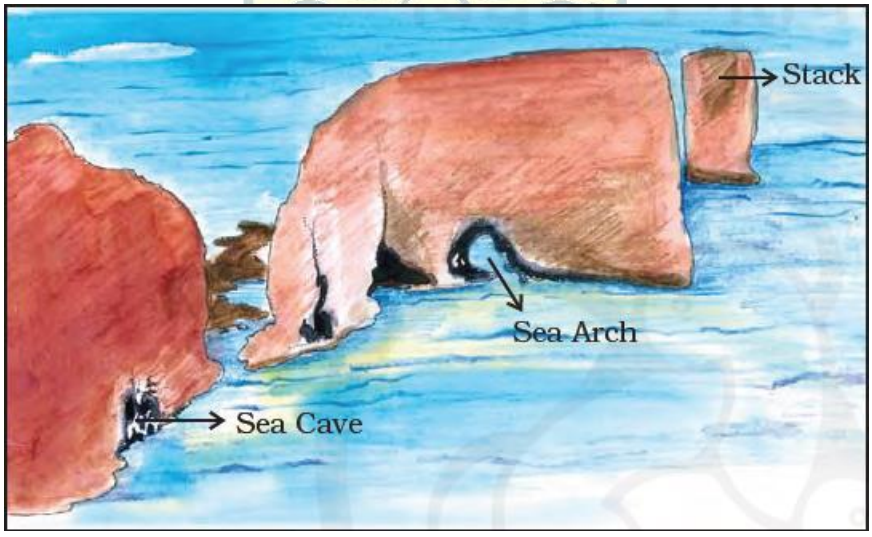
- The erosion and deposition of the sea waves gives rise to coastal landforms.
- The sea waves deposit sediments along the shores forming beaches.

Sea Caves: When sea waves continuously strike at the rocks, crack develops. Over time they become larger and wider. Thus, hollow like caves are formed on the rocks. They are called sea caves.

Sea Arch: When sea waves further strike sea caves, over time their cavities become bigger and bigger and finally only the roof of the caves remain, thus forming sea arches. (See fig below)

Stacks: Further, erosion breaks the roof and only walls are left. These wall-like features are called stacks.

Cliff: The steep rocky coast rising almost vertically above sea water is called sea cliff.



3. <u>Landforms of Glaciation: Work of ice</u>

- Glaciers are “rivers” of ice which too erode the landscape by bulldozing soil and stones to expose the solid rock below.
- When glaciers moves below the mountain, it carries along rocks, sand and stones and these materials carve out deep hollows.
- As the ice melts, these hollows gets filled up with water and become **beautiful lakes (called tarn or corrie lakes)** in the mountains.
- The material carried by the glacier such as rocks big and small, sand and silt gets deposited. These deposits form **glacial moraines**.

4. <u>Desert Landforms: Work of wind</u>

- An active agent of erosion and deposition in the deserts is wind.

Mushroom rocks: Rocks in the shape of mushroom - This is because winds erode the lower section of the rock more than the upper part. Therefore, such rocks have narrower base and a wider top.

Sand dunes: When the wind blows, it lifts and transports sand from one place to another. When it stops blowing the sand falls and gets deposited in low **hill – like structures**. These are called sand dunes.

Loess: When the grains of sand are very fine and light, the wind can carry it over very long distances. When such sand is deposited in large areas, it is called loess.

Our Country – India

At a glance

Area of India: About 3.28 million sq. km

North-south extent: From Kashmir to Kanyakumari (3,200 km)

East-west extent: From Arunachal Pradesh to Kuchchh (2,900 km)

Population: Second most populous country of the world after China

Location

Hemisphere: Northern hemisphere

Passage of: The Tropic of Cancer (23°30'N) passes almost halfway through the country

South to north: India extends between 8°4'N and 37°6'N latitudes

West to east: India extends between 68°7'E and 97°25'E longitudes

Timing:

- Due to great longitudinal extent of about 29°, there could be wide differences in local time of places located at two extreme points of India and the difference between these two points would be of about two hours.
- Local time changes by four minutes for every one degree of longitude—The sun rises two hours earlier in the east (Arunachal Pradesh) than in the west (Gujarat)
- Thus, the local time of longitude of 82°30'E has been taken as the Indian Standard Time—also termed as the Standard Meridian of India

India’s Neighbour

India Political

India Physical

Himalayan mountains: Divided into three main parallel ranges

Northernmost: The Great Himalaya or Himadri→ Location of world's highest peaks

Middle Himalaya or Himachal lies to the south of Himadri (popular hill stations)

Southernmost: The Shiwalik

The Northern Indian plains lie to the south of the Himalayas

— Generally level and flat and are formed by the alluvial deposits laid down by the rivers– the Indus, the Ganga, the Brahmaputra and their tributaries→Provide fertile land for cultivation→High concentration of population in these plains

Western part of India lies in the Great Indian desert—Dry, hot and sandy stretch of land with very little vegetation

Peninsular plateau: South of Northern plains

— Triangular in shape—highly uneven relief
— Region with numerous hill ranges and valleys
— Aravali hills, one of the oldest ranges of the world, border it on the north-west side
— **Other ranges:** Vindhyas and the Satpuras

West-flowing Rivers: Narmada and Tapi—drain into the Arabian Sea

East-flowing rivers: Mahanadi, Godavari, Krishna and Kaveri drain into the Bay of Bengal—formed fertile deltas at their mouth

Sunderban delta: World's largest delta

- Formed where the Ganga and Brahmaputra flow into the Bay of Bengal
- Delta is triangular in shape—an area of land formed at the mouth of the river (Where rivers enter into the sea, that point is called the mouth of the river)

— **West:** The Western Ghats or Sahyadris (almost continuous)
— **East:** Eastern Ghats (broken and uneven)
— Rich in minerals like coal and iron-ore.

To the West of the Western Ghats and the East of Eastern Ghats: Coastal plains

— **Western coastal plains:** Very narrow
— **Eastern Coastal plains:** Much broader

Indian Islands

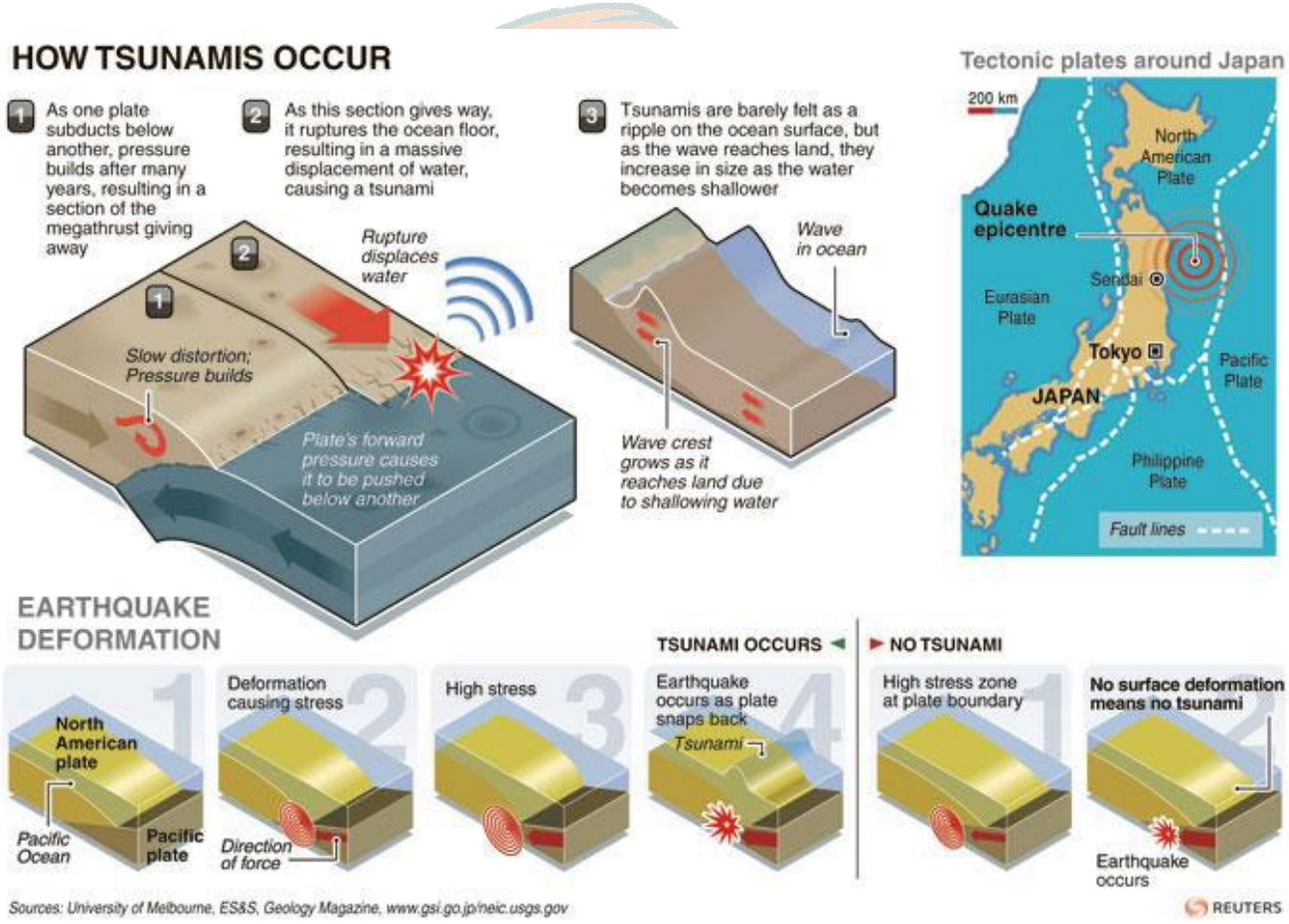
Lakshadweep Islands—Arabian Sea- coral islands located off the coast of Kerala

Andaman and the Nicobar Islands lie to the southeast of the Indian mainland in the Bay of Bengal (affected by tsunami)

Corals— *Skeletons of tiny marine animals called Polyps.*

When the living polyps die, their skeletons are left and other poplyps grow on top of the hard skeleton which grows higher and higher, thus forming the coral islands

Tsunami is a huge sea wave generated due to an earthquake on the sea floor.



India: Climate, Vegetation and Wildlife

Weather:

Day to day changes in the atmosphere— changes in temperature, rainfall and sunshine etc.

Major seasons recognised in India are:

Cold Weather Season (Winter) December to February

- ✓ Cool, dry winds blow from north to the south
- ✓ Sun rays do not fall directly in the region→temperatures are quite low in northern India

Hot Weather Season (Summer) March to May

- ✓ Sun rays more or less directly fall in this region
- ✓ High Temperature
- ✓ Hot and dry winds called loo, blow during the day

Southwest Monsoon Season (Rainy) June to September

- ✓ Marked by the onset and advance of monsoon
- ✓ Winds blow from Arabian Sea and Bay of Bengal towards the land→Carry moisture
- ✓ When these winds strike the mountain barriers→Rainfall

Season of Retreating Monsoon (Autumn) October and November

- ✓ Winds move back from the mainland to the Bay of Bengal—the season of the retreating monsoons
- ✓ Southern parts of India, particularly Tamil Nadu and Andhra Pradesh receive rainfall in this season

Climate

The average weather condition, which have been measured over many years

Climate of India: Monsoon type

- ✓ India's location in the tropical region: Most of the rain is brought by monsoon winds.
- ✓ Agriculture in India is dependent on rains—adequate rain and a bountiful crop.

Factors leading to the climate of a place

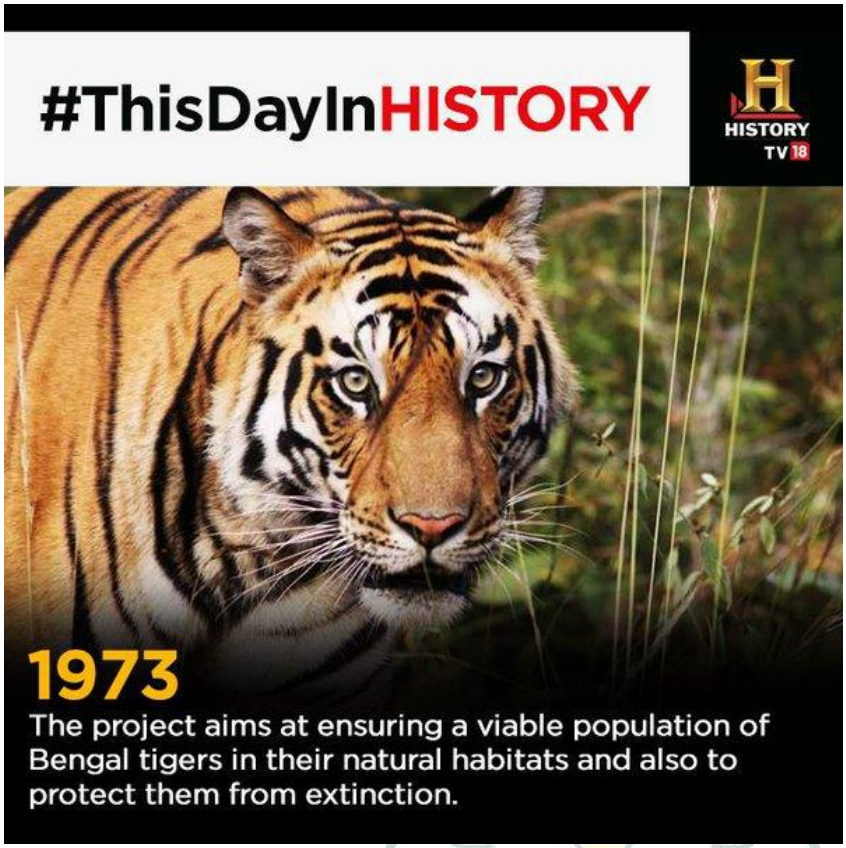
1. Location,
2. Altitude,
3. Distance from the sea,
4. Relief

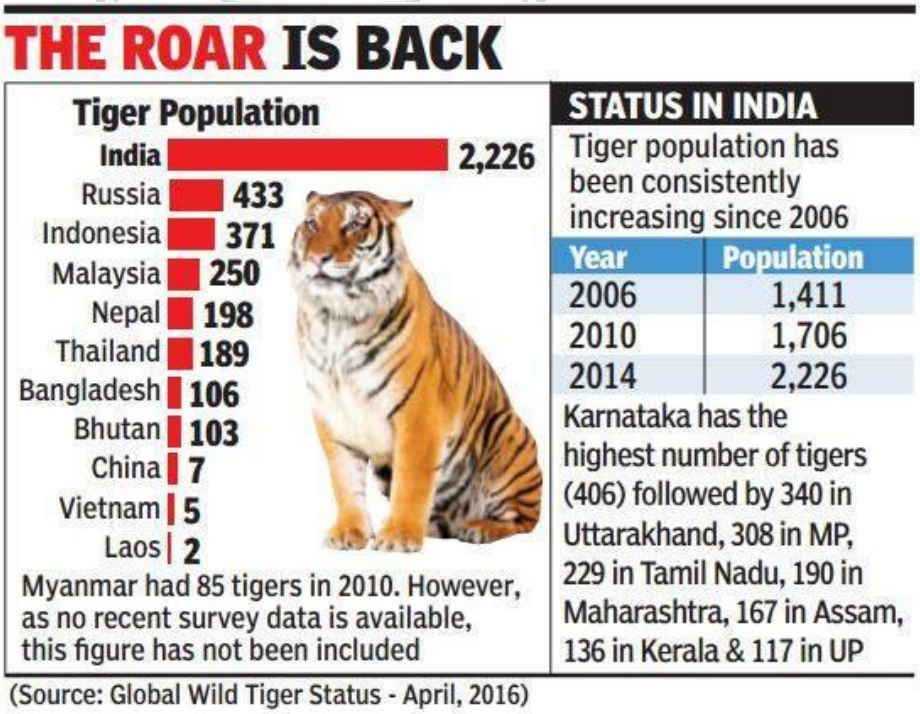
Reason behind regional differences in the climate— Above-mentioned points

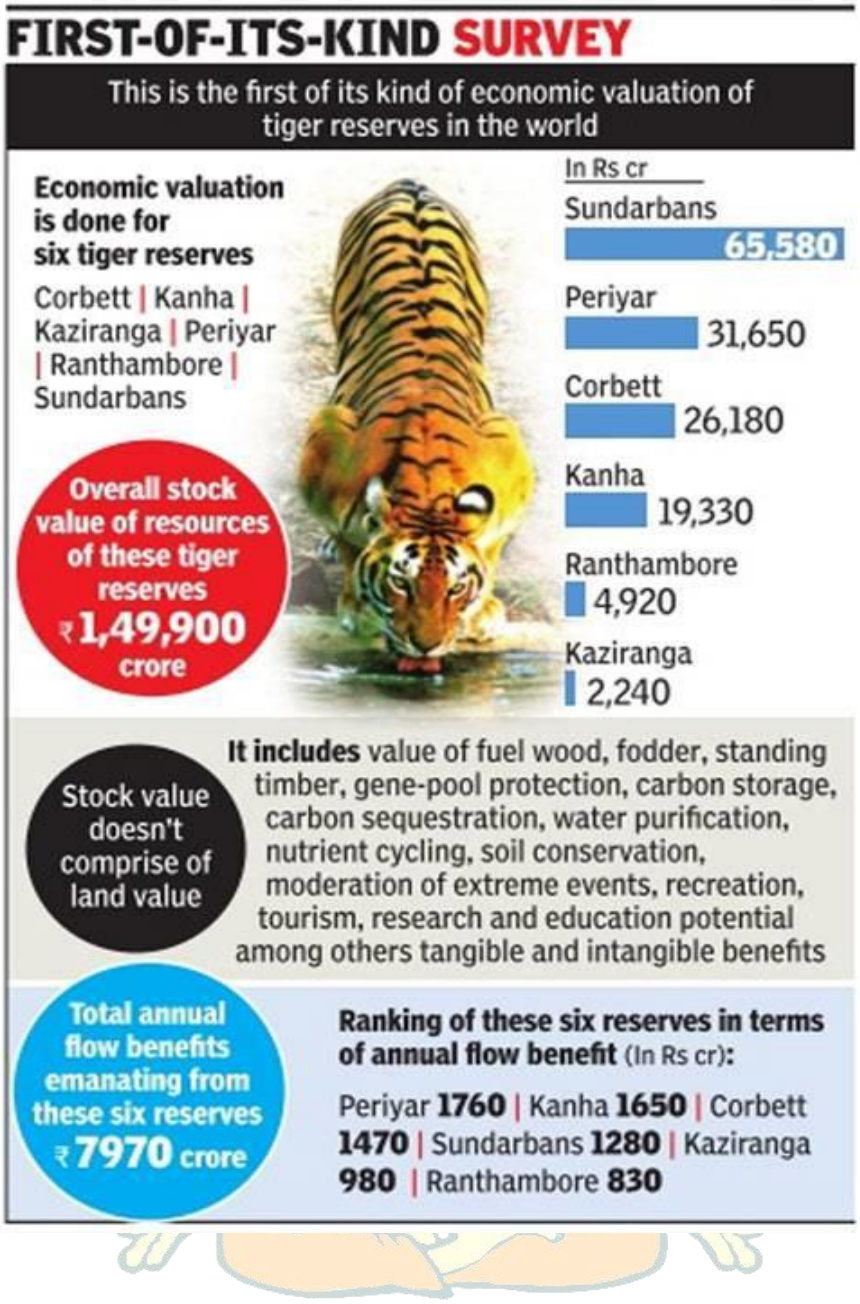
World's highest rainfall: Mawsynram in Meghalaya

Vegetation: *Covered later in the document*

Project Tiger







NOTE- Detailed coverage of Wildlife will be done in Environment Value Add Notes

Environment

What is Environment?

- The **sum total of all surroundings** of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage.
- French Word 'Environer/Environner' means **"Neighbourhood"**
- Environment is our **basic life support system**.

Do you know? World Environment Day is celebrated on **5th June**.

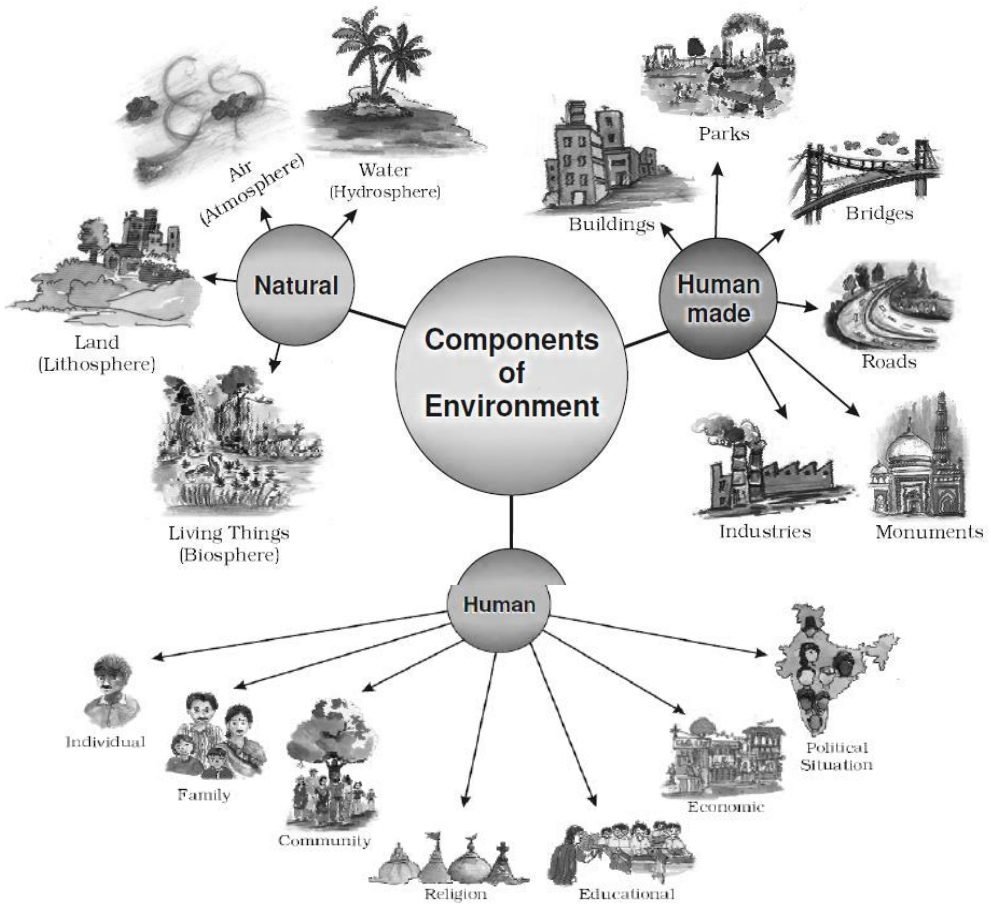
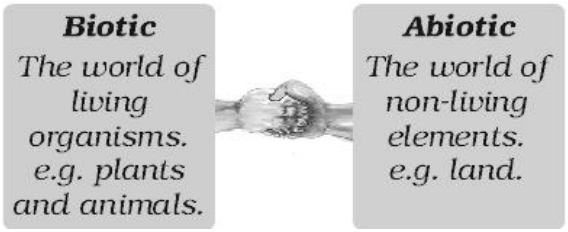


Fig. 1.1: Components of Environment

From above figure, we see that all places, people, things and nature that surround any living organism is called environment.

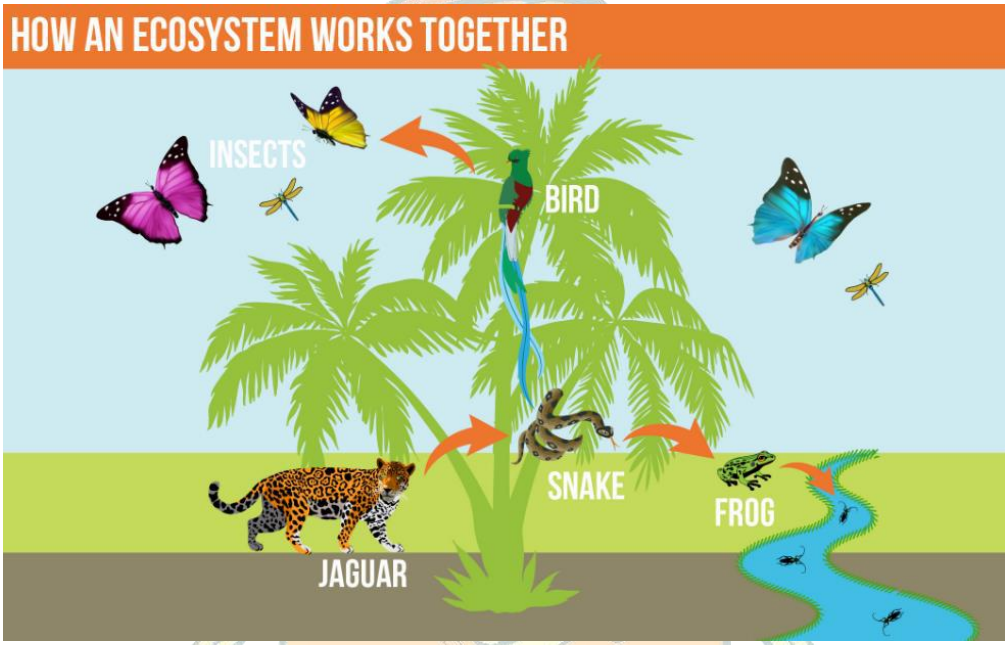
Therefore, Environment is a combination of natural and human made phenomena.

What is Biotic and Abiotic?



What is an Ecosystem?

Ecosystem is a system formed by the **interactions of all living organisms with each other** and with the physical and chemical factors of environment.



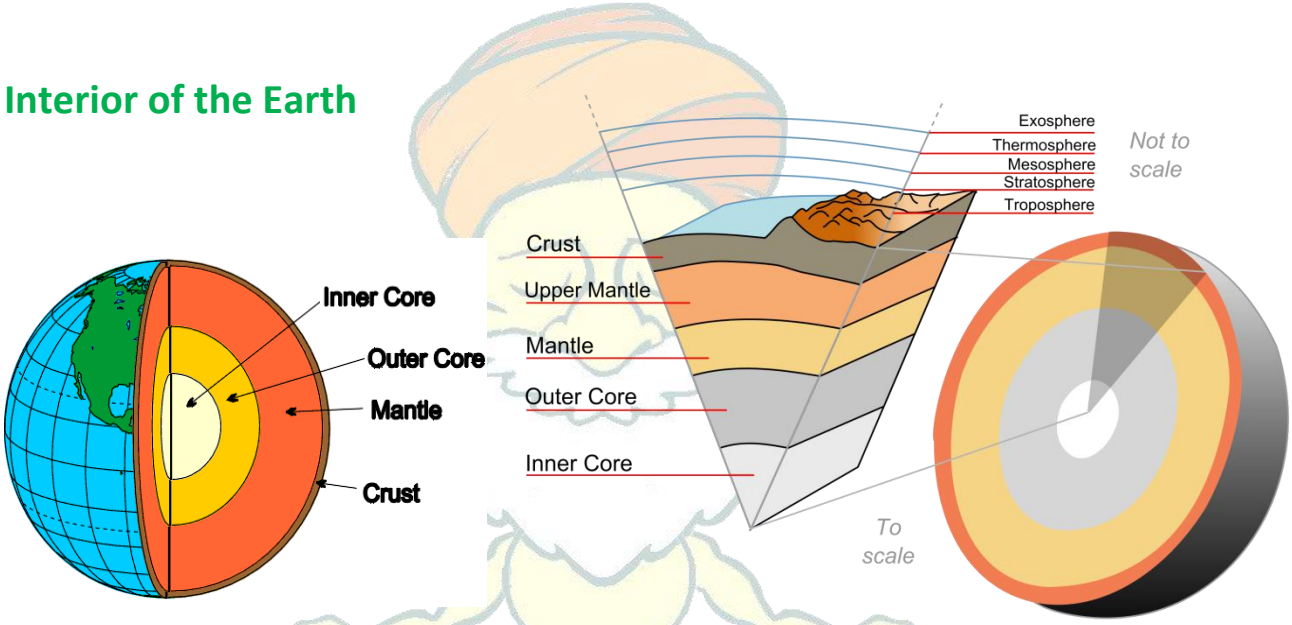
- The relation between the living organisms, as well as, the relation between the organisms and their surroundings- forms an ecosystem.
- There could be an ecosystem of large rain forest, grassland, desert, mountains, lake, river, ocean and even a small pond.

Inside our Earth

This chapter deals with:

- Interior of the Earth
  - Crust
  - Mantle
  - Core
- Rocks and Minerals
  - Igneous rocks
  - Sedimentary Rocks
  - Metamorphic Rocks
- Rock cycle

Interior of the Earth



CRUST

- uppermost layer over the earth's surface
- thinnest of all the layers
- about 35 km on the continental masses and about only 5 km on the ocean floors

Continental crust	Ocean crust
• thickness is about 35 km	• thickness is about 5 km only
• Mineral constituents – ***"sial"*** (silica and alumina)	• Mineral constituents – ***"sima"*** (silica and magnesium)

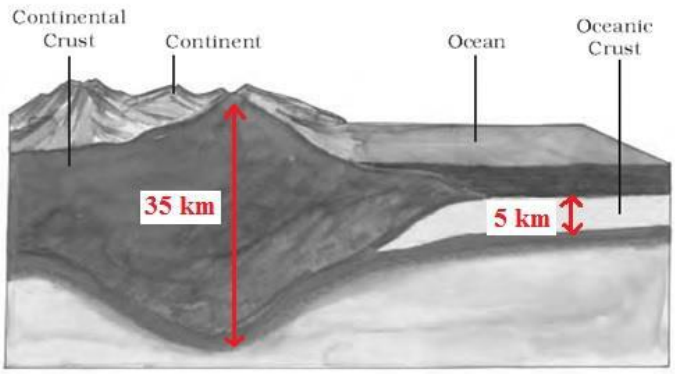


Fig. 2.2: Continental Crust and Oceanic Crust

MANTLE

- Just beneath the crust is the mantle
- extends up to a depth of 2900 km
- composed mainly of very dense rocks rich in ***"olivine"***

CORE

- innermost layer is the core
- radius of about 3500 km
- mainly made up of ***"nife"*** (ni – nickel and fe – ferrous i.e. iron)

Important facts:

- The crust forms only 1 per cent of the volume of the earth, 84 per cent consists of the mantle and 15 per cent makes the core
- The radius of the earth is 6371 km.
- Do you know? ***"sial"*** is lighter than ***"sima"***

ROCKS AND MINERALS

Rocks:

- The earth's crust is made up of various types of rocks
- Any **natural mass of mineral matter** that makes up the earth's crust is called a 'Rock'.
- In simple, rocks are made up of different minerals.

Minerals:

- Minerals are naturally occurring substances which have certain physical properties and definite chemical composition.
- Ex – Gold, petroleum, coal

Different types of rocks:

There are three major types of rocks:

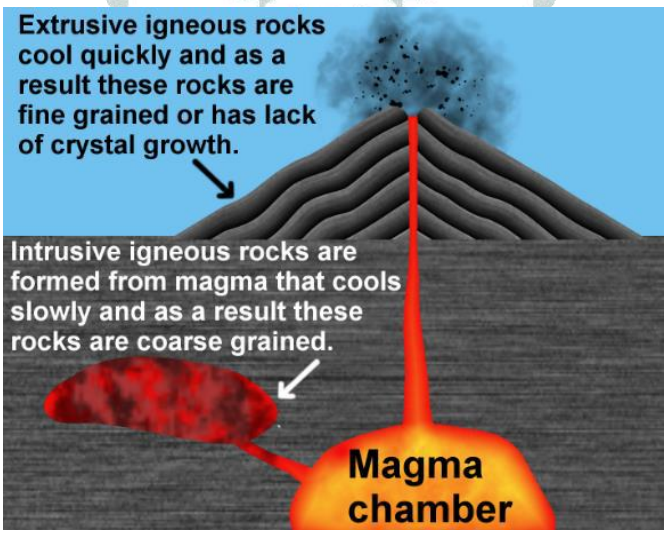
1. Igneous rocks,
2. Sedimentary rocks and
3. Metamorphic rocks.

Igneous Rocks:

- Igneous: Latin word *Ignis* meaning fire.
- Rocks that are formed when the molten magma cools and becomes solid are called **primary rocks** or Igneous rocks
- There are two types of igneous rocks: intrusive rocks and extrusive rocks.

Intrusive and Extrusive Igneous Rocks:

Intrusive Igneous rocks	Extrusive Igneous rocks
• Magma cools beneath Earth's surface.	• Lava cools on the Earth's surface.
• Cools very slowly	• Cools very quickly
• coarse-grained texture	• Fine-grained texture
• Large crystals	• Small or no crystals
• Ex. Granite	• Ex. Basalt



Sedimentary Rocks:

- Sedimentary: Latin word *sedimentum* meaning settle down.
- When rocks roll down, crack and hit each other, they break down into small fragments called sediments. These sediments get transported and deposited by wind, water etc.
- When these loose sediments are compressed and hardened, they form layers of rocks called sedimentary rocks.

- These rocks may also **contain fossils** of plants, animals and other microorganisms that once lived on them.
- For example, sandstone.

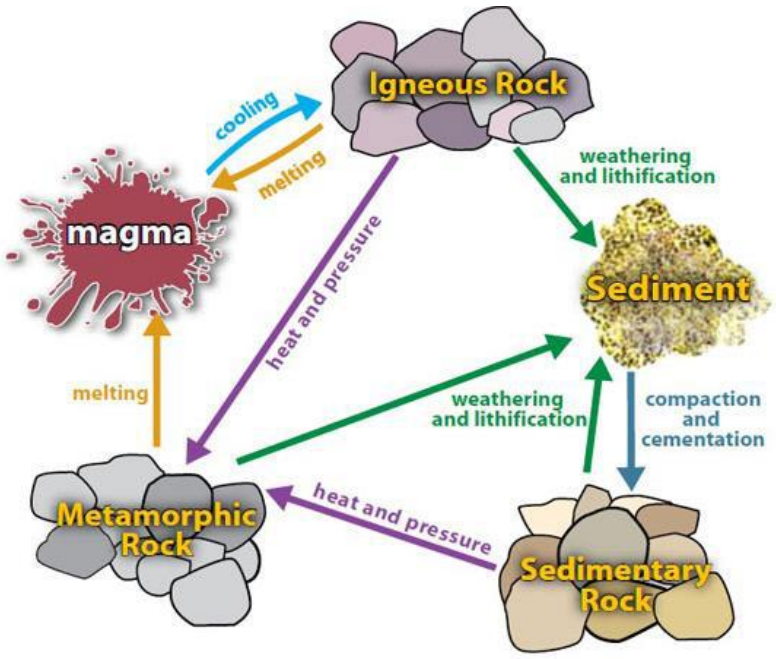


Fig: Rock Cycle

Metamorphic Rocks:

- Metamorphic: Greek word *metamorphose* meaning change of form.
- Igneous and sedimentary rocks can change into metamorphic rocks under great heat and pressure. (see Rock Cycle figure above)
- For example,
    - clay changes into slate
    - limestone into marble
    - sandstone into quartzite
    - granite into gneiss
    - shale into schist
    - coal into graphite

Rock cycle:

- The process of transformation of the rock from one type to another under certain conditions in a cyclic manner is known as the rock cycle.
- Observe above figure.

Our changing Earth

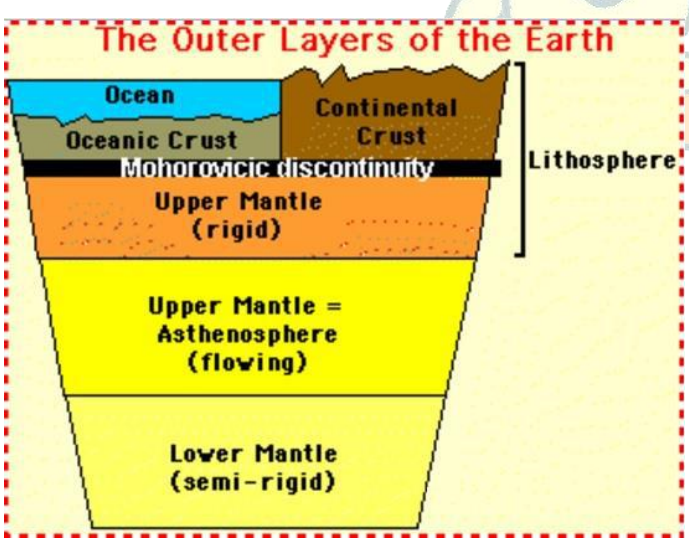
This chapter deals with:

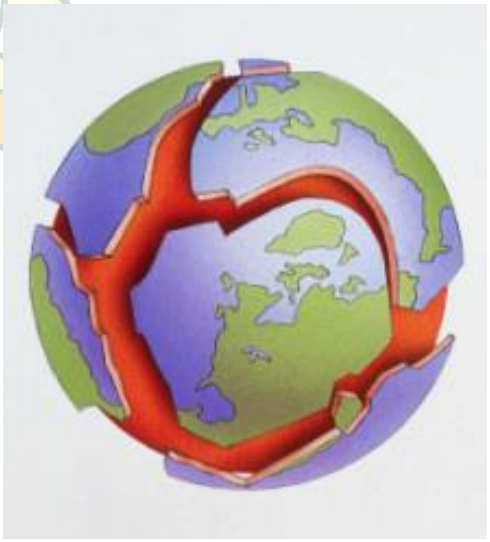
- Lithosphere and Lithospheric plates
- What causes changes on the Earth surface?
    - Endogenic forces
    - Exogenic forces
- Volcano
- Earthquake
    - Different types of Earthquake waves
- Landforms
    - Landform made by running water
    - Coastal Landforms: Work of sea waves
    - Landforms of Glaciation: Work of ice
    - Desert Landforms: Work of wind

Lithosphere:

- It is the **rigid outer part** of the earth, consisting of the **crust and upper mantle** (only rigid part).
- The lithosphere comprises of a number of plates known as the **Lithospheric plates**.
- This is because of the circular movement of the molten magma inside the earth.

Lithospheric plates: The earth's crust consists of several large and some small, rigid, irregularly shaped plates (slabs) which carry continents and the ocean floor.





What causes changes on the Earth surface?

- The movement of Lithospheric plates because of the circular movement of the molten magma inside the earth causes changes on the surface of the earth.
- Changes on the Earth surface is caused by certain forces called **Endogenic forces** and **Exogenic forces**.

Endogenic forces: The forces which act in the interior of the earth are called as Endogenic forces.

Exogenic forces: The forces that work on the surface of the earth are called as Exogenic forces.

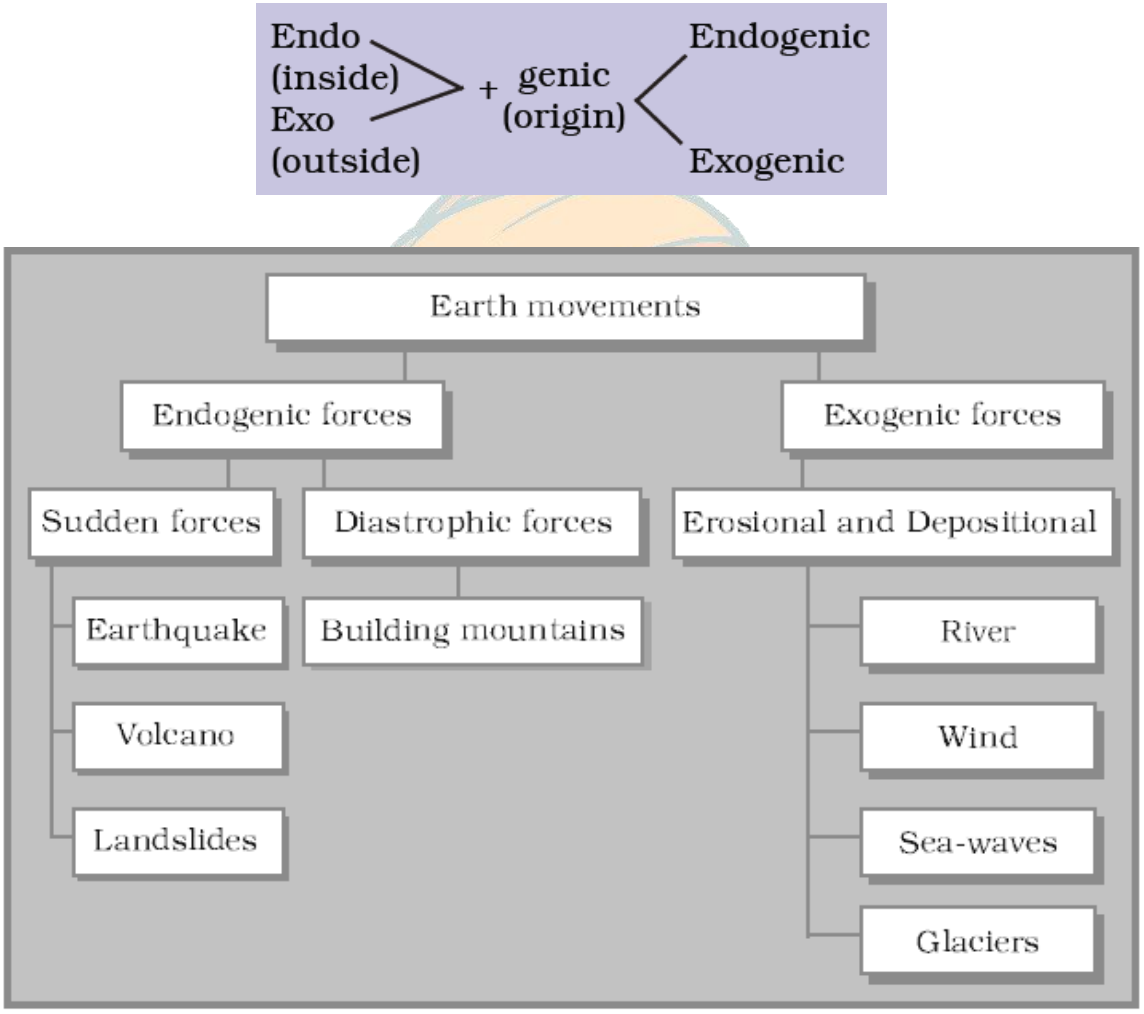


Fig. 3.1: Evolution of Landforms

Volcano:

A volcano is a vent (opening) in the earth's crust through which molten material erupts suddenly.

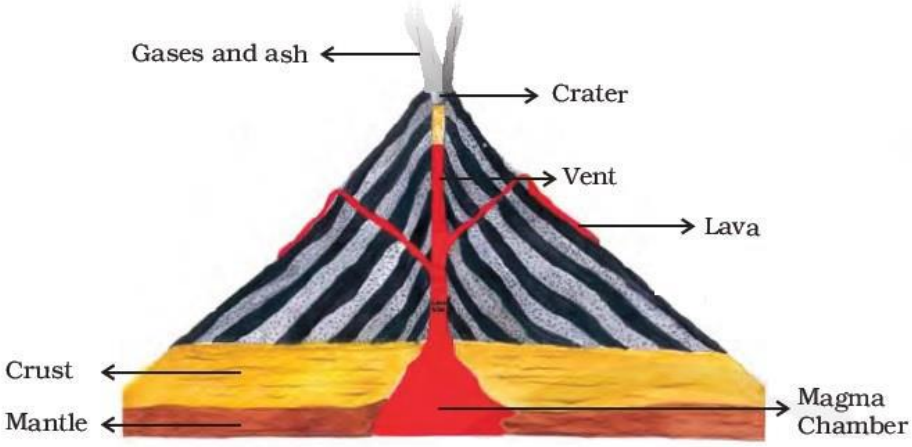
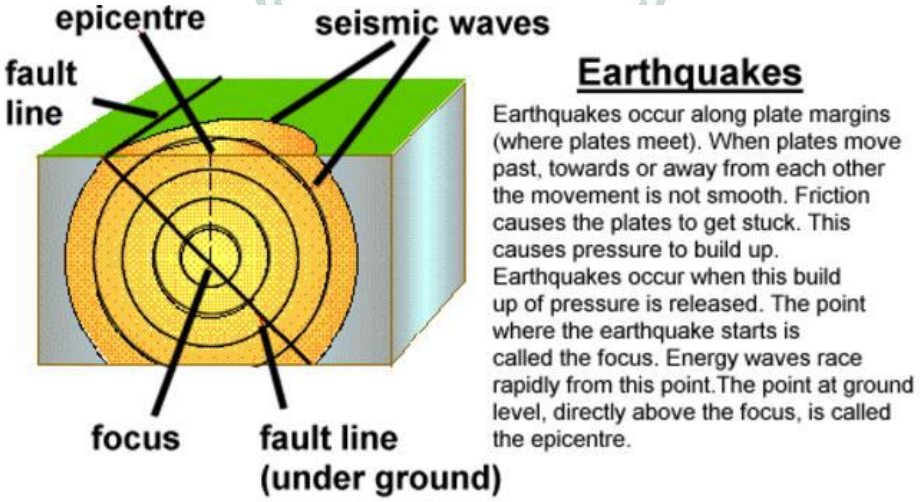


Fig. 3.2: A Volcano

Earthquake:

- When the Lithospheric plates move, the surface of the earth vibrates.
- The vibrations can travel all-round the earth. These vibrations are called earthquakes.
- Greatest damage is usually closest to the epicentre and the strength of the earthquake decreases away from the centre.



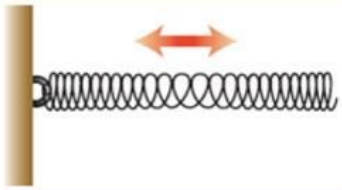
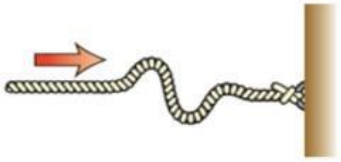
Different types of Earthquake waves:

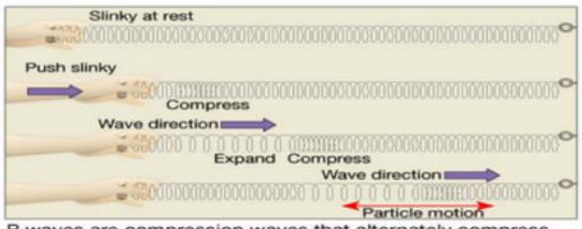
Earthquakes generate three types of seismic waves:

1. P (primary) waves or longitudinal waves
2. S (secondary) waves or transverse waves
3. L waves or surface waves

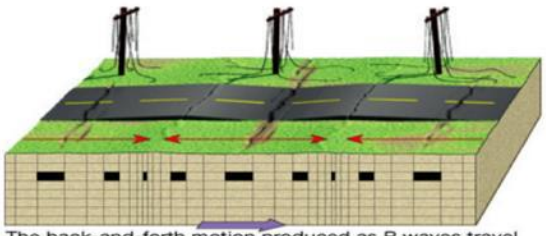
- All these waves arrive at seismic recording stations one after another.
- Both P and S waves penetrate the interior of the Earth while surface waves do not. Due to this, **P and S waves are known as "body waves"**.
- **Surface waves arrive last** and are the least interesting to seismic tomographers because **they don't penetrate deep inside the Earth**, therefore provides little information about inaccessible terrain.

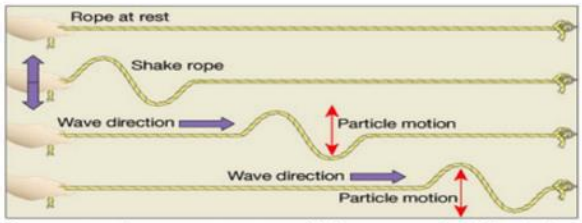
Types of Seismic Waves

Seismic Wave	Abbreviation	Description	Ground Motion
Primary wave	P	• Type of body wave • First to arrive (fastest) • Ground squeezes and stretches in direction of wave travel. • Travels through solids, liquids, and gases	
Secondary wave	S	• Type of body wave • Second to arrive (slower) • Ground motion is perpendicular to direction of wave travel. • Travels through solids but not liquids	
Surface wave	L	• Travels along Earth's surface • Last to arrive (slowest) • Ground motion is a rolling action, like ripples on a pond.	

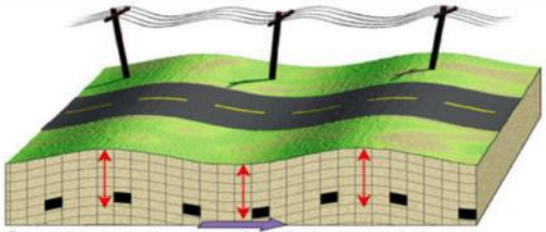


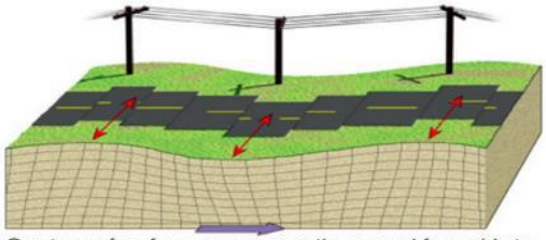
P waves are compression waves that alternately compress and expand the material through which they pass.

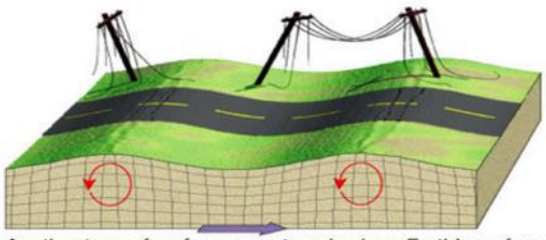

The back-and-forth motion produced as P waves travel along the surface can cause the ground to buckle and fracture.



S waves are transverse waves which cause material to shake at right angles to the direction of wave motion. The length of the red arrow is the displacement, or amplitude, of the S wave.


S waves cause the ground to shake up-and-down and sideways.


One type of surface wave moves the ground from side to side and can damage the foundations of buildings.


Another type of surface wave travels along Earth's surface much like rolling ocean waves. The arrows show the movement of rock as the wave passes. The motion follows the shape of an ellipse.

Important facts:

- An earthquake is measured by a device called a **seismograph**.
- The **magnitude of the earthquake** is measured on the **Richter scale**.
- An earthquake of 2.0 or less can be felt only a little.
- An earthquake over 5.0 can cause damage from things falling.
- A 6.0 or higher magnitude is considered very strong and 7.0 is classified as a major earthquake.
- The **Mercalli intensity scale** is a seismic scale used for **measuring the intensity of an earthquake**.

(Know the difference between Richter and Mercalli scale)

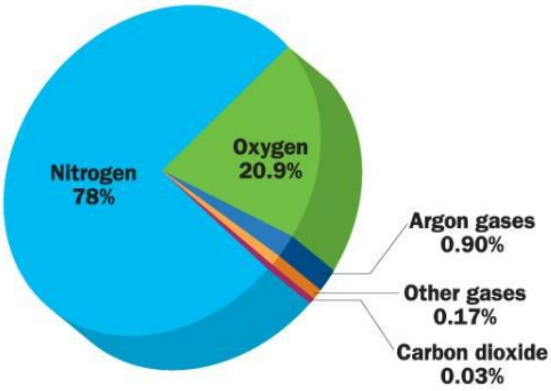
Air

This chapter deals with:

- Composition of air
- Structure of air
- Temperature
- Air pressure
- Wind
- Moisture and Humidity
- Do you know - Why do Jets leave smoke trail?
- Rainfall

Composition of air

- CO_2 released in the atmosphere creates **Green House effect** by trapping the heat radiation from the earth. It is therefore called as Green House Gas, without it earth would be too cold to live.
- However, when its level rises, then the heat retained increases the temperature of earth and this phenomenon is called as Global Warming.

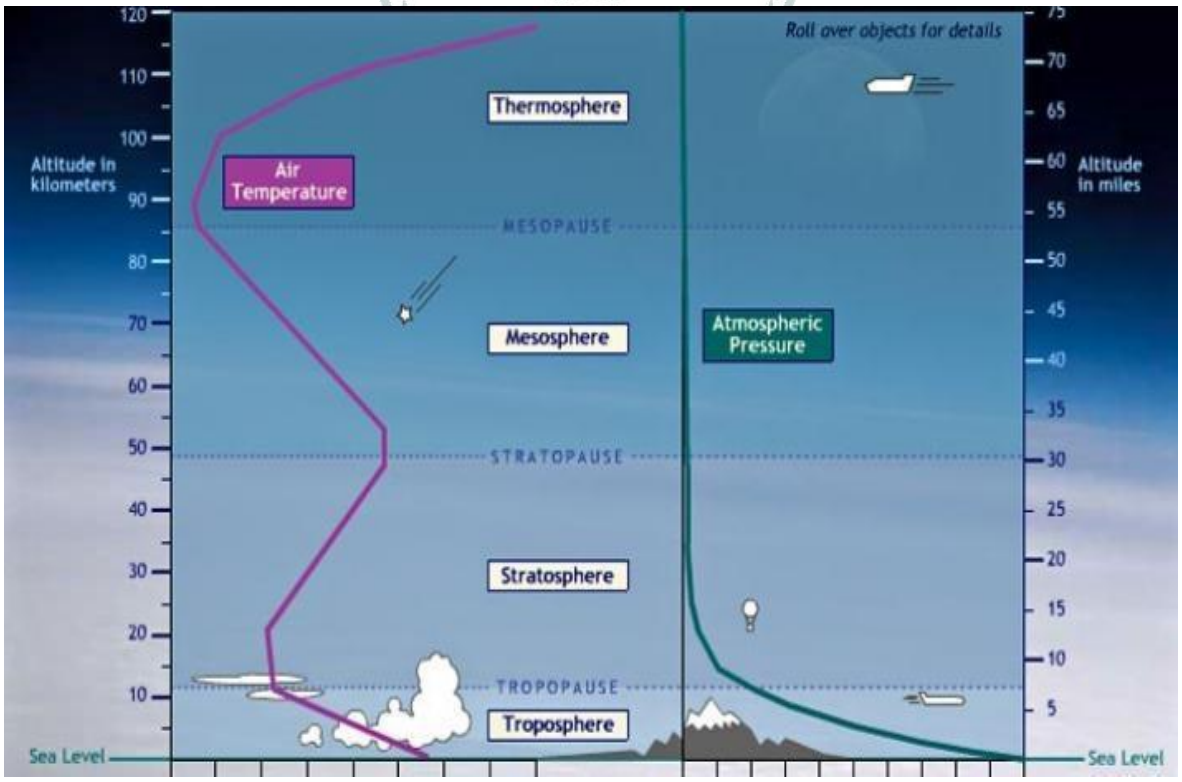


Chemical Composition of Air		
Name	**Symbol**	**% by volume**
Nitrogen	N2	78.084 %
Oxygen	O2	20.9476 %
Argon	Ar	0.934 %
Carbon Dioxide	CO2	0.0314 %
Neon	Ne	0.001818 %
Methane	CH4	0.0002 %
Helium	He	0.000524 %
Krypton	Kr	0.000114 %
Hydrogen	H2	0.00005 %
Xenon	Xe	0.0000087 %

Structure of Air:

Structure of Atmosphere –

Troposphere	◦ Most Important Layer ◦ Average height about **13 Kms** ◦ all the weather phenomena like rainfall, fog and hailstorm occur in this layer.
Stratosphere	◦ **Above the troposphere lies the stratosphere** ◦ Extends upto **50 Kms** ◦ Contains Ozone Layer ◦ **Free from clouds and associated weather phenomenon** ◦ **Perfect for flying aeroplanes**
Mesosphere	◦ **Third layer of the atmosphere** ◦ Extends upto **80 Kms** ◦ Meteoroids burn up in this layer on entering Earth.
Thermosphere	◦ **Ionosphere is a part of this layer** ◦ Extends upto **80-400 Kms** ◦ Temperature rises very rapidly with heights. ◦ Helps in Radio Transmission.
Exosphere	◦ **Upper most layer of the atmosphere** ◦ Contains very thin Air ◦ Light gases like Helium & Hydrogen floats into space



Temperature:

- The degree of hotness and coldness of the air is known as temperature.
- Important factor that influences the distribution of temperature is **Insolation**
- **Insolation** is the incoming solar energy intercepted by the earth.
- Insolation decreases from Equator to Pole. (This is the reason why poles are covered with snow)

Air Pressure:

- Air pressure is defined as the pressure exerted by the weight of air on the earth's surface.
- Air pressure is highest at sea level and decreases with height.

Horizontally the distribution of air pressure is influenced by temperature of air at a given place.

High Temperature ⇒ Low Pressure Area ⇒ cloudy skies and wet weather

Low Temperature ⇒ High Pressure Area ⇒ clear and sunny skies

Wind:

- The air always moves from high pressure areas to low pressure areas.
- Air movement from High to Low pressure is called Wind.

Winds can be broadly divided into three types.

1. *Permanent winds* – The trade winds, westerlies and easterlies are the permanent winds. These blow constantly throughout the year in a particular direction.
2. *Seasonal winds* – These winds change their direction in different seasons. For example monsoons in India.
3. *Local winds* – These blow only during a particular period of the day or year in a small area. For example, land and sea breeze. Do you recall the hot and dry local wind of northern planes of India? It is called *loo*.

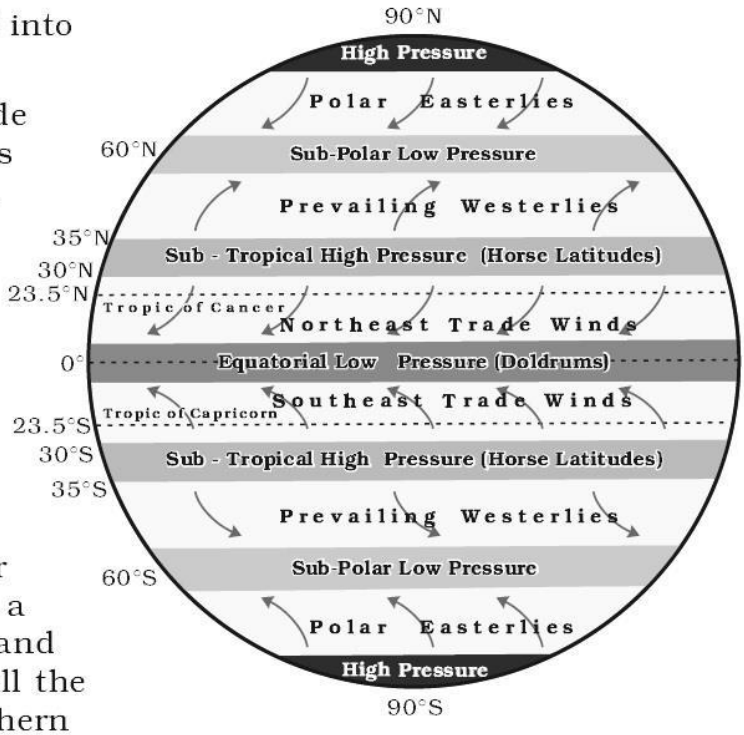


Fig. 4.4: Major Pressure Belts and Wind System

Permanent Winds	Trade winds, Westerlies & Easterlies
Seasonal Winds	Monsoon
Local Winds	Loo (On Particular Day)

Moisture and Humidity:

- Moisture in the air at any time, is known as humidity.
- When the air is full of water vapour we call it a humid day.
- When the water vapour rises, it starts cooling. The water vapour condenses causing formation of droplets of water.
- Clouds are just masses of such water droplets. When these droplets of water become too heavy to float in air, then they come down as **precipitation**.

Do you know - Why do Jets leave smoke trail?

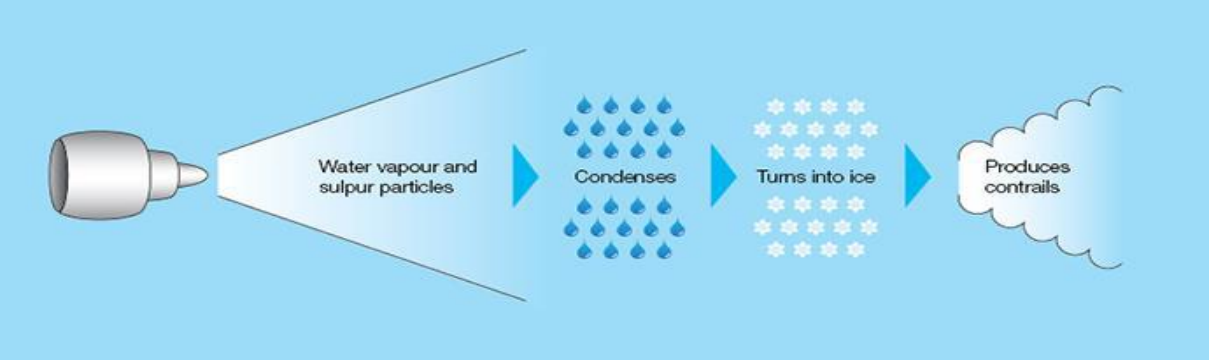
It's not smoke. It's pure ice.

The moisture from their engines condenses. We see trails of this condensed moisture for some time when there is no air movement to disturb it.

It is the exact same principal as you blow out cold breath; just like the **dude** in the picture below:

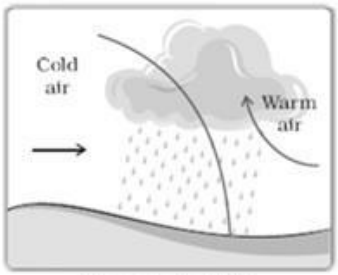
You see the water droplets in our mouth are exhaled with carbon dioxide. The water droplets are instantly cooled down to ice crystals which are so small that they have negligible mass and thus float in the air.

So this is how it works: ☺

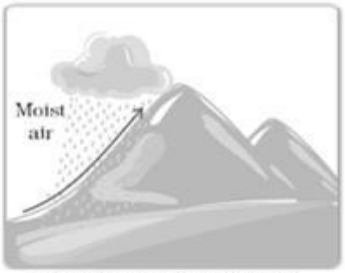


Rainfall:

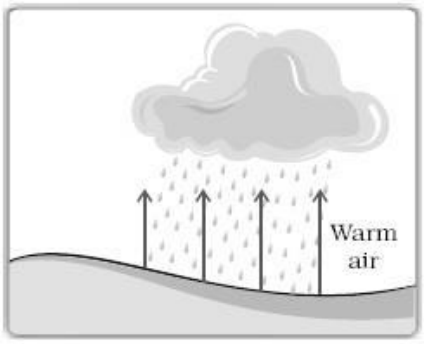
- Precipitation that comes down to the earth in liquid form is called rain.
- Other forms of precipitation are snow, sleet, hail.
- On the basis of mechanism, there are three types of rainfall:
    1. the convectional rainfall,
    2. the orographic rainfall and
    3. the cyclonic rainfall



Cyclonic Rainfall



Relief (Orographic) Rainfall



Convectional Rainfall

Water

The chapter deals with:

- Distribution of Water bodies
- World's major rivers and lakes map
- Ocean Circulation
- Ocean Currents

Terrarium – Artificial enclosure for keeping small house plants.

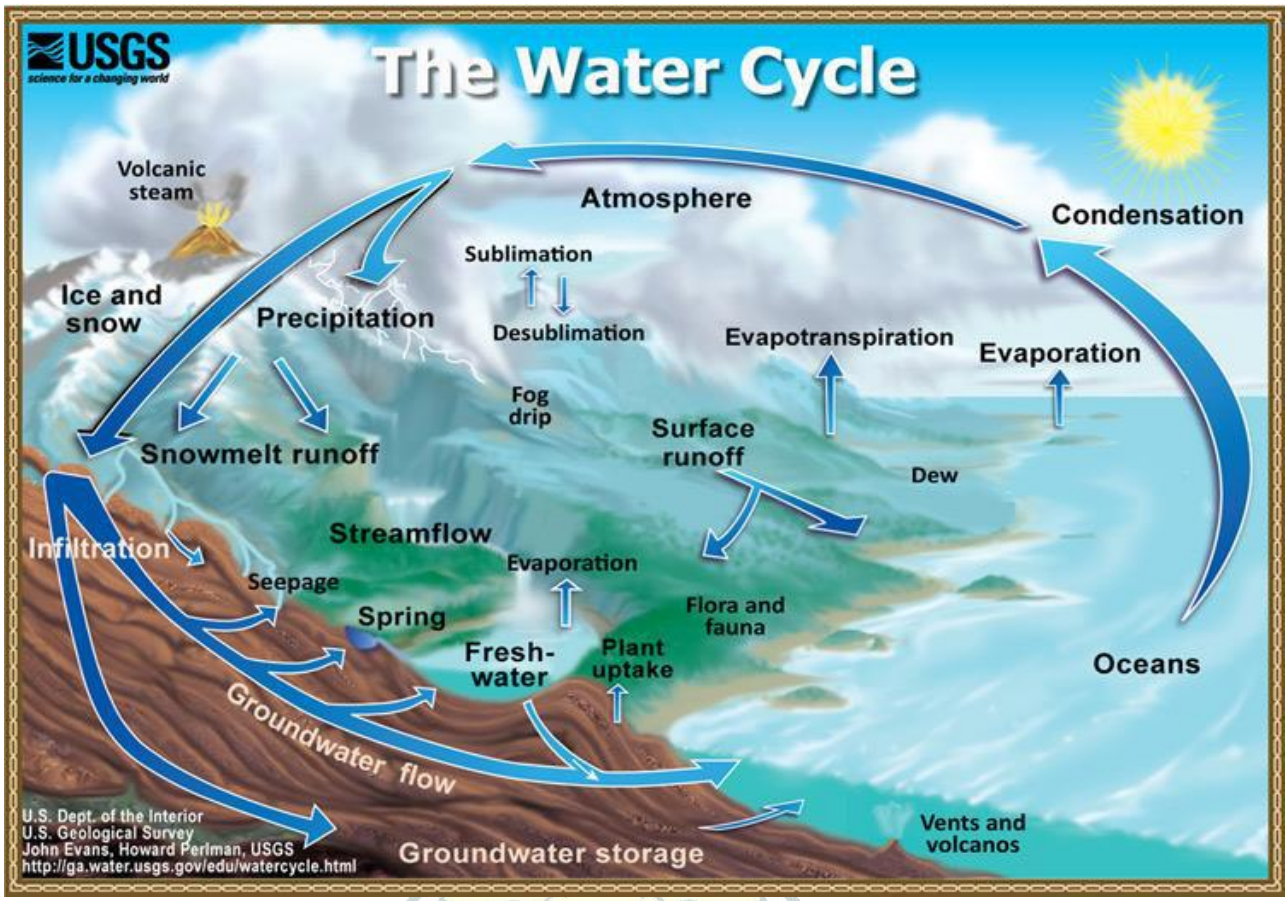
- More than 71 percent of the earth is covered with water and 29 percent is with land.
- Salinity is the amount of salt present in 1000 gm of water.
- Average Salinity of Oceans = 35 ppt (parts per thousands).
- Dead Sea (in Israel) = highly saline, Swimmers can easily float in it because the increased salt content makes it dense.

DISTRIBUTION OF WATER BODIES

Oceans	:	97.3	Saline Water
Ice-caps	:	02.0	
Ground water	:	0.68	
Fresh Water			
Fresh water lakes	:	0.009	Fresh Water
Inland seas &			
Salt lakes	:	0.009	
Atmosphere	:	0.0019	
Rivers	:	0.0001	
		100.00	

Do you know?

World Water Day is celebrated on March 22nd.



The water on earth is found in all the three states (Solid, liquid and gas). It keeps on transforming from one state to another in a closed cycle. This cycle is called the **water cycle**.

- ✓ The sun, which drives the water cycle, heats water in oceans and seas.
- ✓ Water evaporates as water vapor into the air.
- ✓ Ice, rain and snow can sublimate directly into water vapour.

Evapotranspiration: Water transpired from plants and evaporated from the soil

Note: Water vapour molecule H_2O, has less density compared to the major components of the atmosphere, nitrogen and oxygen, N_2 and O_2.

- ✓ Due to the significant difference in molecular mass, water vapor in 'gas-form' gain height in open air as a result of buoyancy. However, as altitude increases, air pressure decreases and the temperature drop (see Gas laws).
- ✓ The lowered temperature causes water vapour to condense into a tiny liquid water droplet which is heavier than the air, such that it falls unless supported by an updraft.
- ✓ A huge concentration of these droplets over a large space in the atmosphere becomes visible as cloud.

- ✓ Fog is formed if the water vapour condenses near ground level, as a result of moist air and cool air collision or an abrupt reduction in air pressure.
- ✓ Air currents move water vapour around the globe; cloud particles collide, grow, and fall out of the upper atmospheric layers as precipitation. Some precipitation falls as snow or hail, sleet, and can accumulate as ice caps and glaciers, which can store frozen water for thousands of years.
- ✓ Most water falls back into the oceans or onto land as rain, where the water flows over the ground as surface runoff.
- ✓ A portion of runoff enters rivers in valleys in the landscape, with streamflow moving water towards the oceans. Runoff and water emerging from the ground (groundwater) may be stored as freshwater in lakes.
- ✓ Not all runoff flows into rivers, much of it soaks into the ground as infiltration. Some water infiltrates deep into the ground and replenishes aquifers, which can store freshwater for long periods of time. Some infiltration stays close to the land surface and can seep back into surface-water bodies (and the ocean) as groundwater discharge.
- ✓ Some groundwater finds openings in the land surface and comes out as freshwater springs. In river valleys and flood-plains there is often continuous water exchange between surface water and ground water in the hyporheic zone. Over time, the water returns to the ocean, to continue the water cycle.

Although the water appears to be in abundance, there is a limited supply of fresh water. Increasing population, rising demand of food and cash crops, increasing urbanization, and rising standards of living are the major factors leading to shortage in the supply of fresh water.

Water Scarce Regions of the World:

- Africa
- West Asia
- South Asia
- Parts of Western USA
- Northern Mexico
- Chile and parts of Argentina
- Central Australia

There are three major reasons for water shortage in this region:

- Scarcity due to variation in rainfall
- Contamination of water
- Scarcity due to overexploitation

Major sources which are responsible for contamination of water:

- Sewage, Partially Treated Waste Water, and Sludge
- Leakage from Underground Storage Tanks
- Urban Run-Off
- Mines, Tailings, and Spoils
- Landfills and Dumps
- Industrial Effluents and Waste Disposal
- Pesticides
- Animal Production Wastes
- Agricultural Run-Off from Crops

Conservation of water resources:

Following steps can be taken to conserve fresh water:

- Treatment of effluent waste before releasing it into rivers
- Increase of forest and vegetation cover to reduce runoff and increase penetration.
- Rainwater harvesting, especially in urban areas
- Water canals used for irrigation should be properly lined to reduce penetration.
- Sprinklers can be used for irrigation to reduce water efficiently.
- Drip or trickle irrigation should be used in places with high rates of evaporation.
- Apart from the above points the best way is to use the water judiciously and not to waste it.

THINK!

- Learn about major fresh water lakes of the world

Ocean Circulation:

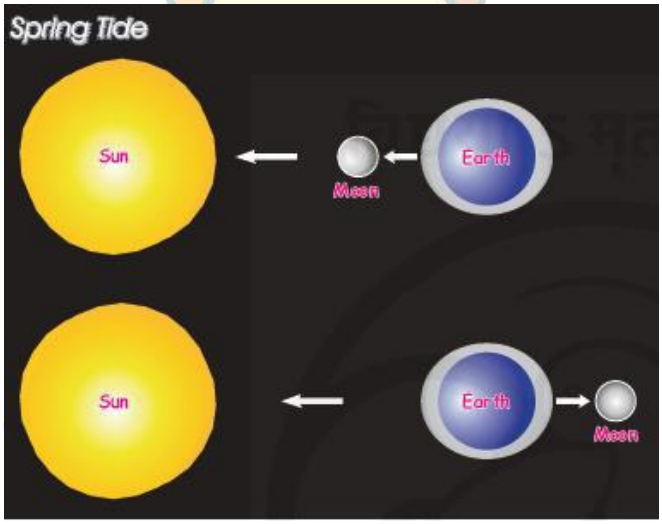
Classification of Movements –

- Waves
- Tides
- Currents

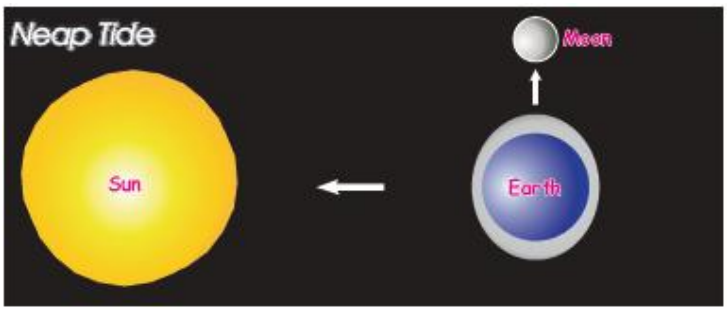
Waves: When water on the surface of ocean rises and falls alternately, they are called waves. Waves are formed when winds scrape across the ocean surface. The stronger the wind blows, the bigger the wave becomes.
Eg : Huge tidal waves – Tsunami

Tides: The rhythmic rise and fall of ocean water twice in a day is called Tide. The strong gravitational pull exerted by the sun and the moon on the earth's surface causes the tides.

Spring tide: Full Moon and New Moon ⇒ Highest Tides or Spring tide
High tides helps in fishing as many more fish come closer to the shore during the high tide.



Neap Tide: when the moon is in its first and last quarter, the ocean waters get drawn in diagonally opposite directions by the gravitational pull of sun and earth resulting in low tides. These tides are called neap tides



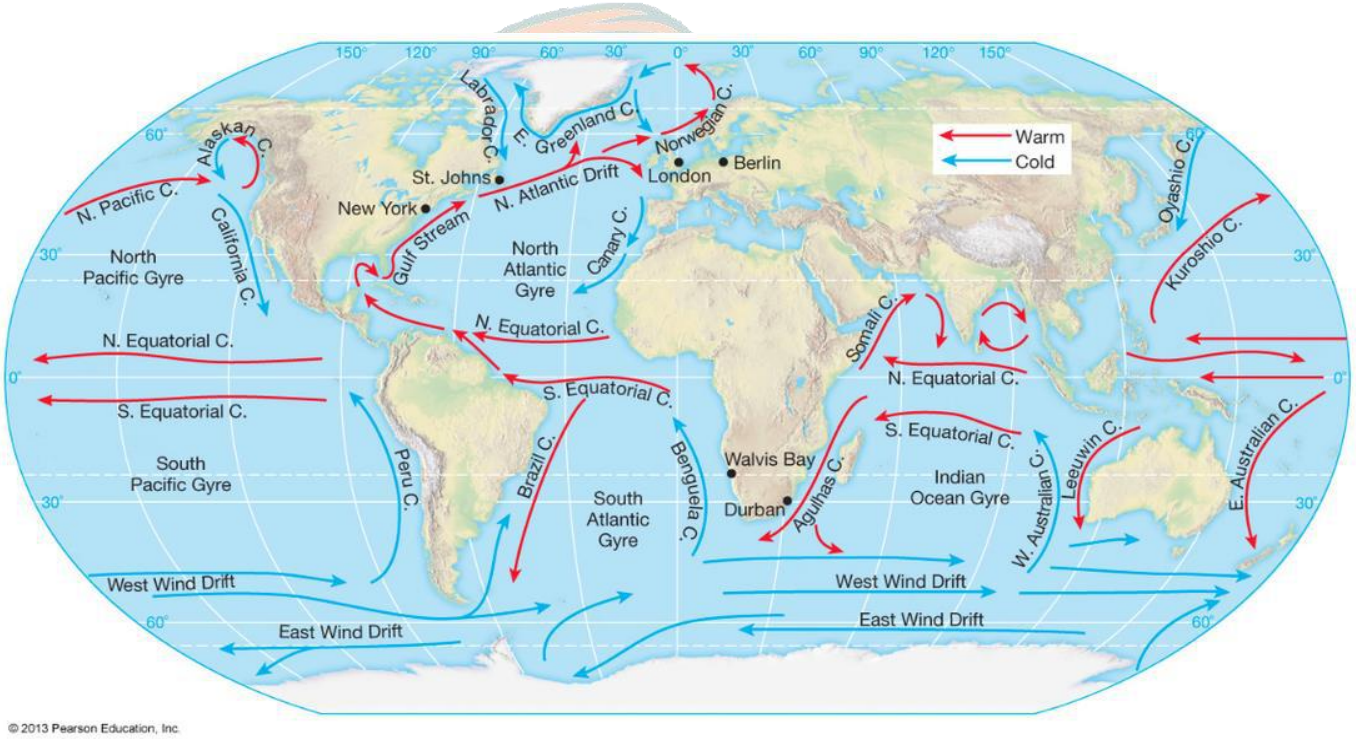
Ocean Currents:

- Ocean currents are streams of water flowing constantly on the ocean surface in definite directions.
- The ocean currents may be warm or cold.

Cold Currents	Poles to Equator
Warm Currents	Equator to Poles

The ocean current influence the temperature conditions of the area

- Warm currents bring about warm temperature over land surface.
- The areas where the warm and cold currents meet provide the best fishing grounds of the world.

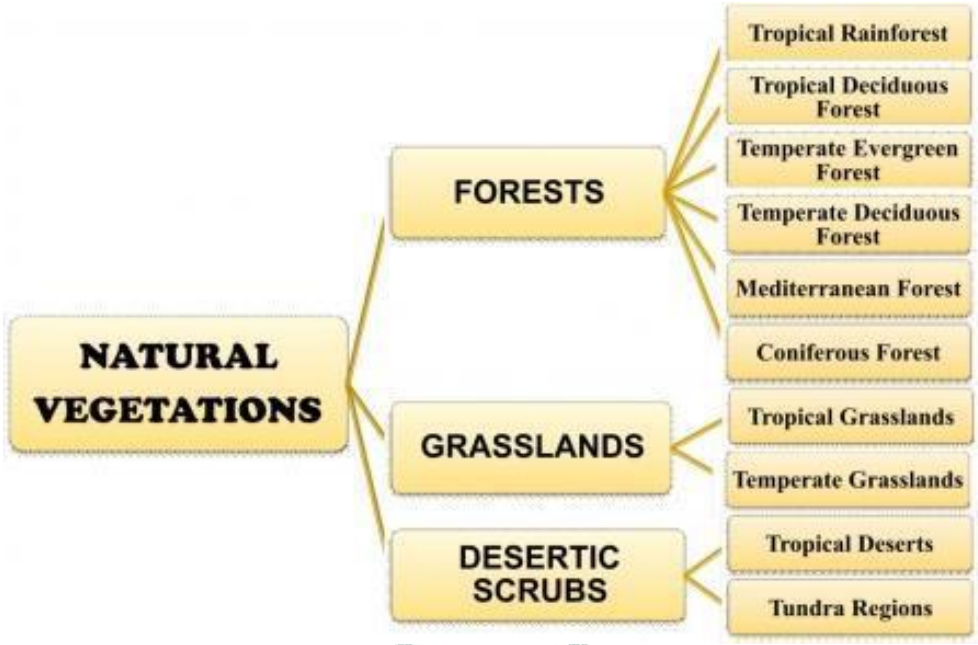


Natural Vegetation & Wildlife

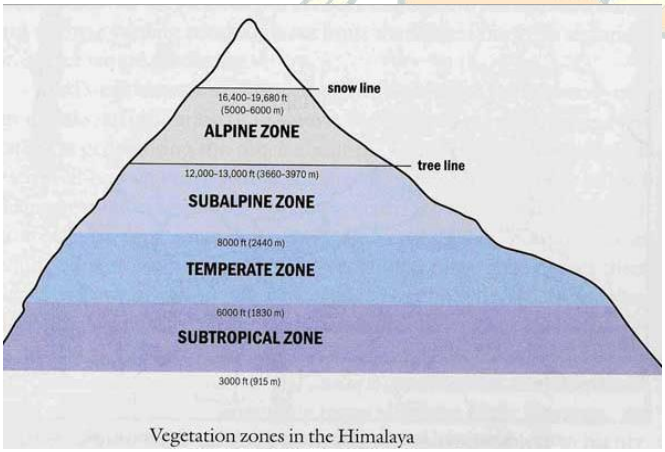
Classification of Vegetation (Major):

Natural vegetation is generally classified in to three broad categories

- **Forests:** grows where Temperature and Rainfall are plentiful.
- **Grassland:** grows in the region of Moderation rain.
- **Shrubs:** grows generally in Dry Regions.

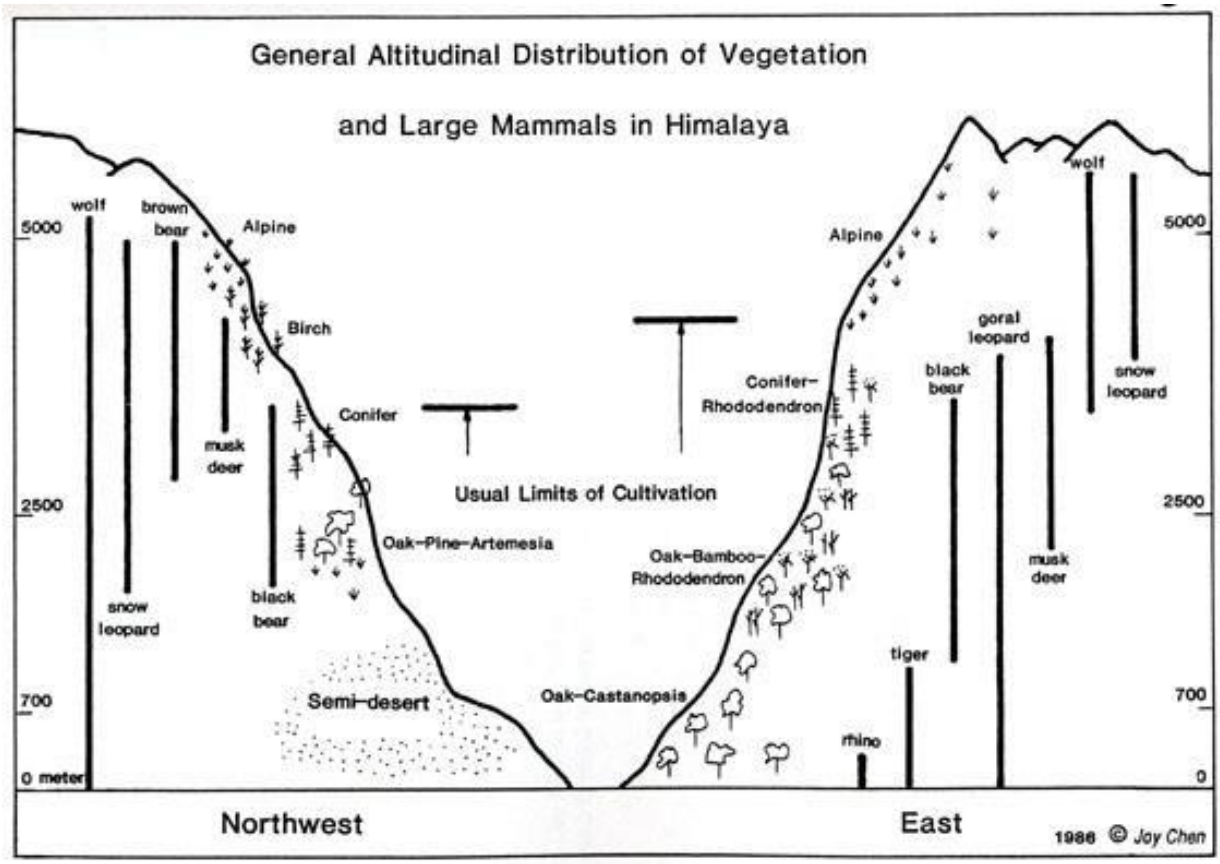


What changes in the landform and natural vegetation one can see in the Himalayas when he/she travelling from the foothills and going to the higher altitudes?



Vegetation zones in the Himalaya

- The deep jungles of the foothills comprises of sal and teak.
- When we move further up we can see tall trees with thin pointed leaves and cone shaped canopies on the mountain slopes (coniferous trees)
- In higher altitude we can notice blooms of bright flowers on tall trees. These were the rhododendrons.
- Above tree line, we can notice Alpine meadow and above that moss and lichens.



Forests:

Tropical Evergreen Forests –

- a.k.a Tropical Rain Forest.
- Forests majorly near equator and tropics regions.
- Hot and Heavy rainfall throughout the year.
- As due to no particular dry season, trees do not shed their leaves altogether, this is why they are called as Evergreen.
- Thick canopies of trees do not allow sunlight to reach ground in even day time.
- Eg. Hardwood → Rosewood, Ebony, Mahogany.
- Tropical evergreen forest in Brazil is so enormous → Lungs of the Earth.
- Anaconda is found in Tropical Rainforest.

Tropical Deciduous Forest –

- Monsoon forest in India, N Australia and in Central America.
- These regions experiences seasonal change.
- Trees shed leaves in dry season to conserve water.
- Eg - Hardwood Trees: Sal, Teak, Neem, Shisham [Rose].
- Animals – Tigers, Lions, Elephants, Langurs, Monkeys.

Temperate Evergreen Forest –

- Located in Mid-latitude coastal regions.
- Commonly found in earthen margin of continents like S-E USA, South China, S-E Brazil.
- Eg - Trees both Hard and Soft Wood: Oak, Pine, and Eucalyptus.

Temperate Deciduous Forest –

- Located in Higher-latitude in Temperate zone like North Eastern USA, China, New Zealand, Chile and coastal region of Western Europe.
- Trees shed leaves in dry seasons.
- Eg - Trees: Oak, Ash, Beech.
- Animal: Deer, Foxes, Wolves.
- Bird: Pheasants, Monals

Mediterranean Vegetation –

- This region is known as ***"Orchards of the world"*** for their fruit cultivated.
- Since, East and North East Margins of continents have Evergreen and Deciduous, West and South West margin of continents have Mediterranean vegetation like Mediterranean Sea in EU, Africa, and Asia.
- Also found in outside the actual Mediterranean region i.e. in California is U.S.A, S-W Africa, S-W S. America and S-W Australia.
- Mediterranean trees adapt themselves against dry summers with the help of their thick barks and wax coated leaves which help them reduce transpiration.
- Hot dry summers and mild rainy winters.
- Citrus fruits such as oranges, figs, Olives, Grapes.

Coniferous Forests –

- In higher latitude (50° – 70°) of Northern Hemisphere.
- a.k.a Taiga [means Pure/Untouched in Russian]
- They are tall soft evergreen trees.
- Trees: Chir, Pine, Cedar.
- Animals: Silver fox, mink, polar bear

Grasslands:

Tropical Grasslands –

- Either Side of Equator and extended till tropics.
- Moderate to low amount of Rainfall.
- Tall Grasses 3-4 mts. Eg: Savannah grassland of Africa
- Animals – Elephants, Zebra, Giraffe, Leopards
- Various Examples –
    - East Africa – Savannah
    - Brazil – Campos
    - Venezuela – Llanos

Temperate Grasslands

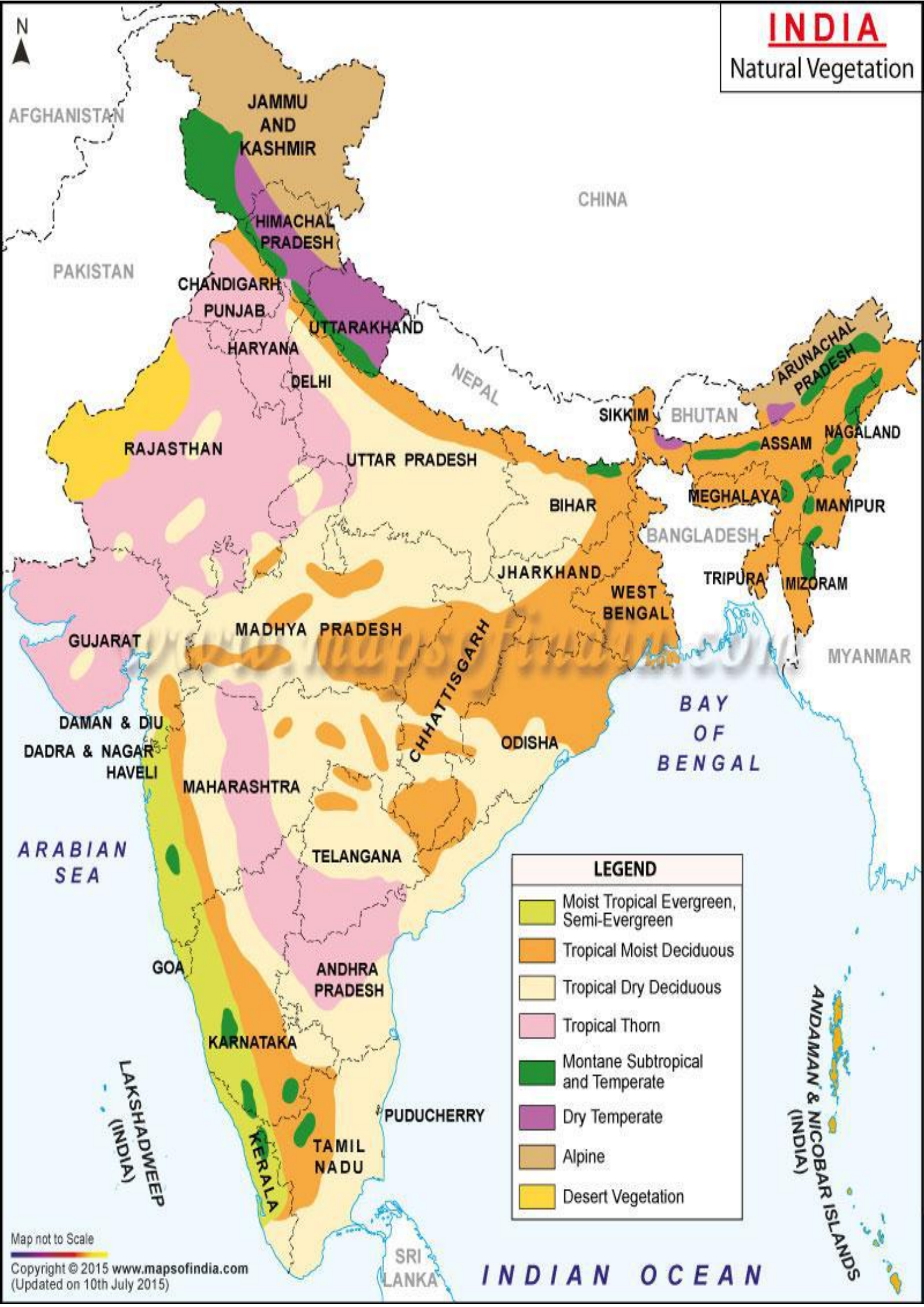
- Mid-latitude zones and in interior of continents.
- Short grasses and Nutritious.
- Animals: Buffaloes, Bisons, Antelopes.
- Various Examples –
    - Argentina – Pampas
    - N. America – Prairies
    - S. Africa – Velds
    - C. Asia – Steppes
    - Australia – Downs

Shrubs:

- Thorny Bushes – found in dry desert regions
- Generally located on Western Margin of continents.
- Scanty Rain and scorching heat.
- Mosses, Lichens and very small shrubs.
- Grows for very short summer.
- Called Tundra type Vegetation
- Animals: Seal, Walruses, Musk-oxen, Arctic Owl, Polar Bear, Snow foxes.
- Found in Polar Region of EU, Asia and N. America

Frozen	Polar & Tundra Vegetation		Glacial
Cold			Periglacial
Cool Temperate	Temperate Deciduous Forest (British Type)	Coniferous Forest Taiga (Siberian type)	Mixed Forest Laurentian type
Warm Temperate	Forests and Scrubs Mediterranean type	Temperate grassland Steppes type	Warm wet forest China type
Hot tropical	Desert vegetation Hot desert	Savanna Vegetation Sudan type	Tropical deciduous forest Monsoon type
Equatorial	Equatorial Rainforest Hot Wet Equatorial Climate		

Fig: ***Classification of vegetation types***


INDIA
Natural Vegetation
N
AFGHANISTAN
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
MYANMAR
SRI LANKA
JAMMU AND KASHMIR
HIMACHAL PRADESH
CHANDIGARH
PUNJAB
UTTARAKHAND
HARYANA
DELHI
RAJASTHAN
UTTAR PRADESH
BIHAR
SIKKIM
ARUNACHAL PRADESH
NAGALAND
ASSAM
MEGHALAYA
MANIPUR
TRIPURA
MIZORAM
JHARKHAND
WEST BENGAL
CHHATTISGARH
MADHYA PRADESH
GUJARAT
DAMAN & DIU
DADRA & NAGAR HAVELI
MAHARASHTRA
ODISHA
TELANGANA
ANDHRA PRADESH
GOA
KARNATAKA
KERALA
TAMIL NADU
PUDUCHERRY
LAKSHADWEEP (INDIA)
ANDAMAN & NICOBAR ISLANDS (INDIA)
BAY OF BENGAL
ARABIAN SEA
INDIAN OCEAN
LEGEND
Moist Tropical Evergreen, Semi-Evergreen
Tropical Moist Deciduous
Tropical Dry Deciduous
Tropical Thorn
Montane Subtropical and Temperate
Dry Temperate
Alpine
Desert Vegetation
Map not to Scale
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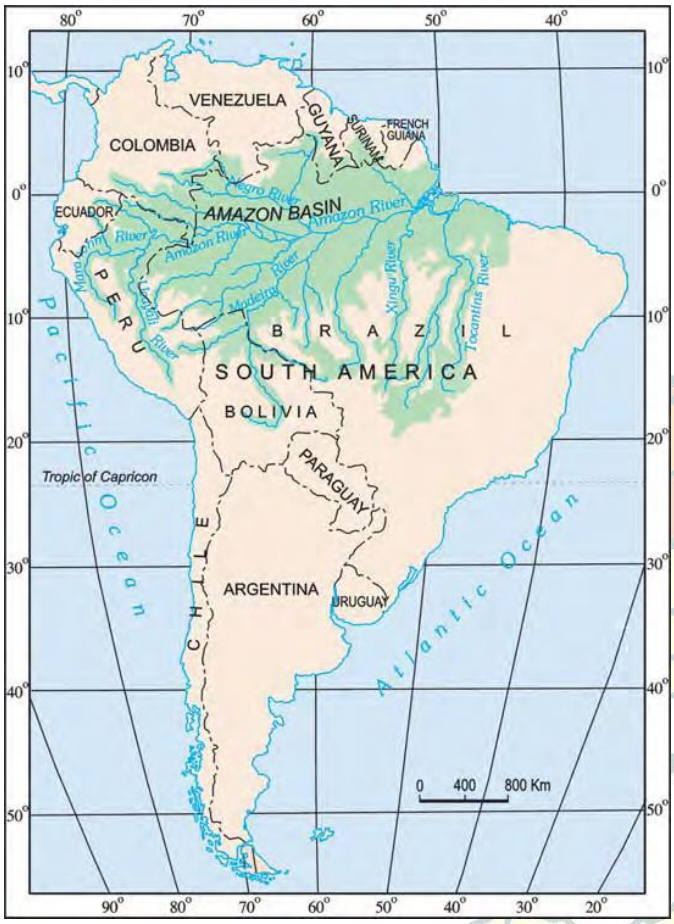
(Updated on 10th July 2015)

Human Environment (Interactions)

Life in Amazon Basin –



Climate:

- The river Amazon flows through the equatorial region.

- Characterized by hot and wet climate throughout the year

- Both day and nights are almost equally hot and humid. It rains almost everyday

- It flows from the mountains to the west and reaches the Atlantic Ocean to the east.

- The river basin drains portions of Brazil, parts of Peru, Bolivia, Ecuador, Columbia and a small part of Venezuela.

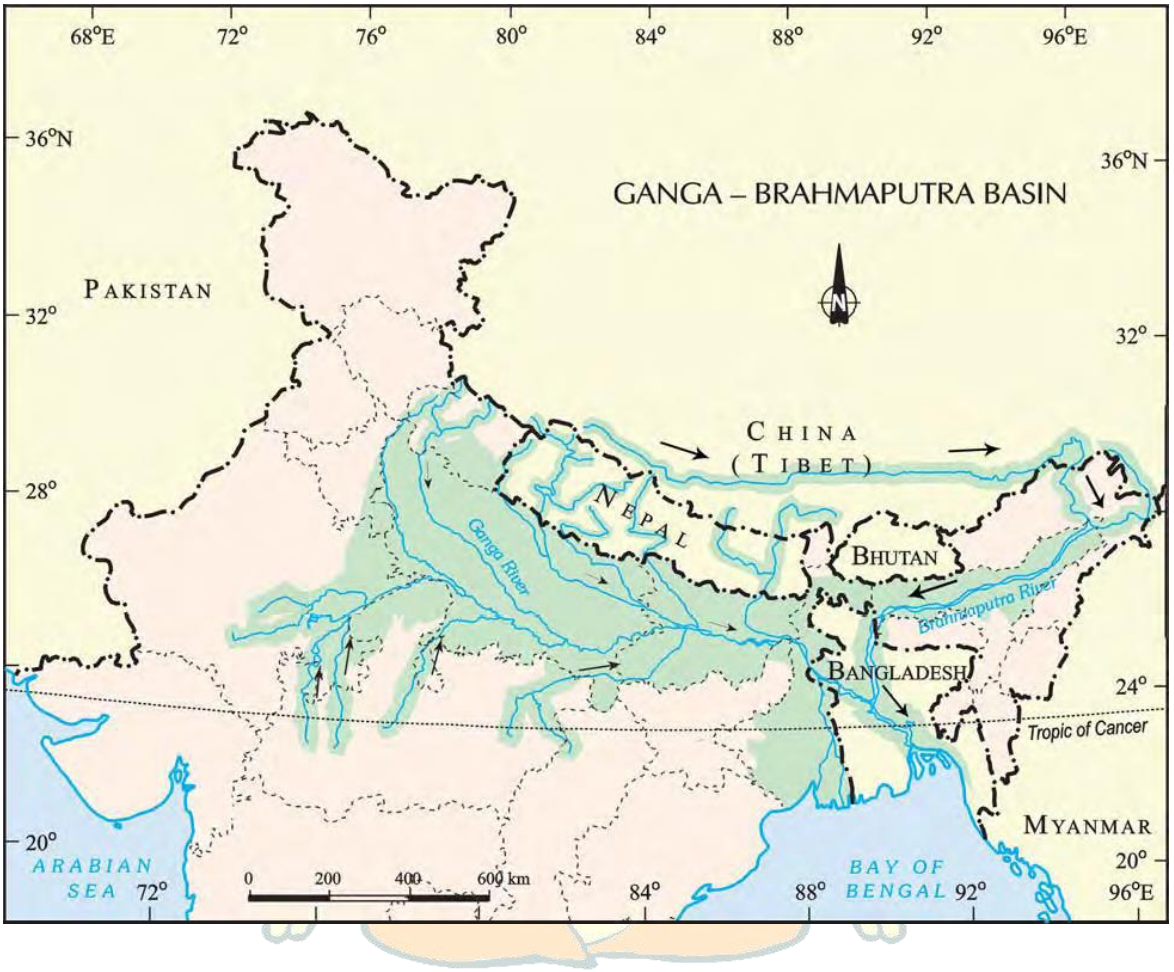
- ***The Amazon Basin is the largest river basin in the world***.

Rainforests and agriculture:

- Largest rainforest in world.
- Region very much similar to Tropical evergreen Forests.
- Orchids, bromeliads grow as plant parasites.
- Bromeliads are special plants that store water in their leaves.
- 'Slash & Burn' agriculture is involved.
- **'Slash & Burn'** ⇒ Way of cultivation, farmers clear pieces of land by cutting trees. Then they burnt them which releases nutrient in soil. Then, they cultivate for few year. Afterward, repeating the process for another piece of land and left the old one to grow trees to regain its fertility.
- Mainly grow tapioca, pineapple and sweet potato
- Cash crops: – Coffee, Maize, Cocoa.
- Apartment like houses called **"Maloca"**

LIFE IN THE GANGA-BRAHMAPUTRA BASIN

- Lies in Sub- Tropic region
- The tributaries of rivers Ganga and Brahmaputra together form the Ganga-Brahmaputra basin.
- Tributaries of Ganga – Ghaghara, Son, Chambal, Kosi, Yamuna
- Himalayas and the Sundarbans delta are the main features of the basin.
- Ox-bow lakes dot the plain area.



Climate:

- The area is dominated by monsoon climate.
- The summers are hot and the winters cool.

Agriculture:

- Agricultural is dominating due to fertile land. Main crop is Paddy.
- Wheat, maize, sorghum, gram and millets are the other crops that are grown.
- Cash crops like sugarcane and jute are also grown. Banana plantations are seen in some areas of the plain. In West Bengal and Assam tea is grown in plantations

Misc:

- Bamboo groves are common in Brahmaputra plain.
- Delta area is covered by Mangrove forests.
- Animals: Bengal Tiger, Crocodiles, Alligator.
- Fishes: Rohu, Catla, Hilsa
- Terrace farming is also adopted.
- Variety of Dolphin, called **SuSu** is found

Life in the Temperate Grasslands

Temperate Grasslands:

- Grassland covers over quarter of total land surface.
- World's grasslands can be divided into two broad categories: temperate grasslands and tropical grasslands.

The Prairies–

- Temperate grasslands of North America are known as the Prairies.
- Prairies are treeless but, near the low lying plains, flanking river valleys, woodlands can be found.
- Tall grasses up to 2 mts – called as **"Sea of Grass"**
- The prairies are bound by the Rocky Mountains in the West and the Great Lakes in the East.
- Prairies cover parts of United States of America and parts of Canada.
- Drained by Rivers –
  - In Canada – Tributaries of Saskatchewan
  - In US – Tributaries of Mississippi.
- Grassland of Prairies was the home of American Indians, more popularly known as **'Blackfoot Indians'.**
- Extreme temperature: S ⇒ 20°C, W ⇒ -20°C
- Annual rainfall is moderate, good for grasses.

- No N-S barrier, hence **local winds 'Chinook'** blows – it is **hot wind** that blows in winter and therefore raises the temperature in short time. Resulting in melting snow, making pasture available for grazing.

Agriculture:

- Major crop is Maize; others are potato, soybean, cotton, alfa-alfa.
- Large cattle farms called Ranches.
- Bison i.e. American Buffalo found (Now Protected Species).
- Prairies are also known as "Granaries of world" due to huge surplus of wheat.
- Dairy farming and Extensive Agriculture.

Important Cities:

- US – Chicago, Minneapolis, Indianapolis Kansas, Denver
- Canada – Edmonton, Saskatoon, Calgary, Winnipeg.

The Velds –

- Temperate grassland of S.Africa. (see fig)
- Velds lie in the Southern hemisphere
- Velds are rolling plateaus with varying heights ranging from 600 m to 1100 m.
- Bonded by Drakansburg Mts in east and Kalahari desert in west.
- On the northeastern part, "high velds" are located that attain a height of more than 1600 m.
- The tributaries of rivers Orange and Limpopo drain the region.

Climate:

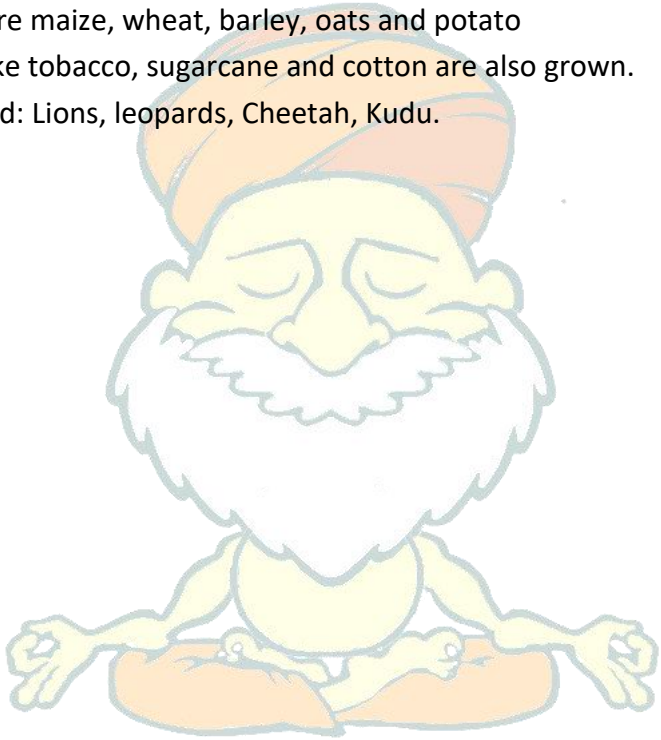
- Velds lie in the Southern hemisphere
- have a mild climate due to the influence of the Indian Ocean
- Winters are cold and dry. Temperatures vary between 5°C and 10°C.
- Summers are short and warm.
- Velds receive rainfall mainly in the summer months. This is mainly because of the warm ocean currents that wash the shores of the velds.

Vegetation and activities:

- Vegetation cover is sparse. Soil is not fertile in Velds, due to discontinuous grasses.
- Red grasses are grown in bush velds, Acacia and Maroola are grown in High velds.
- Known for cattle rearing and mining. Sheep rearing is most imp.(Merino Sheep give warm clothes)
- Dairy farming is next important occupation
- Velds have high reserves of minerals. – Iron, steel, coal. Gold & Diamond mining is major occupation.
- Johannesburg is known as 'Gold Capital of World'.
- Kimberley for its diamond mines.

Agriculture and Animals:

- Main crops are maize, wheat, barley, oats and potato
- Cash crops like tobacco, sugarcane and cotton are also grown.
- Animals found: Lions, leopards, Cheetah, Kudu.

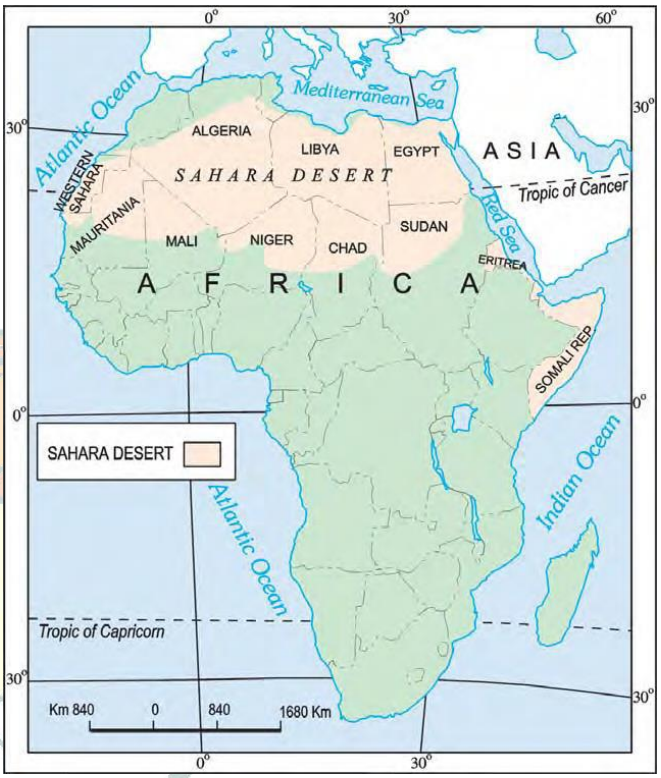


Life in the Desert

Desert is an arid region characterized by extremely high and low temperature and scarce vegetation.

Hot Desert – Sahara

- Sahara desert covers a large part of North Africa
- World's largest desert
- Touches 11 countries - Algeria, Chad, Egypt, Libya, Mali, Mauritania, Morocco, Niger, Sudan, Tunisia, and Western Sahara.
- Surface covered with sand, also gravel plains and elevated plateaus with bare rock surface (>2500m).
- Historical evidences shows that earlier Sahara was once lush green plain.



Do you know?

Al Azizia in the Sahara desert, south of Tripoli, Libya recorded the highest temperature of 57.7°C in 1922.

Climate:

- Scorching hot and parch dry.
- Short rainy season.
- Sky is cloudless and clear.
- Days are unbelievably hot (50°C) nights nearly 0°C

Vegetation:

- Cactus, Date, Palms, Acacia.
- Depressions are formed, when the wind blows away sand and the underground water reaches the surface, hence Oasis is formed, which makes land fertile.
- Sometimes Oasis can be of abnormal size – Eg. Tafilalet Oasis in Morocco is large with 13,000 sq.km.
- Near Oasis: Green islands with date palms.

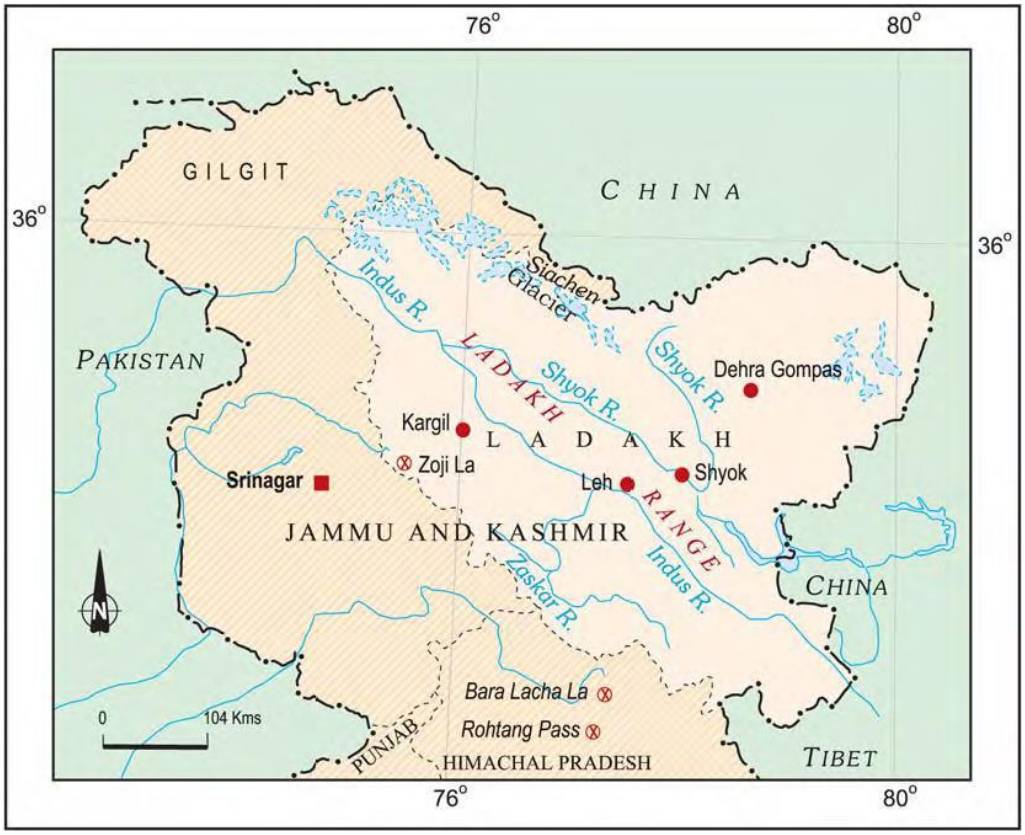
Animals:

- Camels, Hyena, Jackals, Foxes, Scorpions, Snake, Lizards
- **Tribes** like Bedouins and Tuaregs rearing livestock.
- Sahara Oasis and Nile river provide water to reared livestock.

Activities:

- Egyptian cotton famous worldwide.
- Oil – Algeria, Libya, Egypt.
- Other minerals - Iron, Phosphorous, Magnesium, Uranium.

Cold Desert – Ladakh



- Ladakh is also known as Khapa-chan which means snow land.
- 'La' – Mountain Pass; 'Dak' – country
- Bounded by Karakoram in north and Zanskar in south.
- River flowing through Ladakh – Indus , Glacier found in Ladakh – Gangri
- Altitude in Ladakh varies around – 3000m (in Kargil) – 8000m (in Karakoram).

Climate:

- Air is so thin, that heat of sun can be felt intensely.
- day temperatures in summer are just above zero degree

- Night temperatures well below –30°C.
- It is freezing cold in the winters (below –40°C for most of the time).
- As it lies in the rain shadow of the Himalayas, there is little rainfall (10 cm every year)

Flora and Fauna:

- Vegetation in Sparse. There are scanty patches of grasses and shrubs for animals to graze.
- Summers: Apple, apricot, walnuts bloom.
- Birds: Robins, Redstarts, Tibetan Snowcock, Raven and Hoopoe.
- Animals: Wild goats, Wild Sheep, Yak and special kind of dogs.

Commercial Activities:

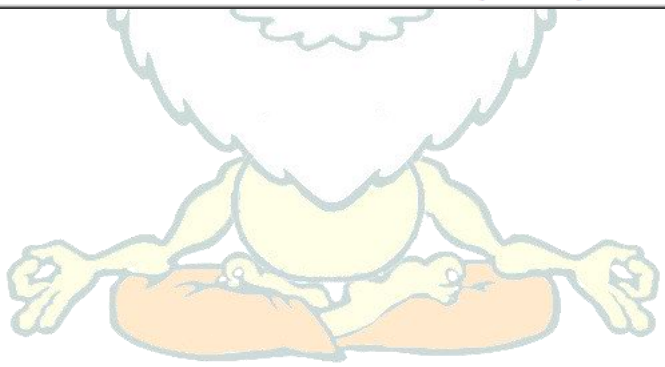
- Yak milk is used for Cheese and butter.
- Finest cricket bats of wood of willow tree.
- Chiru or Tibetan antelope is an endangered species. It is hunted for its wool known as ***Shahtoosh*** (extreme light and warm).

Tourism:

- People here are mainly Buddhists & Muslims.
- Several Buddhists monasteries dot the Ladakhi landscape with their traditional 'gompas'.
- NH-1A connects Leh to Kashmir thru Zoji-la-pass.
- Largely tourist base due to its beauty and Buddhist gompas.
- Manali – Leh Highway crosses 4 passes – Rohtang La, Baralacha La, Lungalacha La and Tanglang La.

World Climatic Types

Climatic Zone	*Latitude (Approximate)*	*Climatic Type*	*Rainfall Regime (with approx. total)*	*Natural Vegetation*
Equatorial Zone	0°-10°N and S	1. Hot, wet equatorial	Rainfall all year round : 80 inches	Equatorial rain forests
Hot Zone	10°-30°N and S	2. a) Tropical Monsoon	Heavy summer rain: 80 binches	Monsoon forests
		b) Tropical Marine	Much summer rain: 70 inches	
		3. Sudan Type	Rain mainly in summer: 30 inches	Savanna (tropical grassland)
		4. Desert: a) Saharan type	Little	Desert vegetation and scrub
		b) Mid-latitude type	rain: 5 inches	
Warm Temperate Zone	30-°40°N & S	Western Margin (Mediterranean type)	Winter rain: 35 inches	Mediterranean forests and shrub
		6. Central Continental (Steppe type)	Light summer rain: 20 inches	Steppe or temperate grassland
		7. Eastern Margin: a) China type	Heavier summer rain : 20 inches	Wawrm, wet forests and bamboo
		b) Gulf type		
		c) Natal type		
Cool Temperate Zone	45°-65°N & S	8. Western Margin (British type)	More rain in autumn & winter : 30 inches	Decidous forests
		9. Central Continental (Siberian type)	Light summer rain: 25 inches	Evergreen coniferous forests
		10. Eastern Margin (Laurentian type)	Moderate summer rain : 40 inches	Mixed forests (coniferous and deciduous)
Cold Zone	65°-90° N & S	11. Arctic or Polar	Very light summer rain : 10 inches	Tundra, mosses, lichens
Alpine Zone		12. Mountain climate	Heavy rainfall (variable)	Alpine pastures, confiers, fern, snow



Resources

Resource: *"Anything that can be used to satisfy a need is a resource"(NCERT definition)*

A **resource** is a source or supply from which benefit is produced. Typically resources are materials, energy, services, staff, knowledge, or other assets that are transformed to produce benefit and in the process may be consumed or made unavailable. Benefits of resource utilization may include increased wealth, meeting needs or wants, proper functioning of a system, or enhanced well-being. From a human perspective a natural resource is anything obtained from the environment to satisfy human needs and wants.

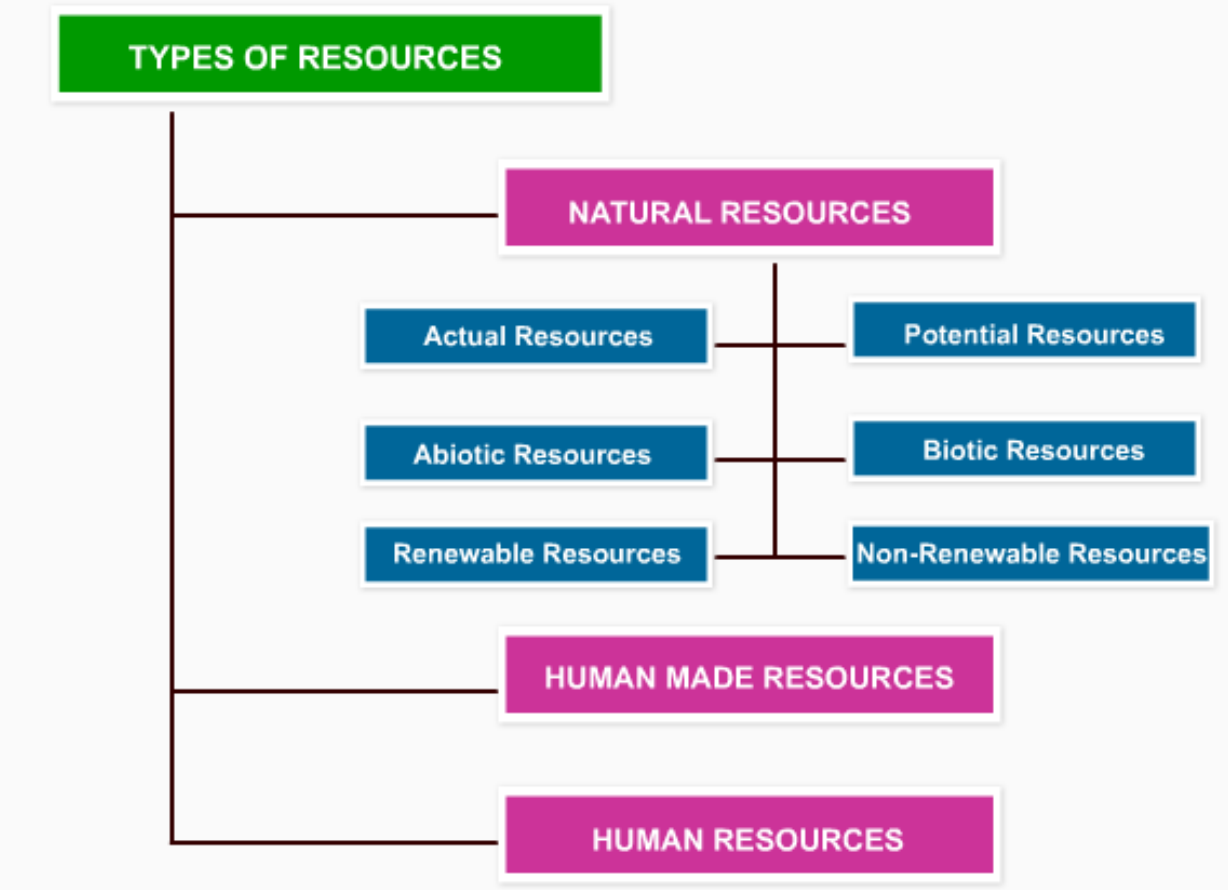
All resources have two things in common- Utility and Value

Utility: Utility or Usability is what makes a substance a resource.

Value: Value refers to its worth. Some resources have tangible economic value like petrol, while others might not have an economic value, but they will still be resources, like a beautiful landscape, fresh air etc.

An important point to be remembered is that "Resources are not, they *become*"

Utility of a substance or object depends upon the time and the technology available. Time and technology are two important factors that can change substances into resources. Both are related to the needs of the people. People themselves are the most important resource. It is their ideas, knowledge, inventions and discoveries that lead to the creation of more resources. Each discovery or invention leads to many others. The discovery of fire led to the practice of cooking and other processes while the invention of the wheel ultimately resulted in development of newer modes of transport. The technology to create hydroelectricity has turned energy in fast flowing water into an important resource.



Resources are broadly classified as- Natural Resources, Human-made resources and Human Resources

Natural Resources: Natural resources are the materials provided by the nature that can be directly or indirectly used by humans for their personal or economic gain. The Earth's *natural resources* are vital to the survival and development of the human population. A natural resources value rests in the amount available and the demand for it.

Some examples of natural resources are: Sunlight, Water, sir, minerals, Plants and animals etc.

Depending upon various factors, Natural Resources are further classified into different categories.

Based on the need of development:

On the basis of need of development, the resources are classified as –

- Directly usable resources
- Resources that need development

Resources that need development are further classified into –

- Actual Resources
- Potential Resources

Actual Resources: Actual resources are those which are currently being used. They are already surveyed and quantified to a large extent. Eg- Coal, petroleum, metal ores, Forests etc.

Potential Resources: These are those resources which are present in a region but are not currently used. This can be due to non-availability of technology or proper amount. These resources can be potentially used in future. Eg: Thorium found in Kerala is a potential resource that can be used in future.

(NOTE: Do find more examples of potential resources.)

Based on the origin of Natural Resource:

On the basis of origin, natural resources are classified into Biotic and Abiotic.

Abiotic Natural Resource: These resources have an inorganic origin i.e. they comprise of non-living things like land, water, air, metals etc.

Their use and viability depends upon their accessibility and their value. Their total reserve cannot be increased by human efforts.

Biotic Natural Resources: These resources have an organic origin. These include forests and forest product, flora and fauna, and also coal, petroleum etc.

Based on availability and distribution of the resource:

This is the most famous classification which you must have read many times.

On the basis of availability, the natural resources are classified as –

- Renewable Resources
- Non-Renewable Resources

Renewable resources are those which can be replenished by nature in a short period of time. These include, air, water, crops, forests etc. However, their rate of replenishment can differ according to the resource.

Non-renewable resources are formed over a very long geological period. These include minerals and fossil fuels. Since their rate of formation is very slow, they cannot be

replenished quickly once they are used. Hence their supply is limited and exhaustible. There are some resources which can be recycled, like metals etc. while some resources cannot be recycled

Eg. Coal, Natural gas, etc

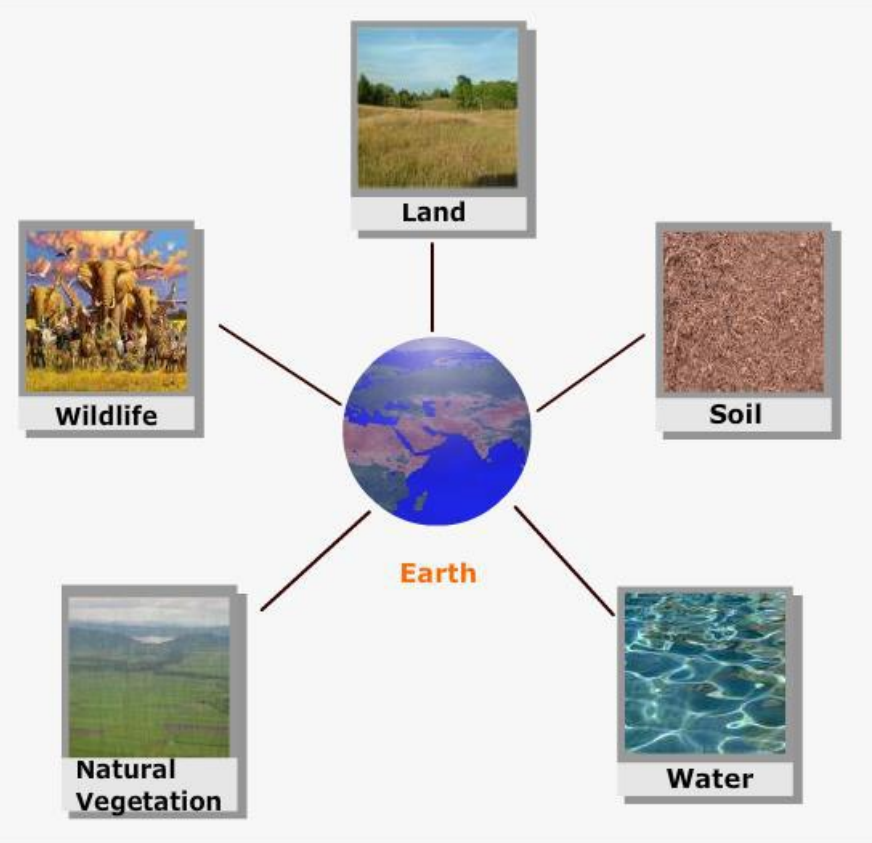
After Industrial revolution and population blast, the demand for these resources increased exponentially. This not only resulted in quick depletion of these resources but also caused ecological imbalance, destruction of habitat and pollution.

To prevent all this destruction, the idea of **Sustainable development** was put forward.

Sustainable development will be dealt in detail in Environment Value Add in later sets.

Land, Soil, Water, Natural vegetation and Wildlife

Chapter deals with the basic natural resources which are necessary for the survival of human beings.



LAND

Land: Land is the most important resource not only for the mankind, but for all living organisms.

Land covers only about 30% of the total earth's surface, and rest is covered by oceans.

Basic uses of Land:

- Land provides a solid surface to the living organisms.
- We get our food directly or indirectly from plants and trees grown on land.
- The entire hard infrastructure (houses, roads, railway tracks etc) is built on the land as a base.
- Minerals are extracted from the land.

Almost 90% of the world's population is concentrated on 30% of the available area. This distribution of population is mainly because of varied land and climatic conditions. Land has many topographical features which makes it difficult for man to settle anywhere. There are variety of landforms (We will deal with them in detail in coming Sets)-

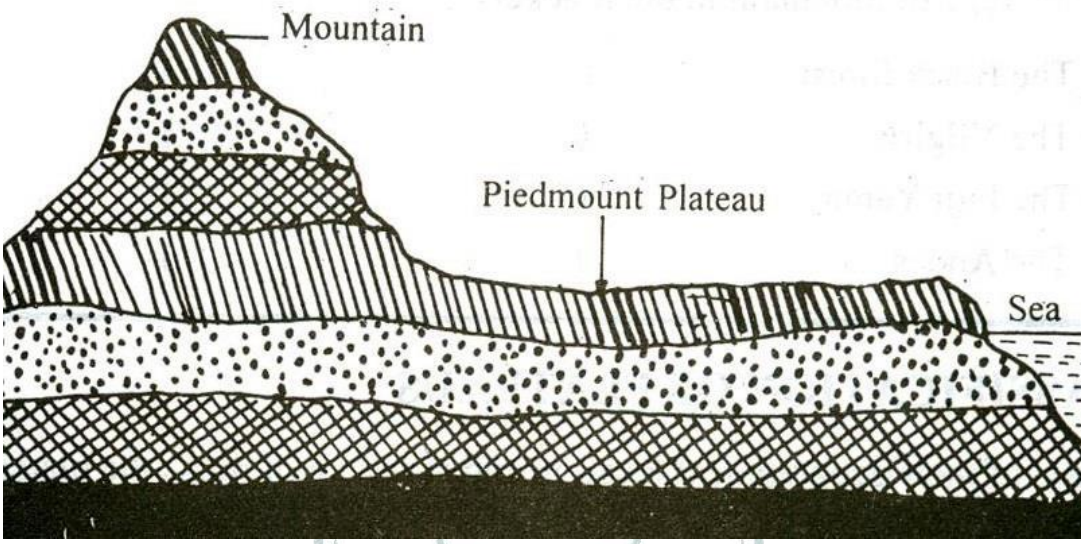
- Valleys
- Plateaus
- Mountains
- Plains
- Hills
- Glaciers

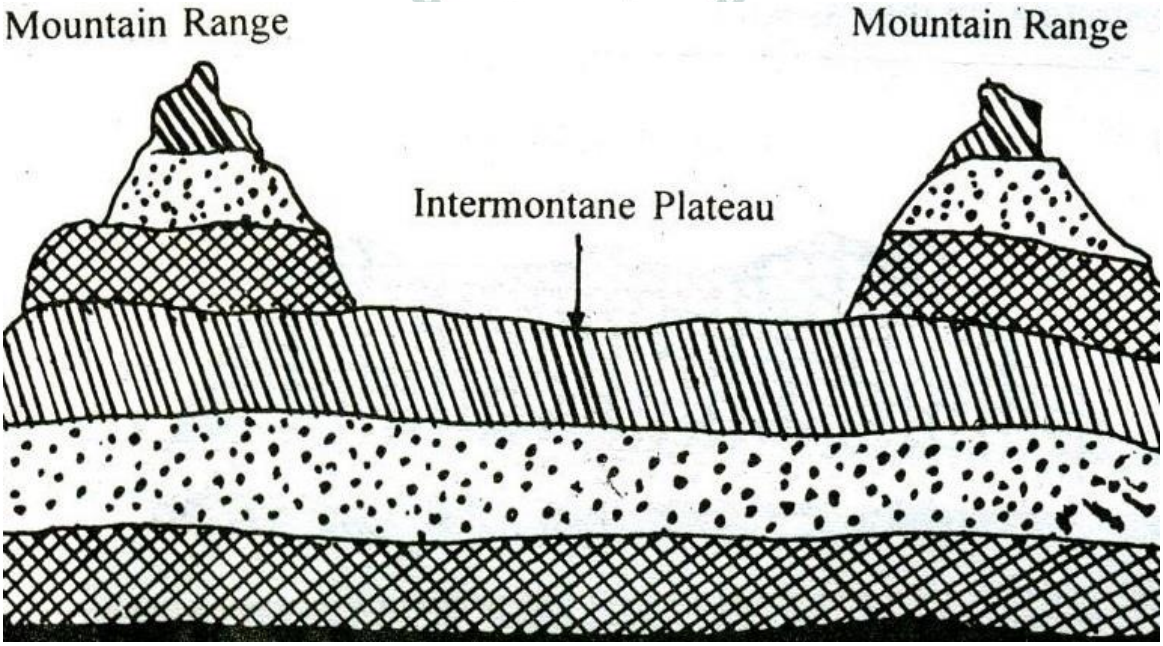
Valley: A **valley** is a type of land formation. A valley is a lower part in the land, between two higher parts which might be hills or mountains. Valleys often start as a downward fold between two upward folds in the surface of the Earth. A valley is made deeper by a stream of water or a river as it flows from the high land to the lower land, and into a lake or sea. Some valleys are made by glaciers which are slow-moving rivers of ice.

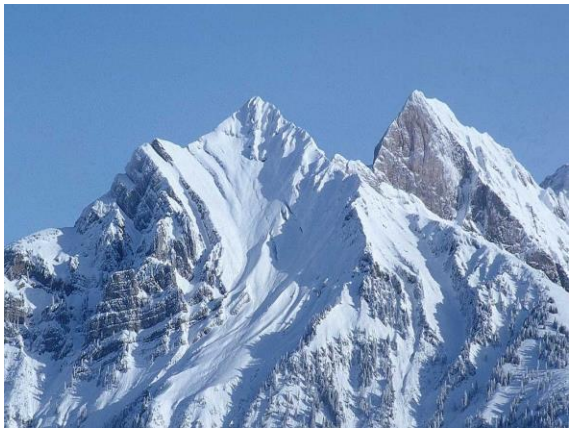
Plateau: A **plateau,** also called a **high plain** or **tableland**, is an area of highland, usually consisting of relatively flat terrain that is raised significantly above the surrounding area, often with one or more sides with steep slopes.

- May have one or more sides with steep slopes—Varied heights
- May be young or old
- **The Deccan plateau in India:** One of the oldest plateaus

- **The Tibet plateau:** The highest plateau in the world with a height of 4,000 to 6,000 metres above the mean sea level
- **Waterfall:** Hundru falls in the Chhotanagpur plateau on the river Subarnarekha and the Jog falls in Karnataka
- **Usage:** Rich in mineral deposits—many of the mining areas in the world are located in the plateau areas
  - ✓ **African plateau:** gold and diamond mining
  - ✓ **Chhotanagpur plateau in India:** Huge reserves of iron, coal and manganese
  - ✓ **Lava plateaus** are rich in black soil that are fertile and good for cultivation

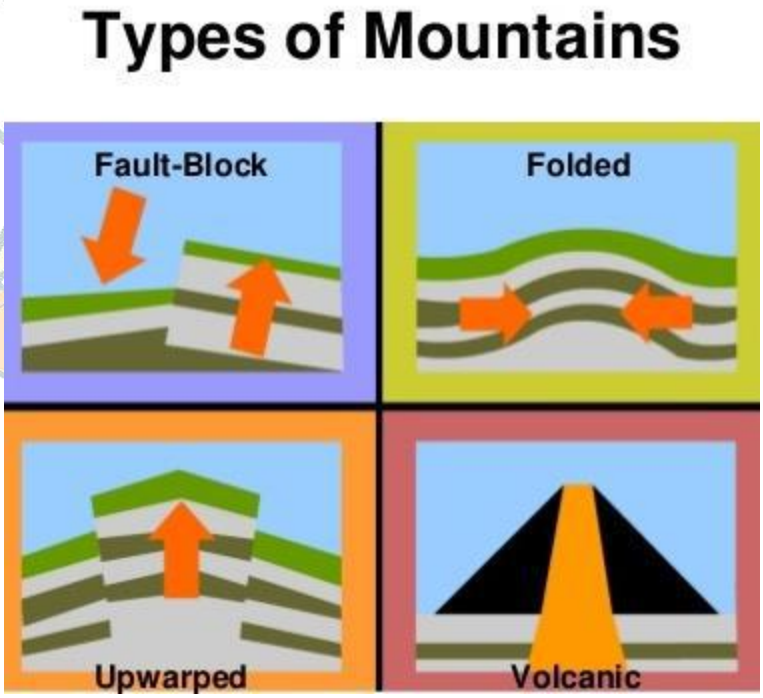




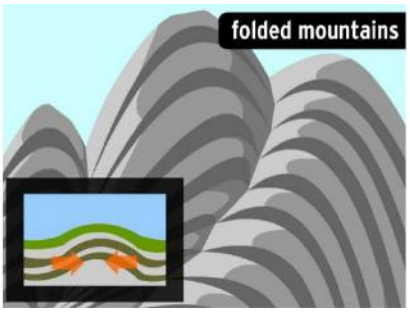


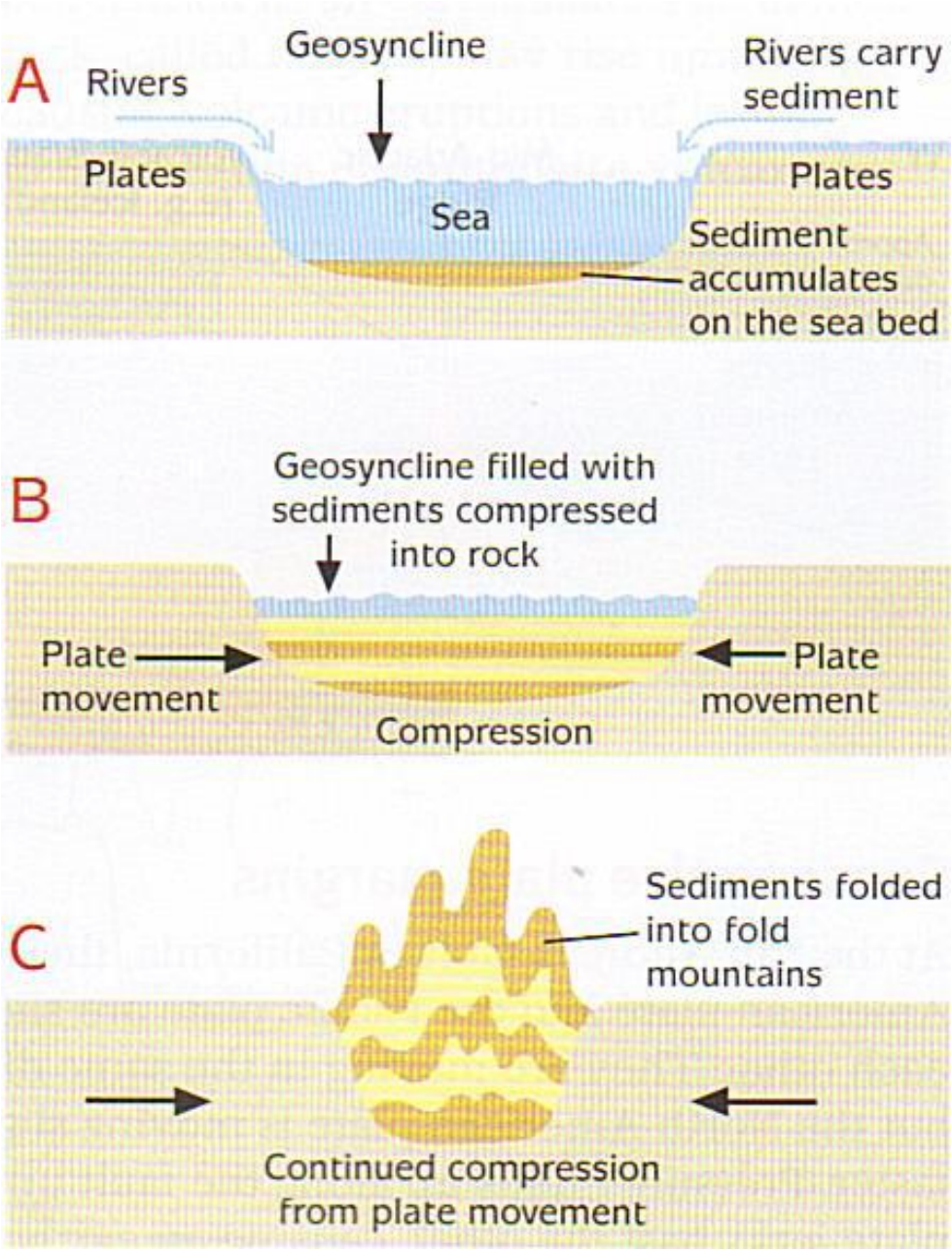
Mountain: A *mountain* is a large landform that stretches above the surrounding land in a limited area, usually in the form of a peak. A *mountain* is generally steeper than a hill. *Mountains* are formed through tectonic forces or volcanism.

- May have a small summit and a broad base
- Is considerably higher than the surrounding area
- ***Range:*** Mountains arranged in a line; The Himalayas, the Alps and the Andes are mountain ranges of Asia, Europe and South America, respectively
- ***Glaciers:*** permanently frozen rivers of ice on mountains



Fold Mountains



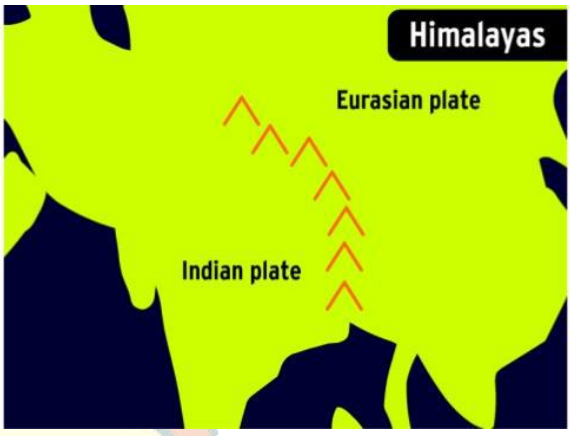


Formation of a Fold Mountain

The Aravali range in India: One of the oldest fold mountain systems in the world— worn down due to the processes of erosion

The Appalachians in North America and the Ural Mountains in Russia: Very old fold mountains with rounded features and low elevation

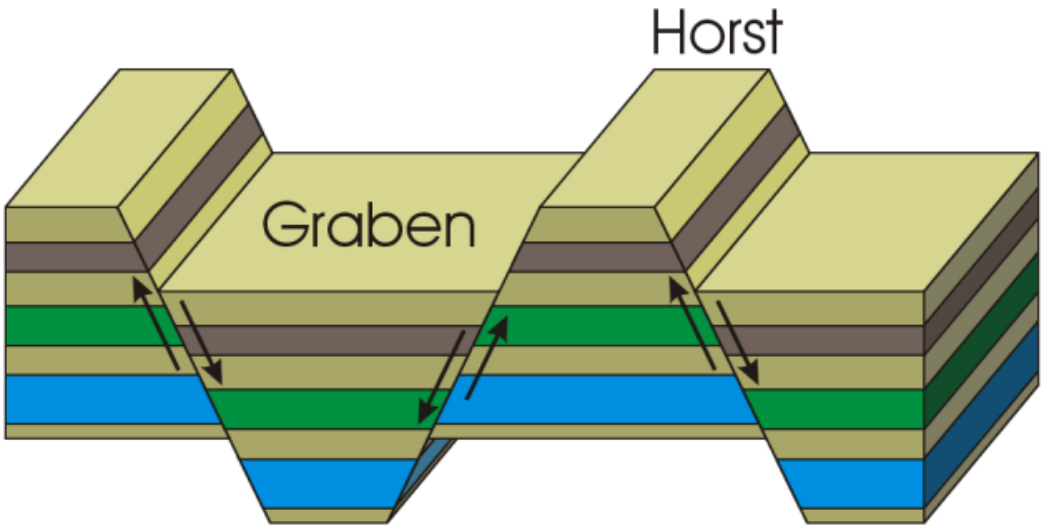
The Himalayan Mountains and the Alps: Young fold mountains with rugged relief and high conical peaks



Block Mountains

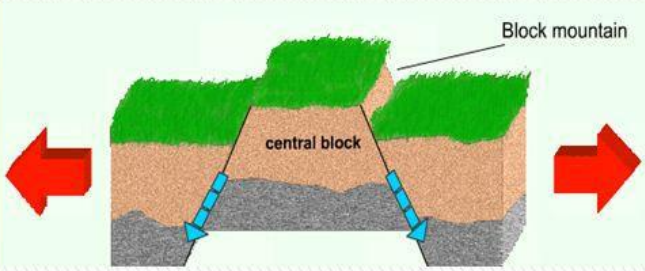
Created when large areas are broken and displaced vertically

- Uplifted blocks: Horsts
- Lowered blocks: Graben
- Eg: The Rhine valley and the Vosges mountain in Europe



Formation of Block Mountains by:

TENSION

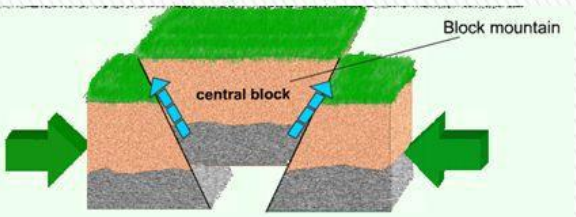


- Normal Faults
- Rock layers are pulled apart
- Side blocks are lowered relative to the central block

Examples: Death Valley, California (USA), Black Forest (Germany)

COMPRESSION

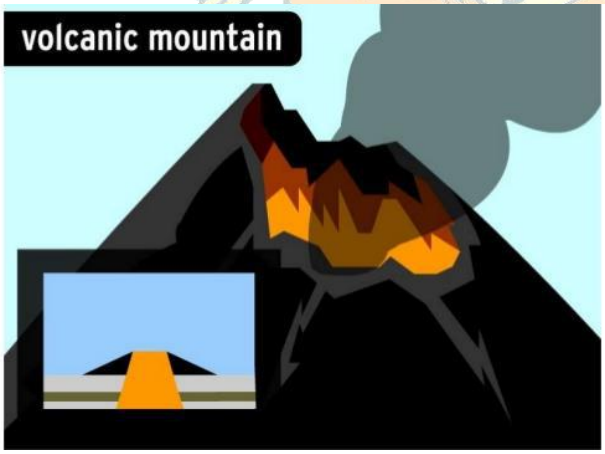
- Reverse faults
- Rock layers are compressed
- Central block is pushed upwards
- Overhanging escarpment

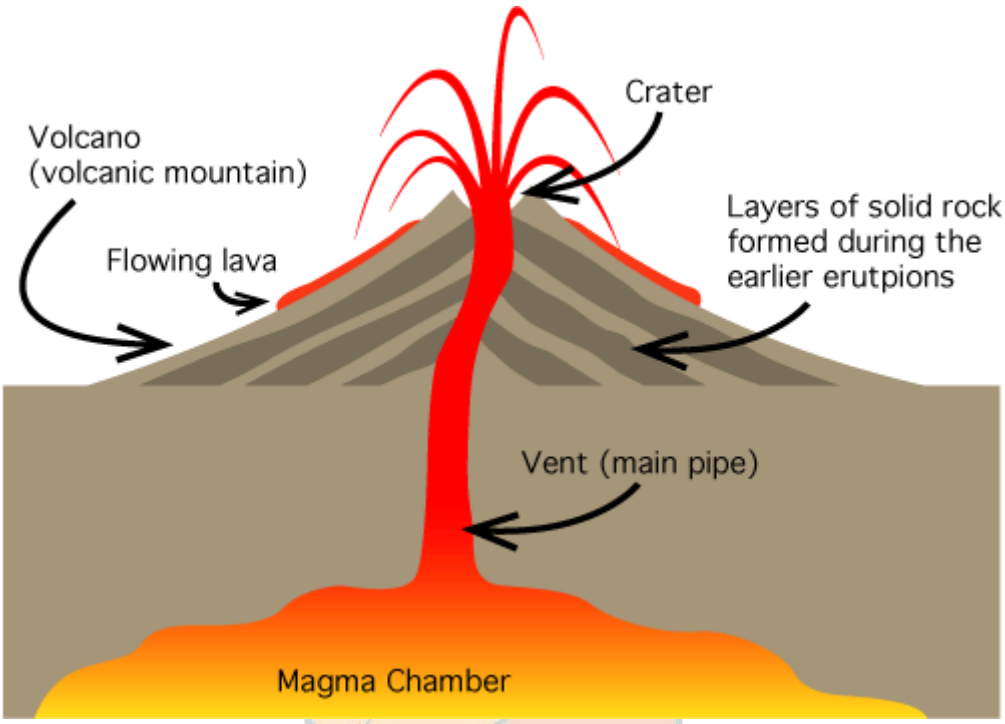


Examples: Sierra Nevada (USA), Flinders Range (Australia), The Tetons (USA)

Volcanic Mountains

- Formed due to volcanic activity
- Eg: Mt. Kilimanjaro in Africa and Mt. Fujiyama in Japan





Plains: In geography, a **plain** is a flat area. Plains occur as lowlands and at the bottoms of valleys but also on plateaus or uplands at high elevations. In a valley, a plain is enclosed on two sides but in other cases a plain may be delineated by a complete or partial ring of hills, by mountains or cliffs.

Features:

- Levelled, slightly rolling and undulating
- Most of the plains are formed by rivers and their tributaries→rivers flow down the slopes of mountains and erode them and carry forward the eroded material which they deposit as load consisting of stones, sand and silt along their courses and in their valleys leading to the formation of plains

Benefits:

- Very fertile- highly productive for cultivation (Indo-Gangetic plains)

- Easy construction of transport network
- More flat land is available for building houses

Thus, these plains are very thickly-populated regions of the world

Places where Population is sparsely populated:

- Steep slopes of the mountains
- Deserts
- Low lying areas susceptible to water logging
- Thick forested areas
- Areas with permafrost

Places with dense population:

- Plains
- River valleys

The utilization of land is determined by the physical features of the region:

- Landscape
- Soil
- Climate
- Availability of minerals
- Human Population
- Technology

On the basis of ownership, land can be divided into-

- **Private Land:** Land owned by individuals
- **Community Land:** Land owned by the community or government and which is used for common purposes.

Increasing Demand for Land:

- With rapid increase in population, there has been an exponential rise in the demand of usable land.
- Encroachment of humans is increasing on wild lands. More land is required for housing and other infrastructure.
- More forests are being cleared for agricultural land to feed the teaming billions.
- More land is needed for mining and resultant industries.

This over exploitation of land has resulted into disastrous environmental changes:

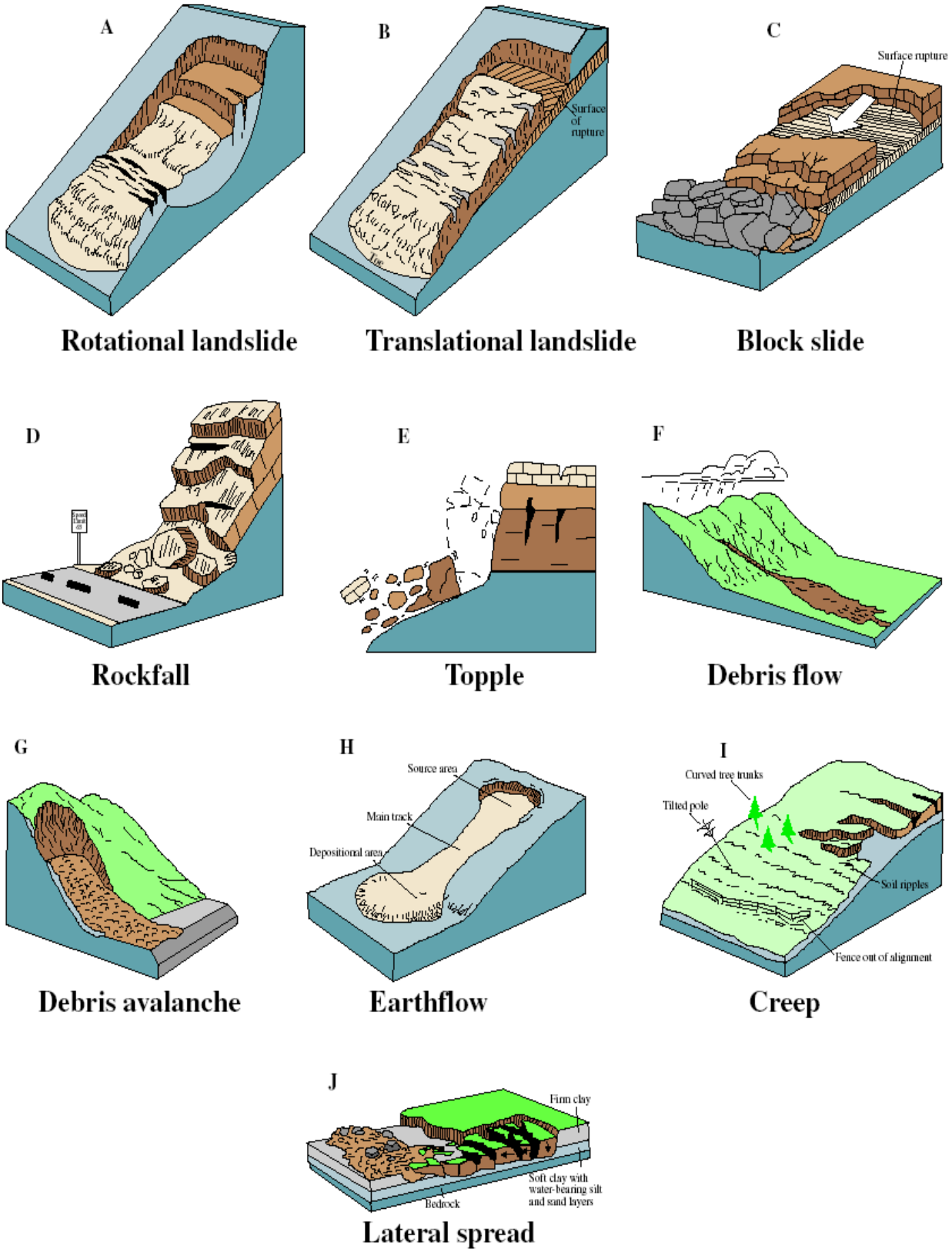
- Land degradation
- Land slides
- Soil erosion
- Desertification
- Loss of habitat

Landslides

A landslide is the movement of rock, debris or earth down a slope. They result from the failure of the materials which make up the hill slope and are driven by the force of gravity. *Landslides* are known also as landslips, slumps or slope failure.

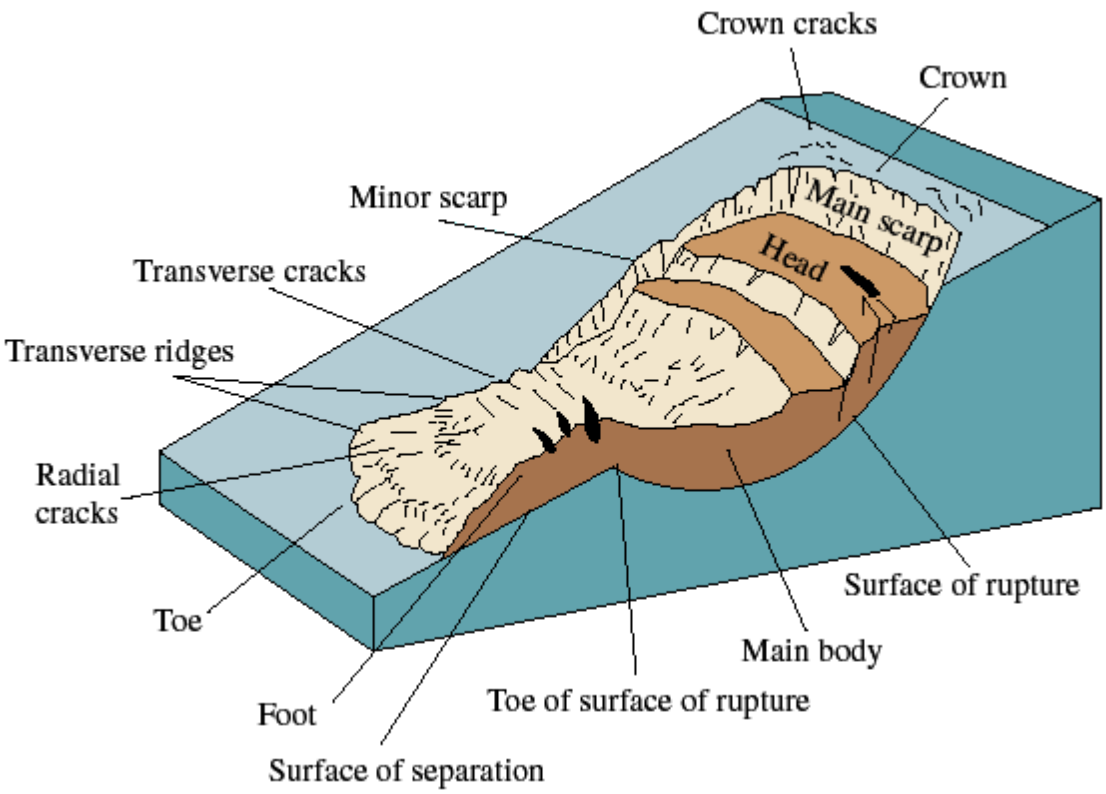
Types of landslide Movements:

- **Falls** are masses dislodged from very steep slopes or escarpments which then free-fall, bounce, or roll downslope. Falls usually move extremely rapidly.
- **Topples** are a forward rotation around a pivot point low or below one or more masses.
- **Lateral spreads** are the result of movement involving lateral extension accommodated by shear or tensile fractures. This type of movement is earthquake-induced.
- **Slides** displace masses along one or more discrete planes. Slides may either be rotational or translational in their movement.
- **Rotational movement** is where the plane is curved. The mass rotates backwards around a common point with an axis parallel to the slope.
- **Translational movement** is where the plane is more or less planar or gently undulating. The mass moves roughly parallel to the ground surface.
- **Flows** are masses moving as a deforming, viscous unit without a discrete failure plane.
- More than one form of movement may be represented in some landslides. Movement in this case is often described as **complex.**



Types of Land Slides

Parts of Landslide



Causes of Landslides:

Natural Causes:

- Ground water pressure acting on the slope.
- Loss of vegetation
- Weakening of slope due to melting of glacier or heavy rainfall
- Earthquakes
- Volcanic eruptions

Human Causes:

- Vibrations from machinery
- Blasting of mines
- Earthwork which alters the slope
- Construction, agriculture or forestry activities which can affect the amount of water entering the soil

Prevention of Landslides:

Many methods are used to remedy landslide problems. The best solution, of course, is to avoid landslide-prone areas altogether.

Listed below are some common remedial methods used when landslide-prone slopes cannot be avoided:

Improving surface and subsurface drainage: Because water is a main factor in landslides, improving surface and subsurface drainage at the site can increase the stability of a landslide-prone slope. Surface water should be diverted away from the landslide-prone region by channeling water in a lined drainage ditch or sewer pipe to the base of the slope. The water should be diverted in such a way as to avoid triggering a landslide adjacent to the site. Surface water should not be allowed to pond on the landslide-prone slope.

Excavating the head: Removing the soil and rock at the head of the landslide decreases the driving pressure and can slow or stop a landslide. Additional soil and rock above the landslide will need to be removed to prevent a new landslide from forming upslope. Flattening the slope angle at the top of the hill can help stabilize landslide-prone slopes.

Buttressing the toe: If the toe of the landslide is at the base of the slope, fill can be placed over the toe and along the base of the slope. The fill increases the resisting forces along the failure surface in the toe area. This, in turn, blocks the material in the head from moving toward the toe.

Constructing piles and retaining walls: Piles are metal beams that are either driven into the soil or placed in drill holes. Properly placed piles should extend into a competent rock layer below the landslide. Wooden beams and telephone poles are not recommended for use as piles because they lack strength and can rot.

Removal and replacement: Landslide-prone soil and rock can be removed and replaced with stronger materials, such as silty or sandy soils.

Preserving vegetation: Trees, grasses, and vegetation can minimize the amount of water infiltrating into the soil, slow the erosion caused by surface-water flow, and remove water from the soil.

Rock fall protection: Rock falls are contained by—

- Ditches at the base of the rock exposure
- Heavy-duty fences
- Concrete catch walls that slow errant boulders that have broken free from the rock outcrop

SOIL

Soil can be defined as the organic and inorganic materials on the surface of the Earth that provides the medium for plant growth.

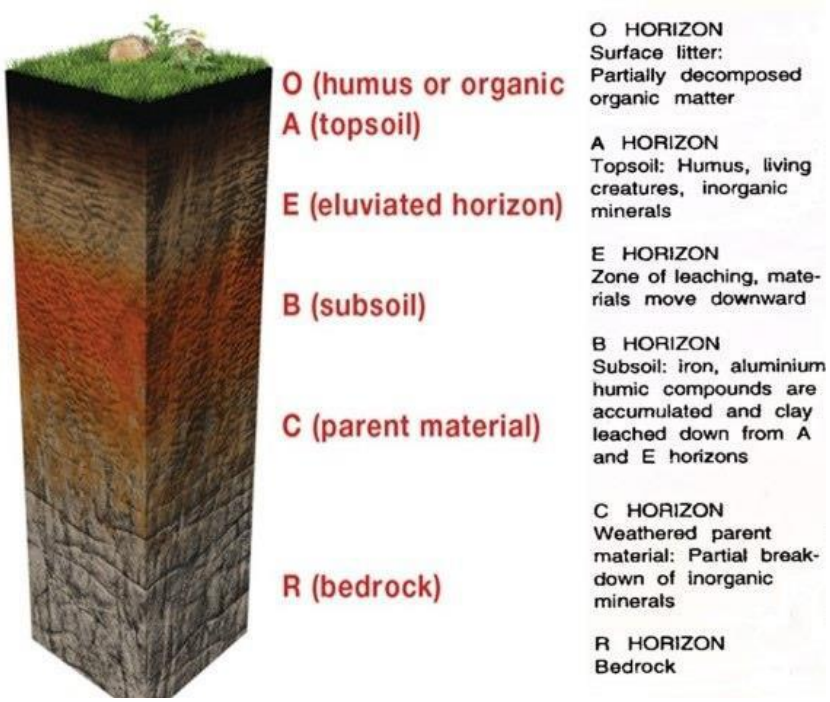
Inorganic materials, or those materials that are not living, include weathered rocks and minerals. **Weathering** is the mechanical or chemical process by which rocks are broken down into smaller pieces. As rocks are broken down, they mix with organic materials, which are those materials that originate from living organisms. For example, plants and animals die and decompose, releasing nutrients back into the soil.

(*The process of weathering will be covered in detail in later blocks*.)

Soil Profile:

If you look in a soil pit or on a roadside cut, you will see various layers in the soil. These layers are called **soil horizons**. The arrangement of these horizons in a soil is known as a **soil profile**. Soil scientists, who are also called pedologists, observe and describe soil profiles and soil horizons to classify and interpret the soil for various uses.

Soil horizons differ in a number of easily seen soil properties such as color, texture, structure, and thickness. Other properties are less visible. Properties, such as chemical and mineral content, consistence, and reaction require special laboratory tests. All these properties are used to define types of soil horizons.

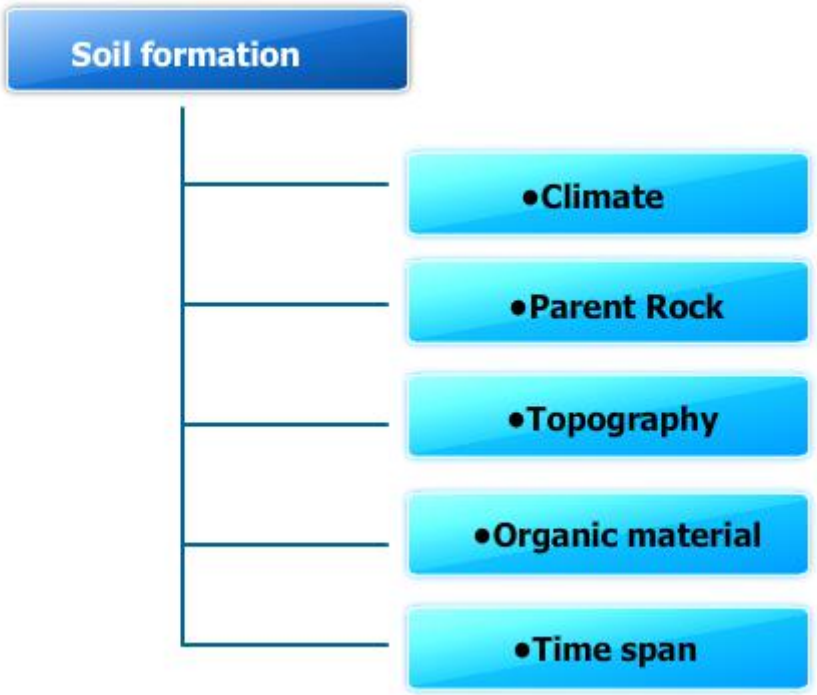


Soil scientists use the capital letters **O**, **A**, **B**, **C**, and **E** to identify the master horizons, and lowercase letters for distinctions of these horizons. Most soils have three major horizons –

- the surface horizon (**A**),
- the subsoil (**B**)
- the substratum (**C**).

Some soils have an organic horizon (**O**) on the surface, but this horizon can also be buried. The master horizon, **E**, is used for subsurface horizons that have a significant loss of minerals (eluviation). Hard bedrock, which is not soil, uses the letter **R**.

Factors of Soil formation:



Formation of soil is a very slow process and it takes thousands of years for the formation of one cm soil.

Climate: Temperature and humidity decides the rate of weathering of rocks and amount of humus in soil.

Parent Rock: Decides the colour, minerals and grain size of soil.

Topography: Slope and altitude decides the accumulation of soil on the surface. Slopes usually have thin layer of soil.

Organic Material: flora, fauna and microorganisms decide the formation of humus in the soil.

Time: Time is the most important factor for the soil formation. Time decides the formation of zones in soil. It also decides it thickness.

Soil Degradation:

Soil degradation is the decline in soil quality caused by its improper use, usually for agricultural, pastoral, industrial or urban purposes.

Soil degradation is a serious global environmental problem and may be exacerbated by climate change. It encompasses physical, chemical and biological deterioration. Examples of soil degradation include

- Loss of organic matter
- Decline in soil fertility
- Decline in structural condition
- Erosion
- Adverse changes in salinity
- Acidity or alkalinity
- The effects of toxic chemicals, pollutants or excessive flooding.

Soils host the majority of the world's biodiversity and healthy soils are essential to securing food and fibre production and providing an adequate water supply over the long term. Ecosystem services provided by soils are integral to the carbon and water cycles and include cultural functions. There are strong links between climate change and soil condition.

Some factors leading to Soil degradation are:

- Deforestation
- Overgrazing
- Overuse of Chemical fertilizers and pesticides
- Rain
- Landslides
- Floods

Some of the methods used across the world to conserve soil are:

Mulching: The bare ground between plants is covered with a layer of organic material like straw. This helps to retain soil moisture.

Contour Barriers: Stones, soil, grass are used to build barriers along the contours. Trenches are made in front of the barrier to collect water.

Rock Dam: Rocks are piled up to slow down the flow of water which prevents gully formation.

Terrace Farming: The terraces are cut on the slopes to provide a flat surface for farming. This also prevents the direct flow of water down the slope.

Intercropping: Different crops are grown in the same field in different rows and at different times to avoid exposing the bare land to water or wind.

Crop Rotation: It is a practice of growing different crops in systematic succession. This helps in maintaining the level of nutrients in the soil and also pest control.

Contour Ploughing: In slopes farmers plough the land across the slope rather than up and down the slope.

Shelter belts: In coastal and dry regions, rows of trees are planted to check the wind movement to protect soil cover.

Afforestation: Planting of trees on a large scale to create a barrier against flowing water and wind. It also increases water penetration in soil.

Prevention of overgrazing

Natural Vegetation and Wildlife

The biosphere, (from Greek *bios* = life, *sphaira*, sphere) is the layer of the planet Earth where life exists. This layer ranges from heights of up to ten kilometres above sea level, used by some birds in flight, to depths of the ocean such as the Puerto Rico trench, at more than 8 kilometres deep. These are the extremes; however, in general the layer of the Earth containing life is thin: the upper atmosphere has little oxygen and very low temperatures, while ocean depths greater than 1000 m are dark and cold. In fact, it has been said that the biosphere is like the peel in relation to the size of an apple.

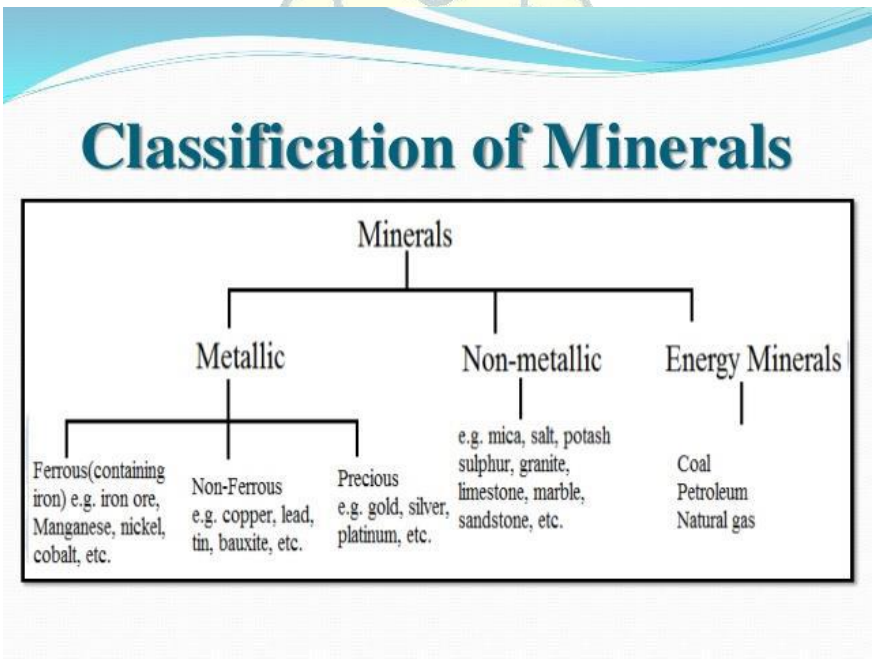
The biosphere is unique. So far there has been no existence of life elsewhere in the universe. Life on Earth depends on the sun. Energy, provided as sun light, is captured by plants, some bacteria and protists, in the marvellous phenomenon of photosynthesis. The captured energy transforms carbon dioxide into organic compounds such as sugars and produces oxygen. The vast majority of species of animals, fungi, parasitic plants and many bacteria depend directly or indirectly on photosynthesis.

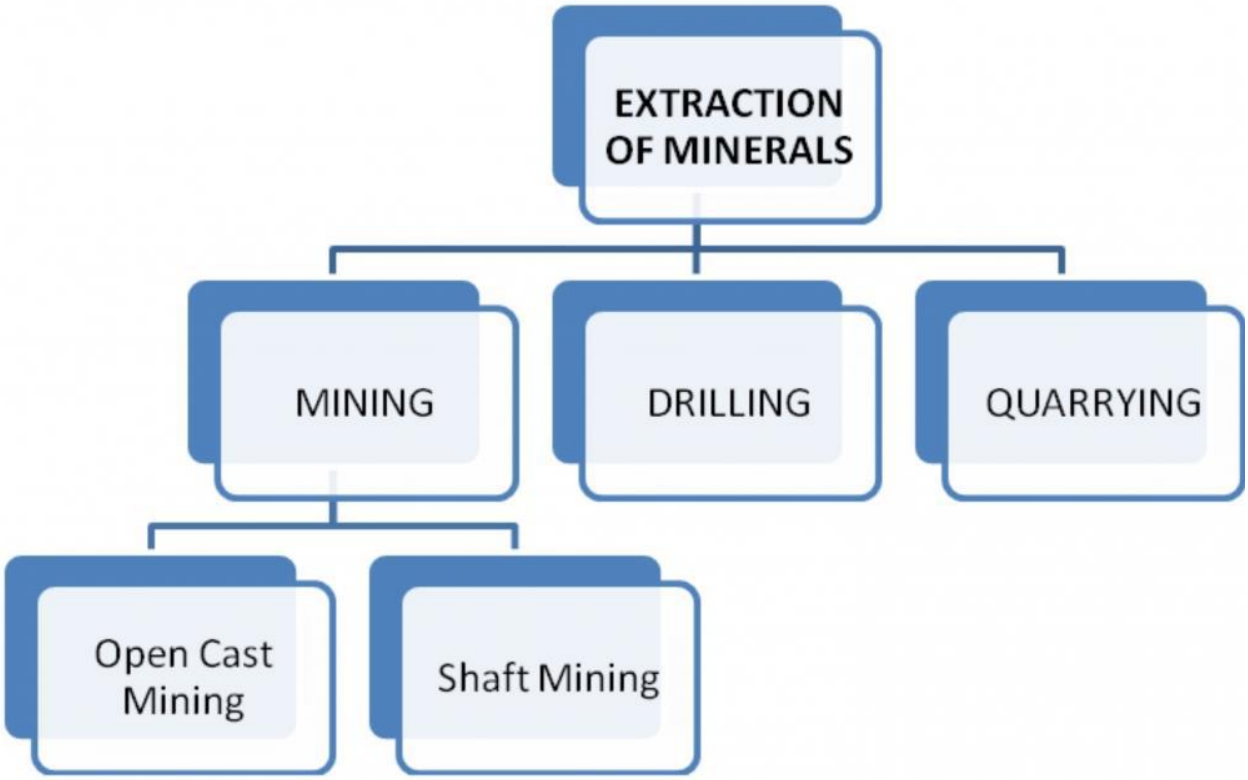
Mineral and Power Resources

A mineral is a naturally occurring inorganic solid, with a definite chemical composition, and an ordered atomic arrangement. This may seem a bit of a mouthful, but if you break it down it becomes simpler.

- **Minerals are naturally occurring**. They are not made by humans
- **Minerals are inorganic** They have never been alive and are not made up from plants or animals
- **Minerals are solids**: They are not liquids (like water), or gases (like the air around you)
- **Minerals have a definite chemical composition:** Each one is made of a particular mix of chemical elements
- **Minerals have an ordered atomic arrangement:** The chemical elements that make up each mineral are arranged in a particular way - this is why minerals 'grow' as crystals

Minerals are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major resource for development. Management of mineral resources has, therefore, to be closely integrated with the overall strategy of development; and exploitation of minerals is to be guided by long-term national goals and perspectives.





Open Cast Mining: Open-pit mining, also known as opencast mining, open-cut mining, and strip mining, means a process of digging out rock or minerals from the earth by their elimination from an open pit or borrow.

The word is used to distinguish this type of mining from extractive methods that need tunneling into the earth. Open-pit mines are used when deposits of commercially helpful minerals or rock are found close to the surface; that is, where the overburden (layer material covering the valuable deposit) is comparatively thin or the material of interest is structurally inappropriate for tunneling.

Shaft Mining: *Shaft mining* is a form of underground mining using shafts driven vertically from the top down into the earth to access ore or minerals. **Shaft mining** or **shaft** sinking refers to the method of excavating a vertical or near-vertical tunnel from the top down, where there is initially no access to the bottom.

Drilling: Petroleum and natural gas occur far below the earth's surface. Deep wells are bored to take them out, this is called Drilling.

Quarrying: *Quarrying*, open, or surface, excavation of rock used for various purposes, including construction, ornamentation, road building, and as an industrial raw material

NOTE: *World Distribution of minerals is nicely given in the NCERT and can be sufficiently covered from there.*

Uses of Minerals:

Following points can be cited as the general uses of the minerals:

Mineral resources can be found in almost every aspect of our lives.

- Granite is widely used as building stone is one of the hardest rocks found in nature. It is made up of three minerals - quartz, feldspar and mica. Gypsum is used in plaster cast which is used on broken arms or legs.
- The lead in your pencil is made from graphite while crayons and paints are made from talc.
- The fireworks are made from yellow-coloured mineral called sulphur, also used for making matches and explosives, sulphuric acid, fertilizers, chemicals and dyestuff.
- Copper is a good conductor of heat and electricity obtained from metallic mineral called chalcopyrite or copper pyrite. It so flexible that it can be rolled into flat sheets, wires, and other shapes. Hence, copper is used extensively in various electrical appliances. It is also used to make electrical cables and wires, switches, coins, cooking utensils and water pipes. Copper is also used in plumbing, heating, roofing and construction.
- Iron is another very important metal that is obtained from minerals such as limonite, hematite and magnetite. These minerals are called iron ores. Iron is mainly used to manufacture steel. Iron and steel are used in almost all industries for manufacturing ships, airplanes, cars, cycles, trucks and vans.
- They are widely used in the construction industry to make building support and structures. Iron is also used in the manufacture of computers, and office stationery like staples, nails and paper clips.
- The mineral manganese is a key component in the production of iron and steel. Today, the technique devised by the Hittites is called smelting of iron.
- Aluminium is another very important metal that is obtained from its ore bauxite. It is used in the manufacture of automobiles and airplanes, and building and electrical materials. It is also used in the bottling and canning industries; kitchen cookware and foil, and personal product like deodorants and cosmetics.
- Gold and silver are rare metals that are popularly used to make jewellery. They are also used to make medallions and coins, and in dentistry and medicine.

- Certain minerals, called gemstones, are also used to make jewellery. They are hard and come in many beautiful colours. Some gemstones, like diamonds, sapphires, emeralds and rubies, are rare and very expensive and are known as precious stones.
- Some gemstones, like turquoise, garnet, amethyst, aquamarine, topaz, moonstone, peridot and opal, are not as rare and so are known as semi-precious stones.
- Gemstones are first cut and polished, then set into precious metals like gold, silver and platinum to make artistic jewellery.
- Diamond is the hardest mineral found on the earth and so is used for making cutting tools that are used for cutting other gemstones.
- Minerals are also very essential for all living beings.
- Iron is present in every living cell. It is very essential for the production of hemoglobin, which is the primary component of red blood cells. Other minerals like zinc, manganese, copper and fluoride are also required in very small amounts in our diet.

Need for conservation of minerals:

Minerals are non-renewable resources. They cannot be replenished and their new reserves created once these are depleted. Also these are earthly treasure which belongs to entire mankind of present and future generations.

They have decisive role cultural, social and economic development of' mankind. We have moral and social obligations to conserve them, avoid their misuse and wastage a: preserve them for use in future.

This could only' be possible through the adoption of conservation techniques. In India conservation strategy is more important because of the scarcity of certain important minerals which need conservation and new technological revolution currently going on in the count' which will evolve better mining and processing technology in future for judicious exploitation mineral resources.

Conservation measures:

There are three basic ways of conserving minerals for future use –

Reduce-Recycle-Reuse

- You can reduce the amount of waste you create by choosing what rubbish you throw away.
- Recycling means to return a waste product to a place where it is remade into either the same product or something different. The reuse of metals will also help in reducing the rate of consumption, and help in the conservation of minerals.

Apart from this, the following measures can be taken by the government:

1. New researches should be undertaken it find out and develop 'replacement minerals' for us in place of scarce minerals which are in short supply and are going to be depleted soon.

2. Researches should also be carried on to develop new technology which should avoid west age and promote maximum utilization of by-products.

3. There should be curbing on wasteful minim methods. Miners should be imparted training to adopt new techniques of mining, use latest technology and machines and take maximum precaution' cause little damage to the environment.

4. There should be proper development of infrastructural facilities in mining areas, suite location for processing plants and refineries and encouragement to private sectors to establish re] search units and adequate provision for financial support and loans.

5. Processing plants should invariably be coated in mining areas to reduce transport cost. In case of weighty materials like coal it is better to convert it into coking coal or in electricity near the pit heads.

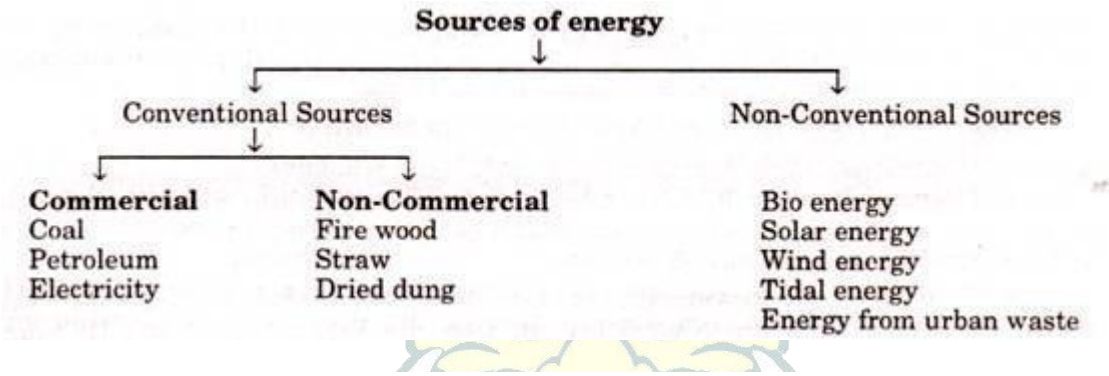
6. There is a great scope for the expansion of several mineral-based industries which open new vista for economic development.

7. New explorations should be carried on to find out locations and new areas of minerals using latest technology. In case of India sea floor exploration and mining may yield good dividend.

8. In conservation policy emphasis should be placed on sustainable mining. Similarly more reliance should be placed on the exploitation and utilization of such mineral resources which are renewable and are in plenty.

Energy Resources:

Energy is required to perform various activities in every field. Heat and electricity are two different forms of energy. The most common sources of generating heat and electricity are firewood, coal, petroleum and natural gas. These sources are called conventional sources of energy.



Conventional Sources of Energy

I. The sources of energy which have been in use for a long time, e.g., coal, petroleum, natural gas and water power.

II. They are exhaust able except water.

III. They cause pollution when used, as they emit smoke and ash.

IV. They are very expensive to be maintained, stored and transmitted as they are carried over long distance through transmission grid and lines.

Non-Conventional Sources of Energy

I. The resources which are yet in the process of development over the past few years. It includes solar, wind, tidal, biogas, and biomass, geothermal.

II. They are inexhaustible.

III. They are generally pollution free.

IV. Less expensive due to local use and easy to maintain.

Conventional Sources of Energy:

Firewood: Firewood is primarily used for cooking and heating. However, it is not a very convenient and eco-friendly source of energy. Collecting firewood and cooking with it is time consuming and also burning firewood releases carbon monoxide in the air. This results in air pollution and higher levels of greenhouse gases. Firewood is also the main cause of deforestation.

Fossil Fuels: Fossils are remains of plants and animals that were buried under the earth for millions of years. Coal, petroleum and natural gas are fossil fuels as they are formed from fossils.

Coal: Coal is a combustible black or brownish-black sedimentary rock with a high amount of carbon and hydrocarbons. Coal is classified as a nonrenewable energy source because it takes millions of years to form. Coal contains the energy stored by plants that lived hundreds of millions of years ago in swampy forests.

The plants were covered by layers of dirt and rock over millions of years. The resulting pressure and heat turned the plants into a substance now known as coal.

Coal is classified into four main types, or ranks: anthracite, bituminous, lignite and peat. The ranking depends on the types and amounts of carbon the coal contains and on the amount of heat energy the coal can produce. The rank of a coal deposit is determined by the amount of pressure and heat that acted on the plants over time.

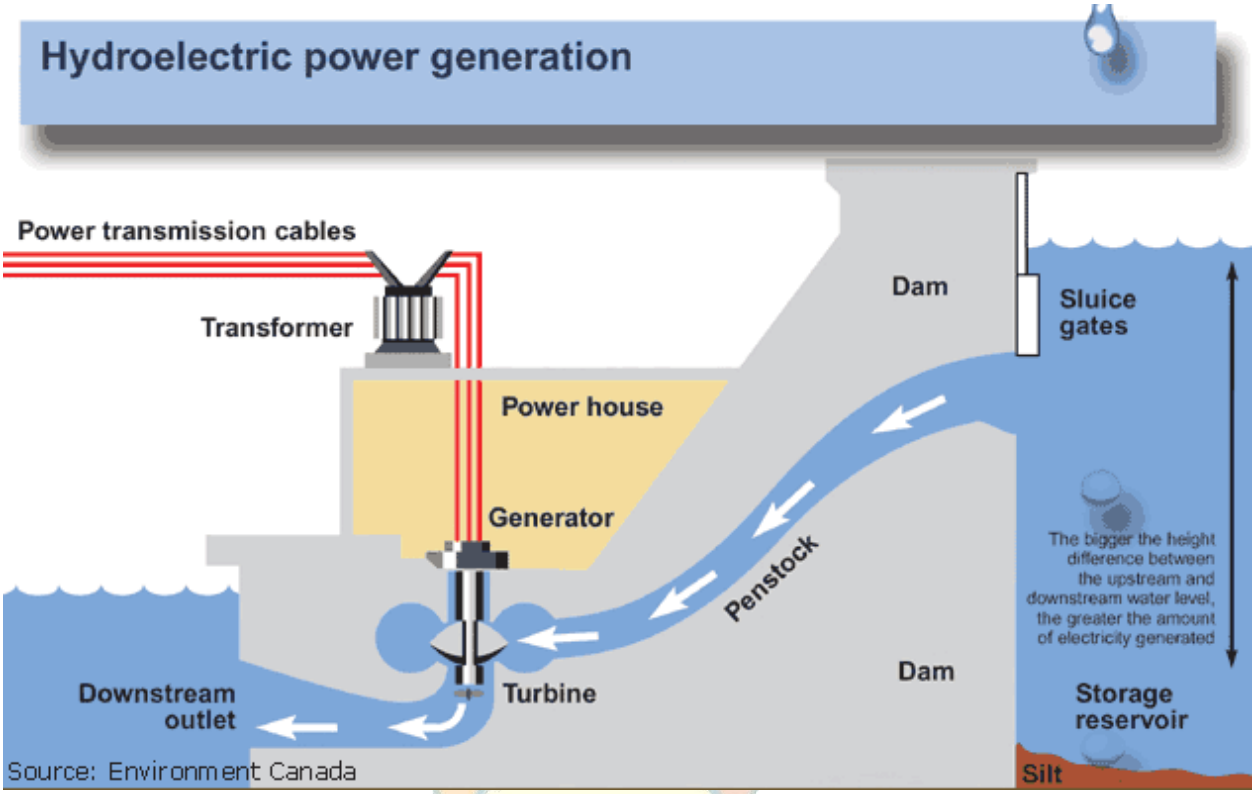
China, US, India, Australia and Indonesia are the top five coal producing nations of the world.

Petroleum and Natural Gas: Petroleum is another important conventional source of energy. The word petroleum means rock oil and is found between layers of rocks in the form of a thick black liquid.

In its raw form petroleum is called crude oil which is drilled from oil fields located in off-shore and coastal areas. The major petroleum producing countries in the world are Iran, Iraq, Saudi Arabia and Qatar.

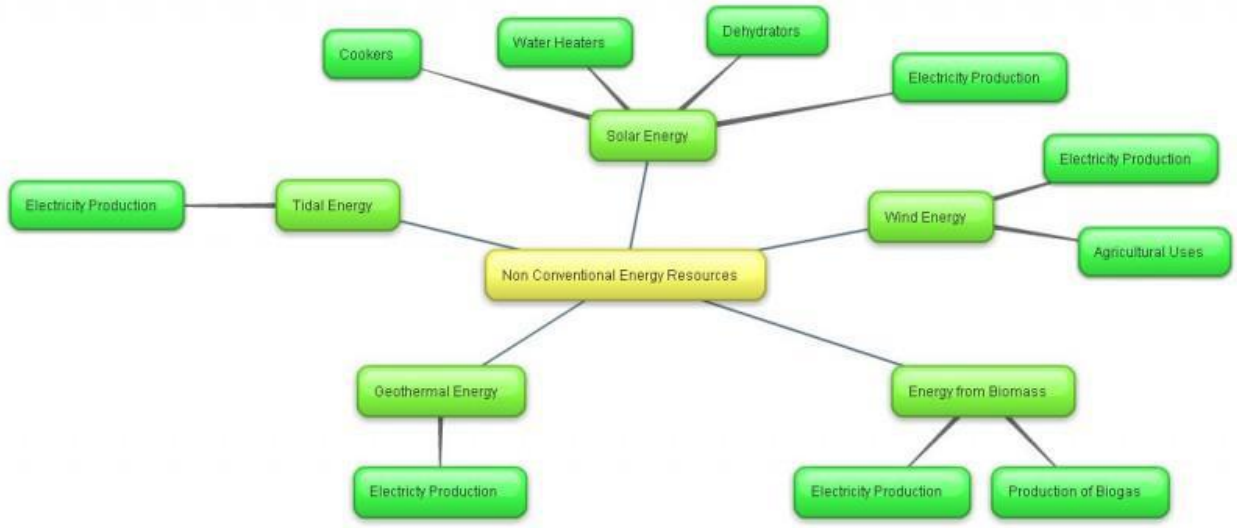
A major advantage of petroleum is that it can be easily transported in tankers. Natural gas is another fossil fuel that is traditionally used as a source of energy. It is found with petroleum deposits and is released when the crude oil is brought to the surface.

Hydel Power: Electricity is also generated from the energy of flowing water. The energy derived from flowing water is called hydropower. The electricity generated from hydro-power is called hydroelectricity. Norway was the first country in the world to develop hydroelectricity. The leading producers of hydro power in the world are Paraguay, Norway, Brazil, and China.

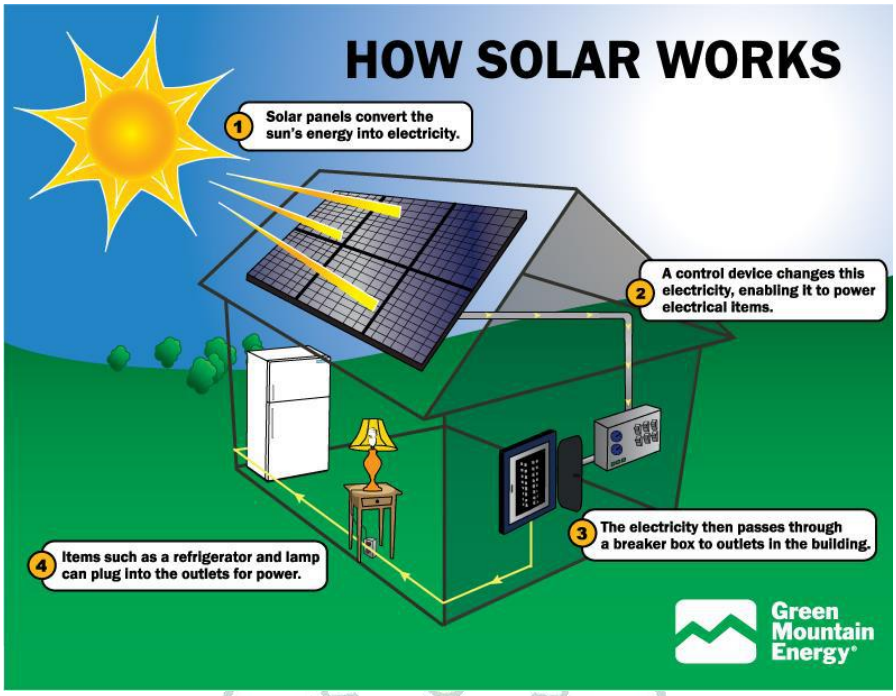


Non-conventional Energy Resources:

Non-conventional energy resources are basically those resources which can be used to harness energy in different forms rather than the conventional fossil fuels and nuclear energy. Non-conventional energy resources are eco-friendly and do not have adverse effects on the environment. They are also renewable, i.e. over the years these sources are renewed. The non-conventional energy resources include solar energy, tidal energy, wind energy, energy from biomass and geothermal energy.



Solar energy: Solar energy is the most commonly used non-conventional source of energy. These days it is being used to produce electricity and also in various other applications for example solar cookers, solar water heaters, etc. Solar cells and solar panels are used to convert light energy to electrical energy, which in turn can be used where ever required. But due to its low efficiency and high cost, it isn't quite the popular choice of the people.



Wind Energy: Wind energy is a form of solar energy. Wind energy (or wind power) describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity. Mechanical power can also be utilized directly for specific tasks such as pumping water.

But this is not feasible because of the high investment required for installation of a wind mill. Also the price at which per unit of electricity is produced is higher than all other sources.

Tamil Nadu is the highest producer of wind energy in India

Tidal Energy: Tidal energy is the energy harnessed by the tides or waves of the sea. The rise and fall in the water of the sea is called a tide. This happens due to the gravitational pull of the sun and the moon. It is estimated that India has a potential of harnessing 8000-9000 MW of tidal energy. This harnessing of tidal energy requires an engineered set up under water. Tidal energy as of now hasn't seen the light of the day, but we hope that in the near future it shall act as substitute for fossil fuels.

Indian Scenario:

- No major work done till now
- The Gulf of Kutch and Gulf of Cambay in Gujarat and Ganga delta in the Sunderbans, the world's largest mangrove, are the three sites identified as potential areas for tidal power generation.

What is happening worldwide?

- Globally there are only four countries which have tapped the tidal energy and are generating power through tidal energy.
- The first country to start generating electricity using tidal energy was France, that began the La Rance Tidal plant in 1966.
- The Shiwa Lake Tidal plant in South Korea is the largest tidal power plant in operation with a capacity of 254 MW.
- The other places where tidal power is used to generate electricity include Canada (20 MW), China (3.2 MW) and Russia (0.4 MW).

Do you know?

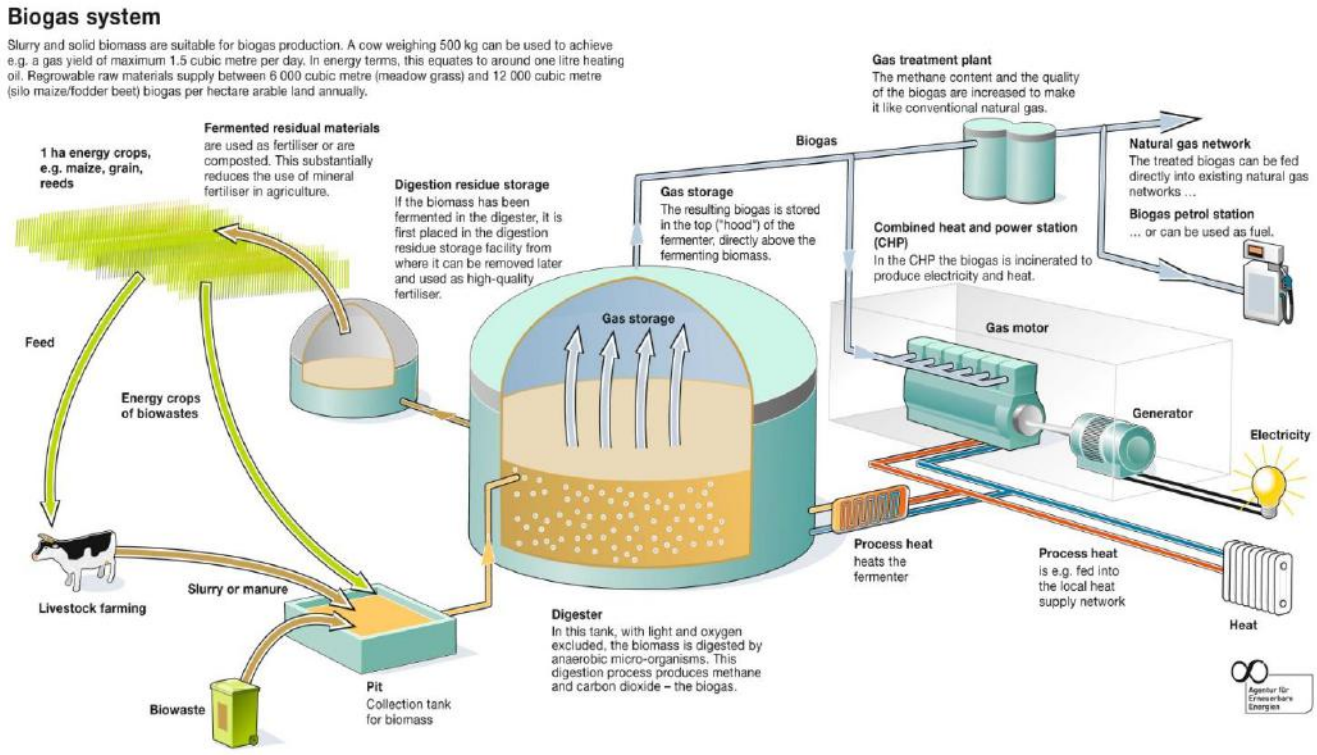
- The world's first large-scale tidal power plant was the Rance Tidal Power Station
- The tidal cycle occurs every 12 hours due to the gravitational force of the moon. The difference in water height from low tide and high tide is potential energy. Similar to traditional hydropower generated from dams, tidal water can be captured in a barrage across an estuary during high tide and forced through a hydro-turbine during low tide. To capture sufficient power from the tidal energy potential, the height of high tide must be at least five meters (16 feet) greater than low tide. There are only approximately 20 locations on earth with tides this high and India is one of them. The Gulf of Cambay and the Gulf of Kutch in Gujarat on the west coast have the maximum tidal range of 11m and 8m with average tidal range of 6.77m and 5.23m respectively.

Geo-Thermal Energy: Geo-thermal energy is the energy harnessed using the heat of the earth's interior. It is usually harnessed by hot water springs, where in the hot steam is again sent into a cylinder which is in turn connected to a turbine and thus produce electricity. As

of now, this is not at feasible at many areas because the amount of energy spent on pumping of water and other mechanisms is more than that energy which can be harnessed.

Biogas: *Biogas* means a gas produced by the anaerobic digestion or fermentation of organic matter. The organic matter can be manure, sewage sludge, municipal solid waste, biodegradable waste or any other biodegradable feedstock. *Biogas* is mainly methane and carbon dioxide.

Anaerobic respiration produces **methane** along with other gases which forms biogas. This biogas can be used for heating and cooking purposes. Biogas can also be used to produce electricity. This is gaining popularity, especially in the villages of India where the people suffer a minimum power cut of 8 hours/day.



Note: *Nuclear Energy will be covered in detail in Science and Technology Module*

Agriculture

Agriculture refers to the process of producing food, feed and fiber through the cultivation of plants, and rearing livestock and is also known as farming.

About 50% of the world's population is engaged in agriculture. In India, more than 2/3rd of the population is dependent (directly or indirectly) on agriculture for their livelihood. This is because; India has the land and climatic conditions favorable for carrying out agricultural activities. The land that can be used for cultivation is referred to as arable land.

Apart from soil conditions, different climatic factors that affect the cultivation of crops in an area are rainfall or precipitation, temperature, and light. Different crops require different climatic conditions for a healthy growth.

Other forms of cultivation are: Sericulture, Pisciculture, Viticulture and Horticulture.

- **Sericulture** is the art and science of rearing silk worms to produce raw silk and involves the cultivation of food-plants to feed the silk worms, and the extraction of raw silk yarn from the cocoons of the silk worms for processing and weaving. Sericulture derives its name from the Latin words serikos, meaning silk, and cultura, meaning cultivation.

- **Pisciculture** is the scientific method for breeding fish in specially designed ponds, tanks or lakes and is done purely for commercial purposes. Pisciculture also derives its name from the Latin words pisci, meaning fish, and cultura, meaning cultivation.
- **Viticulture** derives its name from the Latin words vitis, meaning vine, and cultura, meaning cultivation and is the science, study and production of grapes.
- **Horticulture** is the industry and science of cultivating fruits, vegetables, flowers or ornamental plants. It also derives its name from the Latin words horti, meaning garden, and cultura, meaning cultivation. It involves all the activities carried out to improve the crop yield, quality and nutritional value, and resistance to insects and diseases.

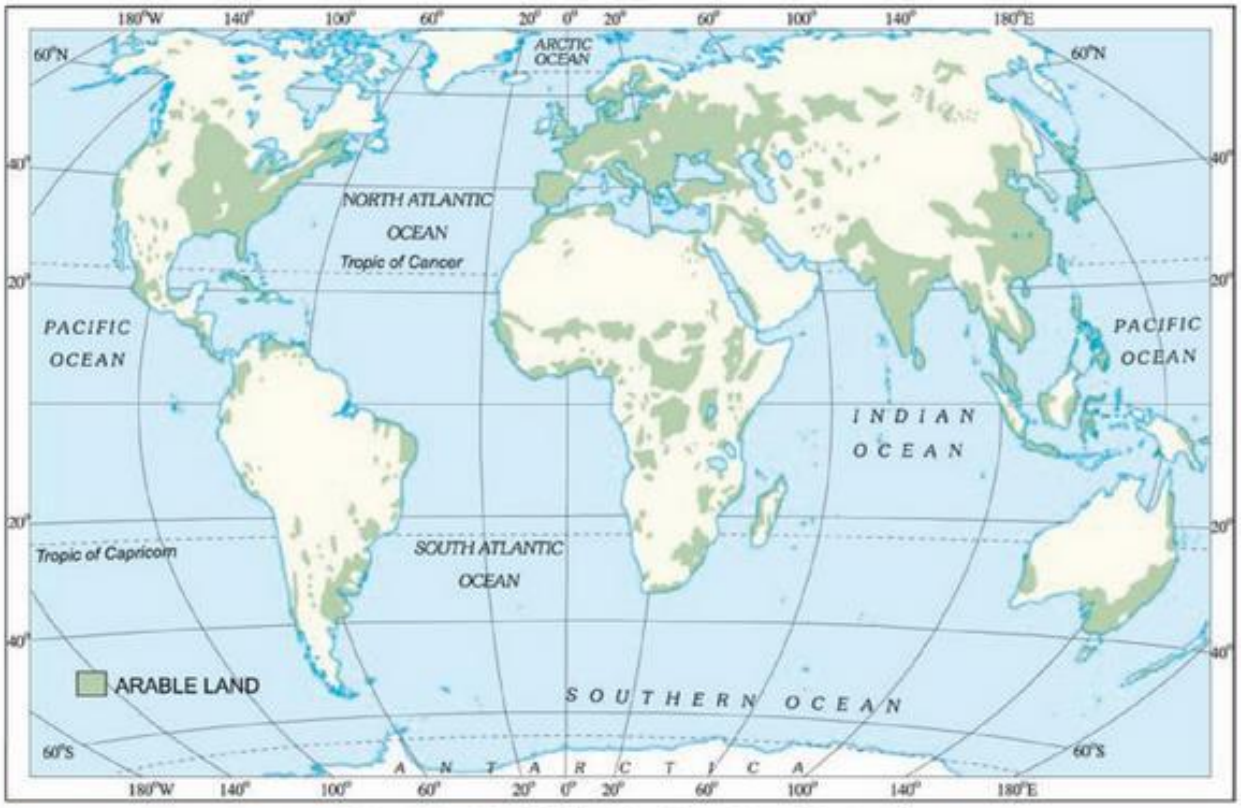
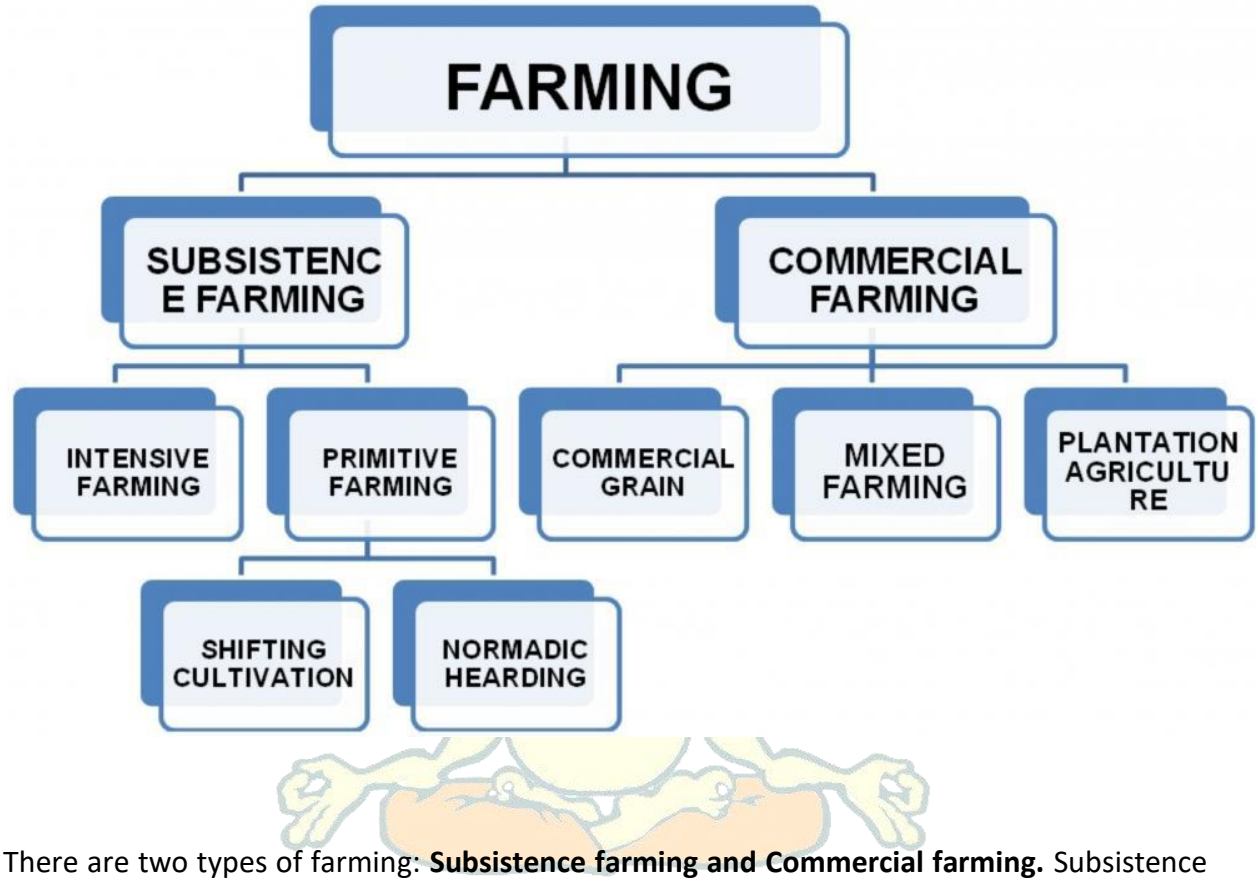


Fig. 4.1: World Distribution of Arable Land

Farming Systems:

The farming system has three components: Input, Process and Output

The inputs to a farming system include seeds, fertilizers, machinery and labor while the outputs of farming are crops, wool, dairy and poultry products. The outputs are obtained by processing activities, like tilling, sowing, irrigating, weeding and harvesting, or breeding in case of an animal farm.



There are two types of farming: **Subsistence farming and Commercial farming.** Subsistence farming is carried out at a low scale for a small output while commercial farming involves activities on a larger scale and yields a much larger produce.

Subsistence farming mostly serves to meet the requirements of the farmer and his family while commercial farming, the crops grown and the animals reared are sold in the market. The technology used in subsistence farming is very low-end, and most of the labour is manual whereas in commercial farming, minimal manual labour is involved and machines do most of the work.

Subsistence farming can be further classified into two types: Intensive subsistence farming and Primitive subsistence farming.

Intensive Subsistence Farming: In intensive subsistence farming, farmers use simple tools, such as spades and ploughs, and manual labour to cultivate a small plot of land. Intensive subsistence farming is practiced in areas having fertile soil and receiving plenty of sunshine throughout the year. For example, it is practiced in the tropical and sub-tropical areas of West Bengal and Andhra Pradesh.

Intensive subsistence farming is practiced by farmers in the monsoon regions of south, southeast and east Asia. It is more common in the thickly populated areas in these regions. Rice is the main crop grown through intensive farming in addition to wheat, maize, pulses and oilseeds on the same plot of land.

Primitive Subsistence farming: Primitive subsistence farming can be further classified into: Shifting cultivation and Nomadic herding.

- In **shifting cultivation** farmers temporarily use a plot of land for cultivation and then abandon it when the soil loses its fertility. This farming system is common in areas where the rainfall is heavy and the vegetation can regenerate rapidly. It is practiced in the dense forest areas of north-east India, parts of south-east Asia, tropical Africa and the Amazon basin. This type of farming is also known as slash and burn agriculture owing to the process. The crops grown here are maize, yam, potatoes and cassava.
- **Nomadic herding** is a form of animal farming where herdsmen move from one place to another with their animals, fodder and water, following defined routes. It is practiced in semi-arid and arid areas like Rajasthan, and Jammu and Kashmir Sahara and Central Asia.The nomads rear sheeps, goats, camels and yaks and these animals provide milk, meat, wool, hides to the herdsmen.

Commercial Farming:

Commercial farming is of three types: Commercial grain farming, Mixed farming and Plantations.

Commercial Grain Farming: Commercial grain farming is the cultivation of crops for commercial purposes where crops are grown for sale in the market. This type of farming is common in the sparsely populated areas of the temperate grasslands of North America, Europe and Asia. The main crops grown are wheat and maize.

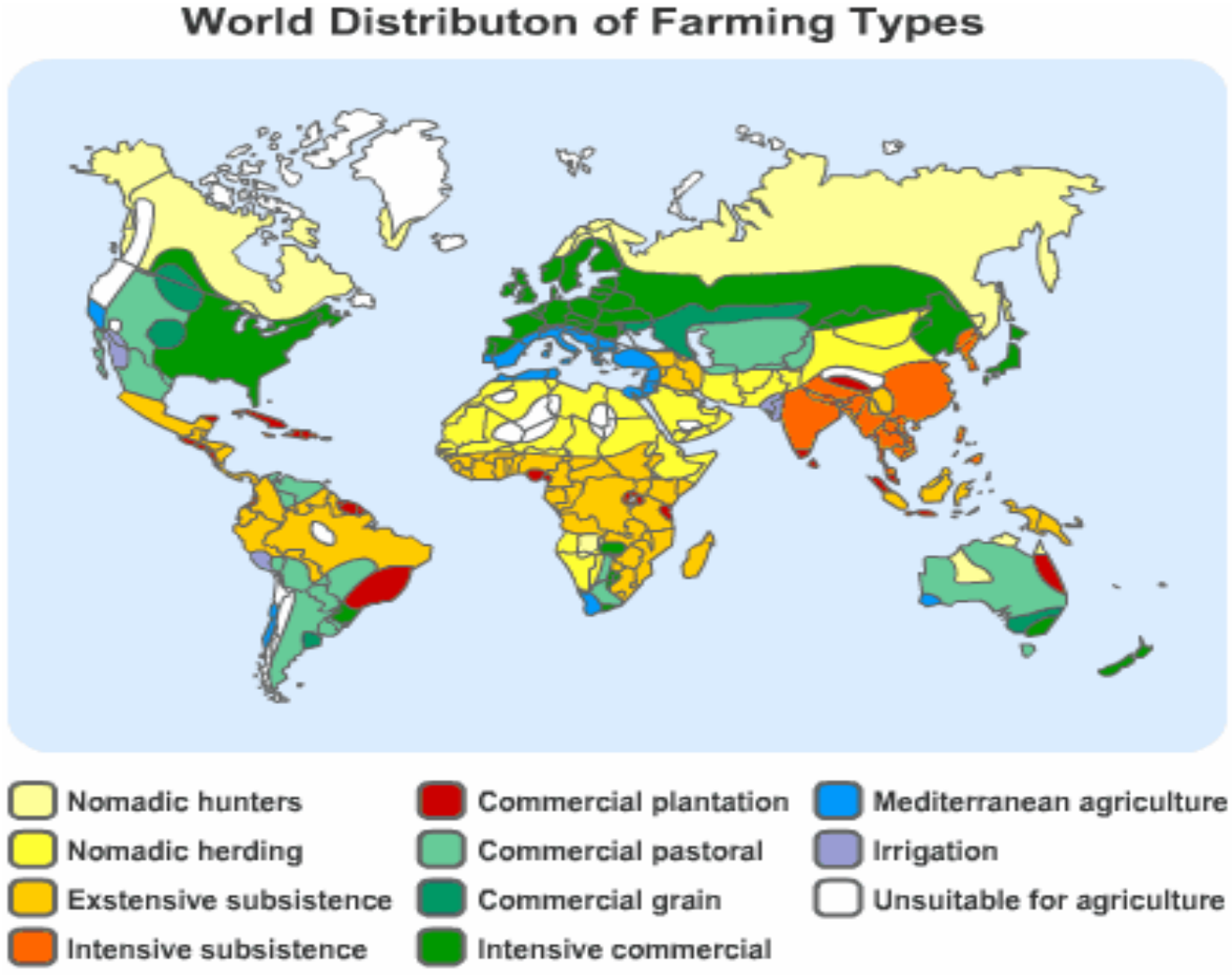
Mixed Farming: In mixed farming, the same plot of land is used for cultivating crops and rearing livestock. Farmers cultivate food crops like rice and wheat, and fodder crops like barley and grass. This type of farming is common in Europe, parts of eastern USA, Argentina, southeast Australia, New Zealand and South Africa.

In India to increase their sources of income, farmers are going for mixed farming.

Apatani tribe of Arunachal Pradesh farms fishes in paddy fields.

Plantation Agriculture: Plantation refers to large farms or estates growing a single crop for commercial usage. This type requires a large amount of labour, and capital investment in building an extensive transportation network. Plantations involve the cultivation of crops like tea, sugarcane and rubber for supply to agro-based industries as raw material.

The produce from these plantations, like tea leaves and rubber latex, are processed to produce market-ready output, i.e. tea and rubber sheets. Plantations are common in tropical and sub-tropical regions of the world, like India, Sri Lanka, Malaysia, and Brazil.



Major Crops of the World:

Crops are plants that are grown and harvested for eating or selling. On the basis of usage, crops are classified into three types: Crops grown for food, Beverage Crops, and Crops grown for agro-based industries. These include fiber crops.

Food Crops: The Crops which are grown for food are called food crops like rice, wheat, millets and maize. Every food crop needs a specific environment and geographical conditions to grow and thrive. Hence different crops are produced at different places.

Rice: Rice is the main component of people's diet in the tropical and subtropical regions of Asia. This is because rice crops show best yield with high temperature, high humidity and rainfall. Alluvial clayey soil is the best for growing rice as it can retain water.

China is the leading producer of rice, followed by India which together account for half of the world's total rice production. Japan, Sri Lanka, Egypt and Bangladesh are the other major producers of rice.

Wheat: Wheat requires a well-drained loamy soil. This crop grows best in moderate rainfall and moderate temperature and requires loads of sunshine in the harvest season. Hence, in India, wheat is sown in the winter season and harvested in the summer. Bangladesh, West Bengal, the Prairies of the USA, Canada, Russia, Australia and Pakistan are major producers of wheat.

Millets: Millets are also known as coarse grains and are available in the form of jowar, bajra and ragi in India. Millets grow well on soils of relatively low fertility or sandy soil and require low to adequate rainfall and temperatures ranging from high to moderate. Along with India other major producers of millets in the world are China, Niger and Nigeria.

Maize: Maize another popular food crop is commonly referred to as corn. The soil needs to be well drained and fertile for growing maize with moderate temperatures, moderate rainfall and abundance of sunshine. The major producers of maize in the world are: USA, Brazil, China, Mexico, India, Canada, and South Africa.

The major crops grown for agro-based industries are cotton and jute and are also known as fibre crops. Cotton is the main raw material for the cotton textile industry and owing to its light and airy texture, it is ideal for clothing.

Cotton: A good yield of cotton requires: high temperatures, light rainfall, 210 frost-free days and plenty of sunlight. Black soil and alluvial soil are best suited for growing cotton. Hence, in India, cotton is mostly grown in parts of the Deccan Plateau. Apart from Indian the leading producers of cotton in the world are: China, The USA, Pakistan, Brazil and Egypt.

Jute: Jute on the other hand is golden in colour with a silky shine and is popularly known as the Golden Fibre. Jute requires high temperatures, plain alluvial soil, plenty of rainfall and a humid climate to thrive. India and Bangladesh are the primary providers of jute.

Beverage Crops

Beverage crops include crops like tea and coffee. Tea grows best in regions with a cool and humid climate, well-distributed rainfall through the year and well-drained soil, like the loamy soil. Hence tea planters need areas with sloping grounds as the slope ensures that water does not clog.

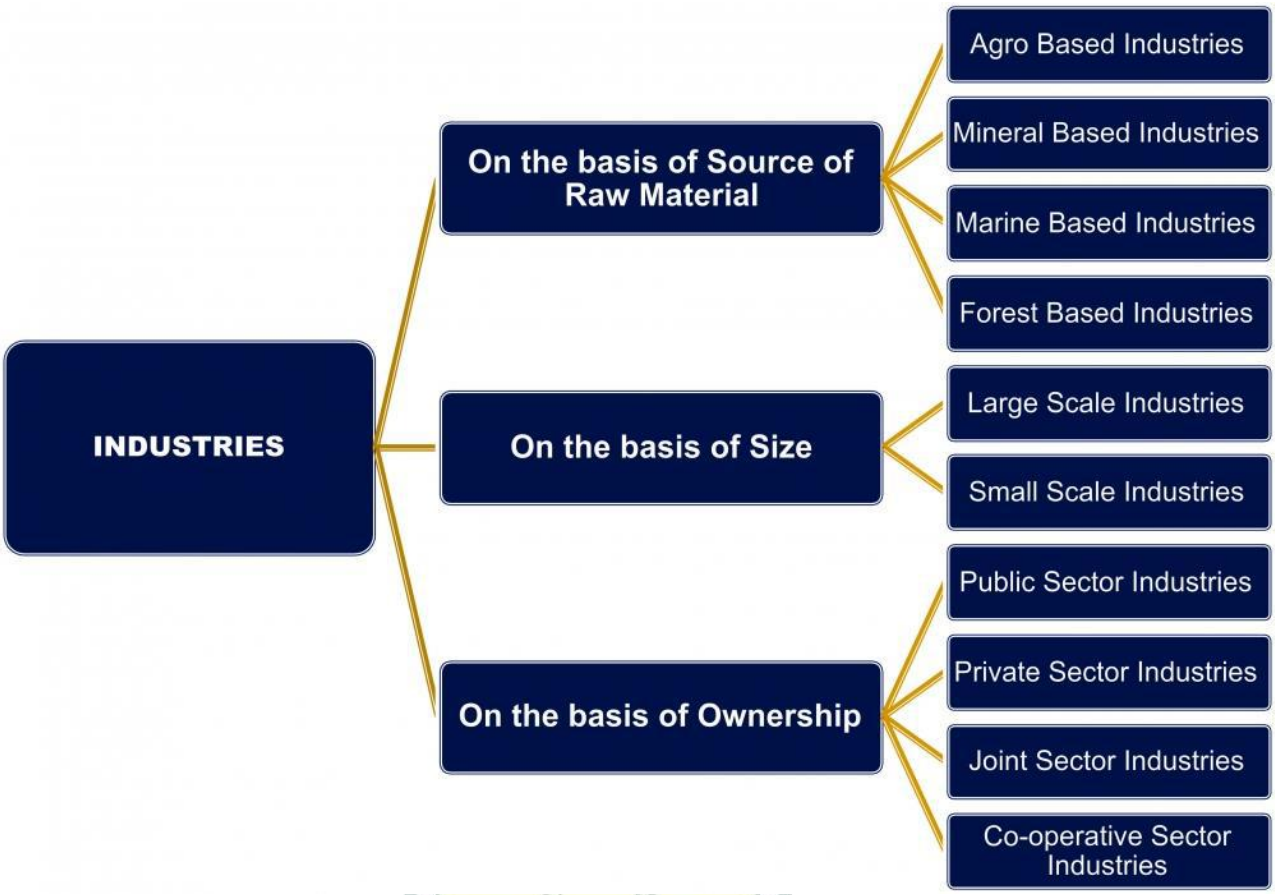
- China, India, Kenya and Sri Lanka are known to produce the finest tea in the world.
- Darjeeling tea is recognized by consumers worldwide for its unique flavor and quality.

Coffee: Coffee is another popular beverage crop worldwide. Coffee grows well in: well-drained loamy soil and hilly slopes. The climate needs to be warm and wet like in subtropical regions. Brazil is the world leader in the production of coffee, followed by Columbia and India.

Industries

An industry is a manufacturing unit which converts raw materials into usable goods. (Goods can be classified as final goods or Capital goods. This will be covered in detail in Economics). This is called the Secondary sector of economy.

An industry is at the heart of a country's economy; it includes manufacturing of goods, extraction of metals and provision of services. All the products available for use in the market are finished products, and are the result of some industry.



An industry can be classified on the basis of raw material, size and ownership

Any material that we get from our natural surroundings to be used by an industry is called **raw material**. Plant- and animal-based products are used as raw material in food processing, vegetable oil, cotton textile, dairy and leather products, which are all examples of agro-based industries.

There is another type of industry that is based on the produce derived from forests. This is known as forest-based industry, and is responsible for producing paper, pharmaceuticals, furniture, equipment and buildings.

Industries are classified on the basis of **ownership** as well, i.e. privately owned, cooperative or state-owned. Privately owned industry means it is owned by an individual or a group like the Tata group. State-owned or public sector means they are owned and operated by the government like Bharat Heavy Electricals Limited (BHEL).

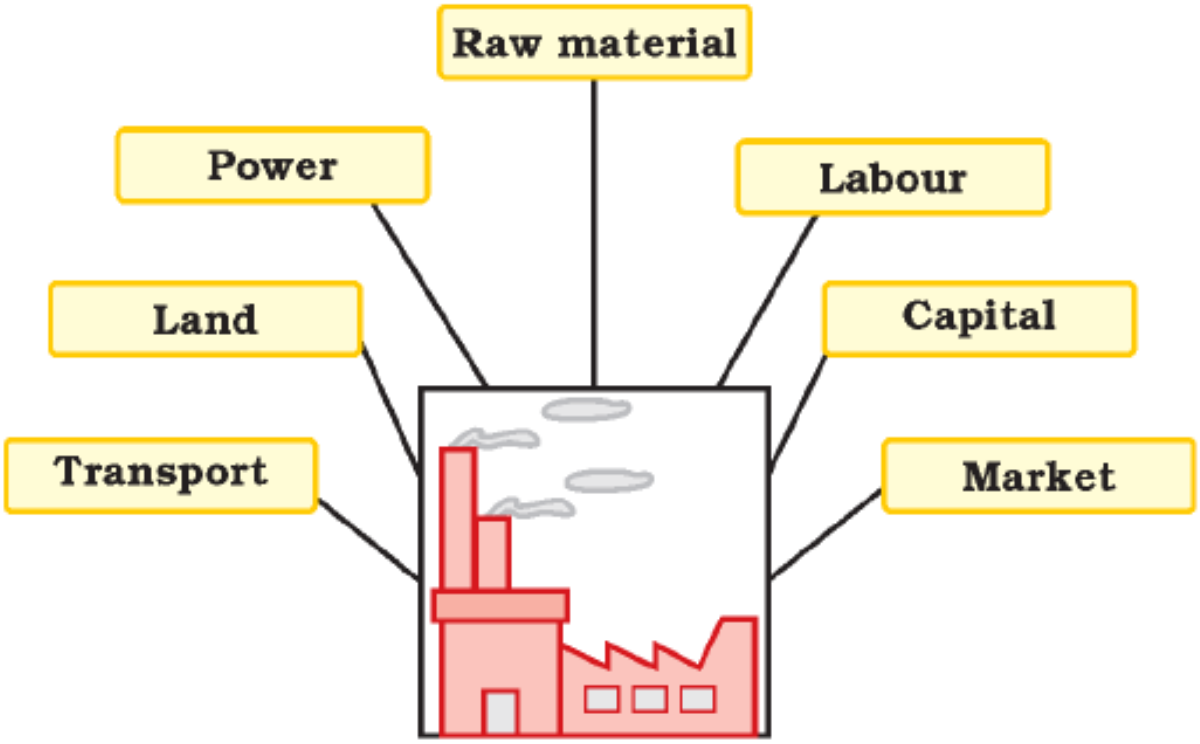
A partnership between the state and an individual or a group is called the joint sector like Maharashtra Scooters Limited, which is a partnership between the Government of Maharashtra and the Bajaj Group.

The cooperative sector was formed to play a major role in the advancement of agriculture and related industries. In this sector, the state facilitates the producers, suppliers and even workers to own the enterprise like the Amul Dairy.

Industries are classified as **large-scale or small-scale** depending, on the amount of capital invested, the number of people employed and the volume of production.

A small-scale industry needs a lesser amount of capital and technology inputs. A large-scale industry has automated production, and is capital- and manpower-intensive, requires heavy investment in plant and machinery.

Factors responsible for location of Industries:



Locational factors for industries

According to a geographical theory, the location of an industry is largely influenced the transportation cost of raw materials and finished product.

If an industry is a **weight losing** industry, i.e. the net weight of product is less than the net weight of raw material, than the industry is **located near the raw materials**. Eg. Iron and steel industry, glass industry, etc.

It there is no loss or gain in the net weight of raw material and product, then the industry can be placed anywhere between raw material and market. Other factors become more important. Eg. Cotton, leather etc.

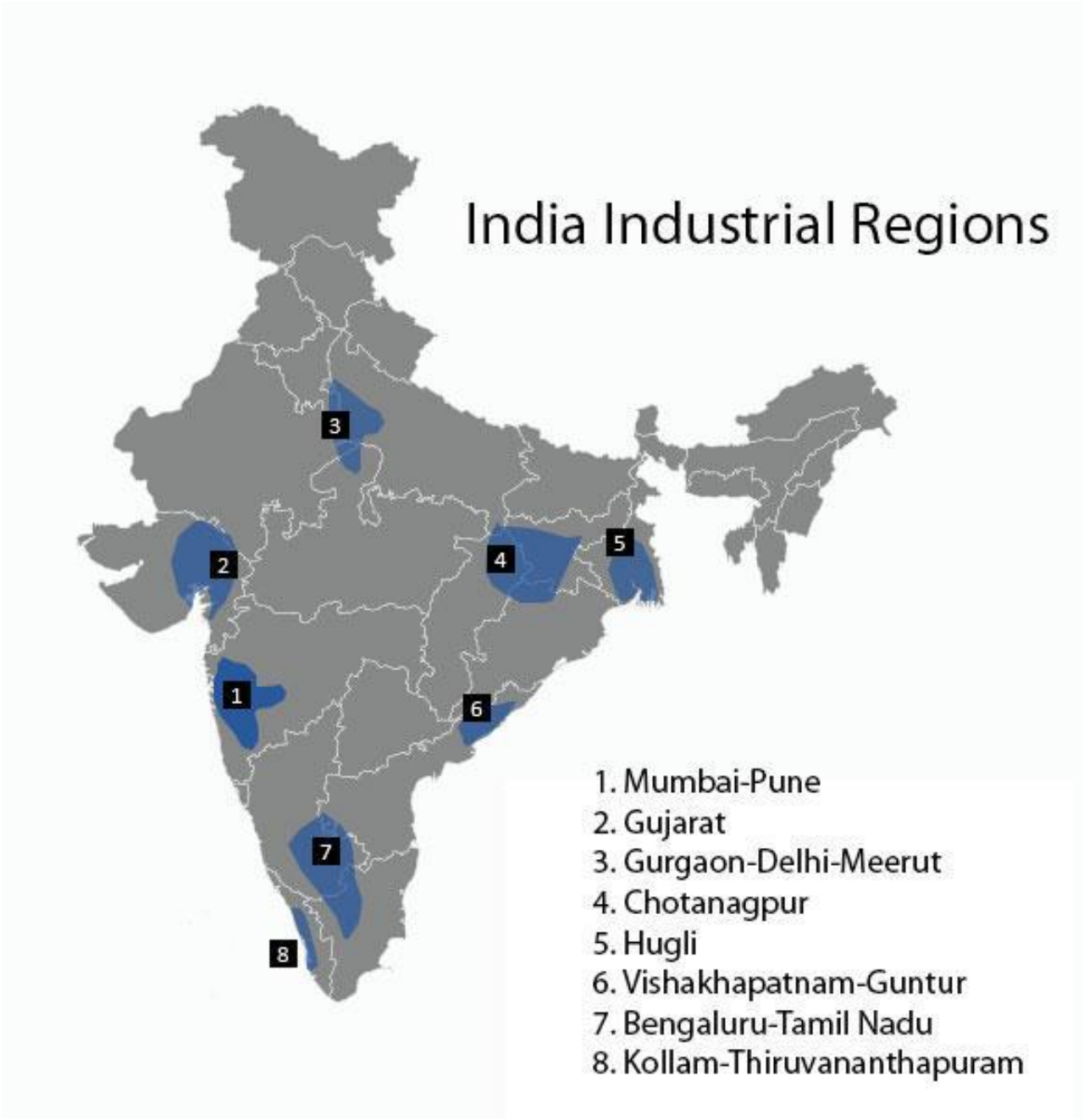
If an industry is **weight gaining industry**, i.e. the net weight of final product increases, then the industry is **located near the market**. Eg.: Automobile, heavy machinery, etc.

Industries are usually located in temperate areas, sea ports and coal mines. When many industries are located close by, the place becomes known as an industrial region. This is the reason why a government provides incentives like subsidized power, low transport cost and infrastructure to industries located in the backward regions of the country.

The three steps involved in an industrial cycle are:

Input, Processes and Output

- The first step is putting together the inputs, like raw material, labour, cost of land, transport, power and other infrastructure.
- The second step is the process, which includes a wide range of activities that convert the raw material into finished goods like ginning, spinning, weaving, dyeing and printing.
- The final step is the finished product or the output that we use.



The major industrial regions in India are the Mumbai-Pune region, Bangalore–Tamil Nadu region, Hugli region, Ahmadabad–Baroda region, Chhota Nagpur industrial region, Vishakhapatnam–Guntur belt and the Kollam–Thiruvanathapuram industrial belt.

(Note: Individual Industries are covered in much detail in the book itself. No need for external material for them.)

Industrial Disasters:

Industrial workers are sometimes required to work in a dangerous environment. Any lapse in the regular maintenance of technical equipment or irresponsible handling of hazardous material may lead to accidents.

There are some risk reduction measures, which, if followed, can prevent large-scale disasters like:

- Industrial areas should be on the outskirts of a city or town, or located far away from residential areas.
- People in the vicinity of the industrial area should be aware of the hazardous materials handled in these industries and their effects on humans in case of an accident.
- Improvement in the fire warning systems, fire-fighting systems and in pollution dispersion qualities and limiting toxic storage capacity within these industries will reduce the risk of a large-scale disaster considerably.

Human Resource

This is an introductory chapter on Population geography. In this value add we will discuss some important definitions used in Population Geography. This section will be dealt in detail in Economics.

Population: Total number of individuals at a given place in a given time.

Population Change: Population change refers to the change in the number of people due to birth, death and migration during a specific time.

Life Expectancy: Life expectancy is the number of years that an average person can expect to live. The major cause of the sudden change in the world's population is the imbalance in the birth rate and the death rate.

Natural Growth Rate: Birth rate is the number of live babies born in a year for every 1000 people in the total population. Death rate is the number of people dying per 1000 people. The difference in the birth rate and the death rate of a country is called the natural growth rate.

A rapid growth in population is referred to as population explosion. If the birth rate is more than the death rate, then there is an increase in population. If the death rate is more than the birth rate, then there is a decrease in the population. A decrease in population is known as depopulation.

If birth rate and death rate are at the same level, there will be no natural growth. Migration is another cause of change in the size of a population which is the movement of people into and out of an area.

Migration: Movement of people from one place to another for permanent or semi-permanent settlement is called migration.

People who leave a country are called emigrants, while those who arrive in a country are called immigrants. A search for better employment opportunities is the main reason behind international migrations.

Factors affecting Population Growth

Natural Factors:

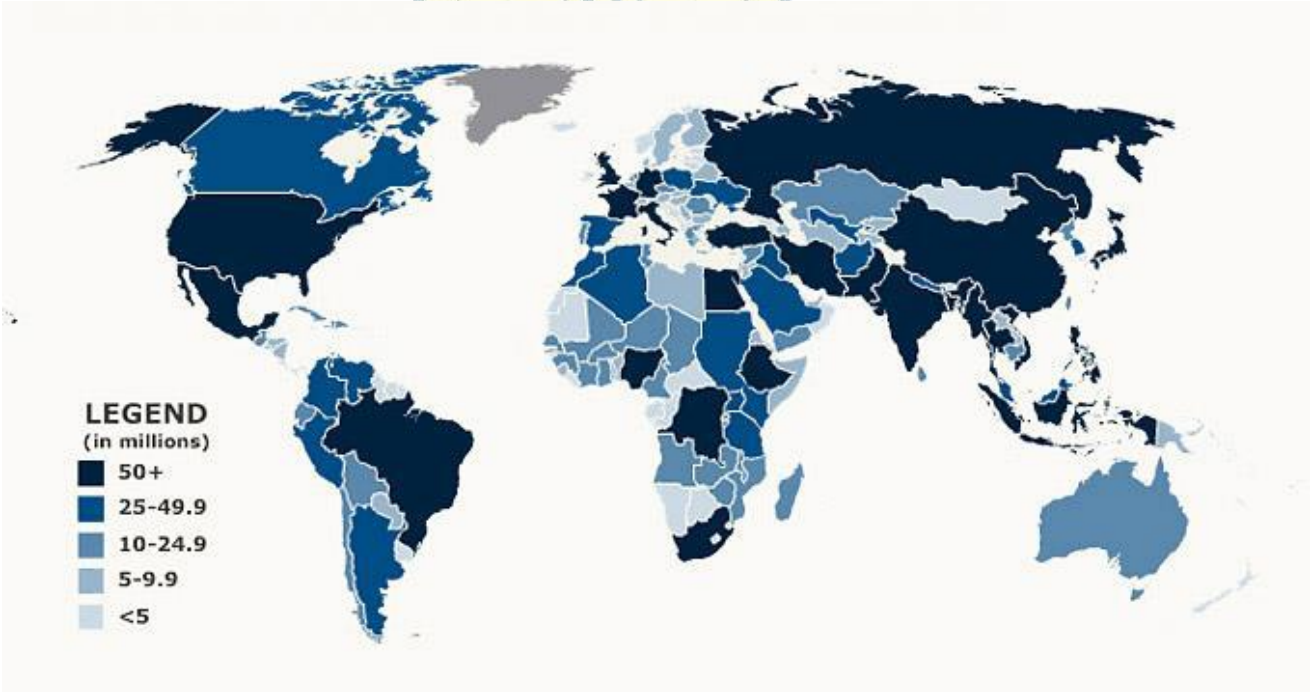
FACTORS	DENSE POPULATION	SPARSE POPULATION
RELIEF	LOW LYING LAND ALLOWS FOR EASY DEVELOPMENT OF AGRICULTURE, TRANSPORT AND INDUSTRY e.g the Indo Gangetic Plain in India and Bangladesh	HIGH RUGGED LAND AND WATERLOGGED CONDITION HINER DEVELOPMENT OF AGRICULTURE, TRANSPORT AND INDUSTRY e.g the mountainous relief of the Himalayas e.g the swampy areas of eastern Sumatra in Indonesia
CLIMATE	MODERATE RAINFALL AND MAKE TEMPERATURES MAKE AGRICULTURE EASIER AND LIVING MORE COMFORTABLE e.g Southeast Australia	TOO LITTLE RAIN AND EXTREME TEMPERATURES, THAT IS TOO HOT OR TOO COLD MAKE AGRICULTURE DIFFICULT AND LIVING UNCOMFORTABLE e.g the Sahara in Africa and Antarctica
SOILS	FERTILE SOILS AID AGRICULTURE e.g. Java in Indonesia with its rich volcanic soil	INFERTILE SOIL HINDER AGRICULTURE e.g Central Australia
MINERAL RESOURCE	MINERAL DEPOSITS SUCH AS COAL AND GOLD ATTRACT SETTLERS AND PROMOTE INDUSTRIAL DEVELOPMENT e.g The Ruhr industrial area in Germany where coal is found	LACK OF MINERAL RESOURCES DISCOURAGES INDUSTRIAL DEVELOPMENT e.g The Sahel in Africa
ACCESSIBILITY	COMMUNICATION LINKS ENCOURAGE TRADE AND DEVELOPMENT e.G Singapore which lies at the crossroad of air and shipping routes	POOR COMMUNICATION LINKS DISCOURAGE TRADE AND DEVELOPMENT e.g the densely forested Amazon basin in South America

World's Population Distribution:

Humans are the ultimate resource of nature, and are referred to as human resources. In India, a Ministry of Human Resource Development was created in 1985 with the primary purpose of ensuring that the people of India are healthy, educated and motivated.

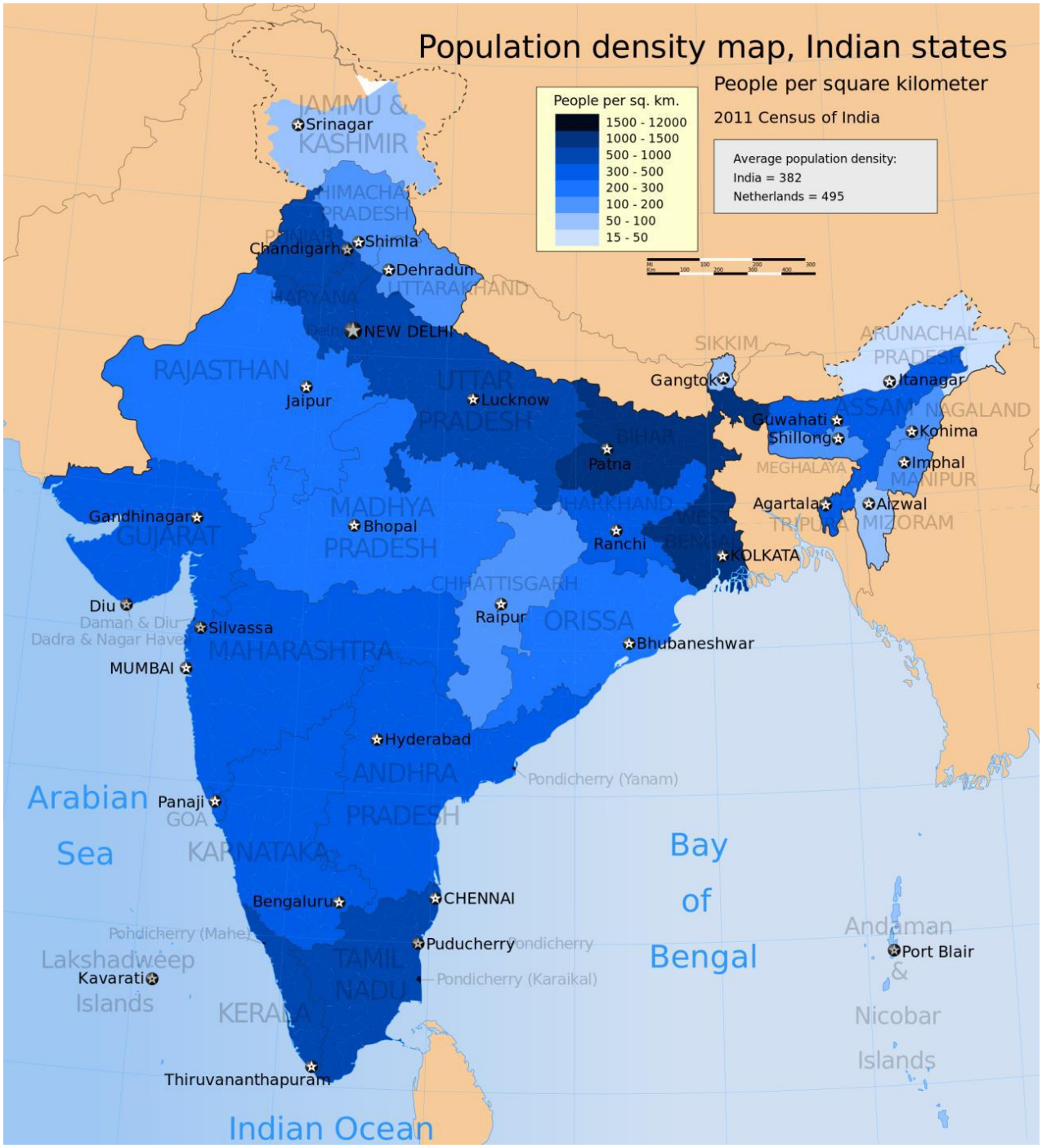
The pattern in which people are spread across the earth is known as population distribution. The number of people living in a unit area of the earth's surface gives the density of population. Population density is calculated by dividing the number of people by area and is usually expressed as the number of people per square kilometre.

The average density of population in the whole world is 45 persons per square kilometre. The population density of a place depends on a range of geographical and socio-economic factors. The topography of a place, its climate and availability of resources like water, soil, minerals, social, cultural and economic factors are some geographical factors that affect the population of a place. As per the provisional population totals of Census 2011, the population density of India has gone up to **382 persons per square kilometer** from 325 persons per square kilometer in 2011.



World population density

India’s Population density:



Population Composition:

The development of a country depends on the quality of the people that comprise the population. The quality of the people can be determined by studying their age, gender, and literacy level and health condition.

Age-Sex pyramid

The most important demographic characteristic of a population is its age-sex structure. Age-sex pyramids (also known as population pyramids) graphically display this information to improve understanding and ease of comparison. The population pyramid sometimes has a distinctive pyramid-like shape when displaying a growing population.

How to Read an Age-Sex Pyramid Graph

An age-sex pyramid breaks down a country or location's population into male and female genders and age ranges. Usually you'll find the left side of the pyramid graphing the male population and the right side of the pyramid displaying female population.

Along the horizontal axis (x-axis) of a population pyramid, the graph displays population either as a total population of that age or a percentage of the population at that age. The center of the pyramid starts at zero population and extends out to the left for male and right for female in increasing size or proportion of the population.

Along the vertical axis (y-axis), age-sex pyramids display five-year age increments, from birth at the bottom to old age at the top.

Some Graphs Actually Look Like a Pyramid

Generally, when a population is growing steadily, the longest bars of the graph will appear at the bottom of the pyramid and will generally decrease in length as the top of the pyramid is reached, indicating a large population of infants and children which declines toward the top of the pyramid due to the death rate.

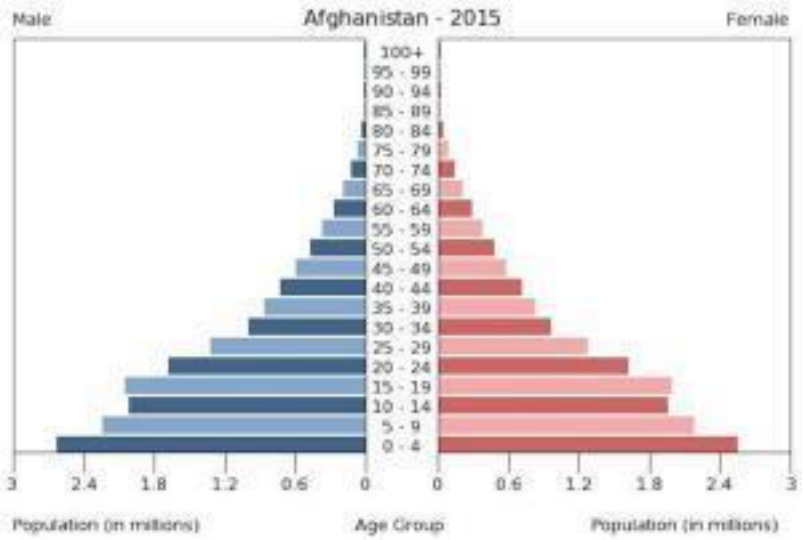
Age-sex pyramids graphically display long-term trends in the birth and death rates but also reflect shorter term baby-booms, wars, and epidemics.

The Three Types of Population Pyramids

1. Rapid Growth

This age-sex pyramid of Afghanistan's population breakdown in 2015 represents a fast growth rate of 2.3 percent annually, which represents a population doubling time of about 30 years.

We can see the distinctive pyramid-like shape to this graph, which displays a high birth rate (Afghan women have on average 5.3 children, this is the total fertility rate) and a high death rate (life expectancy in Afghanistan from birth is only 50.9).

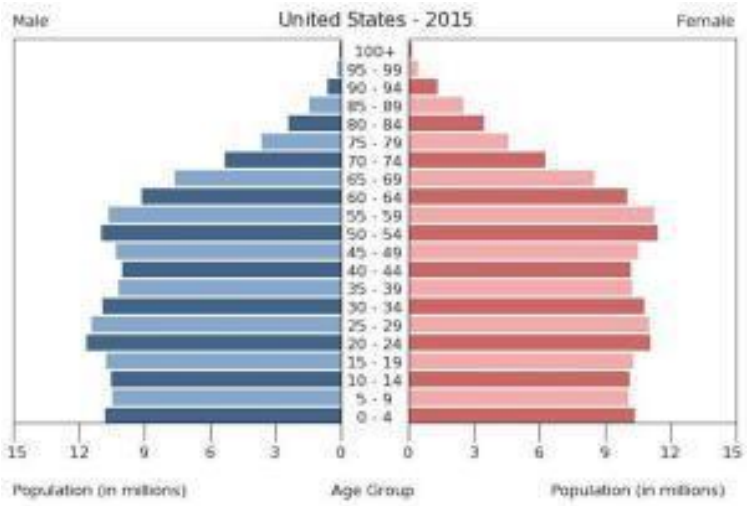


This age-sex pyramid for Afghanistan shows very rapid growth. Courtesy U.S. Census Bureau International Data Base

2. Slow Growth

In the United States, the population is growing at a very slow rate of about 0.8 percent annually, which represents a population doubling time of almost 90 years. This growth rate is reflected in the more square-like structure of the pyramid.

The total fertility rate in the United States in 2015 is estimated at 2.0, which results in a natural decline in the population (a total fertility rate of about 2.1 is required for population stability). As of 2015, the only growth the United States is from immigration.



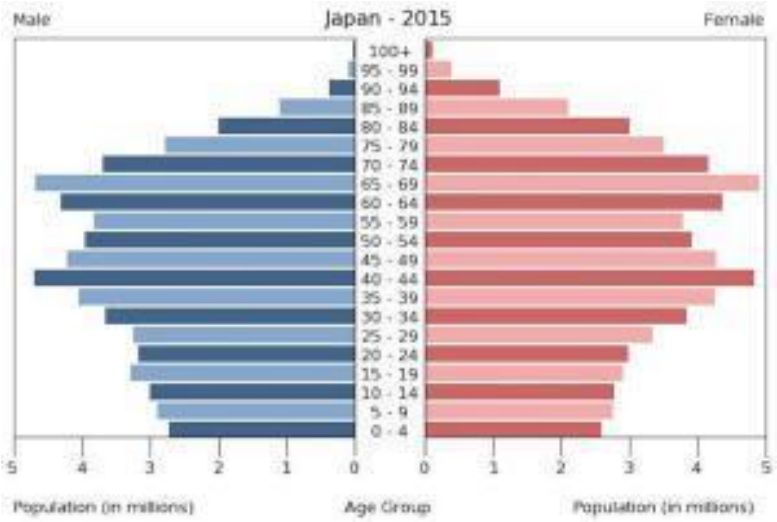
This age-sex pyramid for the United States displays slow population growth. Courtesy U.S. Census Bureau International Data Base

On this age-sex pyramid you can see that the numbers of people in their 20s of both genders is significantly higher than the number of infants and children aged 0-9.

Also note the lump in the pyramid between the ages of about 50-59, this large segment of the population is the post-World War II Baby Boom. As this population ages and climbs up the pyramid, there will be a much greater demand for medical and other geriatric services but with fewer young people to provide care and support for the aging Baby Boom generation.

Unlike the Afghanistan age-sex pyramid, the United States population shows a significant number of residents aged 80 and above, showing that increased longevity is much more likely in the U.S. than in Afghanistan. Note the disparity between male and female elderly in the United States - women tend to outlive men in every population group. In the U.S. life expectancy for men is 77.3 but for women it is 82.1.

3. Negative Growth



This age-sex pyramid for Japan shows negative population growth.

Courtesy: U.S. Census Bureau International Data Base.

As of 2015, Japan is experiencing a negative population growth rate of -0.2%, forecast to drop to -0.4% by 2025.

Japan's total fertility rate is 1.4, far below the replacement rate necessary for a stable population of 2.1. As Japan's age-sex pyramid shows, the country has a huge number of elderly and middle-age adults (about 40% of Japan's population is expected to be over 65 by 2060) and the country is experiencing a dearth in the number of babies and children. In fact, Japan has experienced a record low number of births over the past four years.

Since 2005, Japan's population has been declining. In 2005 the population was 127.7 million and in 2015 the country's population dropped to 126.9 million. The Japanese population is projected to about 107 million by 2050. If current predictions hold true, by 2110, Japan is expected to have a population under 43 million people.

Japan has been taking their demographic situation seriously but unless Japanese citizens start coupling and reproducing, the country will have a demographic emergency.

Important Note: This is just a basic document. Extensive coverage for all geography related concepts will be taken care in future Value Add Notes.