

**NATURAL RESOURCES**

Definition:

Natural resources are the sources which are useful to man or it can be transformed into a useful product.

**Kinds of Resources**

1. Forest resources
2. Water resources
3. Mineral resources
4. Food resources
5. Energy resources
6. Land resources

**FOREST RESOURCE**

- One of the important renewable natural resource on earth.
- 1/3rd of the world's land surface is covered with forest.
- Forest covering the earth like a green blanket.
- Forest not only produce innumerable material goods, but also provide several environmental services.

**Types of forest**

1. Evergreen forest
2. Deciduous forest
3. Coniferous forest

**Uses of Forests**

**Commercial uses:**

- ❖ Man depends heavily on a larger number of plant and animal products from forests for his daily needs.
- ❖ The chief product that forests supply is wood, which is used as fuel, raw material for various industries as pulp, paper, newsprint, board, timber for furniture items, other uses as in packing articles, matches, sports goods etc.

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- ❖ Indian forests also supply minor products like gums, resins, dyes, tannins, fibers, etc.
- ❖ Many of the plants are utilized in preparing medicines and drugs; Total worth of which is estimated to be more than \$300 billion per year.
- ❖ Many forests lands are used for mining, agriculture, grazing, and recreation and for development of dams.

### Ecological uses:

The ecological services provided by our forests may be summed up as follows:

- ✓ **Production of Oxygen:** The main green house gas carbondioxide is absorbed by the forests as a raw material for photo synthesis. Thus forest canopy acts as a sink for carbondioxide thereby reducing the problem of global warming caused by green house gas CO<sub>2</sub>
- ✓ **Wild life habitat:** Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.
- ✓ **Regulation of hydrological Cycle:** Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff. They control climate through transpiration of water and seed clouding.
- ✓ **Soil Conservation:** Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind breakers.
- ✓ **Pollution moderators:** Forests can absorb many toxic gases and can help in keeping the air pure and in preventing noise pollution.

### Aesthetic uses:

Forest attracts tourist for its beauty.

### Economical uses:

Forest gives income to a country.

### Consequences:

1. Over Exploitation
2. Deforestation
3. Timber extraction
4. Mining
5. Construction of dams

#### **OVER EXPLOITATION**

- ⊙ Human beings depend heavily on forests for food, shelter, wood, fuel and medicine with growing civilization etc, thereby resulting in large scale mining, road building and clearing of forests.

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- ⊙ In India - area of forest required - good ecological balance - 33% of total area. But at present - 22%.

### CAUSES OF OVER EXPLOITATION

- ⊙ 1. Shifting of Cultivation
- ⊙ 2. fuel requirement
- ⊙ 3. raw materials for industrial use
- ⊙ 4. developmental projects
- ⊙ 5. growing food needs
- ⊙ 6. overgrazing

The important effects of over exploitation are

- ⊙ thinning of forests
- ⊙ loss of biodiversity, particularly tree breeding species
- ⊙ soil erosion and loss of soil fertility
- ⊙ migration of tribal people from one place to another in search of new forest
- ⊙ extinction of tribal people and their culture
- ⊙ Global warming
- ⊙ flood and landslides
- ⊙ Unemployment problems
  
- ⊙ Less rainfall
- ⊙ Hot climate and others.

### DEFORESTATION

- ⊙ It is process of removal of forest resources due to natural or manmade activities (i.e.) destruction of forests.

### CAUSES OF DEFORESTATION

- ⊙ 1. Shifting of Cultivation
- ⊙ 2. fuel requirement
- ⊙ 3. raw materials for industrial use
- ⊙ 4. developmental projects
- ⊙ 5. growing food needs
- ⊙ 6. overgrazing

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- ⊙ Less rainfall
- ⊙ Hot climate and others.

### TIMBER EXTRACTION

Removal wood is known as timber extraction

#### CAUSES OF DEFORESTATION

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- ⊙ 3. raw materials for industrial use
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- ⊙ Less rainfall
  - ⊙ Hot climate and others.

#### MINING

Mining is a process of removing ores from area which is very much below the ground level. Mining is done for the extraction of several minerals of metals like Fe, Mn, Au, Ag, etc. The minerals are especially found in thick forests.

Mining can be carried out in two ways

1. Surface mining
2. Underground mining or sub-surface mining

Classification of minerals

Minerals are classified into two ways based on their composition and usage.

I based on composition

1. Metallic minerals – various metals can be extracted for example: Fe, Al, Cu, Zn
2. Non – Metallic minerals – various non-metallic compound can be extracted. For example: quartz, dolomite, calcite, etc

II Based on usage

1. Critical minerals - these are essential of the economic power of a country. For eg: Fe, Al, Cu etc

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2. Strategic minerals- These are required for the defense of a country. For example: Mn, Co, Pt, etc

### Effects of mining:

- ① 1. Pollute soil, water and air.
- ① 2. Destruction of natural habitat.
- ① 3. Continuous removal of minerals leads to the formation of trench where water is logged which contaminates the Ground water.
- ① 4. Vibrations cause earth quakes.
- ① 5. Produces noise pollution
- ① 6. Reduces shape and size of the forest.
- ① 7. Sometimes landslides may also occur.
- ① 8. Rapid depletion of mineral deposits

### Environmental damages caused by mining activities

- ① **1. De vegetation :**
  - Topsoil and vegetation are removed
  - Deforestation leads to several ecological losses
  - Landscape badly affected
- ① **2. Ground water contamination:**
  - Mining pollutes ground water; sulphur is converted into sulphuric acid which enters into the soil.
- ① **3. Surface water pollution**

Radioactive wastes and other acidic impurities affect the surface water, which kills many aquatic animals.
- ① **4. Air pollution**

Smelting and roasting are done to purify the metal which emits air pollutants and damage the nearby vegetation. It causes many health problems.
- ① **5. Subsidence of land**

Mainly underground mining results in cracks in houses, tilting of buildings and bending of rail tracks.

### Management of mineral resources

- ① 1. The efficient use and protection of mineral resources.
- ① 2. Modernization of mining industries
- ① 3. Search for new deposit
- ① 4. Reuse and recycling of the metals.
- ① 5. Environmental impacts can be minimized by adopting eco friendly mining technology.

### DAM

- ① Dams destruct vast area of forest area. India has more than 1600 large dams.

### Effects of dams on forest:

- ① 1. Thousands of hectares of forest have been cleared.
- ① 2. Killing of wild animals and destruction of aquatic life.
- ① 3. Spreading of water borne diseases.

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- ④ 4. Water logging reduces the salinity of the soil.  
(e.g.) Narmada sagar project it has submerged 3.5 lakhs hectares of forest.

### **Effects of dam on tribal people:**

- ④ 1. Construction of big dam leads to the displacement of tribal people.
- ④ 2. Displacement and cultural change affects the tribal people both mentally and physically.
- ④ 3. They do not accommodate the modern food habits and life style.
- ④ 4. Tribal people are ill treated by the modern society.
- ④ 5. Many of the displaced people were not recognized and resettled or compensated.
- ④ 6. Body condition of tribal people will not suit with new areas and hence they will be affected by many diseases.

### **WATER RESOURCES**

- ④ Water is essential component of all living things
- ④ 97% of earth surface is covered with water
- ④ Most of the animals and plants have 60-65% of water in their body
- ④ Out of the total available water 75% is used for agriculture, 20% for industrial usage
- ④ In our country ~93% of water is used for agricultural purposes

### **Hydrological cycle**

**Evaporation**

**Precipitation or Condensation**

**Transpiration**

**Snowmelt**

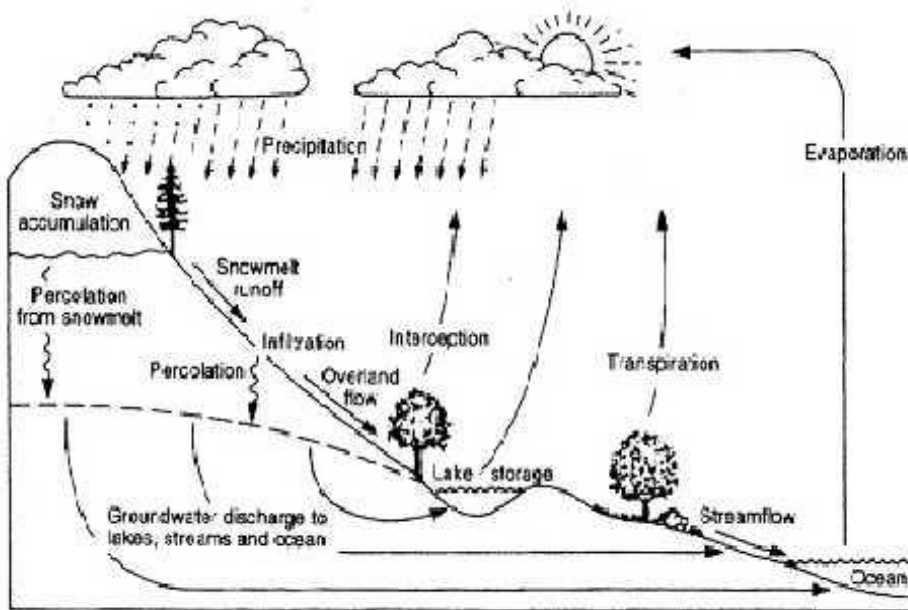
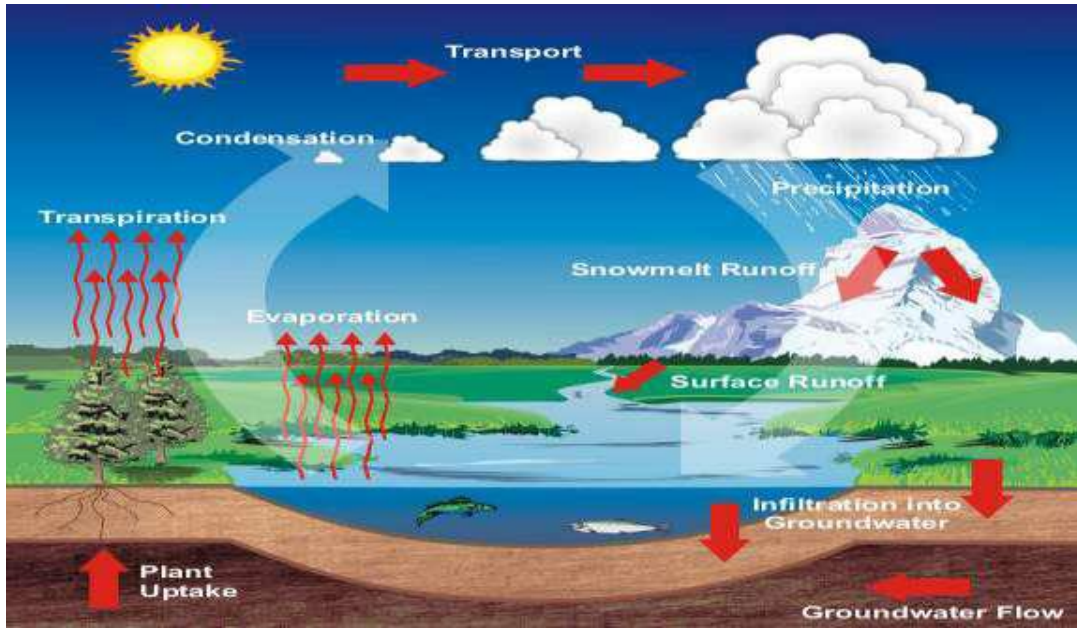
**Runoff**

**Infiltration**

**Subsurface Flow**

**Sublimation**

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Types of Fresh water resources:

- i) Surface water
- a) Standing water bodies: lakes, reservoirs;
- b) Flowing water bodies: rivers, streams;
- ii) Under ground water

Aquifer: The layer of soil which is permeable has the ability to store water is called an aquifer. It is generally made up of gravel, sand etc.

Unconfined aquifer: it is covered by permeable layer. The recharge of this layer is by rainfall or snowmelt.

Confined aquifer: sandwiched between impermeable layers. The recharge is through unconfined aquifer layers.

Consequences:

- ⊙ Over utilization of water (surface and ground water)
- ⊙ Floods
- ⊙ Drought
- ⊙ Conflict over water
- ⊙ Big dams Benefits and problems.

### **OVER UTILIZATION OF SURFACE AND GROUND WATER**

- ⊙ Demands have increased many folds – large proportion of the water - polluted due to anthropogenic activities.
- ⊙ Out of the total water reserves - 97% is salty water - 3% is fresh water.
- ⊙ Even this small fraction - locked up in polar ice caps - 0.003% is readily available to us in the form of ground water and surface water.

Effects of over exploitation of water

- ❖ Land Subsidence- When ground water withdrawal is more than its recharge rate, the sediments in the aquifer (a layer of rock that is highly permeable and contains water) get compacted, a phenomenon known as ground subsidence. It results in sinking of overlying land surface. Due to this structural damage in buildings, fracture in pipes etc., occurs.
- ❖ Lowering of water table - Mining of groundwater is done extensively for irrigating crop fields. However, excessive mining would cause lowering of water table.
- ❖ Water logging- When excessive irrigation is done with brackish water it raises the water table gradually leading to water-logging and salinity problems.
- ❖ Intrusion of salt water - over exploitation of water leads to Intrusion of salt water.
- ❖ Earthquake and landslides- over exploitation of water leads to Earthquake and landslides
- ❖ Drying up of wells- over exploitation of water leads to drying up of wells.
- ❖ Pollution of water - over exploitation of water leads to pollution of water.

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### **Flood**

- ⊙ It is an over flow of water. It happens when the magnitude of flow of water exceeds the carrying capacity of the channel within its bank.

### **Causes of flood**

- ⊙ 1. Heavy rainfall, melting of snow and sudden release of water from dams.
- ⊙ 2. Reduction in the carrying capacity of the channel.
- ⊙ 3. Deforestation, mining and over grazing increase the runoff from rains and the level of flood raises.

### **Effect of flood**

- ⊙ 1. Water spreads in the surrounding area and submerges them.
- ⊙ 2. Cultivated land affected.
- ⊙ 3. Extinction of civilization.

### **Flood Management**

- ⊙ 1. Floods can be controlled by dams.
- ⊙ 2. Channel management and embankment also control flood.
- ⊙ 3. Flood hazards reduced by forecasting or flood warning.
- ⊙ 4. Flood may also be reduced by reduction of run off by increasing infiltration through appropriate afforestation in the catchment area.

### **Drought:**

Drought is nothing but scarcity of water, which occurs due to

- ⊙ 1. Inadequate rain fall
- ⊙ 2. Late arrival of rain fall
- ⊙ 3. Excessive withdrawal of ground water.

Lack of water for the narrow needs of agriculture, livestock, industry or human population may be termed as a drought. Drought causes serious damages to plants, animals and human life.

### **Types of drought**

- ⊙ **1. Meteorological drought**

It occurs when the total amount of rain fall is less than 75% of the normal rain fall. It will be severe if the rain fall is less than 50%.

- ⊙ **2. Hydrological drought**

It occurs when the total amount of rainfall is less than the average rain fall. It is generally associated with reduction of water in aquifers, lakes and reservoirs.

- ⊙ **3. Agricultural drought**

It occurs due to the shortage as well as timing of overall rain fall, which intern reduce the ground water level and reservoir level. Agricultural drought affects cropped plants.

- ⊙ **4. Socio economic drought**

It occurs due to reduction in the availability of food and social security of the people in the affected areas. Socio economic drought leads to famine.

### **Drought management**

- ⊙ 1. Indigenous knowledge is essential.
- ⊙ 2. Rain water harvesting system.

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- ⊙ 3. Construction of reservoir to improve ground water level.
- ⊙ 4. Modern irrigation technology (drip irrigation) very useful to conserve water.
- ⊙ 5. Afforestation activities also improve the potential of water in the drought area.

### **Conflicts over water**

#### **Causes of water conflict**

1. **Conflict through use**
2. **Construction of dams or power stations**
3. **Conflicts through pollution**

⊙ **1. Conflict through use**

Unequal distribution of water led to interstate and international disputes.

#### **National conflicts**

- a. Sharing of Cauvery water between Karnataka and Tamil Nadu.
- b. Sharing of Krishna water between Karnataka and Andhra Pradesh
- c. Siruvani – Tamil Nadu and Kerala

#### **International conflicts**

- a. Indus – India and Pakistan
- b. Colorado river – México and USA
- c. Brahmaputra – India and Bangladesh

⊙ **2. Construction of dams or power stations**

For hydro electric power generation, dams are built across the river. It creates the conflicts between the states.

⊙ **3. Conflicts through pollution**

Water reservoirs like lakes and rivers are also used for industrial purposes, therefore removal of industrial wastes creates conflicts.

### **Management of conflicts over water**

- ⊙ 1. Implement laws to check these practices to control water pollution.
- ⊙ 2. The inter linking of rivers has been one such solution

### **DAMS – BENEFITS AND PROBLEMS**

River valley projects with big dams are considered to play a key role in the development of a country. India has large number of river valley projects

- ⊙ 1. These dams are regarded as symbol of national development.
- ⊙ 2. provides large scale employment of tribal people and increase the std. of living of them
- ⊙ 3. contribute for economic uplift and growth
- ⊙ 4. help in checking flood
- ⊙ 5. generate electricity
- ⊙ 6. reduce power and water shortage
- ⊙ 7. provide irrigation water
- ⊙ 8. provide drinking water to remote areas
- ⊙ 9. Promote navigation and fishery.

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Environmental problems:

The environmental problems can be at upstream as well as downstream Level.

Upstream problems

- ① 1. Displacement of tribal people
- ① 2. Loss of flora and fauna
- ① 3. siltation and sedimentation near reservoir
- ① 4. stagnation and water logging near reservoir
- ① 5. growth of aquatic weeds
- ① 6. micro climatic changes
- ① 7. RIS causes earthquakes
- ① 8. breeding of disease vectors

Downstream problems

- ① 1. Water logging and salinity due to over irrigation
- ① 2. micro climatic changes
- ① 3. salt water intrusion at river mouth
- ① 4. loss of fertility due to sediment deposits
- ① 5. Outbreak of vector born diseases.

### MINERAL RESOURCES

#### ① **Mineral resources**

Mineral resources are naturally occurring substances with different physical and chemical properties.

#### ① **Ores**

These are mineral or combination of minerals from which metal can be extracted. Concentration of minerals at one particular spot is called mineral deposit.

#### **Classification of mineral resources**

Non renewable mineral resources are 3 categories.

#### ① **1. Identified resources**

Location, existence, quality and quantity are known by direct geological evidence and measurement.

#### ① **2. Undiscovered resources**

Assumed to exist on the basis of geological knowledge, but their specific location, quality and quantity are unknown.

#### ① **3. Reserves**

Minerals are identified. Usable materials can be extracted profitably.

#### **Uses and exploitation of minerals**

- ① 1. Development of industrial plants and machinery. - Fe, Al & Cu
- ① 2. Construction work – Fe, Al & Ni
- ① 3. Generation of energy - coal, lignite, uranium

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- ⊙ 4. Designing defense equipments like weapons and ornaments
- ⊙ 5. Agricultural purposes – fertilizers and fungicides – Zn & Mn
- ⊙ 6. Jewellery –Au, Ag & Pt
- ⊙ 7. Making alloys for various purposes – phosphoresces
- ⊙ 8. Communication purposes – telephone, wires, cables and electronic devices
- ⊙ 9. Medicinal purposes, particularly in ayurvedic system – sulphur pyrites

### **MINING**

Mining is a process of removing ores from area which is very much below the ground level. Mining is done for the extraction of several minerals of metals like Fe, Mn, Au, Ag, etc. The minerals are especially found in thick forests.

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II Based on usage

1. Critical minerals - these are essential of the economic power of a country. For eg: Fe, Al, Cu etc
2. Strategic minerals- These are required for the defense of a country. For example: Mn, Co, Pt, etc

### **Effects of mining:**

- ⊙ 1. Pollute soil, water and air.
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### **Environmental damages caused by mining activities**

- ⊙ **1. De vegetation :**
  - Topsoil and vegetation are removed
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  - Landscape badly affected
- ⊙ **2. Ground water contamination:**

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- ⊙ 2. Modernization of mining industries
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## **FOOD RESOURCES**

- ⊙ India is 3rd largest producer of crops, nearly 300 million Indians are still under nourished

- ⊙ **World Food Problems**

During the last 50 years world grain production has increased almost three times.

The per capita production is increased by about 50%.

Every 40 million people die of undernourishment and malnutrition.

Our food problem is killing as many people as were killed by the atomic bomb dropped on Hiroshima during World War II.

This statistics emphasize the need to increase our food production, and also to control population growth.

It is estimated that 300 millions are still undernourished.

Consequences:

- i) Over grazing
- ii) Agriculture

- ⊙ **Over grazing**

It is a process of eating the forest vegetation without giving a chance to regenerate.

### **Impact of overgrazing**

- ⊙ 1. Land degradation
- ⊙ 2. Soil erosion
- ⊙ 3. Loss of useful species

### **Agriculture**

It is an art, science and industry of managing the growth of plants and animals for human use.

Types of Agriculture

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There are two types

1. Traditional agriculture
2. Modern agriculture

1. TRADITIONAL AGRICULTURE- It involves a small plot, simple tools, surface water, organic fertilizers and a mix of crops.

Effect of Traditional agriculture

- a. Deforestation- Removal of trees for cultivation purpose.
- b. Soil erosion- Top soil removed by wind and rainfall, resulting in loss of soil fertility.
- c. loss of nutrients- During cutting and burning the trees, the organic matter in the soil gets destroyed. So the soil becomes poor in nutrient, which makes the farmers shift to another area.

### 2. MODERN AGRICULTURE

This involves the use of hybrid seeds of single crop variety, high-tech equipment, lot of fertilizer, pesticides and water to produce large amount of single crops.

#### 1. Problem using fertilizer

It is used to improve the soil fertility, fertilizer are used in agriculture.

##### a. Micronutrient imbalance

Excessive use of fertilizer (N,P,K etc) causes the deficiency of the micronutrient (Zn, Mn, etc) in the soil which affect the productivity of the soil.

##### b. Blue baby syndrome

When the nitrogenous fertilizers used in the crop fields is washed off by the runoff water contaminate the ground water. When the nitrate concentration exceeds 25mg/lit, they cause serious health problem called blue by syndrome. This disease affects infants and leads even to death.

##### c. Eutrophication

When the large proportion of N and P fertilizers used in the crop fields is washed off by the runoff water and reaches the water bodies causing over nourishment of the lakes. This process is known as Eutrophication.

#### 2. Problem using pesticides

It is used to improve the crop yield, pesticides are used in agriculture

##### a. First generation pesticides

These are used to kill the pest. For example: sulphur, arsenic, lead, etc

##### b. Second generation pesticides

Although these pesticides protect the crops from pests, they produce number of side effects.

##### a. Death of non-target organism

Many pesticides not only kill the target species, but also kill the several non-targets species, which are useful to us.

##### b. Producing new pest

Some pest species survive even after the pesticide spray. They are immune to all type of pesticides and are called superpest.

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### c. Bio-magnification

Many of the pesticides are non-biodegradable and keep on concentrating in the food chain. This process is called bio-magnification

### d. Risk of cancer

It directly acts as carcinogens and indirectly suppress the immune system

### 3. Water logging

It is the land where water stand for most of the year.

Causes

- a. Heavy rain
- b. Poor drainage
- c. Excessive use of water in agriculture field

Remedy or control

- a. Preventing excessive irrigation
- b. Sub surface drainage technology
- c. Bio drainage like Eucalyptus tree plantation

### 4. Salinity

The process of accumulation of salts in the top soil is called salinity.

Causes

- a. Irrigation from canal or ground water contains dissolved salts
- b. Evaporation of water, leaving the salts on the top soil

Remedy or control

1. Salinity of the soil removed by flushing the good quality water
2. Using sub surface drainage technology

## ENERGY RESOURCES

Energy is defined as, “the capacity to do work”.

### Development of energy

Wood –coal- oil -alternate energy (solar, wind, tidal energy).

### Energy distribution in the world

Developed countries like USA and Canada constitute only 5% of the world’s population but consume 25% of the world’s available energy.

Energy consumed by a person in a developed country for a single day is equal to energy consumed by a single person in a poor country for one year.

Types of Energy resources:

### Renewable energy resources (or) non-conventional energy resources

Energy resources can be regenerated continuously and are inexhaustible. They can be used again and again in an endless manner.

Example: Wood, solar energy, wind energy, hydropower energy, etc.,

Merits of renewable energy resources

- ☉ 1. Unlimited supply.

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- ⊙ 2. Provides energy security.
- ⊙ 3. Fits into sustainable development concept.
- ⊙ 4. Reliable and the devices are modular in size.
- ⊙ 5. Decentralized 01-Aug-13 energy production.

### **Non- Renewable energy resources (or) Conventional energy resources**

- ⊙ Energy resources which cannot be regenerated once they are exhausted. They cannot be used again.
- ⊙ Example: Coal, petroleum, natural gas, and nuclear fuels.

Even our renewable resources can become non-renewable if we exploit them to such extent their rate of consumption exceeds their rate of regeneration.

Wood is renewable resources but not coal-why?

- ⊙ Wood is renewable resources because we can get new wood by growing sapling into a tree within 15-20 years. but the formation of coal from trees

## **RENEWABLE ENERGY RESOURCES**

### **SOLAR ENERGY**

The energy that we get directly from the sun is called solar energy.

The nuclear fusion reactions occurring inside the sun release enormous amount of energy in the form of heat and light.

The solar energy received by the near earth space is approximately  $1.4 \text{ kJ/s/m}^2$  known as solar constant.

#### **Solar cells (or) photovoltaic cells (or) PV cell:**

Solar cells consist of a p-type semiconductor (such as Si doped with B) and n-type semiconductor (Si doped with P).

They are in close contact with each other. When the solar rays fall on the top layer of p-type semiconductor, the electrons from the valence band get promoted to the conduction band and cross the p-n junction into n-type semi-conductor.

There by potential difference between two layers is created, which causes flow of electrons (i.e., current)

#### **Uses:**

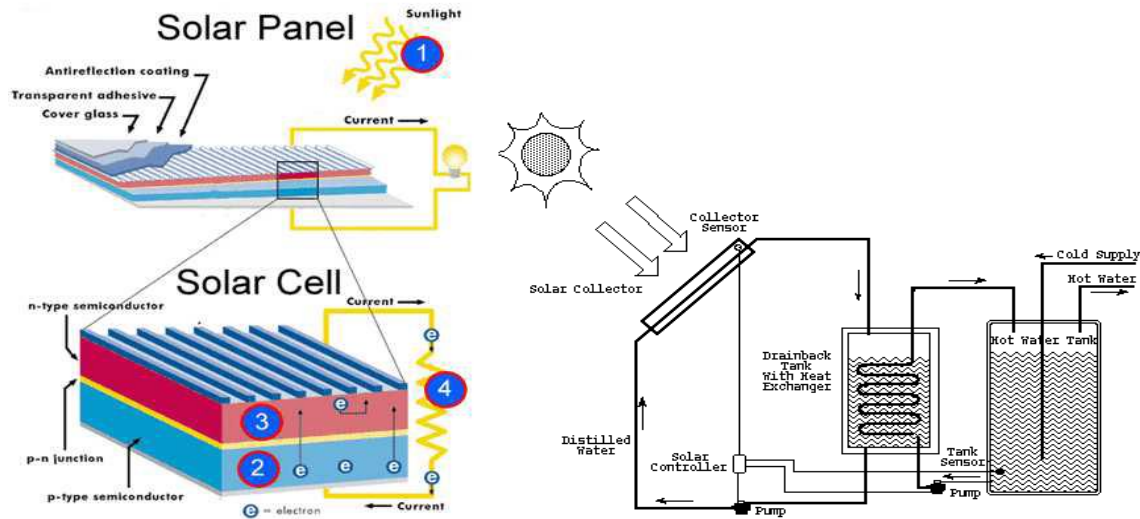
It is used in calculators, electronic watches. Street lights, water pumps to run radios and TVs.

#### **Solar Battery**

When a large number of solar cells are connected in series it form a solar battery.

Solar battery produce more electricity which is enough to run water pump, to run street-light, etc., They are used in remote areas where conventional electricity supply is a problem.

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### Solar water heater

It consists of an insulated box inside of which is painted with black paint. Provided with a glass lid to receive and store solar heat.

Inside the box it has black painted copper coil, through which cold water is allowed to flow in, which gets heated up and flows out into a storage tank. From the storage tank water is then supplied through pipes.

### Solar heat collectors

Solar heat collectors consist of natural materials like stones, bricks, (or) materials like glass, which can absorb heat during the day time and release it slowly at night.

#### Uses

They are used in cold places, where houses are kept in hot condition using solar heat collectors.

### WIND ENERGY

Moving air is called wind. Energy recovered from the force of wind is called as wind energy. The wind energy is harnessed by making use of wind mills and wind farm.

#### 1. Wind mills.

The strike of blowing wind on the blades of the wind mill make it rotating continuously. The rotational motion of the blade drives a number of machines like water pump, flour mills and electric generators

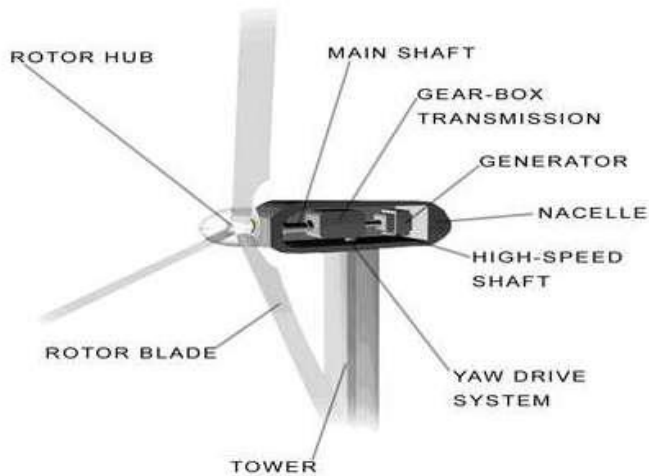
#### 2. Wind farm.

When a large no of wind mills are installed and joined together in a definite pattern it forms a wind farm. The wind farms produce a large amount of electricity.

#### Advantages

1. Does not cause air pollution
2. Very cheap

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## ***OCEAN ENERGY***

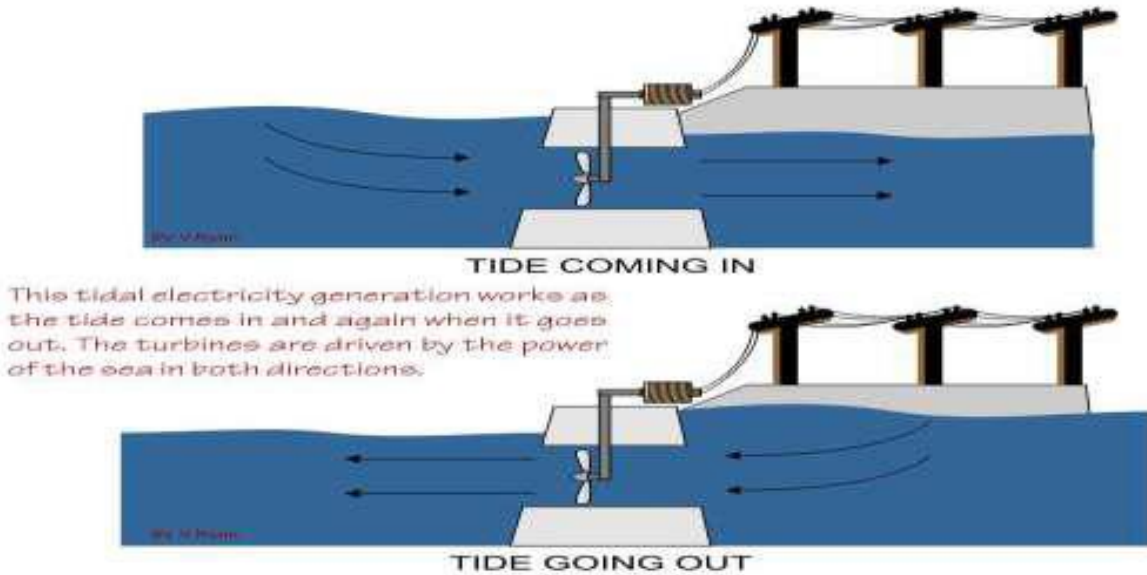
Ocean energy can be generated from the ocean in the following ways.

### ***1. Tidal energy***

Tides are produced by the gravitational forces of sun and moon and contain enormous amount of energy. The **rise and fall of sea water refers to high tide and low tide respectively**

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

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



## **2 .Ocean thermal energy.**

The energy available due to the difference between the temperature of surface and deeper level of the ocean is known as ocean thermal energy.

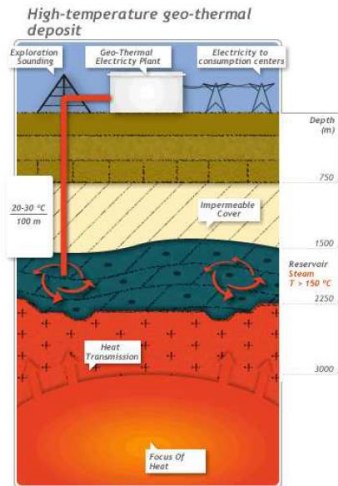
Condition; the difference should be of 20°C or more is required between surface water and deeper water

## **GEOHERMAL ENERGY**

Temperature of the earth increases at a rate of 20-75° C when we move down the earth.

The energy harnessed from the high temperature present inside the earth is called as geothermal energy.

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## BIOMASS ENERGY

Biomass is the organic matter, produced by plants or animals, used as sources of energy. Most of the biomass is burned directly for heating, cooling and industrial purposes.

Eg: Wood, crop residues, seeds, cattle dung, sewage, agricultural wastes.

1. **Biogas** - Mixture of methane, carbondioxide, hydrogen sulphide, etc.

a. It contains about 65% of methane gas as a major constituent

b. Biogas is obtained by the anaerobic fermentation of animal dung or plant wastes in the presence of water.

2. **Bio fuels**- Bio fuels are the fuels, obtained by the fermentation of biomass. Eg: Ethanol, Methanol

(a)Ethanol: Ethanol can be easily produced from the sugarcane. Its calorific value is less when compared to petrol, and produces much less heat than petrol.

(b)Methanol: Methanol can be easily obtained from ethanol or sugar-containing plants. Its calorific value is also too low when compared to gasoline and diesel.

(c)Gasohol Gasohol is a mixture of ethanol + gasoline.

\*In India trial is being carried out to use Gasohol in cars and buses.

\*Gasohol is common fuel in Brazil and Zimbabwe for running cars and buses.

\* Methanol is very useful since it burns at a lower temperature than gasoline or diesel. Due to its high calorific value, hydrogen can serve as an excellent fuel.

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\* Moreover it is non-polluting and can be easily produced.

\* Presently H<sub>2</sub> is used in the form of liquid hydrogen as a fuel in spaceships.

### **NON-RENEWABLE OR CONVENTIONAL ENERGY RESOURCES**

Non-renewable resources cannot be regenerated once they are exhausted they cannot be used again.

Eg: coal, petroleum, LPG, natural gas etc

#### **I. Coal:**

- a. Coal was formed 255-250 million years ago in the hot, damp regions of the earth during the carboniferous age.
- b. The ancient plants along the banks of rivers were buried after death into the soil and due to the heat and pressures gradually got converted into peat and coal over million years of time.
- c. When coal burnt it produces carbon dioxide, which is a green house gas responsible for causing enhanced global warming.

#### **II. Petroleum:**

Petroleum or crude oil = hydrocarbons +small amount S, O, N.

**Occurrence:** The fossil fuel formed by the decomposition of dead animals and plants that were buried under lake and ocean at high temperature and pressure for million years.

**Fractional distillation:** Hydrocarbons are separated by fractioning the crude oil.

- a. It is the life line of global economy.
- b. Petroleum is a cleaner fuel as compared to coal as it burns completely and leaves no residue.
- c. It is also easy to transport and use.
- d. Crude petroleum is a complex mixture of alkane hydrocarbons.
- e. Hence it has to be refined by the process of fractional distillation, during which we get large variety of products namely, petroleum gas, kerosene, petrol, diesel, fuel oil, lubricating oil, paraffin wax etc.
- f. The petroleum gas is easily converted to liquid form under pressure as LPG.

#### **III. LPG (Liquefied Petroleum Gas):**

- a. The petroleum gas, converted into liquid under high pressure as LPG
- b. LPG is colorless and odorless gas.
- c. During bottling some mercaptans is added, to detect leakage of LPG from the cylinder.

#### **IV. Natural gas:**

**Occurrence:** Formed by the decomposition of dead animals and plants, those were buried under lake and ocean, at high temperature and pressure for millions of years.

(i)**Dry gas:** If the natural gas contains lower hydrocarbons like methane and ethane, it is called dry gas.

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(ii) **Wet gas:** If the natural gas contains higher hydrocarbons like propane, butane along with methane it is called wet gas.

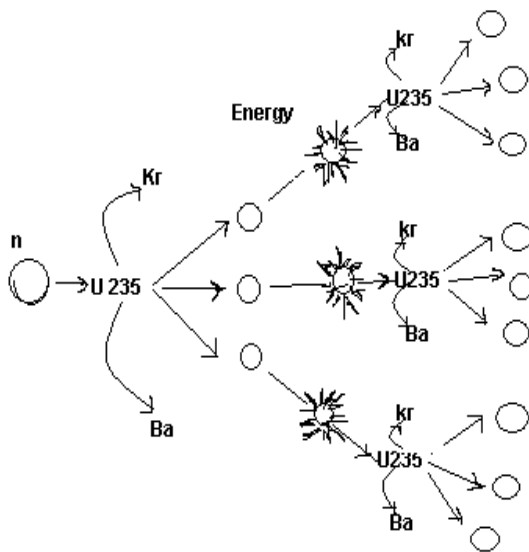
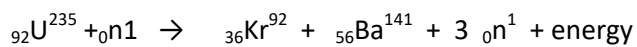
- Mixture of 50-90% methane and small amount of other hydrocarbons.
- Its calorific value ranges from 12,000-14,000 k-cal/m<sup>3</sup>.
- It is used as a domestic and industrial fuel in thermal power plants for generating electricity.
- It is used as a source of hydrogen gas in fertilizer industry and as a source of carbon in tier industry.

e.

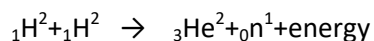
**V. Nuclear energy:**

- Nuclear energy is known for its high destructive power.
- Nuclear energy can be generated by two types of reactions:

(i) **Nuclear fission:** It is the nuclear reaction in which heavy isotopes are split into lighter nuclei on bombardment by neutrons. Fission reaction of U<sup>235</sup> is given below.



(ii) **Nuclear fusion:** Here two isotopes of a light element are forced together at extremely high temperatures (1 billion °C) until they fuse to form a heavier nucleus releasing enormous amount of energy in the process.



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Nuclear energy has tremendous potential but any leakage from the reactor may cause devastating nuclear pollution. Disposal of the nuclear waste is also a big problem.

### **ROLE OF AN INDIVIDUAL IN CONSERVATION OF NATURAL RESOURCES**

Since resources are being exhaustible, it is the duty of every human being on this earth to conserve the natural resources.

#### **Conservation of energy**

- Lights, fans, and other appliances should be switched off when they are not in use
- Solar energy can be used instead of LPG for cooking
- For drying clothes sunlight can be used instead of driers
- Near the houses trees can be planted to get chill breeze this will cut off the electricity charges on AC and coolers
- Pressure cooker should be used always
- Instead of using car or scooter, bicycle can be used or can walk simply

#### **Conservation of water**

- Minimum water should be used for all domestic purposes
- Water leaks in pipes and toilets must be repaired promptly
- The soapy water can be used for washing courtyards, drive ways etc
- Drip irrigation can be used for agriculture
- Waste water coming from the kitchen can be used for watering the plants
- Rain water harvesting system must be built in all houses

#### **Conservation of soil**

- Different types of plants, trees, herbs and grass must be grown in gardens which bind the soil and prevent its corrosion
- Trees should not be uprooted while buildings are constructed
- Plants should not be irrigated with strong flow of water
- Soil erosion can be prevented by the use of sprinkling irrigation
- To protect the soil, green manure can be used in the soil
- By doing mixed cropping, certain nutrients will not be depleted from the soil

#### **Conservation of food**

- Overeating should be avoided
- Food should not be wasted instead it can be given to somebody before getting spoiled
- Only required amount of food should be cooked
- Food should be cooked unnecessarily
- Large amount of food grains should not be stored and protected for longer time

#### **Conservation of forest**

- Non –timber products should be used
- More trees should be planted
- Grassing must be controlled
- The use of papers and fuel wood should be minimized
- Construction of dam, road must be avoided in the forest areas

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***Sustainable development***

All the natural resources must be in such way that it must be available for the future generation also.

***Unsustainable development***

The degradation of the environment due to over utilization and over exploitation of the natural resources

The life style in world can be explained in two ways

- i) Most developed countries
- ii) Less developed countries

***Life style in most developed countries***

As the rich countries are developing more, they are consuming more natural resources and polluting the environment more. The sustainability of the earth's life supporting system is under threat.

***Life style in less developed countries***

They have very low industrial growth. They are struggling hard with their large population and poverty problems.

***Causes of unsustainability***

- Over population in poor countries
- Rich countries consume more resources with more income

***Conditions for sustainable life style***

- It is essential to achieve a more balanced and equitable distribution of land resources and income to meet everyone's basic needs
- The rich countries should lower down their consumption levels while the minimum needs of the poor should be fulfilled by providing them resources.

Thus more balanced and equitable use of resources will reduce the differences between the most developed and less developed countries and will lead to sustainable development