

.

Natural Resources: Introduction, Classification.

Water Resources; Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and Arsenic Problems in Drinking Water.

Mineral Resources; Material Cycles; Carbon, Nitrogen and Sulfur cycles.

Energy Resources; Conventional and Non conventional Sources of Energy.

Forest Resources; Availability, Depletion of Forests, Environment impact of forest depletion on society.

UNIT 2

Natural Resources

- Natural resources occur naturally within environments that exist relatively undisturbed by humanity, in a natural form.
- Natural resources are derived from the environment.
- Some of them are essential for our survival, while most are used for satisfying our wants.

Conserving Natural Resources

- Resources are features of environment that are important and value of to human in one form or the other. However, the advancement of modern civilization has had a great impact on our planet's natural resources.
- So, conserving natural resources is very essential today. There are many ways that one can conserve natural resources.

Conserving Natural Resources

- All we need to do is to look around and see what natural resources we are using and find out ways to limit their usage.
- **4'R' principle** is quite significant in the conservation of natural resources- ie Refuse (avoid or say NO), Reduce (no wastage), Reuse and Recycle. This may/should be applied to all types of resources.

Classification of Natural Resources

- **Renewable Resources** – Renewable resources can be replenished naturally. Some of these resources, like sunlight, air, wind, etc., are continuously available and their quantity is not noticeably affected by human consumption.
- Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use.
- Resources from a human use perspective are classified as renewable only so long as the rate of replenishment/recovery exceeds that of the rate of consumption.

Non-Renewable Resources

- Non-renewable resources either form slowly or do not naturally form in the environment. Minerals are the most common resource included in this category.
- By the human perspective, resources are non-renewable when their rate of consumption exceeds the rate of replenishment/recovery; a good example of this are fossil fuels, which are in this category because their rate of formation is extremely slow (potentially millions of years), meaning they are considered non-renewable.

Non-Renewable Resources

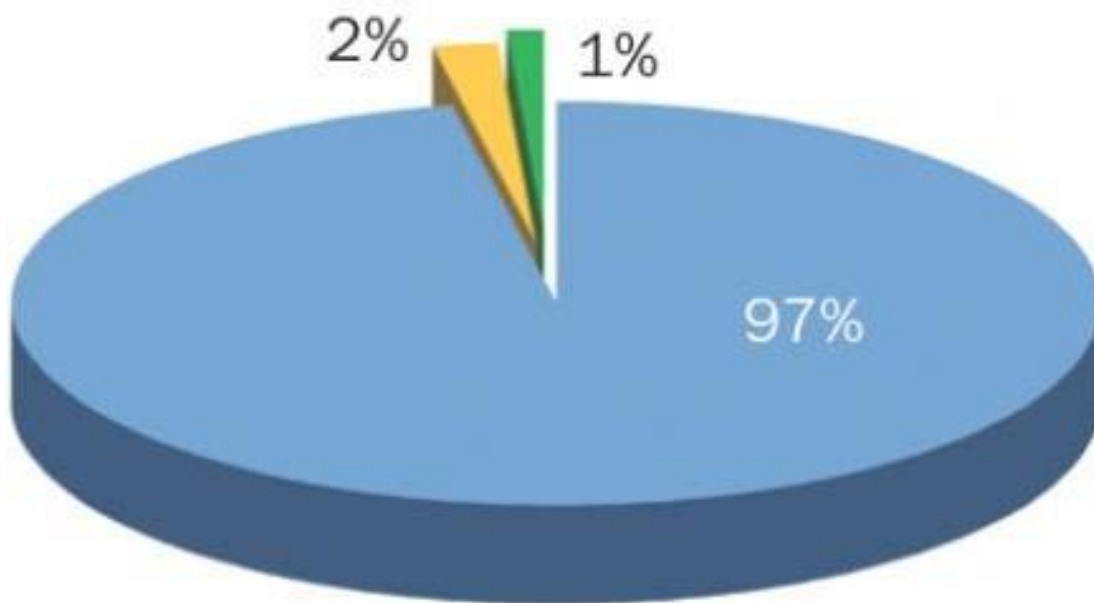
- Some resources actually naturally deplete in amount without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them, but coal and petroleum cannot be recycled.

Resources can be grouped as-

- Water Resources
- Mineral Resources
- Forest Resources
- Food Resources
- Energy Resources

Water Resources

Earth's Water Resources



Salt water

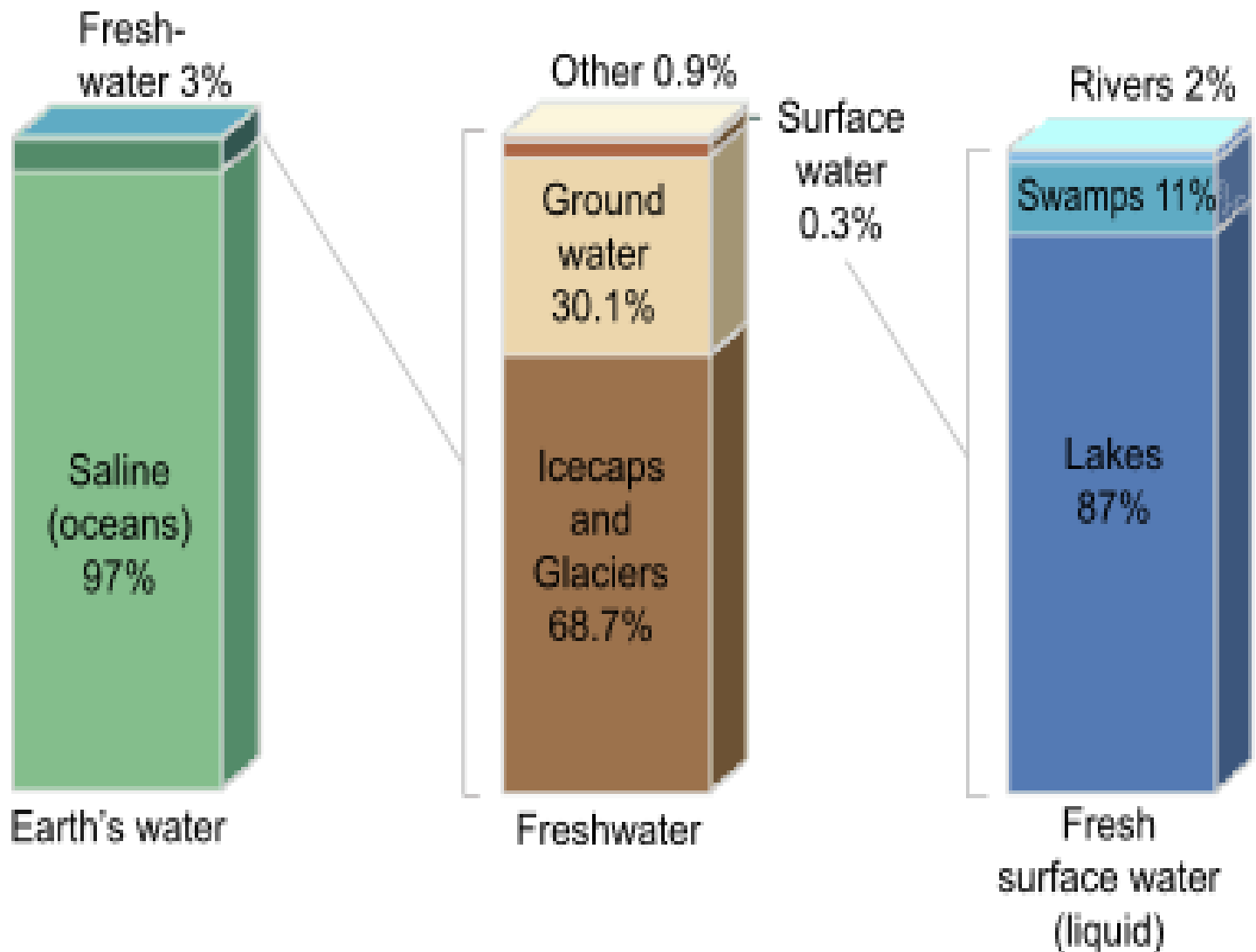


Frozen water in glaciers and ice caps



Available for human consumption

Distribution of Earth's Water



Conservation of Water

Conservation and management of water are essential for the survival of mankind, plants and animals. Water resources are sources of water that are useful or potentially useful.

Uses of water include –

Agricultural

Industrial

Household

Recreational

Environmental Activities

Conservation of Water

- The majority of human uses require freshwater. 97 percent of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps.
- The remaining unfrozen fresh water is found mainly as groundwater, with only a small fraction present above ground or in the air.

Conservation of Water

Fresh water is a renewable resource. The framework for allocating water resources to water users (where such a framework exists) is known as water rights. This can be achieved adopting the following methods:

- Growing vegetation in the catchment areas, which will hold water in the soil and allow it to percolate into deeper layers and contribute to formation of ground water.
- Constructing dams and reservoirs to regulate supply of water to the fields, as well as to enable generating hydroelectricity.
- Sewage should be treated and only the clear water should be released into the rivers.
- Industrial wastes (effluents) should be treated to prevent chemical and thermal pollution of fresh water.
- Judicious use of water in our day-to-day life.
- Rainwater harvesting should be done by storing rainwater and recharging groundwater.
- Recycling of waste water.
- Desalinization of salty water.
- Irrigation process should be improved and less water should be wasted.

The main reasons for the degradation of water are:

1.To meet the need of increasing population, surface water (water from ponds, lakes, rivers, etc) and ground water are overdrawn.

2.Sewage i.e., waste water from domestic and municipal use makes fresh water unfit for use by human beings and animals.

3.Waste water, from all industries flow down the surface water bodies and ground Water bodies and they get polluted.

CONFLICTS OVER WATER

Kaveri River water dispute

The sharing of waters of the Kaveri has been the source of a serious conflict between the Indian states of **Karnataka** and **Tamil Nadu**. The state of Karnataka contends that it does not receive its due share of water from the river as Tamil Nadu does. Decades of negotiations between the parties bore no fruit.

Godavari Water Disputes Tribunal

CONFLICTS OVER WATER

Godavari Water Disputes Tribunal

Godavari river basin is spread in the states of **Maharashtra, Orissa**, old Madhya Pradesh {later bifurcated into present **Madhya Pradesh** (MP) and Chhattisgarh), **Karnataka** (K) and **Andhra Pradesh** (AP).

International water dispute

The most likely sources of inter-state water conflict are the Nile drainage basin, the Tigris- Euphrates River and the Jordan River. All of these potential sites of conflict involve several countries. The conflicting water-diversion projects by Israel and Syria were a significant contributor to the 1967 Six Day War.

Water Borne and Water Induced Diseases

Category	Comments
<i>Water-borne diseases</i>	Caused by the ingestion of water contaminated by human or animal faeces or urine containing pathogenic bacteria or viruses; includes cholera, typhoid, amoebic and bacillary dysentery and other diarrhoeal diseases.
<i>Water-washed diseases</i>	Caused by poor personal hygiene; includes scabies, trachoma and flea-, lice-, and tick-borne diseases, which are also water-washed.
<i>Water-based diseases</i>	Caused by parasites found in intermediate organisms living in water; includes dracunculiasis, schistosomiasis and some other helminths.
<i>Water-related diseases</i>	Transmitted by insect vectors which breed in water; includes dengue, filariasis, malaria, onchocerciasis, trypanosomiasis and yellow fever.

Definition- Any disease that can spread through contaminated water. The contamination can involve bacterial, viral or protozoan organisms. Some examples of waterborne diseases include cholera (bacteria), dysentery (bacteria or amoeba), cryptosporidiosis (protozoa), hepatitis A (virus) and giardia (protozoa). Infection can result not only from drinking the water but also from swimming in the water where it can enter the body in other ways such as through broken skin. Many poorer countries have limited uncontaminated water supplies so waterborne disease is a huge health issue worldwide.

Fluoride and Arsenic Problems in Drinking Water

- An estimated 300 million people worldwide use drinking water contaminated with arsenic or fluoride.
- These trace elements are natural (geogenic) contaminants, leached into groundwater from rocks and sediments.
- Depending on the geological conditions, they may occur in concentrations which pose a risk to human health.
- The guideline values specified by the World Health Organization are 10 micrograms per liter for arsenic and 1.5 micrograms per litre for fluoride.

Fluoride and Arsenic Problems in Drinking Water

- Elevated concentrations are found in particular in parts of Asia, Africa and South America. The problem thus mainly affects people in developing and emerging countries whose drinking water is obtained from groundwater wells.
- In many regions of Asia, Africa and South America, consumption of groundwater contaminated with arsenic or fluoride causes severe health problems.

Fluoride and Arsenic Problems in Drinking Water

Regular use of contaminated water causes serious damage to health. Chronic exposure to arsenic leads to discoloration and thickening of the skin and can also cause cardiovascular disorders or cancer. Excessive fluoride levels are associated with mottling of the teeth and bone and joint deformities.

Various technologies which are suitable for arsenic or fluoride removal in developing countries, including household, community and centralized treatment systems. Arsenic removal generally involves two steps – oxidation and ion exchange. Fluoride can be removed from drinking water by filtration or precipitation.

Arsenic removal from water

1. Small-scale water treatment

(i) A simpler and less expensive form of arsenic removal is known as the Sono arsenic filter, using three pitchers containing cast iron turnings and sand in the first pitcher and wood activated carbon and sand in the second. Plastic buckets can also be used as filter containers.

Arsenic removal from water

(i)Chaff-based filters have been reported to Reduce the arsenic content of water to 3 microgram/litre.

This is especially important in areas where the potable water is provided by filtering the Water extracted from the underground aquifer.

Arsenic removal from water

1. Large-scale water treatment

In some places, such as the United States, all the water supplied to residences by utilities must meet primary (health-based) drinking water standards. Regulations may necessitate large-scale treatment systems to remove arsenic from the water supply.

3.Coagulation/filtration (also known as flocculation) removes arsenic by coprecipitation and adsorption using iron coagulants. Coagulation/filtration using alum is already used by some utilities to remove suspended solids and may be adjusted to remove arsenic. But the problem of this type of filtration system is that it gets clogged very easily, mostly within two to three months. The toxic arsenic sludge is further disposed of by concrete stabilization.

2. Mineral Resources

- A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction.
- These are the natural resources which cannot be renewed. They are present in the organisms as an organic and inorganic molecule and ions.
- 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 consist of calcium, magnesium, sulphur and iron.

. The micro nutrients consist of manganese, cobalt, zinc and chlorine.

- We have attained such an enormous level of consumption of our mineral wealth that good quality deposits of many elements have already disappeared while many others are in the process of being depleted.
- These resources belong to our children and grandchildren as much as they do to us. It is high time now that we should seriously think about conserving them.

Uses of Minerals- Minerals are used for constructing houses, manufacturing machines and automobiles, ornamenting body parts, various defence activities. So various uses are-

- 1 Making weapons
- 2 Generating electricity
- 3 Manufacturing machines
- 4 For industries

Overexploitation of mineral resources cause-

- 1.Rapid depletion of high-grade mineral deposits
- 2.Wastage of mineral wealth
- 3.Pollution of environment from mining
- 4.Pollution caused by heavy energy requirement of mining industry

Conservation of minerals-

Important steps may be taken to make these deposits last longer are:

- 1.Economy in use of Mineral Resources

- 1.Making Finished Products Long Lasting

- 1.Re-Use and Re-Cycling of Metals

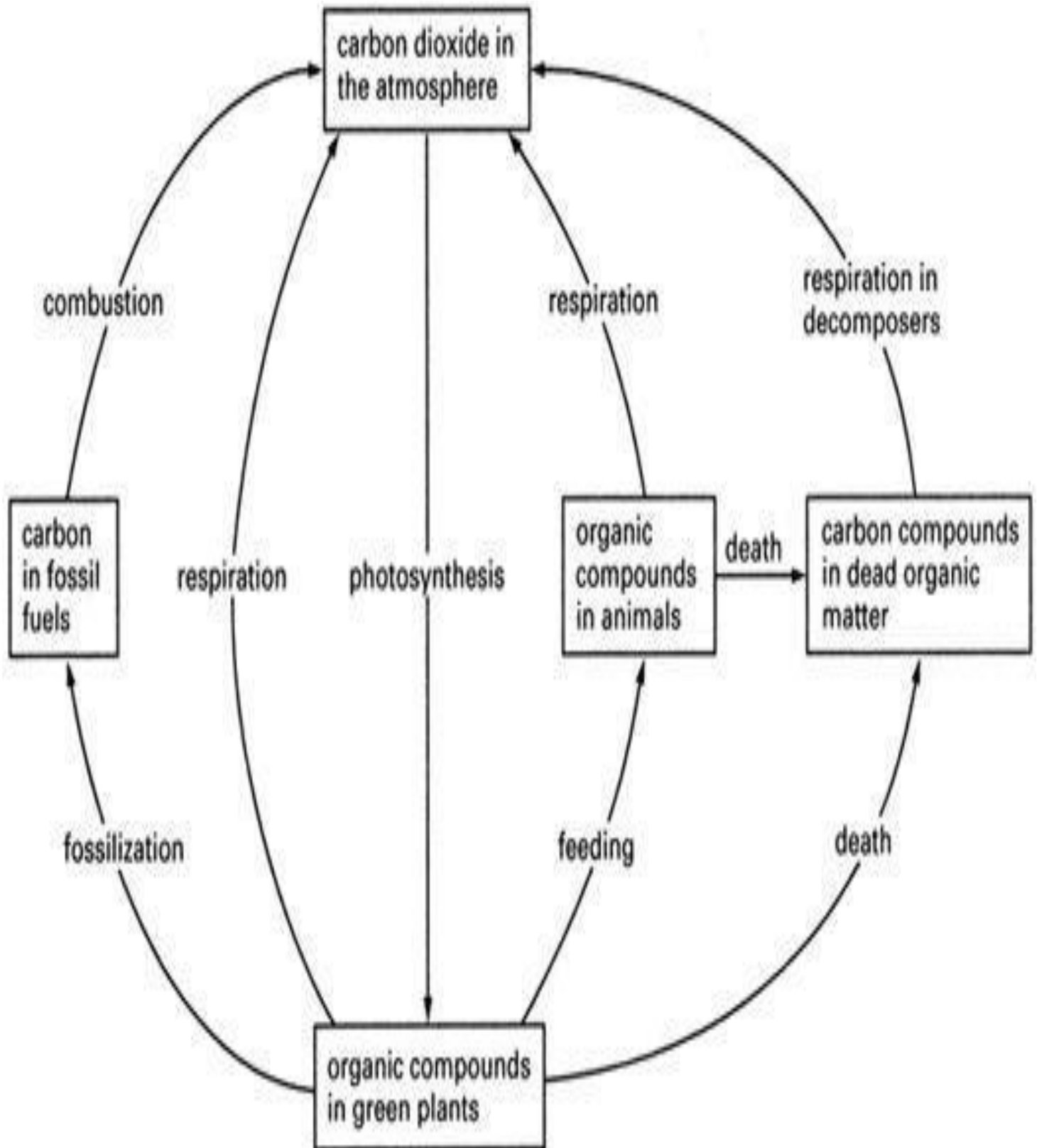
- 2.Use of Cheaper Substitutes

- 3.More Efficient Recovery of Materials from Minerals

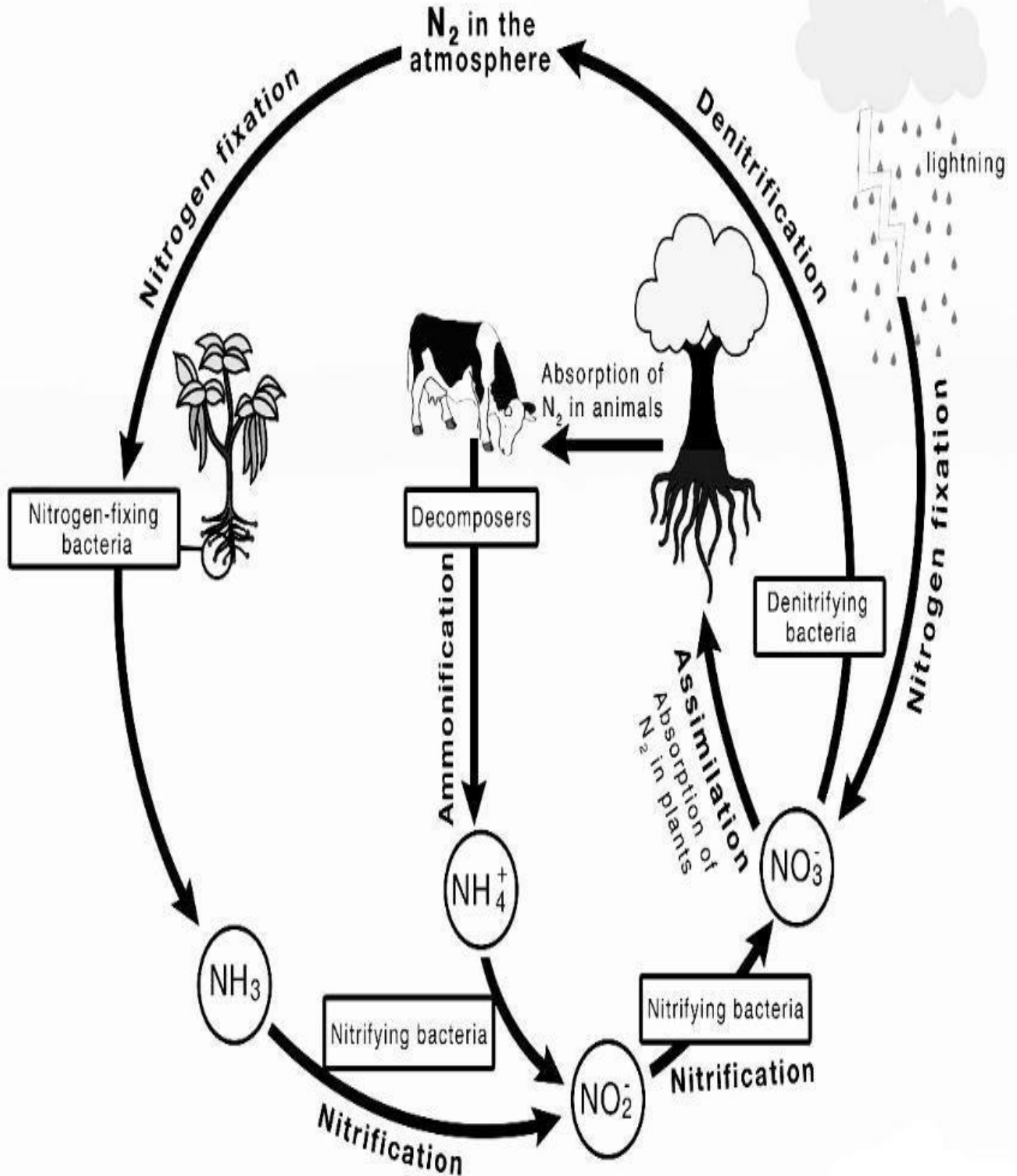
- 4.Search for New Deposits

- 5.Protection of existing mineral deposits

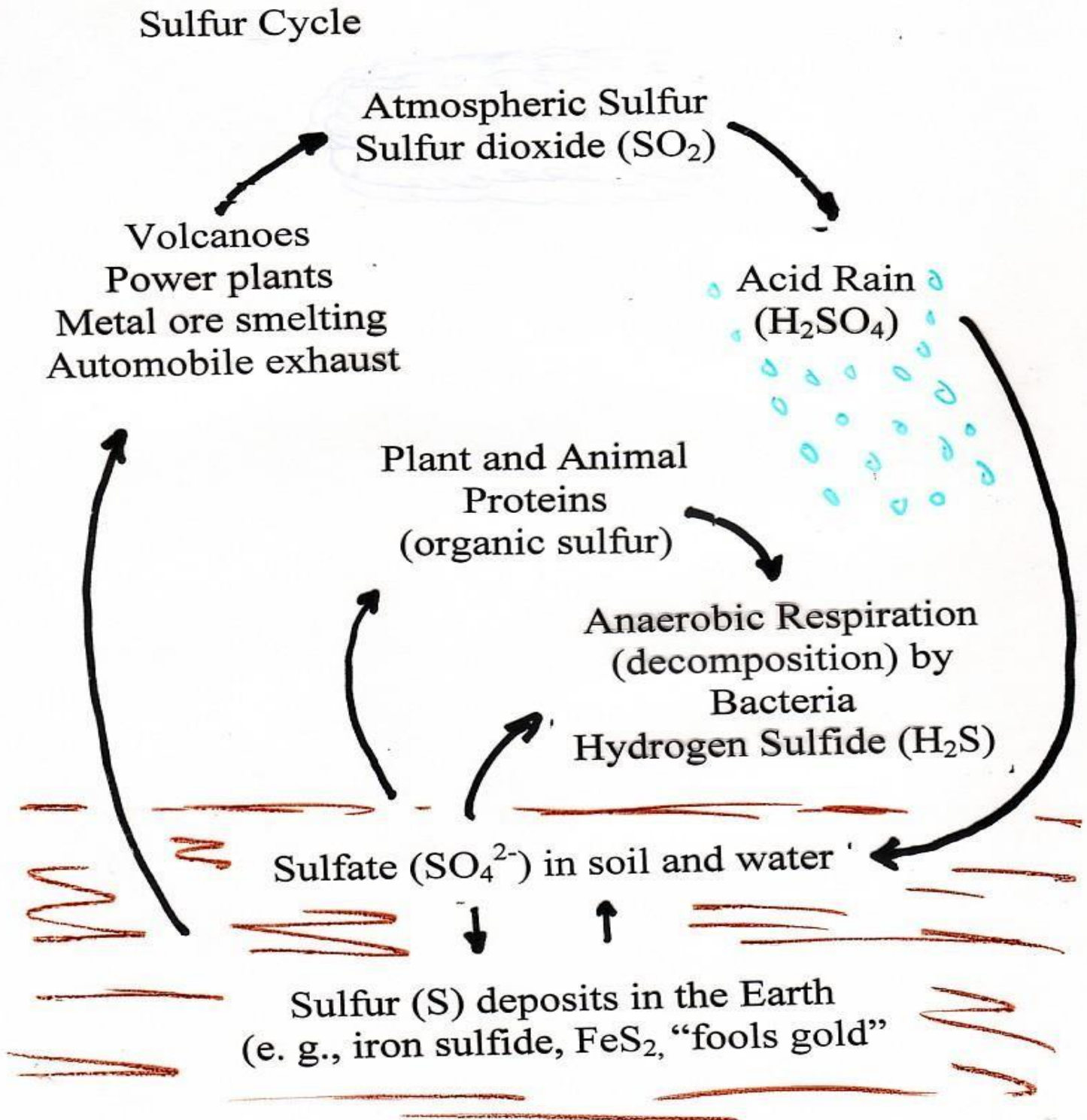
Biogeochemical Cycles / Mineral Flow / Material Flow in Ecosystem Carbon Cycle



Nitrogen Cycle



Sulphur Cycle



Energy Resources- Energy resources are, that can be used as a source of energy.

Classification of Energy Resources

On the basis of availability-

(a) Primary energy resources: These are obtained directly from the environment, as:

Fossil fuels such as coal natural gas etc.

Nuclear fuels such as Uranium, Thorium etc.

Hydro energy

Solar energy

Wind energy

Geothermal energy

Ocean energy such as tidal energy, wave energy

Biomass energy such as gobar gas

Hydrogen energy

Secondary energy resources: They are derived from primary energy resources as they do not exist in nature. The examples are:

Petrol, diesel, kerosene oil

CNG and LPG

Electrical energy based on coal, diesel gas

On the basis of being older and newer-

1. Conventional Energy Resources-the
examples are:

- 1.Fossil fuel
- 2.Nuclear energy
- 3.Hydro energy

2. Non-conventional Energy Resources-For
example includes-

- 1.Solar energy
- 2.Wind energy
- 3.Geothermal energy
- 4.Ocean energy
- 5.Biomass energy
- 6.Hydrogen energy

On the basis of renewable and non-renewable energy resources-

Non-renewable energy resources: The resources which cannot be renewed or recycled are termed as non-renewable energy resources. Excessive use of fossil fuels leads to environmental pollution, out of which CO₂ emission is of immense concern.

Renewable energy resources: The resources which can be renewed or recycled are termed as renewable energy resources. These eco-friendly energy resources have the greatest potential to substitute the depleting non-renewable energy resources as alternative sources of energy in the long run. With the environmental conditions becoming worse day by day, people are trying their bit to save the environment by using natural energy resources.

I.Non-Renewable Energy Resources

1.Fossil Fuel Based Energy

Fossil fuels are found inside the earth's crust where they have formed through heat and compression of forests, waste and other organic matter, which got buried due to earthquake, landslide etc. Fossil fuels are of 3 types:

(a)Solid (e.g.-coal),

(b)Liquid (e.g.-petroleum)

(c)Gaseous (e.g.-Natural gas)

a)- Coal Energy- Coal is the most abundantly found fossil fuel in the world. It contains carbon, water, sulphur and nitrogen. Coal meets 70% of the total energy needs of the world found and 87.4% of all commercial energy. In India about 58% of commercial energy is obtained from coal and 38% from Petroleum along with natural gas. Coal is used for cooking, heating, in industries and thermal power plants. Petroleum is useful for transportation, agricultural equipments and some industries. Natural gas is used both in cooking and in industries.

b)- Petroleum or Crude Oil - The gaseous fuels are basically derived from petroleum. It is a natural, underground fossil energy resource. It is formed due to decomposition of micro plankton deposited upon the sea beds, lakes and rivers for million of years.

Advantages:

1. Liquid fuel is easy to transport.
2. Liquid fuel is comparatively cleaner.
3. They have made possible the introduction and development of newer means of transport.

Disadvantages:

1. After extraction it causes contamination in the water when the leakage takes place.
2. Its burning produces CO_2 and enhances the green house effect.

All combustion processes produce the pollutants like NO , SO_2 , CO , NO_2 , CO_2 smog, etc.

Petroleum contributes to acid rain and urban pollution.

c)- Natural Gas.

It is a fossil fuel but does not generate carbon dioxide, which happens to be the chief greenhouse gas.

- Thus, natural gas is a better option. It can be created by various organisms, and is also found in areas which have fossil fuels.
- After coal and petroleum, natural gas is the third major source of fossil fuel. It contributes to about 24% of the energy requirement of the world.

- It is fast emerging as an alternative source as it is eco- friendly in characters.
- It is a mixture of hydrocarbon gases trapped beneath the earth's surface. It is mainly consisting of methane (CH_4), propane (C_3H_8) and butane (C_4H_{10}).
- After processing it is transported to supply filling stations. Natural gas can be used in two different forms.

1.LPG (Liquefied Petroleum Gas).

2.CNG (Compressed Natural Gas).

Advantages:

- 1.It is a clean fuel, requiring little
- 2.processing.
- 3.It can be readily transported
- 4.Smog formation is less in its use
- 5.It is eco-friendly and causes less pollution

Disadvantages:

It requires both high pressure and low temperature for compression.

Thick-walled tanks are required for storage as it is stored at a high pressure.

Methane is a greenhouse gas and has a large atmospheric lifetime.

Leakage, in any case, is a serious threat to the environment.

After coal and petroleum, natural gas is the third major source of fossil fuel. It contributes to about 24% of the energy requirement of the world. It is fast emerging as an alternative source as it is eco- friendly in characters. It is a mixture of hydrocarbon gases trapped beneath the earth's surface. It is mainly consisting of methane (CH_4), propane (C_3H_8) and butane (C_4H_{10}). After processing it is transported to supply filling stations. Natural gas can be used in two different forms.

1.LPG (Liquefied Petroleum Gas).

2.CNG (Compressed Natural Gas).

2.Nuclear Energy. This is created through atoms. Either by merging or splitting atoms, energy is created. Though it produces a large amount of power, it has certain hazards. Nuclear energy can be derived by two methods-**nuclear fission and nuclear fusion.**

In nuclear fission, the heavy nucleus splits into lighter nuclei with a huge release of energy. But in nuclear fusion two light nuclei of hydrogen fuse to form a helium nucleus with a release of enormous amount of energy. One a.m.u (atomic mass unit) of Uranium-235 yields energy equal to burning of 15 metric tons of coal.

Nuclear reactors are the devices needed to liberate energy from nuclear fuels, under controlled conditions. The output of these reactors is in the form of a high temperature fluid. This can be used in the generation of electricity or as a direct source of heat for intensive industries.

3.Hydro Electric Energy

Hydro power is the cleanest, cheapest & best source of electricity generation. It falls under the conventional energy resource. Energy is derived from fast flowing water.

Hydropower converts power of the falling water to electric power which can be transmitted to long distances through wires & cables.

Working Principle—

Dammed water is used to generate this power, which then drives water turbine and generator. One of the versions of this is tidal power. The power produce by water tides generates pressure, which turns a water wheel or a turbine. The electrical generator gets energy from this power.

It can be stored for future use also.

Hydropower is generated by using hydraulic machine, called turbines.

Now high dams are built to obtain a substantial amount of hydrostatic pressure.

II. Renewable energy resources:

1. Solar Energy– The sun rays which is an inexhaustible source of energy which is trapped into solar cells, wherein, it gets transformed into electricity and this is how solar energy is created. It is commonly used for taking salt out of water, and also used for cooking, heating, and of course to produce electricity.

It is utilized by converting it into the following forms:

1. Thermal Conversion

2. Photo Conversion

Thermal conversion occurs by direct heating and photo conversion is an indirect conversion.

Utilization /Application of Solar Energy

- **Solar water heater:** Its construction consists of a flat plate collector and a storage tank. The solar radiations fall on it are absorbed by a collector and then transferred to the circulating water. It is used in hospitals, hotels, houses and in some industries also.
- **Solar cooker:** It is comprised of an insulated metal box filled with a flat glass cover. The inner surface of the metal box is blackened. When the container is kept in the sunlight, the solar radiations are absorbed and consequentially the foods get cooked. I
- **Solar drying:** The agricultural goods are dried using solar heat by keeping them in a cabinet. It is used for drying vegetables, fruits, milk etc.
- **Solar furnace:** The temperature in a furnace is very high as solar radiation is concentrated using lenses in the furnace.
- **Solar greenhouse:** A green house is a closed chamber covered by transparent glass or plastic. It acts as a solar radiation collector to utilize solar energy for growing plants.

Advantages of Solar Energy

Its use is eco-friendly as it never creates pollution.

The equipment do not require any attention during their working e.g solar cooker.

The food cooked with the help of solar energy remains nutritional.

The maintenance cost remains negligible in most of the equipments.

Containers to store fuel are not required and its initial cost remains cheaper.

In lieu of storage vessels, it requires less space on the floor.

It has a noiseless operation.

Limitations of Solar Energy

- It does not work during night and during cloudy days and becomes useless in the rainy seasons.
- All sort of food cannot be cooked in the solar cooker.
- Solar cooking takes more time. It does not help when food is required urgently.

2. Wind Energy. It can be defined as energy that is created by using the wind to generate power. It is usually a form of kinetic energy of air in motion that can be transformed into mechanical energy or electricity.

Working- As the wind blows, the turbine blades start rotating.

- By using an electrical generator, the rotation gets converted into electrical current.
- This electrical current is used on a small scale to provide electricity to small homes, and is also harnessed by large wind farm, which gets used by national electrical grids.

Advantages

- 1.It causes no air pollution
- 2.It is renewable
- 3.It is eco friendly

Disadvantages

- 1.It can be held at places having wind speed more than 15 km/hr.
2. Its set up is expensive
- 3.It creates noise pollution and disturbs the life of people nearby
- 4.It disturbs the birds also

3. Biomass Energy

Biomass energy or bioconversion refers to the direct burning of wood, agricultural waste manure, waste paper and converting them to a fuel.

Biomass is fuel that is developed from organic materials, a renewable and sustainable source of energy used to create electricity or other forms of power.

Certain of them produce either alcohol or methane gas, when they digest biomass in absence of air which themselves give energy on combustion.

As biomass energy is obtained through the process of photosynthesis it is considered to be the indirect form of solar energy.

Advantages

1. Theoretically inexhaustible fuel source
2. When direct combustion of plant mass is not used to generate energy (i.e. fermentation, pyrolysis, etc. are used instead), there is minimal environmental Impact.
3. Alcohols and other fuels produced by biomass are efficient, viable, and relatively clean-burning
4. Available throughout the world

Disadvantages

Could contribute a great deal to global warming and particulate pollution if directly burned.

Still an expensive source, both in terms of producing the biomass and converting it to alcohols.

On a small scale there is most likely a net loss of energy

1.Biogas Energy. These are fuels that are made from plants or animals. It can include methane from wood, wood chippings, and animal wastes. Biofuels are used to heat homes, to power machines, and for cooking.

Biogas is mixture of gases like- (a) CH_4 (40%), (b) CO_2 , (c) H_2 , (d) N_2 ,

Biogas plants are of mainly following types-

(a) Floating gas holder type

(b) Fixed dome type

Advantages

1. Provides a non-polluting and renewable source of energy. It provides eco-friendly clean fuel.
2. Produces enriched organic manure, which can supplement or even replace chemical fertilizers.
3. Pathogens and parasites cannot come in contact of faecal material as the digestion of waste takes place in closed chamber i.e., it leads to improvement in the environment, sanitation and hygiene.
4. Household wastes and bio-wastes can be disposed of usefully and in a healthy manner.

Advantages

5.The technology is cheaper and much simpler than those for other bio-fuels, and it is ideal for small scale application.

6. Any biodegradable matter can be used as substrate.

7.Anaerobic digestion inactivates pathogens and parasites, and is quite effective in reducing the incidence of water borne diseases.

8.Environmental benefits on a global scale: Biogas plants significantly lower the greenhouse effects on the earth's atmosphere. The plants lower methane emissions by entrapping the harmful gas and using it as fuel.

Disadvantages

- 1.It is very difficult to enhance the efficiency of biogas systems.
- 2.Biogas contains some gases as impurities, which are corrosive to the metal parts of internal combustion engines.
3. Not feasible to locate at all the locations.

5.Geothermal Energy.

This natural energy is produced by the earth. Hot rocks present under the ground heats up water, so that steam is produced. Holes are dug in such areas, and the steam shoots up, driving the turbines. Electrical generators are then powered by these turbines.

- Deep down in the earth's crust, there is molten rock (magma).
- Molten rock is simply rocks that have melted into liquid form as a result of extreme heat under the earth.
- This can be found about 1800 miles deep below the surface, but closer to the surface, the rocks layers are hot enough to keep water and air spaces there at a temperature of about 50-60 degrees F (10-16 degrees C).
- Geothermal technology takes advantage of the hot close-to-earth-surface temperatures to generate power.

Geothermal energy is called a renewable energy source because the water is replenished by rainfall, and the heat is continuously produced by the earth.

6. Hydrogen Energy

As hydrogen burns in air, it combines with oxygen to form water and a large amount of energy (150 kilojoules per gm.) is released. Due to its highest calorific value, hydrogen serves as an excellent fuel. Moreover, it is non-polluting. It can be easily produced. Its production becomes possible by thermal dissociation, photolysis or electrolysis of water.

1. By thermal, dissociation of H_2O , H_2 is produced.

2. Thermo chemically, H_2 is produced by chemical reaction of H_2O with some other chemicals in 2- 3 cycles.

3. Photolysis of H_2O involves breakdown of H_2O in sunlight to release hydrogen.

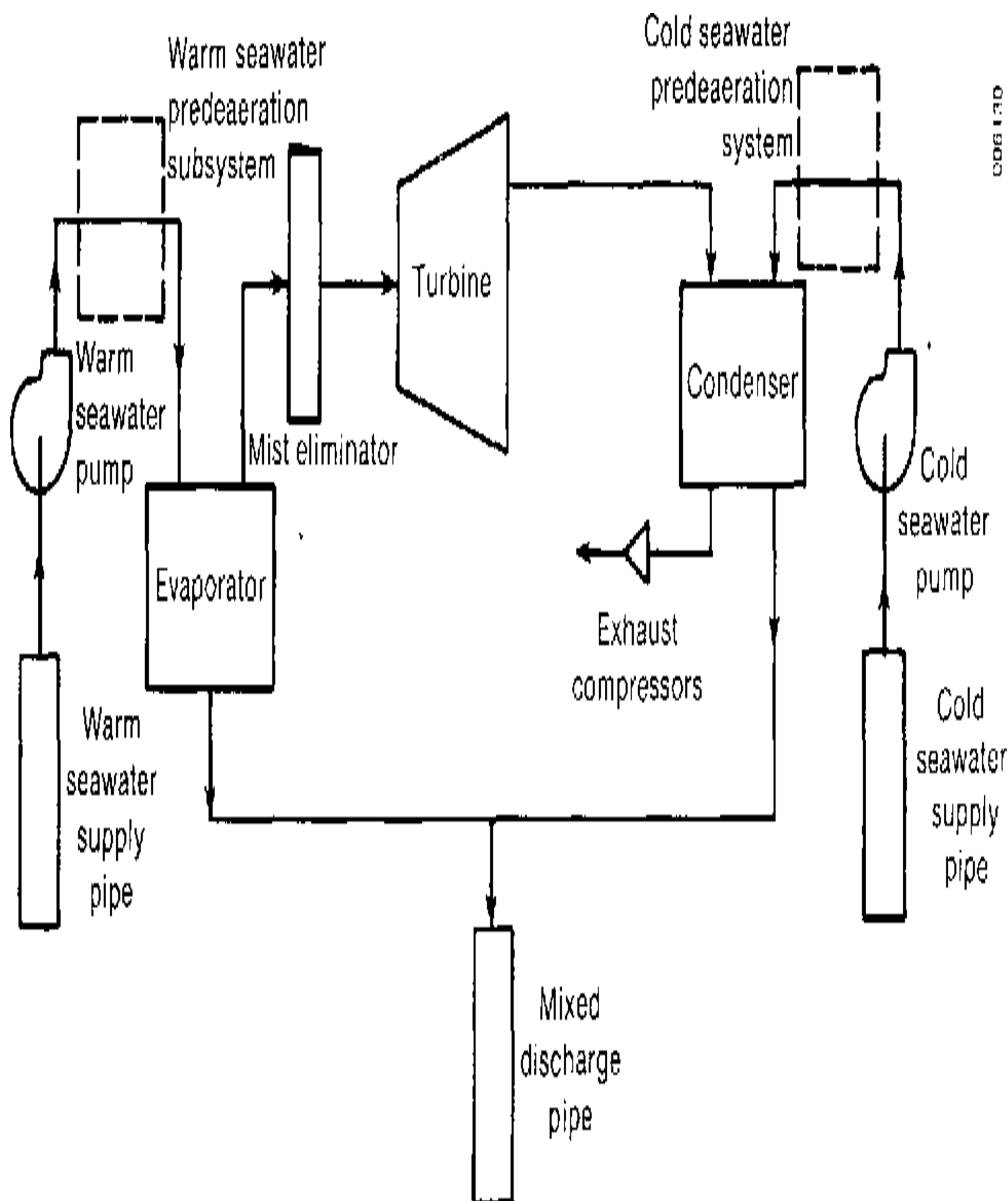
Green plants also have photolysis of water during photosynthesis. Efforts are underway to trap hydrogen molecules which are produced during photosynthesis.

However, H_2 is highly inflammable and explosive in nature. Hence, it requires safe handling when used as a fuel. It is also difficult to be stored & transported as it is being very light; it has to be stored in bulks.

7. Ocean Thermal Energy (OTEC)- a non-polluting and renewable sources of energy

- Ocean thermal energy conversion is an electricity generation system.
- Ocean Thermal Energy, also called Ocean Thermal Energy Conversion (OTEC), refers to using the temperature difference between the deep parts of the sea, which are cold and the shallow parts of the sea, which are warm, to run a heat engine and produce useful work.
- The deeper parts of the ocean are cooler because the heat of sunlight cannot penetrate very deep into the water.

- Here the efficiency of the system depends on the temperature difference.
- Greater the temperature difference, the greater the efficiency.
- The temperature difference in the oceans between the deep and shallow parts is maximum in the tropics, 20° C to 25° C.
- Tropics receive a lot of sunlight which warms the surface of the oceans, increasing the temperature gradient.
- The energy source of OTEC is abundantly available, free, and will be so for as long as the sun shines and ocean currents exist.
- Estimates suggest that ocean thermal energy could contain more than twice the world's electricity demand.
- This makes it necessary for us to give it a closer look.



Ocean Thermal Energy (OTEC) is a real candidate as one of the future sources of energy.

- Its environmental impact is negligible.
- The mixing of deep and shallow seawater brings up nutrients from the seafloor.
- The deep- water is rich in nitrates, which can also be used in agriculture.

4. Forest Resources

Forests are natural, self-sustained biotic community, predominantly characterized by wooden, tall, dense tree and bulky animals.

In areas where forests are destroyed, there are often floods after rainfalls, followed by drought.

Without the plants, the water cycle is compromised.

When there is a heavy rainfall, water will immediately flow to the lower ground and even cause floods because there are not enough plants to absorb the water and prevent all the water from flowing to the lower ground.

- When there is little rainfall and too few plants, which give off moisture into the air, there will be drought.
- Sometimes rivers will even dry up. If we personify the rivers, it is as though the rivers have died.

Therefore, protecting vegetation will bring far greater ecological benefits than building and maintaining dams.

Actually, if people can grow trees in the vast expanses of the barren mountains and shrubs in the plains, the forests will provide people with economic benefits and some of the proceeds can feed the costs of forest conservation programs.

Thus, by conserving nature, man and nature can together form a benevolent relationship. We can help protect the natural environment and in turn, the environment will nourish us.

Conservation of Forest-

- 1.Provision of more accurate and comprehensive estimates of quantity and quality of existing resources.
- 2.Improvement of existing forests by suitable silviculture and management practices by, (a) reservation and protection of more forests, (b) introduction of working plans.
- 3.Intensive forestry and plantation of fast-growing industrial woods on suitable deforested sites.
- 4.Adoption of modern techniques and development of the transport system to increase productivity.
- 5.Stimulation to suitable forest-based industries.
- 6reducing consumption of forest and related products.

- **Deforestation-** Deforestation is the permanent destruction of forests in order to make the land available for other uses.
- Deforestation is considered to be one of the contributing factors to global climate change.
- Trees absorb greenhouse gases and carbon emissions.
- They produce oxygen and perpetuate the water cycle by releasing water vapor into the atmosphere.
- Without trees, forest lands can quickly become barren land.

Causes of deforestation

- 1 Trees are used sold or exported as timber, wood or fuel. This is called logging.
2. Forest lands are used for farming purpose (grazing fields for livestock or farming activities).
3. Making room for human settlement and urbanization like making space for shelter, industries and roads.
4. Using forest land for mining.

CONSEQUENCES OF DEFORESTATION

*The carbon cycle. Forests act as a major carbon store because carbon dioxide (CO₂) is taken up from the atmosphere and used to produce the carbohydrates, fats, and proteins that make up the tree. When forests are cleared, and the trees are either burnt or rot, this carbon is released as CO₂. This leads to an increase in the atmospheric CO₂ concentration. CO₂ is the major contributor to the greenhouse effect. It is estimated that deforestation contributes one-third of all CO₂ releases caused by people.

*The water cycle. Trees draw ground water up through their roots and release it into the atmosphere (transpiration). In Amazonia over half of all the water circulating through the region's ecosystem remains within the plants

. With removal of part of the forest, the region cannot hold as much water. The effect of this could be a drier climate.

**Soil erosion* With the loss of a protective cover of vegetation more soil is lost.

**Silting of water courses, lakes and dams* This occurs as a result of soil erosion.

**Extinction of species* which depend on the forest for survival. Forests contain more than half of all species on our planet - as the habitat of these species is destroyed, so the number of species declines.

**Desertification* The causes of desertification are complex, but deforestation is one of the contributing factors

- **Chipko Movement-** The **Chipko movement** or **Chipko Andolan** is a movement that practiced the Gandhian methods of non-violent resistance, through the act of hugging trees to protect them from being felled.
- The modern Chipko movement started in the early 1970s in the Garwal Himalayas of Uttarakhand, then in Uttar Pradesh with growing awareness towards rapid deforestation.
- The landmark event in this struggle took place on March 26, 1974, when a group of peasant women in Reni village, Hemwalghati, in Uttarakhand, India, acted to prevent the cutting of trees and reclaim their traditional forest rights that were threatened by the contractors assigned by the state Forest Department.

Chipko Movement- The Chipko movement or Chipko Andolan

- Their actions inspired hundreds of such actions at the grassroots level throughout the region. By the 1980s the movement had spread throughout India and led to the formulation of people-sensitive forest policies, which put a stop to the open felling of trees in regions as far reaching as Vindhyas and the western Ghats.
- Today, it is seen as an inspiration and a precursor for Chipko movement of Garhwal. Its leader was **Sunderlal Bahuguna**.

EXTRA TOPICS

Food Resources

- Human body needs food for various purposes. Food consumed by humans are of different types and a balanced diet is needed for all practical purposes, vitamins, proteins carbohydrates and minerals are primarily obtained from cereals, fruits, vegetables, pulses and spices, milk, butter, meat and eggs all of which obtained from different types of plants and animals.
- These are our main food resource. A large number of items are consumed by human either in their natural states or after proper processing and cooking.
- In general, a strong and healthy human consumes about 1.4 kg of food every day. Such a food serves as a source of energy and replacement of uses.

Problems of food security

- 1.Increasing cost of cultivation
- 2.Ecological degradation
- 3.Demand for water
- 4.Low productivity
- 5.Climate change
- 6.Rising population

World food problem

- 1 In world 13% population is malnourished
2. In developed countries-<5%
- 3- In developing country-16%
- 4- In India-21%

Malnourishment and undernourishment

Not having enough to eat (undernourishment) and not having the right balance of nutrients (malnourishment) can both affect our skeletons. Some very specific conditions such as rickets and scurvy are caused by malnourishment – in these cases, not enough vitamin D or vitamin C respectively. But a poor diet in general during childhood can also affect how quickly children grow, and in severe cases can (temporarily) stop growth.

Malnutrition is poor nutrition because of an insufficient OR poorly balanced diet or faulty digestion or utilization of foods. This is mainly because deficiency/lack of particular component from our diet.

Undernutrition is also poor nutrition but ONLY because of INSUFFICIENT DIET, so, if one is undernourished, he would also be malnourished. but if one is malnourished, it doesn't mean he will be undernourished.