MODULE III

NATURAL RESOURCES

3.5Energy Resources

3.5.1Renewable energy resources

3.5.2Non renewable energy resources

3.5 Energy Resources

Energy is defined as, " the capacity to do work".

Growing energy needs

Energy is essential to all. All industrial process like mining, transport, lighting, heating and cooling in buildings all require energy .Due to overpopulation the world is facing further energy deficit.

Our style is changing from a simple way of life to a luxurious life style. At present 95% of the commercial energy is available only from the fossil fuels like coal, oil & natural gas and are not going to last for many more years. It would be really ironic if fuel become more expensive than food.

3.5.1 Renewable energy resources

It is a natural resources which can be generated continuously and are inexhaustible.

It can be used again & again in an endless manner.

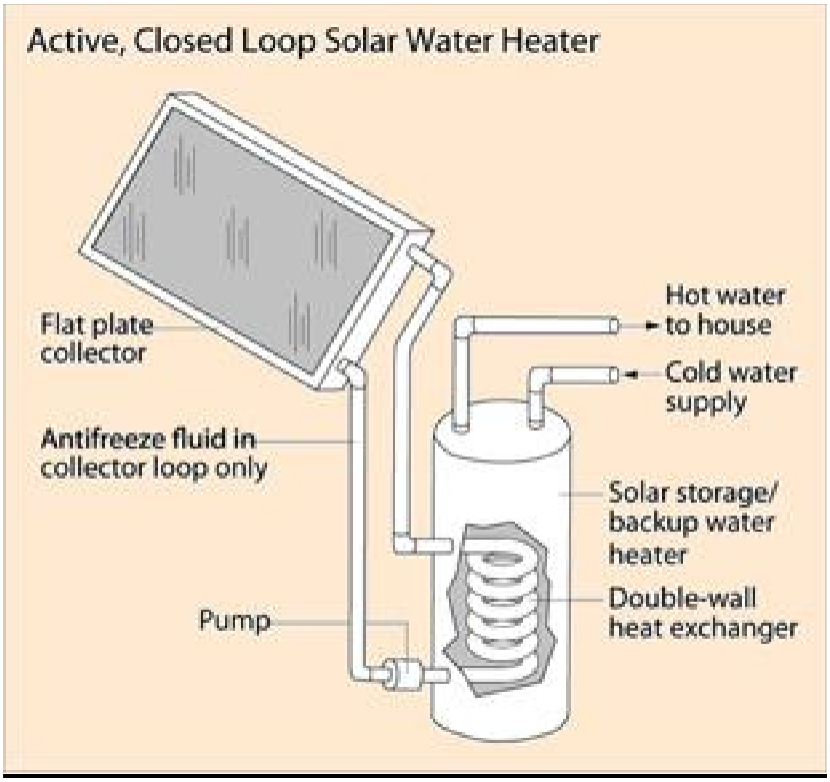
Ex. Solar energy, wind energy, tidal energy

1. Solar energy

The energy that we get directly from the sun is called solar energy. Enormous amount of heat energy is coming from the sun. That heat energy is collected & converted into electrical energy.

Ex. Solar cells, Solar battery, Solar Water battery.

Solar Water Heater

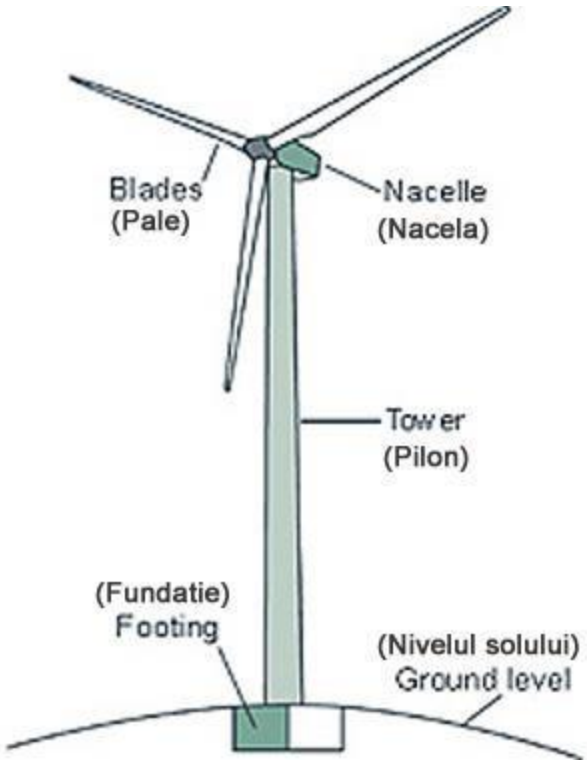


Wind energy

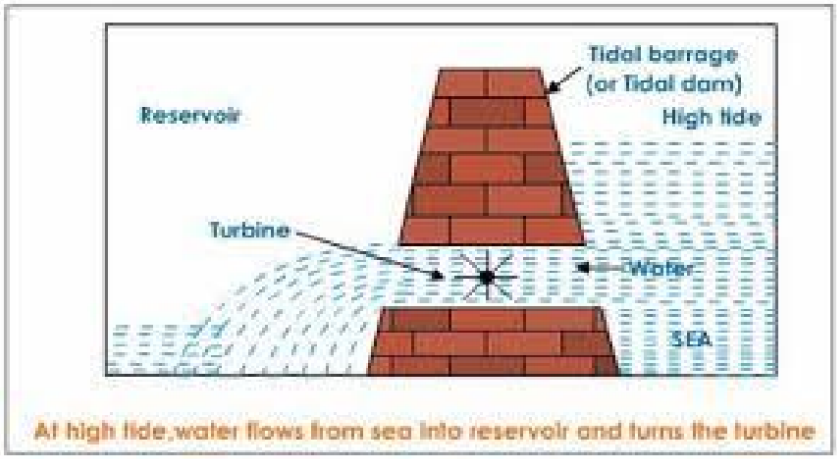
Energy recovered from the force of the wind is called wind energy. The wind energy is converted into electrical energy with the help of wind mills.

A blowing wind strike on the blades of the windmill make it rotating continuously. The rotational motion of the blade drives a no. of machines like water pump, flour mills & electric generators.

Wind Mill



Ocean Energy (Tidal Energy)



Ocean tides produced by gravitational forces of sun & moon, contain enormous amount of energy. The high tide & low tide refers to the rise & fall of water in the oceans.

During high tide, the sea water is allowed to flow into the reservoir of the barrage and rotates the turbine, which produces electricity by rotating the generators.

During low tide, when the see level is low, sea water stored in the barrage reservoir is allowed to flow into the sea and again rotates the turbine.

3.5.2 Non renewable energy resources

Non renewable energy resources are natural resources which cannot be regenerated once they are exhausted. They cannot be used again.

(Ex) Coal, petroleum, natural gas, nuclear fuels.

1. Coal

Coal is a solid fossil fuel, formed in several stages as buried remains of land plants that lived 300 – 400 million years ago, were subjected to intense heat & pressure over millions of years.

2. Petroleum

Petroleum (or) crude oil is a thick liquid formed by the decomposition of dead animals & plants that were buried under lake & ocean at high temp & pressure for millions of years.

3. Nuclear energy

Nuclear energy can be produced by two types of reactions.

1. Nuclear fission Reaction
2. Nuclear Fusion Reaction

Nuclear Fission Reaction :

The release of neutrons once again hit with $\square^{235}$ to produce energy with neutrons. So this reaction is continuously takes place. This is called nuclear chain reaction.

Nuclear Fusion

Two (or) more smaller nuclei combine toform a heavier nuclei is called nuclear fusion.

$$_1\square^1 + {}_1\square^1 \rightarrow {}_2\square\square^4 + \square\square\square$$

Nuclear Power plant in India

1. Kudangulam (TN)
2. Kalpakkam (TN)
3. Narora (UP)
4. Tarapur (Maharastra)
5. RanapratapSagar (Rajasthan)

MODULE III

3.1NATURAL RESOURCES

3.1.1 Forest Resources

3.1.2Types of forest

3.1.3 Function of forest

3.1.4 Uses of Forest

3.1.5 Over exploitation of forest

3.1.6 Deforestation

3.1.7 Timber extraction

3.1.8 Mining

3.1.9 Dams & their effects on forest & Tribal people

3.1 NATURAL RESOURCES

Natural resources can be classified into two types:

1. Renewable resources:

These resources are capable of being regenerated by ecological process.

Examples: soil,water,air,wildlife.

2.Non renewable resources:

These resources are not capable of being regeneratewd by ecological process.

Examples:Minerals,coal,oil,naturalgas,ground water.

3.1.1 Forest Resources

Forests are one of the most important renewable natural resource in this earth.

About $\frac{1}{3}$ of the world's land surface is covered with forest.

Besides economy, it gives fuel, wood, coal, furniture, erosion, and prevent land slides and soil erosion.

3.1.2 Types of forest

Forest

Evergreen forest

i. Found in equatorial region
ii. Temp & rain fall very high
iii. Forest are look like ever green

Ex. Silent valley in kerala
Trees: Teak, rosewood

Deciduous forest

i. Found in tropical region
ii. Seasonal rainfall
iii. Trees drop down their leaves during summer season

Ex. Teak & Sandal wood

Coniferous forest

i.
ii. Needle type leave trees are present here.
iii. Preserve moisture

Ex. Pine tree.

RON
M

3.1.3 Function of forest

i) Forest play an important role for both humans & to nature.

ii) It is a habitat of millions of plants, animals & wild life.

iii) It recycle rain H_2O and remove pollutants from air.

iv) It control water quality & quantity.

v) It helps to maintain temp, weather & humidity.

vi) It prevent soil erosion.

vii) It promotes tourism & contribute aesthetic beauty.

3.1.4 Uses of Forest

1. Commercial Uses:

a. Forest supply wood, which is used as fuel and the raw materials such as pulp, paper, board, timber are used for various industries.

b. It gives minor forest products like gums, resins, dyes.

c. Many plants are used for preparing drugs & medicines.

d. It produce variety of animal products like ivory, honey hides.

e. Forest lands are used for mining, grazing, recreation and for dams.

2. Ecological Uses

a. Trees involving in the "production of oxygen" during the photo synthesis process.

b. It absorbs the "Co_2" gas which is mainly responsible for Global warming

c. Soil conservation Roots of the trees bind the soil tightly. So it prevent soil erosion.

d. It regulate the hydrological water cycle.

e. Trees absorb many toxic gases & noise. So it act as pollution moderator.

f. It is the home of millions of wild animals & plants.

3. Aesthetic Value

a. Forests have aesthetic value and serve as gene reserve of important species.

4. Touristic Value

Tourism provides a growing income to the government.

3.1.5 Over exploitation of forest

In India, the minimum area of forests required to maintain good ecological balance is about 33% of total area. But present is only 22% . So over exploitation of forest materials occur.

Causes of over exploitation

i) Due to over population & poverty.
ii) Increasing agricultural production.
iii) Increasing industrial activity.
iv) Increase in demand of wood resources like timper, pulp, minerals.

Consequences of over exploitation

i) It leads to the migration of farmers.
ii) Environment will be damaged.
iii) Countless plants & animals will be endangered.
iv) Dumping of wastes into land, air, water has a problem.

3.1.6 Deforestation

Deforestation means destruction of forests due to many natural (or) man made activities.

Causes

i) **Developmental Projects** Cause deforestation in 2 ways
   a. Submergence of forest area under H_2O

b. Destruction of forest area.

Ex. Big dams, hydro electric project, road construction.

ii) **Mining Operations** reduces the forest area.

Ex. Mica, Coal, Manganese, Limestone.

iii) Need of raw materials for industries.

iv) Increasing the fuel requirements.

v) Shifting cultivation.

vi) Due to forest fire, the forest area gets destructed.

Consequences

i. **Global warming:** cutting & burning of forest trees increase the CO_2 gas in the atmosphere leads to changes in the climate, rising sea level, depletion of O_3 layer.

ii. **Loss of genetic diversity**: Forests are habitat of wild life. During deforestation, the genetic diversity become lossed.

iii. **Soil erosion:** Due to soil erosion land slide, flood drought may occur. Natural vegetation acts as a barrier to reduce the wind velocity, so it reduce the soil erosion.

iv. **Loss of biodiversity :** most of the species are very sensitive to any disturbance and changes. Due to this deforestation the rare spicies may lossed.

v. **Loss of food grains** from forest.

vi. Increasing the**unemployment** problems.

vii. Floods &land slides occur.

Preventive measurersof deforestation (or) conservation of forest:

i) More no of plants should be planted.

ii) Reduce the usage of wood for fuel.

iii) Forest fire must be controlled by modern techniques.

iv) Over grazing by cattle must be controlled.

v) Discourage the migration of people from foresty area.

vi) Education and awareness programmes must be conducted.

vii) Strict implementation of law of forest conservation act.

3.1.7 Timber extraction

Due to population growth and lack of alternative fuels people living near by forest area are using wood as a fuel. So, timber extraction is increasing day by day.

Uses of timber

a. It is used as a raw material for various wood based industries like pulp, paper, composite, furniture.
b. It is used for developmental activities like railway, boat, rood construction.

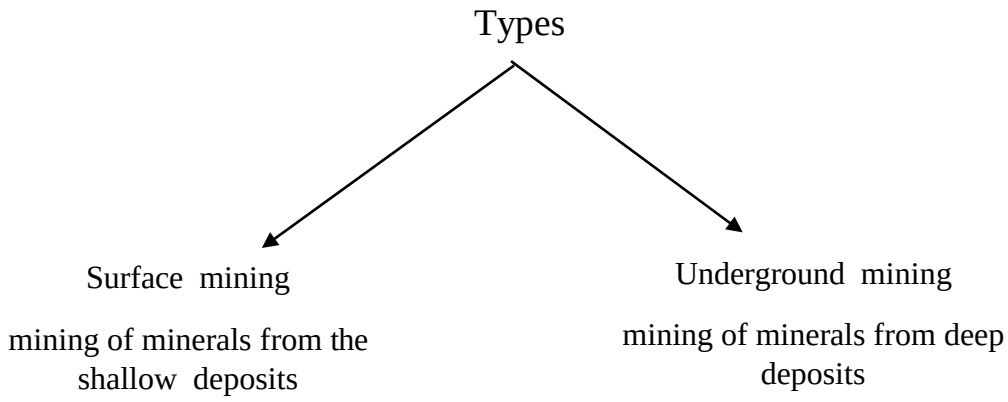
Consequence of timber extraction

a. Large scale timber extraction causes deforestation.
b. It produce soil erosion, loss of fertility, landslides and loss of biodiversity.
c. Loss of tribal culture & extinction of tribal people.
d. It reduce the thickness of the forest.

3.1.8 Mining

Mining is the process of extracting mineral resources and fossil fuels like coal from the earth. These are deposited in the forest area. The mining operation affect the forest.

Type of mining



Steps involved in mining

Mining operation involves the following steps:

a) Exploration (investigation & searching of minerals)
b) Development
c) Exploitation (extraction of minerals)
d) Ore processing (separation of ore)
e) Extraction & purification of minerals.

Consciquenceof mining

1. Mining activity destroys the forest area.
2. It pollutes the soil, water, air with heavy metal toxic, that are impossible to remove.
3. Destruction of natural habitat at the mining area and the waste disposal sites.
4. Formation of trenches on the ground, leads to water logged area, which contaminates the ground water.
5. Noise pollution may created.
6. Due to continuous mining landslide may also occur.
7. Surface & ground water may polluted due to the disposal of waste minerals in H_20.
8. Migration of tribal people from mining areas to other areas for searching land & food.

3.1.9 Dams & their effects on forest & Tribal people

Dams are the massive artificial structure built across the river to create a reservoir in order to store water for many beneficial purpose.

Dams are responsible for the destruction of vast area of forest and displacement of local people.

Effects of dam on forest

i) Thousands of hectares of forest have been cleared for executing river valley projects.

ii) In addition to dam construction, the forest is cleared for residential accommodation,officebuildings,storing minerals and materials,laying roads.

iii) Hydro electric projects reduces the forest area.

iv) Killing of wild animals and destroying aquatic life.

v) The big river projects cause water logging which produces salinity and in turn reduces the fertility of soil.

Ex) Narmada Sager Project : It has submerged 3.5 hectares of forest consisting teak & bamboo trees.

Effects of dam on tribal people

1. Displacement of tribal people
2. They are affected by mentally & physically due to the displacement & cultural change.
3. They areill treated by modern society.
4. Many of the displaced people were not recognized & resettled.
5. Their body conditions are not suitable with the new areas. So they are affected by many diseases.

MODULE II

3.2 WATER RESOURCES

3.2.1 Types of water

3.2.2 Uses of water

3.2.3 Over utilization of water

3.2.4 Flood

3.2.5 Drought

3.2.6Conflicts over water

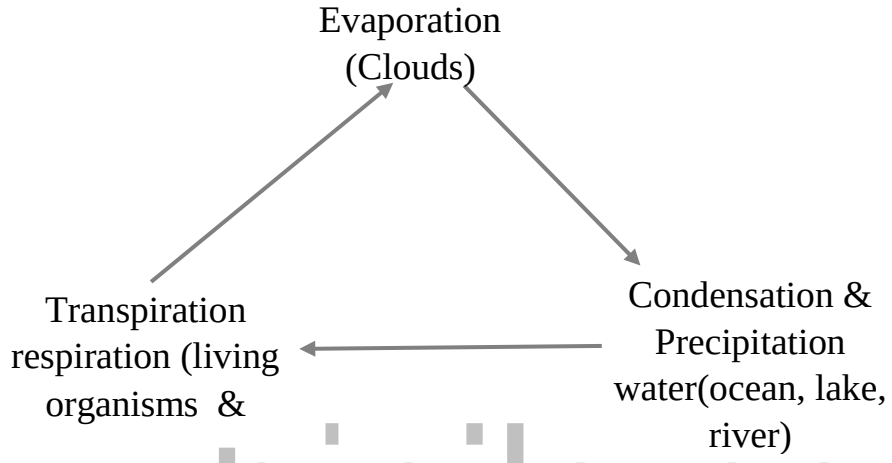
3.2 WATER RESOURCES

H_2O is an importantcomponent of allthe living beings. Nearly 80% of earth surface is covered with water.All organisms are made up of water.

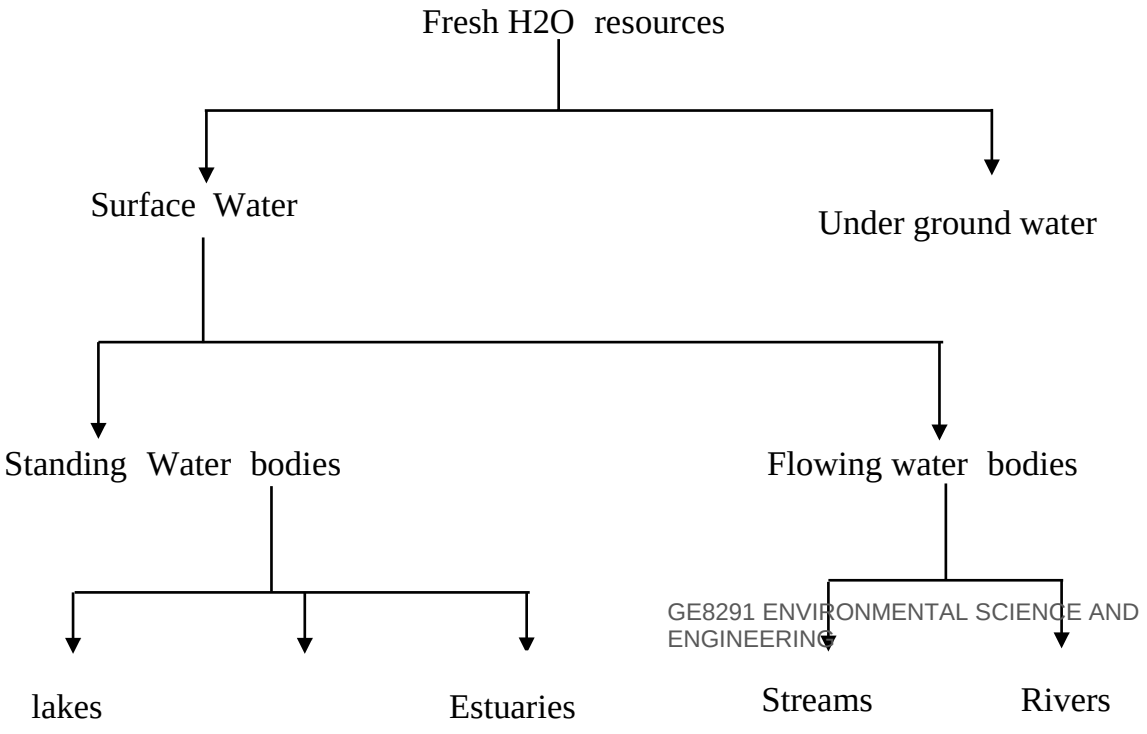
Ex) A tree is made up of 60% by weight of H_2O. Animals are made up of 50 – 65% of H_2O .

Hydrological Cycle

The process of evaporation, condensation, transpiration is called hydrological cycle.



3.2.1 Types of water (fresh H_2O) resources



Surface Water:

The water stored on the surface of earth is called surface water.

(or). The water, which is coming out directly through precipitation and does not percolate down into the ground (or) does not return to the atmosphere by evaporation is known as surface water.

Underground water

The water, which is found available deep in the ground due to percolation of surface water is called underground water.

3.2.2 Uses of water

i) Water is used for domestic purposes like drinking, cooking, bathing, washing etc.

ii) It is used for commercial purposes like hotels, theaters, educational institutions, offices.

iii) Almost 60 – 70% of fresh H_2O is used for irrigation.

iv) 20 – 30% of fresh H_2O is used for industrial operations like refineries, iron, steel, paper & pulp industries.

v) It is used to moderate the climate change and dilute the pollutants.

3.2.3 Over utilization of water

The demand for water resources have increased due to rapid increase in population & industrial growth.

Consciquences of over utilization of water

1. **Decrease of ground water**
   a. Due to increased usuage of ground H_2O'
   b. The erratic& inadequate rainfall.

c. Due to industrial activity reduces the area for percolation of rain H_2O and increase in surface run off.

2. **Earthquake & landslides** are formed due to over utilization of water.
3. Drying up of wells.
4. **Pollution of water :**

   due to the usuage of fertilizers in the agricultural area, the chemical components enter into the ground and pollute the water.

5. **Intrusion of salt water :**

   In coastal area, over usuage of water leads to rapid intrusion of salt water from sea. This water is not used for drinking& agricultural purpose.

6. **Lowering of water table:**

   Due to over utilization of water in arid &semi arid regions for agriculture , disturb the state of equilibrium of the reservoir (disturb the hydrological cycle) in the region.

3.2.4 Flood

A flood is an overflow of water, whenever the magnitude of flow of water exceeds the carrying capacity of the channel within its bank.

Causes of flood

i) Heavy rainfall, melting of snow, sudden release of water from dams causes flood.

ii) Deforestation, mining, grazing increases runoff from rains and hence the level of flood raises.

iii) The removal of dense and uniform forest cover over the hilly zones leads to flood.

iv) Reduction in the carrying capacity of the channel, due to accumulation of sediments (or) obstructions built on flood ways.

Consciquence of flood

a. Due to flood, water spreads in the surroundings area and submerges them.

b. The plain surface become eroded and silted with mud and sand, thus the cultivate land area gets affected.

c. Extinction of civilization in some coastal areas also occur.

Flood management

1. It can be controlled by constructing dam (or) reservoirs.
2. Controlled by channel management and embankments.
3. Encroachment of flood ways should be banned.
4. Flood hazard may be reduced by forecasting (or) flood warning.
5. It can be reduced by reduction of runoff by increasing infiltration through afforestation in the catchment area.

3.2.5 Drought

Drought is nothing but scarcity of water, which occurs due to inadequate rainfall, late arrival of rains and excessive with drawl of ground water.

Causes of drought

1. When annual rainfall is below normal.
2. High population leads to poor land use.
3. Intensive cropping pattern and over exploitation of water resources.

4. Due to deforestation, soil erosion become caused, the removal of thin top layer of soil takes away the nutrients and the soil becomes useless.
5. The eroded soils exhibit droughty tendency.

Consciquence of drought

1. It causes hunger malnutrition, scarcity of drinking H_2O changes of quality of water.
2. It causes widespread crop failure leading to acute shortage of food affects human & livestock population.
3. Raw materials for agro based industries are affected during drought time. ‡ It retards the industrial &commertial growth.
4. It induces the degradation of natural resources.
5. It enhances the migration of people & urbanization.

Drought management

1. To conserve more water and control drought Rain water harvesting system should be implemented.
2. To construct the reservoirs in the drought area.
3. Use the modern irrigation technology.
4. Improves the afforestation activity.
5. Mixed cropping& dry farming methods are used to minimize the crop failure in dry area.

3.2.6 Conflicts over water

Water is so essential for our existence and is fast becoming a scarce resource. Fresh water is considered to be the most environmental issue of this century.

Nearly 1.2 billion people do not have access to safe drinking water. Due to increase in population, and decrease in water resources, conflicts over water starts.

Causes of water conflicts

1. **Conflicts through use:**

   Unequal distribution of water has often led to inter – state (or) international disputes.

   Ex. International conflict – India & Pakistan fight over National conflicts - sharing of Cauvery water between Tamil Nadu & Karnataka.

2. **Construction of dams (or) power stations:**

   For hydro electric power generation dams are built across the rivers, which initiates conflicts between the states.

3. **Conflict through pollution**

   The water resources like lake, river, ponds are used for industrial purpose. Now a day they are polluted by disposing the waste water and industrial rubbish. Thus the water become polluted. The problem of cleaning the water takes on an international conflict.

Management of conflicts over water

1. Efferts should be taken to implement and follow the water conservation act for control the water pollution.
2. The interlinking of rivers between state to state country to country reduces the conflicts over water.

Big dams – benefits and problems:

Dams are built across the river in order to store water for irrigation, hydro electric power generation and flood control. Most of the dams are built to serve for more than one purpose is called “Multi Purpose dam”.

Benefits of constructing dams

i. Dams are used for drinking & agricultural purpose.
ii. It is used to produce electricity.
iii. It is used to control flood and store flood water.
iv. It is used for recreational purpose.
v. Navigation & fishery can be developed in the dam areas.

Problems of constructing dams

i. By upstream problems

a. Displacement of tribal people.
b. Loss ofnon forest land
c. Loss of forest, flora & fauna.
d. Landslides, sedimentation, siltation occur.
e. Stagnation & water logging around reservoirs prevent plant growth.
f. Reservoier induced seismicity causes earthquake.

ii. By down stream problem

a. Water logging and salinity due to over irrigation.
b. Reduced water flow and silt deposition in rivers.
c. Salt water intrusion at river mouth.
d. The sediments carrying nutrients get deposited in the reservoir, the fertility of the land along the river gets reduced.
e. Sometimes, due to structural defects the dam may collapse suddenly and destroy many living organisms.