

**Natural Resources**

Other words in the cloud include: Sunlight, Water, Wind turbines, Solar Radiation, Land, Oil, Timber, Hunting, Minerals, Iron Ore, Coal, Soil, Tidal Energy, Natural Gas, Gravitation, Fruits, Petroleum, Gold, Magnetic, Gravel, Marble, Sand, Silver, Copper, Chromite, Metal Ores, Geothermal energy, Mineral oil, Localized, Forestry, Natural, Hydro, Atmosphere, and Water.

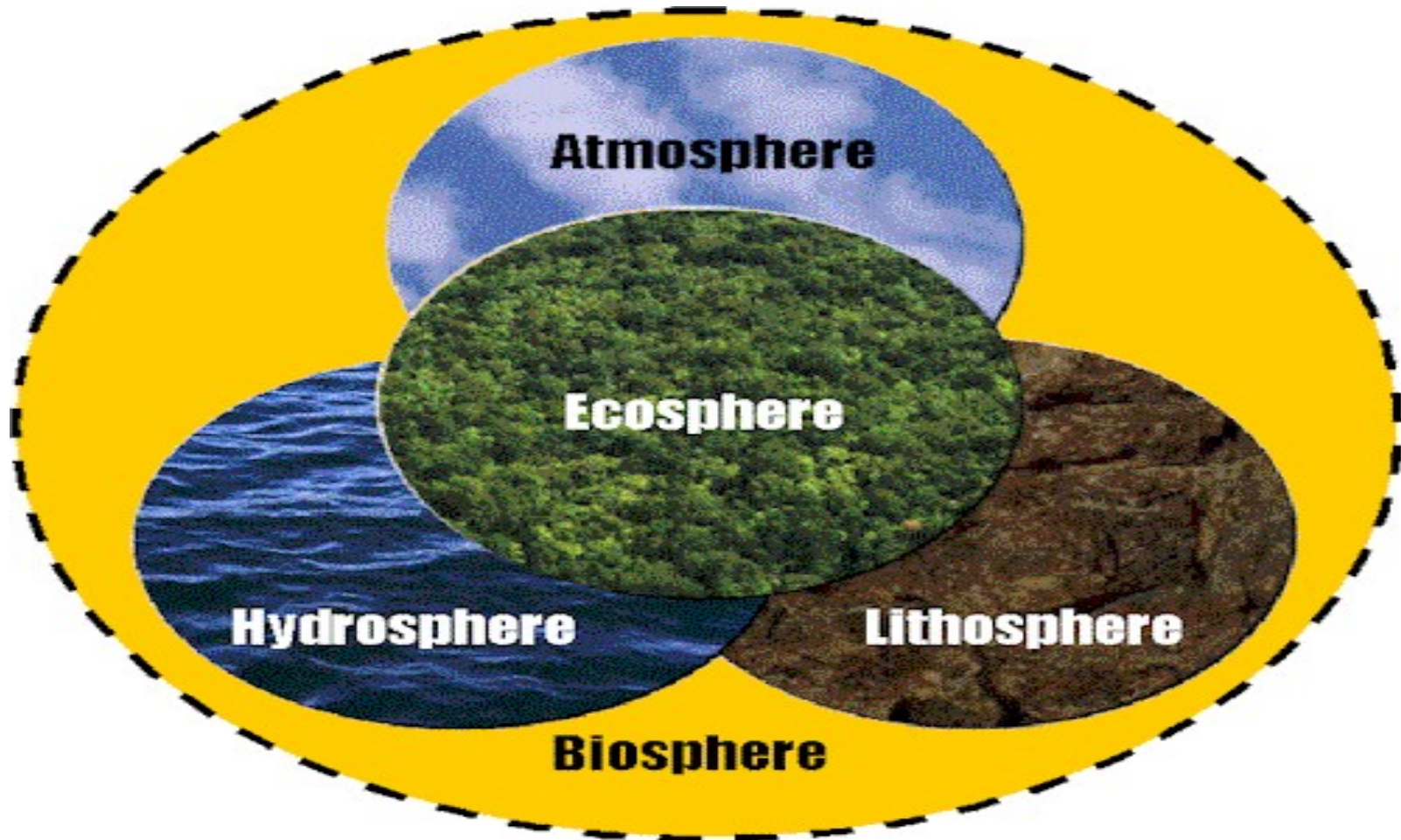
# Natural Resources

## DEFINITION:

- Natural resources are materials and components that can be found within the environment.
- They are naturally occurring substances that are considered valuable in their relatively natural form.
- Inexhaustible resources- solar radiation, geothermal energy, and air
- ubiquitous resources- sun, air



## Classification of Natural Resources



## Based on origin:

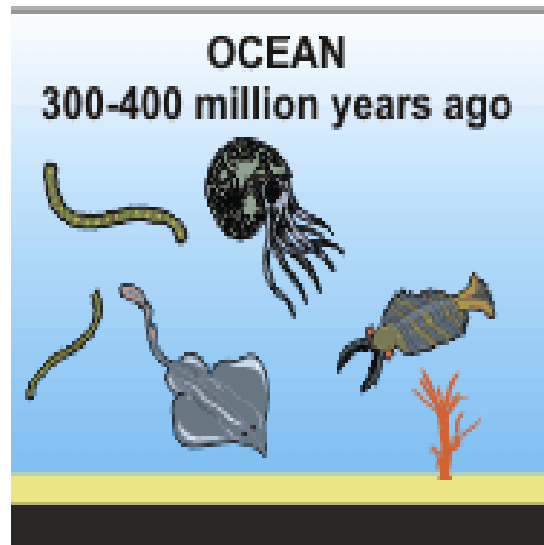
➤ **Biotic:** Obtained from the biosphere

Ex: Fossil fuels such as coal and petroleum

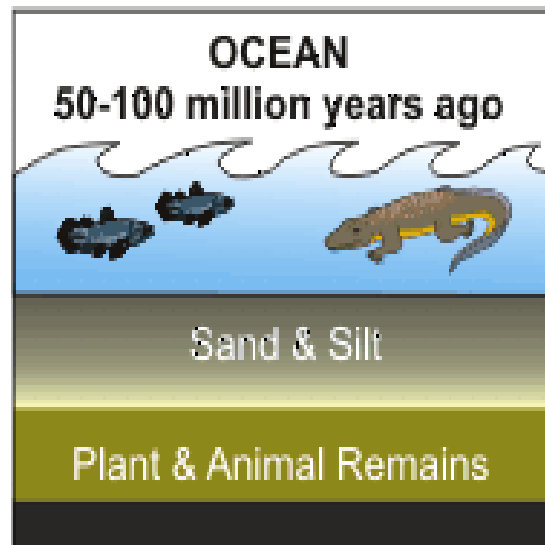
➤ **Abiotic:** Obtained from non-living or non-organic material.

Ex: land, fresh water, air and heavy metals (gold, iron, copper, silver)

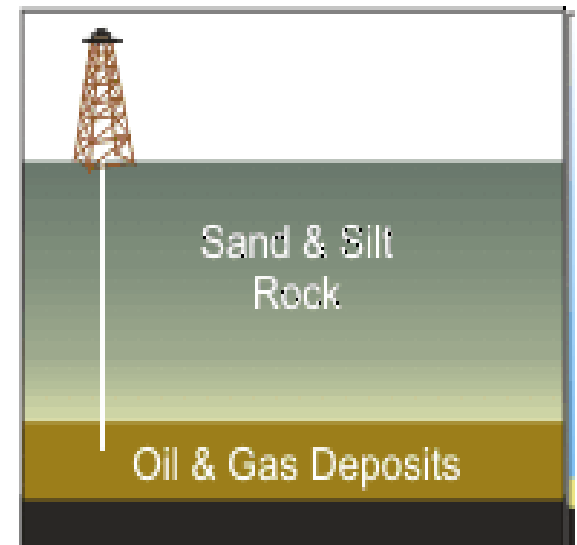
## PETROLEUM & NATURAL GAS FORMATION



Tiny sea plants and animals died and were buried on the ocean floor. Over time, they were covered by layers of silt and sand.



Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned them into oil and gas.



Today, we drill down through layers of sand, silt, and rock to reach the rock formations that contain oil and gas deposits.



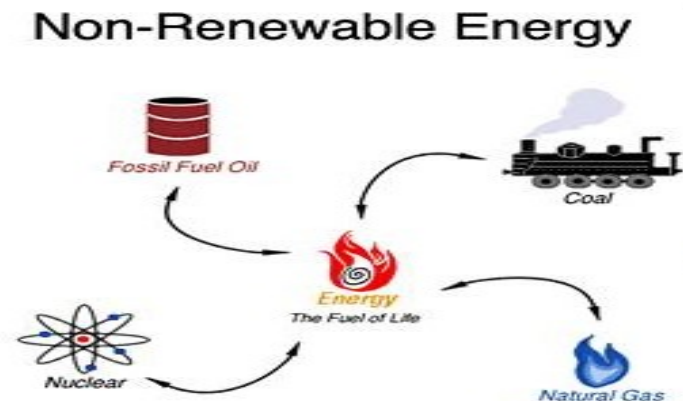
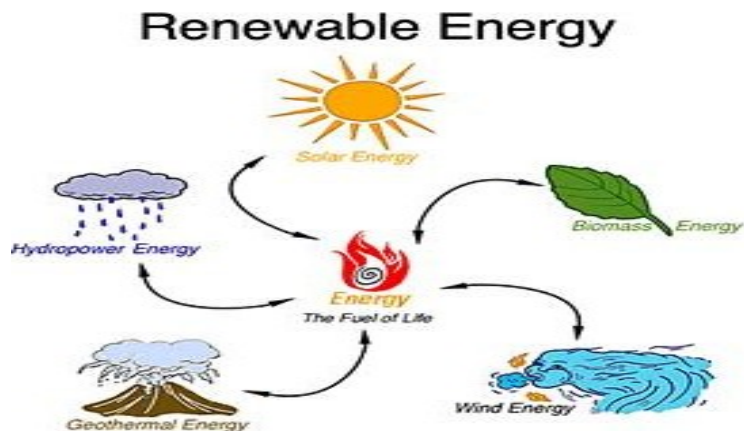
# Basis of Renewability

## Renewable Resources

- Resources have the ability to reappear or replenish themselves by recycling, reproduction or replacement
- Ex: Air, soil, water

## Non-Renewable Resources

- A non-renewable resource exists in a fixed amount that cannot be re-made, re-grown or regenerated as fast as it is consumed and used up.
- Ex: Gold, iron, copper, diamonds, and uranium, coal, fossil fuel, oil etc



## Based on the availability

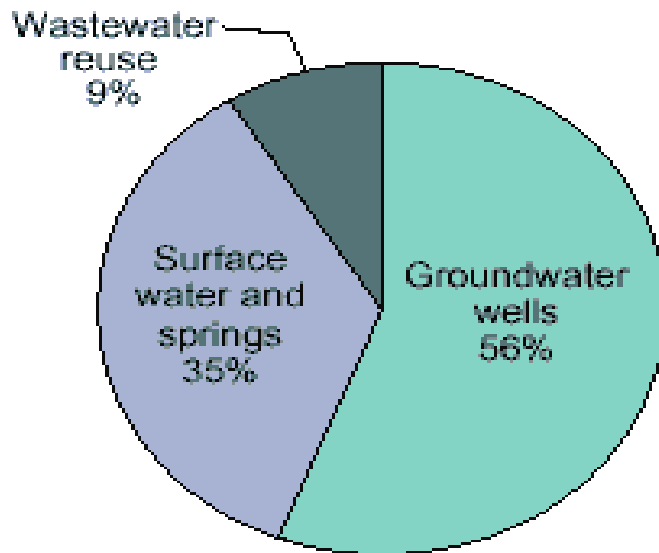
- **Inexhaustible Resources:** Present in unlimited quantities on earth. Ex: Solar energy
- **Exhaustible Resources :** Present in limited quantities.  
Ex: coal, petroleum



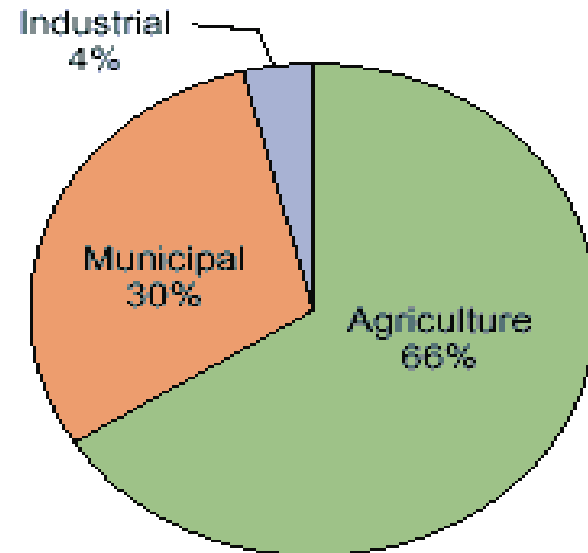
# Water Resources

*Water resources are naturally occurring water supplies that have the potential to be beneficial. Agricultural, commercial, household, leisure, and environmental activities all use water. Water is needed for all living things to grow, live, and reproduce.*

**Water use by source**



**Water use by category**



# Sources of Water

There are various sources of water. About 97% of the water on the Earth's surface is covered with water. The main sources of water are:

## Rainwater :

Rain water is considered the purest form of water.

## River water:

This fed by rain water. Water flows over surface, dissolves salts of soil and suspended organic matter.

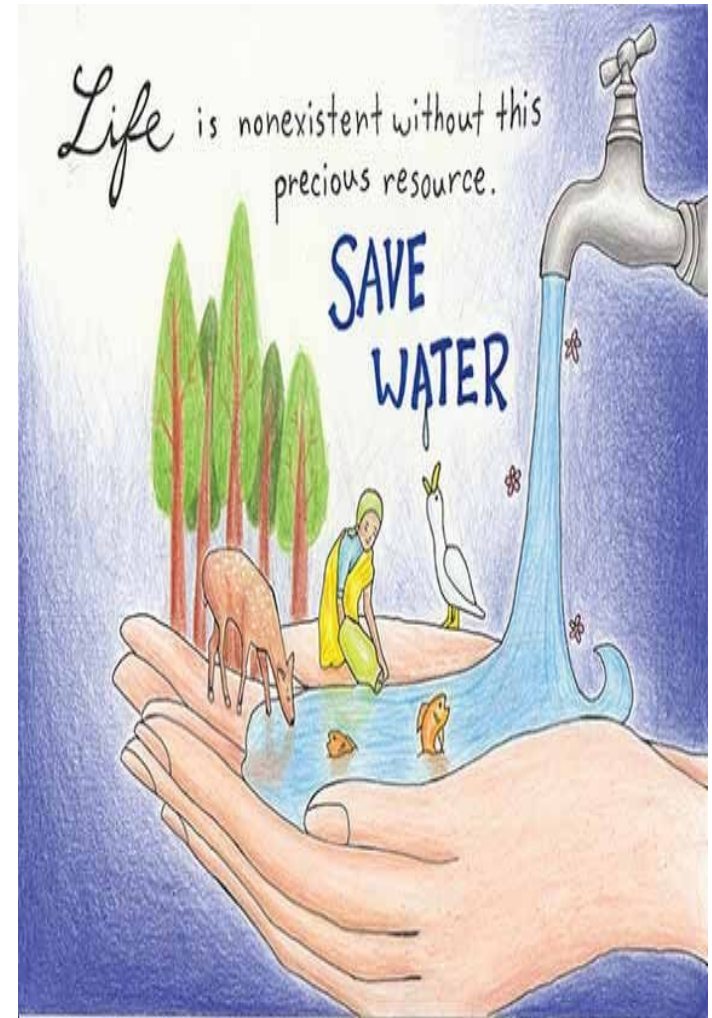
## Lake water:

Contain much lower amount of dissolved salts and organic matter.

## Sea water:

Most impure form of water. River water throws salts and matter. Continuous evaporation makes sea water more concentration.

**Underground water:** water percolates into earth. During its journey it comes contact with minerals get concentrated.





# Uses of Water

Water is a transparent, tasteless and odorless liquid that is essential for all living beings. Around 70% of the earth's surface is covered with water. However, only a small percentage (around 1%) of it is suitable for human consumption.

## Domestic Uses of Water

- Water is important for cooking and helps in boiling, steaming and simmering of food.
- It is required for taking showers, brushing teeth and maintaining personal hygiene.
- It is used for gardening at home.
- Water is used in several home appliances like air coolers.

## Uses of Water in Agriculture

- Plants use water and sunlight for photosynthesis and produce oxygen.
- Water is used for livestock, dairies, and fish farms.

## Industrial Uses of Water

- Water is used in hotels, restaurants, offices, and other commercial facilities.
- It is essential in the manufacturing and production of paper, chemicals, automobiles, steel, food, textile production, dyeing, etc.
- Power plants need a significant amount of water for cooling.
  - Water is a source of hydroelectricity. Dams are constructed across rivers and lakes to store water which is converted to electricity using turbines.

## OVER-UTILIZATION OF SURFACE & GROUND WATER

The rapid increase in population and industrial growth led to severe demand on water resources. After using all available surface water resources to the maximum, human beings began using groundwater to meet their needs.

- The increased extraction of groundwater far in excess of the natural recharge led to decreased groundwater level.
- The erratic and inadequate rainfall caused reduction in storage of water in reservoirs. This also led to decrease of groundwater.
- Building construction activities seal permeable soil zone and reduce the area for percolation of rainwater thereby increasing surface runoff.
- If groundwater withdrawal rate is higher than recharge rate, sediments in aquifers get compacted resulting in sinking of overlaying land surface. This is called land subsidence which leads to structural damage in buildings, fracture in pipes and reverses the flow of canals leading to tidal flooding.



**"WE NEVER KNOW THE WORTH OF  
WATER TILL THE WELL IS DRY."**



## Floods and Droughts

**Floods** occur when land that is usually dry is submerged by large amounts of water.

**Drought** is a prolonged period with little or no rainfall.

- Floods and droughts are two well-known natural hazards in the world. The former is due to excess in water flow and the latter is due to scarcity of water.
- The amount of rainfall received by an area varies from one place to another depending on the location of the place. In some places it rains almost throughout the year whereas in other places it might rain for only a few days. India records most of its rainfall in the monsoon season.
- Heavy rains lead to a rise in the water level of rivers, seas, and oceans. Water gets accumulated in the coastal areas, which results in floods. Floods bring in extensive damage to crops, domestic animals, property and human life. During floods, many animals get carried away by the force of water and eventually die.

- On the other hand, droughts set in when a particular region goes without rain for a long period of time. In the meantime, the soil will continuously lose groundwater by the process of evaporation and transpiration. Since this water is not brought back to earth in the form of rains, the soil becomes very dry.
- The level of water in the ponds and rivers goes down and in some cases water bodies get dried up completely. Ground water becomes scarce and this leads to droughts. In drought conditions, it is very difficult to get food and fodder for the survival. Life gets difficult and many animals perish in such conditions.
- Frequent floods and droughts are mostly due to climate change and global warming. Various environmental organizations world over are of the view that climate change is a long-term change in weather patterns, either in average weather conditions or in the distribution of extreme weather events.



# DAMS

Dams are built across rivers to store water for irrigation, hydroelectric power generation and flood control. The dams built to serve more than one purpose are called "multi-purpose dams". These dams were called the "temples of modern India" by the country's first Prime Minister, Jawaharlal Nehru.

## Advantages of dams

- There are many advantages of dams, which is why so much money and effort goes into constructing and maintaining them. Some of the benefits are:
- With the assistance of hydroelectricity or hydroelectric power, electricity is generated at a steady rate.
- For the use of another time, water is preserved.
- For irrigation purposes, water sports or even other types of pleasurable activities, the lake or reservoir built behind the dam may also be used.
- The buildup of water within the lake ensures that when required and also when water is released for electricity production, the energy can be stored.
- When used the electricity generated by the dams does not generate greenhouse gases and therefore does not cause pollution.

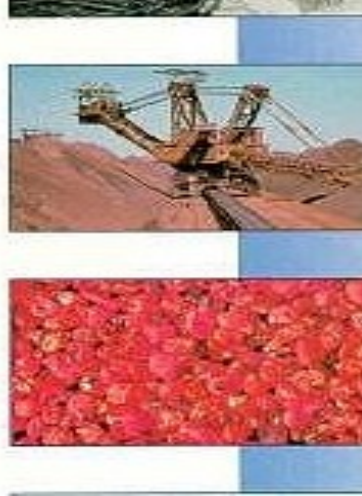


## Disadvantages of dams

There are many benefits of constructing a dam, which is why a state spends so much money in building and maintaining dams. But there are also drawbacks that are linked to it. The drawbacks are those of the following:

- It is very costly to build a dam, the government needs to ensure strict regulations are followed and very high quality is established.
- In order to become profitable enough to compensate for the high construction costs, they must work for several years.
- It is important to evacuate people living in towns and villages in the surrounding area, in which there are risks of flooding. They are losing their farms.
- People are often physically displaced to set up hydro-power plants and this raises a significant ethical problem.
- The construction of large dams can cause serious modifications to the earth's surface and contribute to geological harm. It can trigger frequent earthquakes, but modern dam preparation and design have minimized the risk of such incidents.

# MINERAL RESOURCES



- A mineral is a **pure inorganic substance** that occurs naturally in the earth's crust.
- These are the natural resources which are **non-renewable**.
- The calcium, phosphorous, sodium, chlorine and sulphur are the major minerals in the animals.
- The minor minerals in the animals are iron, copper, cobalt, zinc, fluorine and selenium.
- The minerals in the plants are divided into the macro and micro nutrients.
- The macro nutrients are calcium, magnesium, sulphur and iron. The micro nutrients are manganese, cobalt, zinc and chlorine.
- India is rich in coal, manganese, iron, chromites and mica. It is deficient in the gold, silver, nickel

# Use of Minerals

The use of minerals depends upon its deposits. Some countries are rich in mineral deposits, while others have no deposits.

The greatest use of minerals depends on its properties. Minerals are used in almost all industries.

- Gold, silver and platinum are used in the jewelry industry.
- Copper is used in coin industry and for making pipes and wire.
- Silicon obtained from quartz is used in the computer industry.
- Aluminum is light, strong and durable in nature, so it is used for aircraft, shipping and car industries.
- Mica- Mica is used in electrical and electronics industries. It is also used in production of medicines, paints, etc. Mica has an insulating property.
- Copper- Copper is a good conductor of electricity. Copper is used for making alloys, electric wires and utensils. It is also used in the manufacture of medicines. The demand of copper is always more due to its non-rusting property.
- Lead- Lead is a heavy and soft metal. It does not conduct heat. It is used in the manufacture of ammunition, glass, rubber, paints, etc.
- Bauxite- Bauxite is used in industries as raw materials. India has large deposits of bauxite ore. It is used in industries which manufacture ships, aero planes, automobiles, electric wires, etc.

# Exploitation of Mineral Resources

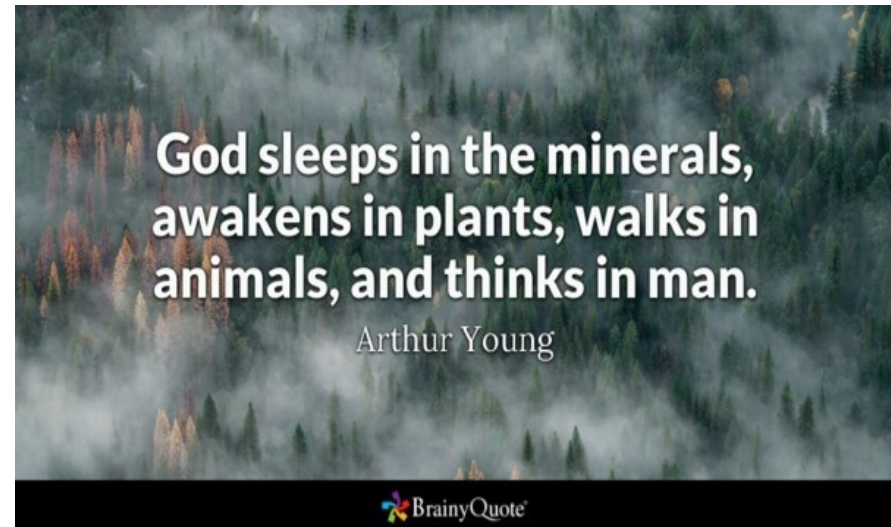
Exploitation of mineral refers to the use of mineral resources for economic growth. Exploitation of mineral resources at a mindless speed to meet the growing needs of modern civilization has resulted in many environmental problems.

Although, the exploitation of minerals began at a slow pace during the industrial revolution in Western countries, during the 20<sup>th</sup> century, the exploitation of some minerals, especially the fossil fuels increased exponentially to meet the growing energy need. Today, about 80% of the world's energy consumption is sustained by the extraction of fossil fuels, which consists of oil, coal, and gas.

## Consequences of Exploitation of Mineral Resources.

Excessive exploitation of mineral resources has led to the following severe problems.

- Deforestation and desertification
- Extinction of species
- Rapid depletion of high grade minerals
- Forced migration
- Wastage of upper soil layer and vegetation
- Soil erosion and oil depletion
- Ozone depletion
- Greenhouse gas increase
- Environmental pollution
- Natural hazards, etc.



# **Environmental Effects of Extraction and Over-exploitation of Mineral Resources**

- Destruction of forest and damage to the earth's surface
- Soil erosion and reduction in soil fertility
- Generation of large amount of wastes which degrade the quality of land
- Pollution of air, water, and land
- Lowering of water table leading to ground subsidence and ground water pollution
- Destruction of natural ecosystems and creation of trenches and open pits
- Earthquakes and other volcanic events
- Occupational health hazards to miners
- Emission of radioactive pollutants, ash and trace metals by the combustion of coal and petroleum

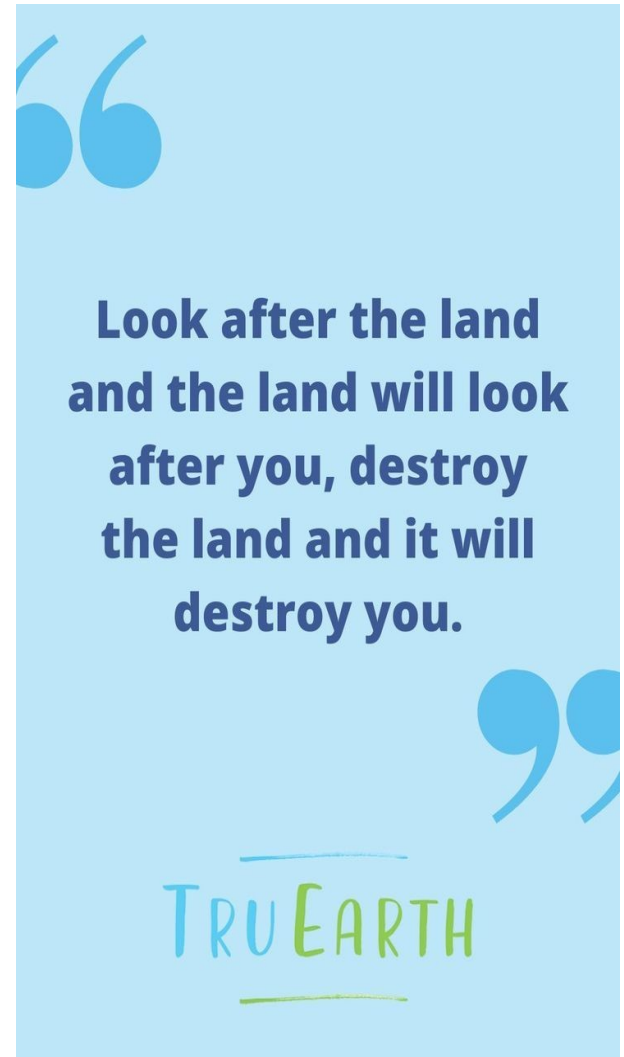


# Land resources

Land is most simply defined as ‘the solid portion of the Earth’s surface’. It is a significant natural resource which plays an important role in the development of human society. The science dealing with land is known as pedology.

The importance of land as a resource for mankind is highlighted by the following points:

- The human civilization has taken shape on land.
- Land is used for agriculture.
- Land contains huge amount of mineral deposits.
- It also contains water in the form of underground water. Most of the animals have their habitat on land.
- Land provides all the resources required to fulfill the basic needs of human civilization such as food, cloth, and shelter.



# Renewable Energy Resources

The resources which cannot be exhausted even after continuous utilization are termed as renewable resources.

Examples of renewable resources are the sun, wind, and tidal energy.

- Renewable energy is a source of clean, inexhaustible energy.
- It is pollution-free as it doesn't produce any greenhouse gas and polluting emissions which are otherwise produced in case non-renewable sources.
- The costs for renewable energy is also falling at a sustainable rate opposite to the rate trend of fossil fuels.
- It reduces energy dependence on fossil fuels.

## Uses of Renewable Energy

- The major use of all renewable energies is to generate electricity. In 2018, 26.2 percent of global electricity requirements was fulfilled by renewable energy which is expected to rise up to 45 percent by 2040.
- Solar energy can be directly used for heating and lighting homes, for hot water heating, solar cooling etc.
- Biomass is also used to heat buildings and provide heat in industries. It is also used as a fuel when converted to liquid biofuel.

# Non-Renewable Resources

The resources which cannot be immediately replaced once they are depleted are called Non-renewable resources.

Examples of Non-renewable resources include fossil fuels, such as coal, petroleum and natural gas and rare minerals .

## Advantages of non-renewable energy

Non-renewable resources are high in energy. Resources such as coal and oil tend to provide us more energy in comparison to renewable energy such as solar or wind energy.

Huge profits can be generated in the mining of coal, selling of oil or the construction of natural gas pipelines.

# Disadvantages of non-renewable energy

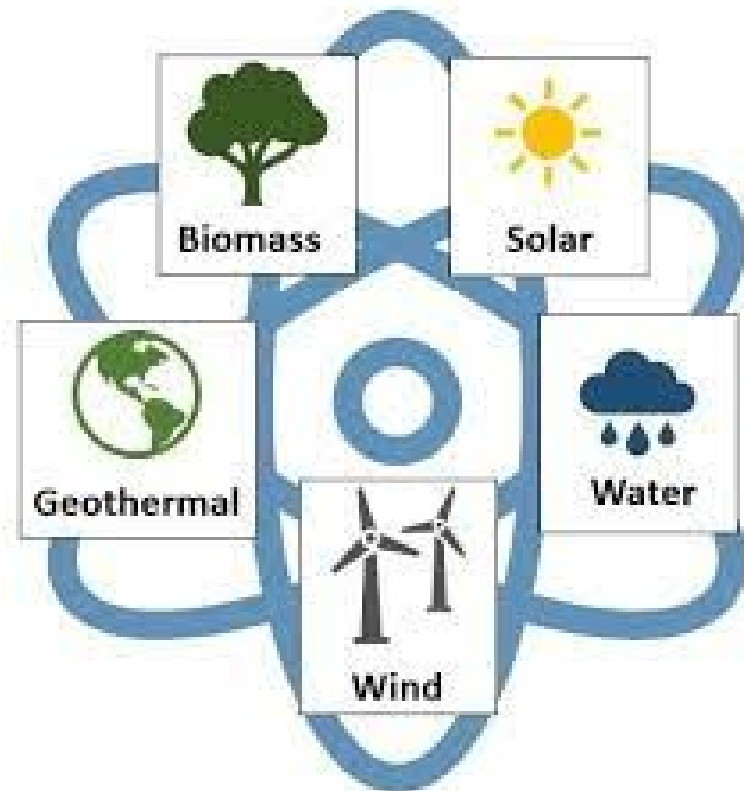
1. One of the major disadvantages of non-renewable energy is that it is time-consuming. Mining of coal, searching for oil, installing oil drills, building oil rigs, inserting pipes to extract and the transportation of natural gases are very time-consuming processes. They also take a lot of effort.
2. Non-renewable energy can be dangerous and cause respiratory problems to humans because sources like fossil fuels emit gases such as carbon monoxide.
3. Sources like coal, oil and natural gas release a large amount of carbon dioxide when burnt. As a result of these chemicals, they are rapidly destroying the ozone layer.
4. Oxides like sulphur oxide and others released while burning fossil fuels may convert the rain in acidic rain which is harmful to the wildlife as well as human beings.
5. Because non-renewable energy takes billions of years in their formation, they are slowly but gradually vanishing from the earth. Using non-renewable resources indiscriminately without thinking for our future generations could be selfish.

<b>Renewable resources</b>	<b>Non- renewable resources</b>
Resources which can be renewed or can be reused are renewable resources.	Resources which cannot be renewed or reused once utilized are called non-renewable resources.
These include components like air, water, wind, sunlight etc.	These include components like fossil fuels, LPG gases.
They are sustainable resources.	They are exhaustible resources.
Their rate of renewal is greater than the rate of getting exhausted.	Their rate of renewal is slower than the rate of getting exhausted.
They are mostly environmental friendly and does not cause pollution.	They are the main cause of pollution.



# Use of Alternate Energy Source.

- Alternative energy is energy that does not come from fossil fuels, and thus produces little to no greenhouse gases like carbon dioxide (CO<sub>2</sub>).
- This means that energy produced from alternative sources does not contribute to the greenhouse effect that causes climate change.
- These energy sources are referred to as “alternative” because they represent the alternative to coal, oil, and natural gas, which have been the most common sources of energy since the Industrial Revolution.
- Alternative energy here includes hydroelectric energy, solar energy, geothermal energy, wind energy, nuclear energy, and biomass energy.



## Solar Energy

- Solar energy is the energy obtained from the sun. The radiant light and heat energy is harnessed by solar collectors.
- The sun's energy can be captured to generate electricity or heat through a system of panels or mirrors.
- Solar, or photovoltaic, cells convert sunlight directly into electricity while solar thermal collectors use heat-absorbing panels and a series of attached circulation tubes to heat water or buildings.



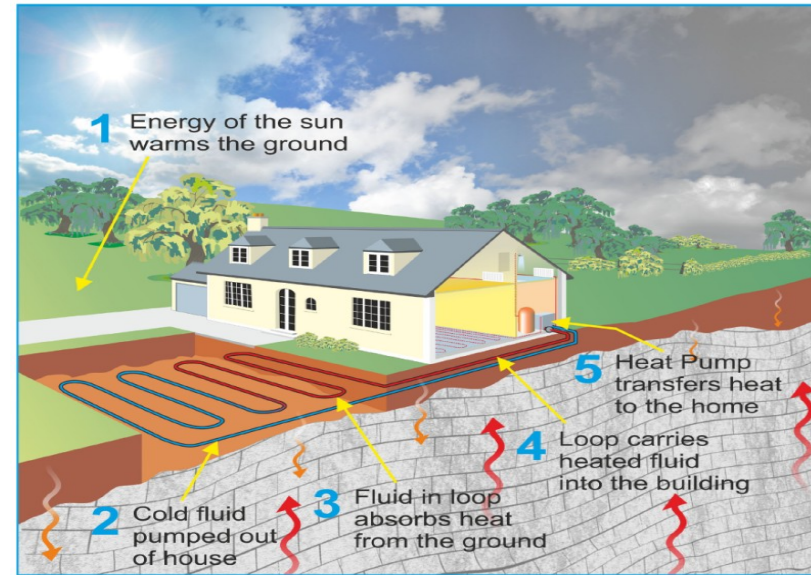
## Wind Energy

- Wind power or wind energy makes the use of wind to provide the mechanical power to electric generators through wind turbines so that they can do operations like milling or pumping.
- The wind hits two or more propeller-like blades around a rotor. This rotor is connected to the main shaft connected to the generator so that when the rotor moves it moves shaft in turn, hence electricity is produced as generator operates.
- These turbines are installed mostly in high altitude areas.



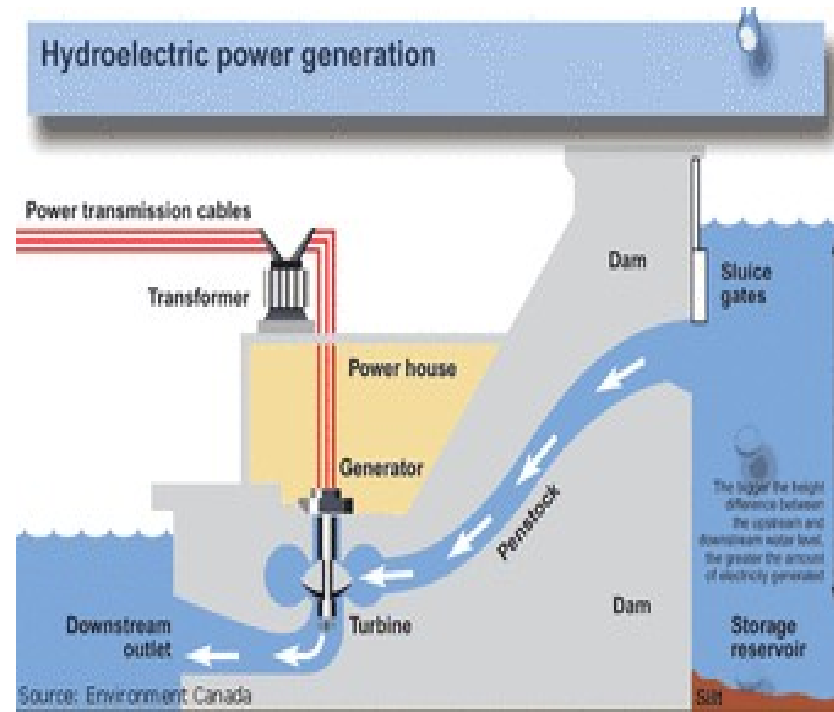
# Geothermal Energy

- Earth has its own thermal energy stored in it. The energy that is generated from the thermal energy stored in the earth is called geothermal energy.
- Hot springs and volcanoes are used to capture the heat energy and this heat is directly used by industries for heating the water and other purposes.



# Hydropower

- Hydropower or hydroelectricity is the energy generated by the use of water.
- Dams and reservoirs are constructed on flowing water which uses the kinetic energy of the water to run turbines and in turn, generate electricity.
- Hydropower is also generated by making use of tides known as tidal energy.
- Also, energy from the surface of ocean waves is used to produce electricity known as wave energy.



# Bioenergy

- Bioenergy is derived from biomass which is organic waste of animals and plants. Biomass contains stored chemical energy.
- It is burnt to produce bioenergy.
- It may be converted to biofuel and then used or it can directly be used to produce heat through combustion.
- The heat generated from combustion is used to run generators to produce electricity.

