Natural resources can be defined as 'variety of goods and services provided by nature which are necessary for our day-to-day lives'.

Eg: Plants, animals and microbes (living or biotic part), Air, water, soil, minerals, climate and solar energy (non- living or abiotic part).

They are essential for the fulfillment of physiological, social, economical and cultural needs at the individual and community levels.

TYPES OF NATURAL RESOURCES

They are of two types of resources namely Renewable and Non-Renewable Resources.

1. Renewable resources: The resources that can be replenished through rapid natural cycles are known as renewable resource. These resources are able to increase their abundance through reproduction and utilization of simple substances.

Ex: Plants, (crops and forests) and animals.

Some examples of renewable resources though they do not have life cycle but can be recycled.

Ex: Wood and wood-products, pulp products, natural rubber, fibers (e.g. Cotton, jute, animal wool, silk and synthetic fibers) and leather. In addition to these resources, water and soil are also classified as renewable resources.

Solar energy although having a finite life, as a special case, is considered as a renewable resource in as much as solar stocks is inexhaustible on the human scale.

2. Non renewable resources: The resources that cannot be replenished through natural processes are known as non-renewable resources. These are available in limited amounts, which cannot be increased. These resources include fossil fuels (petrol, coal etc.), metals (iron, copper, gold, silver, lead, zinc etc.), minerals and salts (carbonates, phosphates, nitrates etc.).Once a non-renewable resource is consumed, it is gone forever.

Non-renewable resources can further be divided into two categories, viz.

A) Recyclable and

B) Non-recyclable

A) Recyclable: These are non-renewable resources, which can be collected after they are used and can be recycled. These are mainly the non-energy mineral resources, which occur in the earth's crust (Ex: Ores of aluminum, copper, mercury etc.) and deposits of fertilizer nutrients (e.g. Phosphate sock and potassium and minerals used in their natural state (asbestos, clay, mica etc.)

B) Non-recyclable: These are non-renewable resources, which cannot be recycled in any way.

Ex: Fossil fuels and uranium, which provide 90 per cent of our energy requirements

NATURAL RESOURCES AND ASSOCIATED PROBLEMS:

The main problem associated with natural resources is unequal consumption.

A major part of natural resources are consumed in the 'developed' world. The 'developing nations' also over use many resources because of their greater human population. However, the consumption of

resources per capita (per individual) of the developed countries is up to 50 times greater than in most developing countries.

Advanced countries produce over 75% of global industrial waste and greenhouse gases. Energy from fossil fuels consumed in relatively much greater quantities in developed countries. Their per capita consumption of food too is much greater as well as their waste.

FOREST RESOURCES

A forest can be defined as a biotic community predominant of trees, shrubs or any other woody vegetation usually in a closed canopy. It is derived from latin word *'foris'* means *'outside'*.

- **FUNCTIONS OF FOREST**

1. It performs very important function both to human and to nature.

2. They are habitats to millions of plants, animals and wild life.

3. They recycle rain water.

4. They remove pollutant from air.

5. They control water quality.

6. They moderate temperature and weather.

7. They influence soil condition and prevent soil erosion.

- **USES OF FOREST**

1. Commercial uses

2. Ecological uses

1. Commercial uses:

i. Wood – used as a fuel

ii. Supply wood for various industries – Raw materials as pulp, paper, furniture timber etc.

iii. Minor forest products – gum, dyes, resins

iv. Many plants – Medicines

v. Supply variety of animal products – honey. Ivory, horns etc.

vi. Many forest lands are used for - Mining, grazing, for dams and recreation.

2. Ecological uses: Forest provides number of environmental services.

i. **Production of oxygen:** Photosynthesis produces large amount of oxygen which is essential for life.

ii. **Reducing global warming:** Carbon dioxide is one of the main green house gas. It is absorbed by plants for photosynthesis. Therefore the problem of global warming caused by CO2 is reduced.

iii. **Soil conservation:** Roots of trees bind the soil tightly and prevent soil erosion. They also act as wind breaks.

iv. **Regulation of hydrological cycle:** Watershed in forest act like giant sponges and slowly release the water for recharge of spring.

v. **Pollution moderators:** Forest can absorb many toxic gases and noises and help in preventing air and noise pollution.

vi. **Wild life habitat:** Forest is the home of millions of wild animals and plants.

- **REASON FOR DEFICIENCY OF FOREST:**

In India the minimum area of forest required to maintain good ecological balance is about 33% of total area. But at present it is only about 12%. So over exploitation of forest material occurs.

- **OVER EXPLOITATION OF FOREST:** Due to over population, there is an increased demand for medicine, shelter, wood and fuel. Hence exploitation of forest materials is going on increasing.

Cause of over exploitation:

1. Increasing agricultural production.

2. Increasing agricultural activities.

3. Increase in demand of wood resources.

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

Causes of deforestation:

1. Developmental projects: Developmental projects causes deforestation through two ways.

Through submergence of forest area.

Destruction of forest area.

Ex: big dams, hydro electric projects, road construction etc.

2. Mining operations: It reduces forest areas. Ex: Mica, coal, Manganese and lime stone.

3. Raw materials for industries: Wood is an important raw material for various purposes.

Ex: Making boxes, furniture and paper etc.

4. Fuel requirement: Wood is the important fuel for rural and tribal population.

5. Shifting cultivation: Replacement of natural forest ecosystem for mono specific tree plantation. Ex: Teak

6. Forest fires: Forest fire destructs thousands of acres of forest.

7. Over grazing: Over grazing by cattle reduces the cultivation land

Consequences of deforestation (or) impacts of deforestation:

1. Economic loss

2. Loss of biodiversity

3. Destructs the habitats of various species

4. Reduction in stream flow

5. Increases the rate of global warming

6. Disruption of weather patterns and global climate

7. Degradation of soil and acceleration of the rate of soil erosion.

8. Induces and accelerates mass movement / land slides.

9. Increases flood frequency, magnitude / severity.

10. Breaks the water cycle

11. Breaks the nutrient cycle

- **PREVENTIVE MEASURES (OR) AVOID OF DEFORESTATION (OR) METHODS OF CONSERVATION OF FORESTS**

1. New plants of more or less of the same variety should be planted to replace the trees cut down for timber

2. Use of wood for fuel should be discouraged.

3. Forest pests can be controlled by spraying pesticides by using aero planes

4. Forest fire must be controlled by modern techniques.

5. Over grazing by cattle must be controlled.

6. Steps should be taken by the government to discourage the migration of people into the islands from mainland.

7. Education and awareness programmes must be conducted.

8. Strict implementation of law of Forest conservation Act.

Dams problems

Dams are the massive artificial structures built across the rivers to store water for much beneficial purpose.

Dams are considered a "Temples of modern India". Dams destruct vast area of forest area. India has more than 1600 large dams.

Effects of dams on forest:

1. Thousands of hectares of forest will be cleared.

2. Killing of wild animals and destruction of aquatic life.

3. Spreading of water borne diseases.

4. Water logging increases the salinity of the soil.

Ex: Narmadha Sagar project it has submerged 3.5 lakhs hectares of forest.

Effects of dam on tribal people

1. Construction of big dams lead to the displacement of tribal people.

2. Displacement and cultural change affects the tribal people both mentally and physically.

3. They do not accommodate the modern food habits and life style.

4. Tribal people are ill treated by the modern society. 15 Environmental Science AITT & H&S

5. Many of the displaced people were not recognised and resettled or compensated.

6. Body condition of tribal people will not suit with new areas and hence they will be affected by many diseases.

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- **Effects of over utilization of water**

1. Decrease of ground water:

i. Increased usage decreases the ground water.

ii. Insufficient rain fall

iii. Building construction activities sealing the permeability of the soil.

2. Ground subsidence: If ground water withdrawal is greater than it's recharge rate, then the sediments in the aquifers get compacted. As a result shrinkage of land surface takes place.

Problems: a. Structural damages to the buildings

b. Fracture in pipes.

c. Reversing the flow of canals.

3. Lowering of water table: Over utilization of ground water in arid and semi arid regions for agriculture disturbs the state of equilibrium of the hydrological cycle.

Problem: a. Lowering of water table

b. Decrease the number of aquifers

c. Change the speed and direction of water.

4. Intrusion of salt water: In coastal area over exploitation of ground water leads to the intrusion of salt water from sea. Therefore that water cannot be used for drinking and agriculture. 18 Environmental Science AITT & H&S

5. Over utilization of water causes earth quakes, landslides and famines.

6. Drying up of wells: Due to over utilization, ground water level decreases much faster than can be regenerated. It leads to drying up of dug well and bore wells.

7. Pollution of water: Near the agricultural land ground water decreases therefore water containing nitrogen enters into the ground and pollute the ground water.

Problem: Water which contains excess nitrate content is not suitable for drinking.

REASONS FOR DECLINE OF GROUND WATER

Population continues to rise at an unprecedented and unsustainable rate; many more areas are expected to experience this imbalance in the near future.

1. Population explosion: World population is > 6 billion and will continue to increase significantly during the next few decades - Enormous demands on the world's limited freshwater supply. The total annual freshwater withdrawals today are estimated at 3800 cubic kilometers, twice as much as just 50 years ago (World Commission on Dams, 2000).

2. Overutilization of Surface and Groundwater: Occurs at various levels. Use of more water than really needed by human beings. Many agriculturists use more water than necessary to grow crops. Industries in order to maximize short-term economic gains, does not bother its liquid waste and releases it into streams, rivers and the sea.

3. Deforestation: Once hill slopes are removed of forest cover, the rainwater rushes down the rivers and is lost. Forest cover permits water to be held in the area permitting it to seep into the ground. This charges the underground stores of water in natural aquifers. This can be used in drought years if the stores have been filled during a good monsoon. This soil and water management and afforestation are long-term measures that reduce the impact of droughts. The destruction of forests influences the regulation of natural water cycle. The removal of dense and uniform cover over the hilly zones leads to occurrence of floods in drainage basins. Nations situated in tropical climates including India experience disastrous floods caused by the indiscriminate deforestation of the slopes above the valleys.

4. Hydropower generation: Large amount of water is used for generating power which otherwise used for human needs.

5. Dams - for Agriculture and Power Generation

6. Rain fall: The erratic and inadequate rainfall results in reduction in storage in subsurface reservoirs. The building construction activities are sealing the permeable zone, reducing the area for percolation of rainwater into subsurface and increase in surface runoff.

7. India's increasing demand for water for intensive irrigated agriculture, for generating electricity, and for consumption in urban and industrial centers, has been met by creating large dams. Dams support 30 to 40% of this area.

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. (Flash floods)

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 gets affected.

3. Extinction of civilization.

1.2.5.4.3 FLOOD MANAGEMENT

1. Floods can be controlled by dams.

2. Channel management 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.