Environmental Studies

Branch: Mechanical Engineering

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1. **Environmental Protection Act (1986)**

   Defined "**Environment as the sum total of water, air and land, their interrelationship among themselves and with the human beings, other living beings and property"**.

2. **Objectives**

   Awareness: To help the social groups and individuals to acquire knowledge of pollution and environmental degradation.

   Knowledge: To help the social groups and individuals, to acquire knowledge of the environment beyond the immediate environment including distant environment.

   Attitude Building: To help the individuals to gain a set of values for environmental protection.

   Skills and Capacity Building: To develop skills required for making discrimination in form, shape, sound, habit etc. and to draw unbiased conclusion.

   Participation: To provide an opportunity to be actively involved at all levels in environmental decision making.

   - The word 'environment' is derived from the French work '**environed**', which means to surround or to encircle.
   - It includes total physical and biotic word.

3. **Definition of Environment**

   Environment is the sum of all social, economical, biological, physical or chemical factors which constitute the surroundings of living organism, who is both creator and decomposer of this environment.

   - The environment for any living organism is always been changing, never constant or static.
   - The change can be slow or sometimes rapid.

4. **Environmental Science / Studies**

   Environmental Science is the multidisciplinary branch of science involving chemistry, physics, life Science, botany, agriculture, medical science, geography and many other fields.

   - With increasing scientific knowledge human / man is able to modify the environment to suit his immediate needs much more than any other organism.
   - The environment science, is the therefore a multidisciplinary science, which may require attention of experts from different branches of science when decisions regarding environmental matters have to be taken.
   - The craze of progression agriculture, industry, transportation and technology is taken as the criterion of development of any nation. Such activities of man has created adverse effect on all living organisms in the biosphere.

5. **Scope and Importance**

   Environment consists of all living and not living things which surrounds us. The basic components of the environment are:-

   i) Atmosphere
   ii) Hydrosphere

iii) Lithosphere

iv) Biosphere

6. **Some major problems to be addressed in environmental science**

Resource Recovery: The selective extraction of disposed materials for a specific neat use, such as recycling, composting etc. in order to extract the maximum benefits from products.

Biodiversity Conservation: Human should conserve biodiversity because of its benefit.

Air, water, soil, noise pollution

Environmental Ethics and Awareness: Human beings' ethical relationship with the environment.

Global Climate Change: A change in the statistical distribution of weather patterns which lost for a period of time.

Urbanisation, Land use: It refers to the population shift from rural to urban areas.

Sustainable Development: It is the organizing principle for meeting human development goals while at the same time sustaining the ability of ecosystem.

7. **Major contributions / Thrust areas made**

- **Bio-technology:** It is the use of living systems and organisms to develop or make products.

  Or

  Any technological application that uses biological systems called as Bio-technology.
- **Ocean and Space Science:** The branch of science which deals with study of earth, ocean and space research.
- **Computer Science and IT**
- **Physics, Chemistry, Biology**
- **Engineering, Medical Science.**
- **Ecology:** It is the scientific analysis and study of interactions among the organisms and their environment.
- Environment is responsible for creating conditions suitable for the existence of a healthy biosphere on this planet.
- The harmful ultra violet rays can severely damage the terrestrial life.
- Though all environmental problems have some solutions, but their effects are very very dangerous.
- Modern Technologies should be developed to reduce the pollution of every step.
- Environmental studies is very important for getting clean drinking water, hygienic living conditions, clean and fresh air, fertile land healthy food etc.

8. **Need for Public Awareness**

- The active co-operation of every one at every level of social organizational educationists, social workers, administrator and public is needed for issues concerning environment.

- When the opinion of public will change it will effect the Govt. Politics, which transform in to actions. Therefore little effort on the part of each individual shall add up to introduce significant improvements of the environment.
- Any Govt. at its own level cannot achieve the goals of sustainable development until the public has a participatory role in it. It is only possible. Only when public aware about the ecological and environmental issues.
- Only by celebrating "World Environmental Day" we cannot rid of this concern, Govt. alone cannot do anything until unless every citizen is aware of the environmental pollution and their effects. This is the time to make aware and motivative each and every individual for environmental consciousness.

Ecology: Ecology is the scientific analysis and study of interactions among organisms and their environment.

- It is an interdisciplinary field that includes biology, geography and the earth science.

Synecology: This is the branch of ecology, which deals with the relations between natural communities and their environment.

- The natural community is a group of plants and animals and their physical environment. An example of a natural community is a "rainforest", the wild life, the plants, soil, moisture etc.

Chapter-2

Natural Resources

The natural resources can be defined as the things or materials of the nature that can be put to some use by human beings for their growth, development, comfort and other necessities.

Eg. : Air, Water, Soil, Forest etc.

1. **Types of Natural Resources**

   All the natural resources can be divided into two categories.

   i. Exhaustible Natural Resources.
   ii. Inexhaustible natural resources.

2. **Exhaustible Natural Resources**

   The natural resources which are consumed or exhausted through continuous use or misuse are called as Exhaustible Natural Resources.

   Soil, forest, water, coal etc.

   It can be further divided into

   i. Renewable Natural Resources
   ii. Non-renewable Natural Resources

3. **Inexhaustible Natural Resources**

   The natural resources, which cannot be exhausted through continuous use or misuse called as Inexhaustible Natural Resource.

   Eg. – Air, Sunlight

4. **Renewable Resources**

   The natural resources, which can be recovered over a period of time are called as renewable resources.

   Soil, forest, ground water.

5. **Non-Renewable Resources**

   Non-renewable resources are those natural resources, which cannot be recovered or replenished at any way.

   Coal, Minerals, Stones etc.

6. **Fossil Fuels**

   These are formed from dead remains of plants and animals buried in the earth long long ago. They are called fuels because they are burnt to give off energy.

   Eg. – Coal, Petroleum

   Fossil fuels are non-renewable sources of energy.

7. **Abiotic Resources**

   The resources in which biological activity is not involved are called as abiotic resources.

   Eg. Minerals, Rocks, Salts and Chemicals.

8. **Natural Resources and Associated Problems**

- Man apply all their power, and intelligence for food and development. They adopt new ways to fulfil their needs and often make improvements in old ways to derive resources and to fulfil their desire more efficiently.
- Therefore proper utilization of our natural resources is the need of today.
- Human beings utilize most of resources like air, water, land, …. Etc. for their growth and development.
- The use of resources should be in limit not to exhaust them so that ecological balance with on the nature should also remain undisturbed.
- Directly or indirectly there are some problems from the over exploitation of natural resources. They are lowering of water level, extinction of wild animals soil erosion, floods, climatic change, various diseases etc.
- Ocean also provide different types of food materials and minerals. Large quantities of petroleum and natural gas, are also obtained from the ocean. But due to human activities, oceans have been put under heavy conditions of serious stream.
- Now, the conservation of natural resources should be the priority of ever gone. Citizen and methods of conservation management should be followed.
- By making rules only, we cannot protect natural resources. Awareness programmes, organising the seminars, public programmes are some means by which we can protect and conserve natural resources.

9. Measures to be Taken

- Societies and NGO's should come forward in the direction of protecting the natural resources.
- Human activities should be refined using high technology under environmental resource management system.
- Population should be controlled, because it is the root cause of resource exploitation.
- Plans for conservation of natural resources for their long term and maximum usage.
- Non-renewable resources should be used in as sustainable manner i.e. they should remain available for further generation.

10. Forest Resources

India is one of the 12 mega diversity countries, commanding 7% of the world's biodiversity and supporting 16% of the major forest types.

The forests need to be managed in a way to ensure that they are ecologically protected and maintained, as well as sustained at the highest productivity level to meet the growing population's demands for fuel, food and timber.

- India has a large and diverse forest resource. It's forest types vary from tropical rain forest on the North-East to desert and thorn fozeet in Gujurat and Rajasthan, mangrove forest on West Bengal, Odisha and other coastal area, and alpine forest in the Western Himalaya.

- Involvement of the private sector in plantation development has not been substantial and are not adequately supported by the government through relevant research, extension, market information or credit facilities.
- In regard to national parks, saxturies and other reserves, the country's achievement in terms of area is substantial. The condition of several protected areas is poor, because of fire, grazing and inadequate management.
- Non-wood forest products have a great potential to support the socio-economic development of the country and also the principle of sustainable forest management. There products are essential to local communities, some products have great potential for export. Some product have also provided employment and income earning.

11. Deforestation

The conversion of forested areas to non-forested areas is called as deforestation.

Or

Deforestation is the permanent destruction of forest, in order to make the land for any other use.

12. Use and over exploitation

People depend on the forest for all their needs, like clothing, food and shelter. Even today people depend on the forest for paper, timber, feed wood medicine and many more.

i. Fuel Wood

For the rural population, wood is an important source of energy for cooking and heating purpose.

ii. Food

There are many varieties of grasses, trees that are nutritious for the livestock. We get fruits from trees to eat and there fruits are a good source of income for few people.

iii. Timber

More than 1500 species of trees are commercially exploited for timber in different parts of India. It is used in timber based industries such as saw milling, plywood and particle boards.

iv. Bamboo

The main commercial use of bamboo are as timber substitute and raw materials for paper and basket.

v. Grasses

Lemon grass, khus grass are some grasses which are used for multiple purpose.

vi. Medicinal Use

There are many medicinal plants found in India like the neem, plant, leaves, bark and other parts of many other plants are also have medicinal value and are used to make various Ayurvedic Medicines.

vii. Oils

Oil is distilled from woods many plants such as sandal wood, agar and Pine Oil is also derived from leaves of Campher and Wintergreen etc. There oils are used for making soap and cosmetics etc.

viii. Floss

The fruit of many trees / plants produces a silky flower. The most common of there is simal, it is used to make cotton wool, pillows and mattress.

ix. Conservation of Soil

Forests prevent soil erosion by binding the soil with the network of roots of the different plants and reduce the velocity of wind and …….. which are the chief agents of calling erosion of soil.

x. Soil Improvement

The fertility of the soil increases due to humus which is formed by forest litter.

13. Over Exploitation of Forest Resources

Because of the widespread nature of human, activity in forest, it is misleading the forest improvement.

- Human have made manipulations with natural processes so as to compel / force forest system to produce more of the goods and services desired by people.
- At times, human management has become as intensive as to become the primary set of factors under which the forest system operates.
- There systems move towards the near total human control found in agricultural system and cannot thought of as forest in any natural sense, although they may continue to resemble forest superficially.

14. Causes of Deforestation

There is no single factor that is responsible for deforestation. Rather, it's a combination of forces that are causing it.

i. **Agricultural Expansion:** The conversion of forests into agricultural plantation is an major cause of deforestation. The increase in global demand for commodities such as palm oil and soya beans are diving industrial scale producers to clean forest at an alarming rate.

ii. **Infrastructure Expansion:** Road construction can lead to deforestation by providing an entry way to previously remote land.

iii. **Over Population:** With over population there is an increase in global needs and wants leading to expansion and deforestation. Growth of population increase the demand of food timber, clothes etc.

iv. **Grazing Animals:** Overgrazing by livestock leading to loss of prosperity of soil and desertification of previously fertile forest areas.

v. **Pest attack :** Forest peets like insects etc. destroy trees by eating up the leaves, boring in to shoots by spreading diseases.

vi. Natural Forces: Hoods, storms, snow, lightening etc. are the natural forces which damage forests.

15. Effect of Deforestation

Forests are closely related to climate change, biological diversity, wild animals, crops, medicinal plants etc. So any change in forest will definitely affect the system related to it consequences are:

i. Habitat destruction of wild animals.
ii. Increased soil erosion due to reduction of vegetation cover.
iii. Reduction in the oxygen liberated by plants through photosynthesis.
iv. Increase in pollution due to bearing of woods.
v. Decrease in availability of forest products.
vi. Loss of cultural diversity.
vii. Loss of Biodiversity.
viii. Lowering of water level.
ix. Rise in carbon dioxide level.
x. Deterioration in economy and quality of life of people residing near forests.

16. Controlling Deforestation

i. **Farming:** New methods are being developed to farm more food crops on less farm land, such as high yield hybrid crops, green house, autonomous building gardens etc. Cycling agriculture actually improve the fertility of the soil.

ii. **Forest Management:** Efforts to stop or slow deforestation have been attempted for many centuries. Landowners also developed techniques to deal with the problems of deforestation.

iii. **Afforestation:** In some countries like China, large scale destruction of forest has occurred and the govt. has required that every able bodied citizen should plant three to five trees per year or do the equivalent amount of work in other forest services. Rain forest Rescue program is a charity that helps to prevent deforestation.

17. Forest Management

Forest management methods include cutting practices, cutting means and replant the area with seedling.

18. Care Study

Indonesia : There are large areas in Indonesia that are being lost as native forest is cleared by a large multinational companies. Like Astra, Unilever.

Brazil : Brazil has suffered the heaviest loss of forest i.e. 23 Mha (1 Hector = 10000m^2)

Africa: Africa lost 53 Mha of forest and also out of which republic of Congo accounts for half of the loss.

US: US has gained 4MHa of forest and also China gained 18 Mha of forest according to year 2000 born.

India: In India the forest reduced to 36 Mha in 2009. Our present cover is only 20% according to national forest – Policy.(NFP)

19. Timber Extraction

The forest management requires to harvest that much quantity of timber and other products so as to fulfil the demand.

The methods are adopted for timber extraction are –

i. Clear felling
ii. Selective Logging.
iii. Mechanical Logging
iv. Hand Logging and
v. Reduced-impact logging.

Clear Felling : It generally means the complete destruction of native forest modifying it by harvesting commercial trees to create an even aged group and removing non-commercial trees if required.

Selective Logging : Only large individual trees of a few economically marketable spies are harvested. The other trees are left untouched till next harvesting.

Mechanized Logging: Heavy machineries are used to full, lift and transport the trees. This process can be used in the clear felling and selective logging operations.

Hand Logging: It takes place in forests that are seasonally flooded or permanently water logged. In such conditions any heavy machinery cannot be used and commercial logging operations have to employ hand logging.

Reduced Impact Logging: It is now a common feature in industrialized nations where environmental damage can be minimized through the selection of site sensitive techniques of harvesting and logging.

Mining

Mining is the process of extraction of valuable minerals or other geological materials from the earth.

Steps involved in mining process

1. To locate the Ore. (Ore)
2. To know the value of the ore
3. Mathematical estimating / the extent and grade of deposit.
4. Mining Planning to evaluate the recoverable portion of the deposit.
5. Feasibility study to evaluate the total project and make a decision as whether to develop or walk away from a proposed mine project.
6. Development to create access to an ore body.
7. Exploitation to extract ore on a large scale.
8. Reclamation to make land where a mine had been suitable for future use.

Environmental Effects of Mining

The environmental impact of mining includes.

1. Soil erosion.
2. Formation of sink holes.

3. Loss of bio-diversity.
4. Contamination of soil and ground water by chemicals from mining process.

Mitigation : Lessening the force of something.

1. Closing illegal and unregulated mines.
2. Scrap mining and recycling.
3. Better regulations.
4. Improving environmental performance.
5. Accurate tallying of toxic mining waste.
6. Building from recyclable water.
7. Closing of shut down mines.
8. Green mining technology.
9. Replenishing the environment.
10. Improving the efficiency and manufacturing process.

Case Study : Some examples of environmental problems associated with mining operation are:

1. During coal mining in 1960 coal book colliery collapsed in South Africa and killed 437 person.
2. In Indian 1975, December-27 Chasnala near Dhanbad 372 persons killed by explosion.

Dams : Dams are constructed in rivers for producing electricity, irrigation etc. But in other side for construction of dams 100s and 1000s area of land are getting destroyed.

Benefits of Dams : Water is essential for survival of all forms of life on the earth. Dams contribute significantly in fulfilling the following basic human needs.

1. Water for drinking and industrial use.
2. Irrigation.
3. Flood control.
4. Hydro Power Generation.
5. Inland Navigation.
6. Recreation.

Water for drinking and industrial use

- Properly designed and well constructed dams play a great role in optimally meeting the drinking water requirement of the people.
- Water stored in reservoirs is also used vastly for meeting industrial needs.

Irrigation

- Dams and reservoirs render / give services to the mankind for meeting irrigation requirements.
- It is estimated that 80% of additional food production by the year 2005 would be available from the irrigation made possibly by dams and reservoirs.

Flood Control

- Dams and reservoirs can be effectively used to control floods by regulating river water flows downstream the dam.
- The water conserved by means of dams and reservoirs, at the time of floods can be utilized for meeting irrigation and drinking water requirements and the hydro-power generation.

Hydro-Power Generation

- Hydro power is the most advanced and economically viable resource of renewable energy.
- Reservoir based hydro electric projects provide much needed peaking power to the grid. The reservoir made possible by constructing a dam presently on beautiful view of a lake. In the areas where natural surface water is scarce or less the reservoir one a source of recreation.

Inland Navigation

Enhance inland navigation is a result of comprehensive basis planning and development utilizing dams, looks and reservoirs that are regulated to play a vital role in realizing large economical benefits of national importance.

Effects of Dams

The environmental impact of dams are numerous and varied and includes direct impact to the biological world.

1. Soil erosion.
2. Species extinction, impact on fish.
3. Spread of Disease.
4. Changes to earth rotation.
5. Degrade the water quality.

Water Resources

This is the source of water that are potentially very useful. Uses of water include agricultural industrial, household and many other environmental activities.

About 70% of the global surface is covered with water in the form of oceans, rivers, lakes and ponds etc.

Sources of Water

It is classified in to two types:

i. Surface Water
ii. Ground Water

Surface Water : Surface water is the water on surface of the plant such as in a river, lake or ocean.

i. **River Water :** River receives water from rain and when this water flows over land, different minerals of soil get dissolved in it.
ii. **Rain Water :** It is the purest form of natural water because it is received by evaporation of surface water.
iii. **Lake Water :** A lake does not flow through different lands, therefore it contains lesser amount of dissolved water.
iv. **Sea Water :** It is the most impure form of water all of the impurities are thrown in to the sea.

Ground Water

It is the water found underground in the cracks and spaces in soil, sand and rock.

Use of water

Water is used for different things like –

i. Cooking

ii. Drinking
iii. Agricultural purpose
iv. Industrial purpose
v. Providing hydro-electric power

Over exploitation of water

- The need of water has increased rapidly with the increase in population.
- Over exploitation of water resources has caused the continuous declining of water levels.
- India is blessed with good water resources but its distribution over the country is not proper.
- The steps taken to avoid there problems is the proper management of the use of ground water resources.

Floods

A flood is an overflow of water that submerges land that is usually dry.

- During floods, people should move themselves and their most precious belongings to higher ground quickly.

Draught

A knowledge is a period of below average precipitation in a given region, resulting in prolonged shortages in the water supply. Whether atmospheric, surface water a ground water.

- In India West Bengal, Madhya Pradesh, Andhra Pradesh, Bihar, Odisha, Jharkhand etc. are suffering high frequency of drought.
- Drought occurs due to deficit of the rain fall.

Mineral Resources

A mineral is a pure inorganic substance that occurs naturally in the earth's …….

- Minerals are the vital raw material for many industries, and play an important role in the process of industrialisation.

Types of Mineral Resources

Minerals are divided into three types

i. Metallic Mineral
ii. Non-metallic minerals
iii. Mineral fuel

Metallic Minerals

Minerals with a high specific gravity and metallic lusture, such as tungsten, lead, iron etc.

According to the availability of the metal, metallic minerals are divided in to two types –

1. Ferrous
2. Non-ferrous

Non-Metallic Minerals

Non-metallic minerals have no metallic lusture and can break easily.

Eg.- Graphite, limestone, ruby, mica etc.

Mineral Fuels

There includes the materials used to provide energy.

Eg.- Coal, natural gases, fossil fuel and petroleum etc.

Use of Mineral resources

Mineral Oil : It has more than 80 thousands bi-products : petrol, kerosene, diesel etc.

Iron Ore : Mainly used in iron and steel, ship building, railway, air ozabi etc.

- Gypsum is mainly used in chemical industries.
- Mica is mainly used in electrical goods decoration, colour and paints etc.
- Bauxite is used in Aeronautical Engg., Chemicals, Furniture, doors etc.
- Copper is mainly used in electrical goods.
- Manganese is mainly used in iron and steels and glass etc.

Over exploitation of mineral resources

- Today about 80% of the world's energy consumption is sustained by the extraction of fossil fuel and minerals.
- Minerals resources are exploited by humans and used in the production of industrial commodities.
- Minerals are al so used for aircraft, shipping and car industries.

Environmental effects of extracting and using mineral resources

i. The less of lot and sub soil.
ii. Land degradation due to lowering of the soil level.
iii. The erosion of soil is enhanced.
iv. Mining drainage has polluted rivers and lakes.
v. Mining causes reduction of forests.
vi. Deforestation and climate change occurs.
vii. Duet and toxic gases indirectly affects air, humidity and temperature.
viii. Adverse effects on the ground water level.
ix. Agricultural land also get affected.
x. Damage the regenerative qualities of soil.

Mineral Resources of India

i. India has sufficient quantities of Iron, aluminium, copper, lead, zinc etc. India is fairly rich in mineral resources.
ii. About 2/3rd of the iron deposit are found in Odisha and Bihar boarder.
iii. Petroleum deposits are found in Assam and Gujurat.
iv. Magnetic iron ore is found in Tamilnadu, Bihar and Himachal Pradesh.
v. Nickel ore is found in Bihar and Mayurbhanj in Odisha.

Case Study

i. POSCO signed an agreement units Odisha Government to set up Rs. 53 thousand Crores Steel Plant with a capacity of 12 million tons per annum.
ii. Tata also signed an agreement with Jharkhand Government to set up a steel plant with a capacity of 10 million tons per annum and the investment is 42000 crore.

Food Resources

Food is essential for the survival of all living beings on earth, it is the resources which is required for tissue development in living organism.

i. Agriculture and domestic animals are the principal source of food.
ii. Fish, chicken are other animal source of food.

World Food Problem

- Before 21st century, it was felt that world food production is not sufficient for the present population.
- Food production was less, because people were using the old technique and seeds etc.
- Later on when population pressure starts, people are using fertilizers, pesticides etc to increase production.
- The main reason of world food problem are –
    i. **Natural Disasters:** The climate change is having an increased impact of food production as drought and floods have become more frequent and severe.
    ii. **Poverty :** Many people are there who are not able to get food for themselves as they are not in a stage to afford the food.
    iii. **Global Food Price:** Rising global food prices affects people's ability to buy enough food for their familiar especially to the urban poor.
    iv. **Uncontrolled Population : The balance of production and consumption of food is also a problem. The growth rate of population is the main problem here.**

Agriculture

Agriculture or farming is the cultivation and breeding of animals, plants and fungi for food, fibre, medicinal plants and other products used to sustain and enhance human life.

Changes caused by agriculture

- The mid of 1800 a great change which brought advances in cultivation method, advance crop verities, fertilizers and crop rotations to maintain the soil productivity.
- By 18160, 7 factories had been established in us to manufacture mixed chemical fertilizer.
- By 1893, there were 42 insecticides offered by several manufacturers.
- Use of fertilizers and pesticides including DDT increased by 50% in between 1940-1944.
- But in India the productivity was not enough because England ruled India till 1947.
- After independence we progressed by giving the facilities to the farmers.

Effects of Modern Agriculture

The advance impacts of the modern agriculture are -

- Soil pollution.
- Contamination of water.
- Global Climate Change.
- Water logging.
- Loss of genetic diversity.

Water Logging and Salinity

Another problem associated with excessive irrigation on poorly demand soil is water logging.

- When the irrigation water eventually raises the water level in the ground, water logging happens and the raised water level causes the plant roots to suffocate due to lack of oxygen. Water logging also damages soil structure.
- Soil salinity is also due to over irrigation. When crops are over irrigated surplus, water evaporates and the dissolved salts are left behind in the soil which is increasing the salinity of the soil.

Over grazing

Over grazing occurs under continuous or rotational grazing. It can be caused by having too many animals on the form or by not properly controlling their grazing activity.

It reduces plant leaf areas which reduces absorption of sunlight and the growth of the plant.

Fertilizers – Pesticides Problem

- **Fertilizers Problem**
  i. **Micronutrients imbalance:** Chemical fertilizers contains nitrogen. Phosphorous and Potassium which are micronutrioact imbalance factors.
  ii. **Nitrate Pollution :** Excess nitrogenerous fertilizers in the field loads to the contamination of soil and ground water.
  iii. **Eutrophication:** The application of excess fertilizers in the field, leads to wash off the nutrient loaded water in to the nearby lake casing over nourishment and it is called eutrophication.
- **Pesticides Problem**
  i. Death of non-target organism.
  ii. Most of pesticides are not bio-degradable and consumed in the food chain.
  iii. Pesticides are harmful to human being.
  iv. Pesticide also enhance the risk of “Cancer” disease.

Energy Resources

The capacity of doing work is called as energy. Energy cannot be created, nor be destroyed it can be transferred from one form to another.

Energy resources are divided into two types –

i. Renewable and
ii. Non-renewable sources of energy.

Renewable Sources of Energy

The energy resources which can be replenished or restored over a period of time called as renewable sources of energy.

Eg. – Soil, forest, ground water, Bio-gas, Bio-mass and solar energy etc.

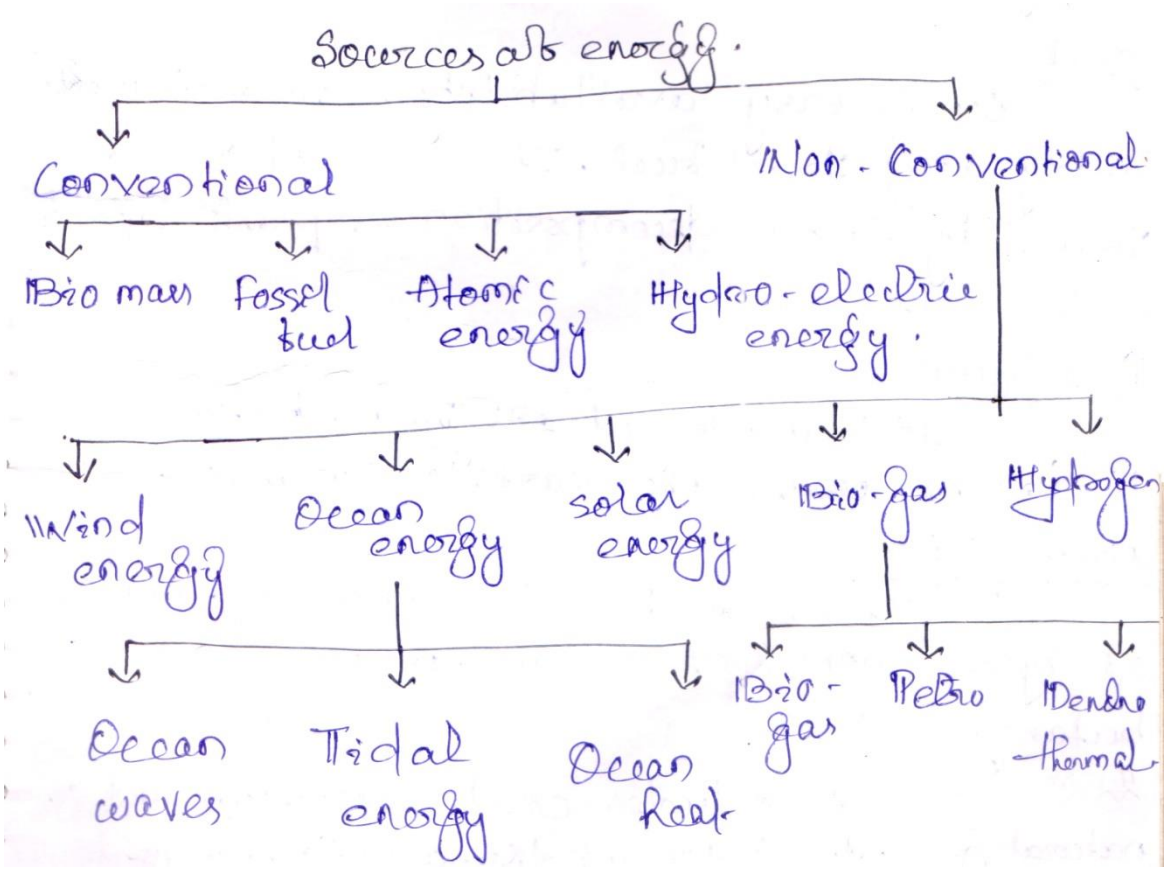
- Renewable energy resources are other wire known as non-conventional sources of energy.

Non-renewable Sources of Energy

The sources of energy which cannot be replenished or restored at any way is called as non-renewable sources of energy.

Eg.- Coal, Petroleum, Natural Gas etc.

- The non-renewable sources of energy are otherwise called as conventional sources of energy.



Biomass

All type of biological substance like plant products and their residues or wastes consists bio-mass.

Bio-Gas

India is rich in cattle, goats, horse and camels, they produce approximately 1000 tons of dung every year from their dung produces the bio-gas.

Solar Energy

The sun is the ultimate source of energy.

Coal

Due to easy availability, coal is the most widely used fossil fuel. It is a solid fossil fuel formed by partial decomposition of plants deposited in the earth crust.

Petroleum

It is a mineral oil found between the rocks under the earth's surface.

Natural Gas

It is a mixture of helium and number of hydro carbons like methane, propane and butane.

Fossil Fuel

It includes coal, petroleum and natural gas. About 90% of the world's energy requirements are met by burning of fossil fuel.

Alternate sources of energy

Nuclear Power

A compound consists of an elementary particle called an atom. An atom has a tiny nuclear and electron revolve around the nucleus. Inside the nucleus, protons and neutrons are held together by a strong nuclear force of attraction.

Hence an atomic nucleus splits a tremendous (huge) amount of energy is released. This energy is known as nuclear energy or atomic energy.

Geothermal Energy

This is the heat of the interior of the earth present at volcanic regions. This is utilised to generate electricity.

Tidal Energy

In some countries, tidal energy is also used to rotate turbines and generate electricity.

Hydrogen Energy

Hydrogen is a clean fuel and energy source for different application. A fuel cell is a device which burns hydrogen to produce electricity. This cost is not yet developed properly due to very high cost.

Land Resources

Land is a critical natural resource but it constitutes only about 29% of the total earth's surface.

Human being depend on land for their food, occupation, storage of surface, ground water and living on housing.

Soil

Soil is defined as a thin layer of earth's crust.

Soil Erosion

Soil erosion means removal of materials from the surface of the soil by agencies like water and wind.

Clarification of Soil in India

Alluvial Soil

It is the most important soil group of India contributing the largest share to its agricultural wealth.

This soil are derived from the deposition laid by the numerous tributaries of the Indus, Ganga and Brahmaputra systems.

Black Soil

It is common in Maharashtra, Western parts of Madhya Pradesh, Andhra Pradesh, Gujurat, Tamilnadu.

Red Soil

The ancient crystalline and metamorphic rocks on meteoric weathering have given rise to the red soil. The red colour is due to the wide diffusion of iron rather than to a high proportion of it.

Laterite Soil

These soils are poor in line magnesia nitrogen, potassium oxide but humus and P_2O_5 is high.

Desert Soil

It contains high percentage of soluble salts, possess high PH, a very high % of calcium carbonate and are poor in organic matter.

Acid Soil

Soils having PH below 7 and considered to be acidic.

Classification of Soil Erosion

Normal Erosion

This is a normal feature of any landscape. It takes place steadily but so slowly. There is always an equilibrium between removal and formation of soil.

Wind erosion

Wind erosion takes place normally in arid areas devoid of vegetation, where the wind velocity is high. The soil particles on the land surface are lifted and blown off as dust storms.

Water erosion

Soil erosion caused by water can be distinguished in three form.

i. **Sheet erosion:** It removes a thin covering of soil from large areas, often from entire fields, more or less uniformly during every rain which produces a run-off.
ii. **Rill erosion:** When sheet erosion is allowed to continue upchucked, the run-off forms a well-defined, but minute finger shaped grooves over the field.

Gully erosion

When rill erosion is neglected the tiny grooves develop in to wider and deeper channels, which may assume a huge size. Gullies are the most spectacular evidence of the destruction of the soil.

Land Degradation

In addition to waters land resources are the precious resources. Food security depend on conservation and proper utilization of all resources. Due to use and over exploitation land resources are degraded. It is due to the more and more pressure with increasing population. Land degradation is a real alarm. Because soil formation is a very slow process. In million of years we have a layer crest of fertile soil. In general, formation of Iron Soil crest from parent material take 300-400 years. Each gram of fertile soil have 30 billion micro-organisms. Land degradation is caused by erosion of soil, water rears-off, vegetation by shrinking of lakes etc.

Land Slides

A landslides is a sudden collapse of a large mass of hill side. There are many different types of landslides where not only earth, but rock, mud and debris flow down the side of slope.

Since the beginning of the monsoon season in June, India has been hit by heavy rains and land slides affecting in particular, Arunachal Pradesh, Assam and Bihar States. According to the latest information on the impact of landslides, more than 12 million people are affected and more than 270 people were killed in these three States.

Land Slides mostly occur

1. Where landslides have occurred before.
2. On steep slopes
3. On benches
4. Where drainage is causing a problem.
5. Where certain geologic conditions exists.

Desertification

It is a process by which productive potential of arid or semi-arid land falls. The decrease in productivity varies from 10% - 50%. Thus desertification leads to the conservation of irrigated crop land to desert. It is characterised by class of vegetal corer, depletion of ground water, and soil erosion.

During last so many years, large area has destroyed by Sahara Desert. In India also there are so many places which affected by desertification. An extreme example of sand movement in the coastal area of Saurashtra has hampered activities at the parts.

Deforestation is also one of the cause for desertification. Because after forest grass lands are used by human. So human activities are also responsible for desertification. Govt. and worldwide ecologists are seriously thinking about this problem. United Nations Envt. Programme (UNEP) organised a conference in 1977 at Nairobi to discuss about the change of desert land into productive agriculture land. The overgrazing is also a cause of desertification.

Role of Individual in Conservation of Natural Resources

The Indian philosophy of conservation is to keep, “Harmony with nature”. Therefor we have to learn to live with the nature. Tor this every individual has to play his role to conserve the nature and natural resources.

Some of the important role of individuals in maintaining peace, harmony and equity in nature are as –

1. People should stop the over utilization of natural resources.
2. Everybody should take part in plantation and care the plants.
3. We should protect wild life.
4. Mixed cropping, crop rotation and proper utilization of pesticides, insecticides.
5. We should make habit for waste disposal, compare and to restore biodiversity.
6. Try to educate local people for the protection and judicious use of natural resources.
7. Maintain a balance between resources and human needs.
8. We should use light, fans and other domestic appliances when it is needed.
9. Install rain water harvesting system in houses or colonies.
10. We should recycle the waste and waste water for agricultural purpose.
11. The fossil fuel should be used only when any alternative source is not available.
12. We must develop energy saving methods to avoid wastage of energy.
13. Prevent soil erosion.
14. Use drip irrigation and sprinkling irrigation to improve irrigation efficiency.
15. Utilize renewable energy sources as much as possible. Encourage use of solar cooker, pump etc.

Equitable use of resources for sustainable life style

- The equal distribution of natural resources should be for all irrespective of rich or poor. There must be a balance between the need and consumption particularly for drinking water, food, fuel etc.
- The developed countries are utilizing more resources as compared to developing countries. This imbalance is responsible for rich become richer and poor gone poorer. This is due to sharp increase in population in developing countries.

- Developed countries like USA, Canada, Japan etc. have 22% of world's population utilizing 86% of natural resources. Thus it is needed to divert resources to poor countries to narrow down the gap between the two. To achieve sustainable lifestyle there should be equal distribution of global resources and income to meet everyone need.
- Now stress is put on our natural resources and on the poor and inefficient people.

Owing to their conditions our Govt. inclined to change the existing model of economic development which should be based on the principle of peace, harmony and equity i.e. sustainable development.

Green Technology

Green technology is the application of one or more of environmental science, green chemistry, environmental monitoring and devices to monitor, model and conserve the natural environmental and resources and to curb the negative impacts of human involvement.

There term is also used to describe sustainable energy generation technologies such as photo voltaics, wind turbines and bioreactors etc.

Chipko Movement (1987)

The forests of India are a critical resource for the subsistence of rural people throughout the Country, especially in hill and mountain areas, both because of their direct provisions of food, fuel and because of their role in stabilizing soil and water resources.

In the 1970s and 1980s this resistance to the destruction of forests spread throughout India and become organized and known as the Chipko Movement.

The first chipk action took place spontaneously in 1973 and over the next 5 years spread to many districts of the Himalayas in Uttar Pradesh. The name of the movement came from a word meaning embrace the villages the trees and thus saved them by putting, their bodies in the way of the contracts axes. The Chipko protests in Uttar Pradesh achieved a major victory in 1980 with a 15 year ban on green fillings in the Himalayan forest of that State by order of India's Prime Minister Indira Gandhi. The movement later spread to Himachal Pradesh in the north, Karnataka in South, Rajastan in West, Bihar in East and to Vindhya in Central India.

The Chipko movement was the results of hundreds of decentralised and locally autonomous initiatives. Its leaders and activists have primarily been village women, acting to save their means of subsistence and their communities. Men have been involved too, however leadership to the movement.

Formation of Gober Gas

Bio gas is a mixture of gases composed of methane (50-80%), CO_2 (15-40%), Nitrogen (4%) and Hydrogen sulfide(1%) with very small percentage of Hydrogen, oxygen and carbon monoxide (Co).

It is gauous feel and serves as a good source of energy for various purposes like fuel for cooking, generation of electricity, mechanical and heat energy.

Fig.

- Bio gas production from biomass is an anaerobic process. The anaerobic digestion is usually carried out by using air tight cylindrical tank known as digester.

- A digester may be made up of concrete bricks and cement or steel, placed or built underground.
- A inlet pipe is attached to a mixing tank for feeding cow dung. The methanogenic bacteria is also mixed with cow dung.
- The digester is attached to a movable gas holding a storage tank with a gas outlet pipe. The used strong comes out from the digester through outlet.
- This type of technology is used in rural area in our country for domestic proper.
- The process of digestion usually taken 2-3 weeks when cow dung is used as a substrate.
- Under ideal conditions, 10kg of biomass can produce 3m of biogas. This biogas can provide 3 hours of cooking, 3 hour lighting.
- The calorific value of biogas around 8500cal/3m.

Chapter – 03
Eco – System

Eco-System : Eco-system is defined as a community of organisms interacting, with one other and the environment in which they live i.e. study of home.

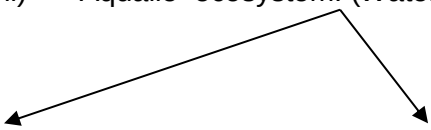
A home can be a drop of water for an amocba a home for a lion may be miles of land over which it reaches for its food.

Types of eco-system :

i) Permanent and Natural eco-system. : There operate under natural conditions without any interference by other organism. There can be further classified in to

i) Terrestrial ecosystem (land, forest)

ii) Aqualie ecosystem. (Water)



Fresh water -(lake) IM arine -(ocean))

Eco-system river Eco-System

ii) Temporary and Natural : There are short lived but operate under natural conditions.

iii) Artificial or anthropogenic ecosystem : There are man-made like fishery tanks dams, croplands and space ecosystems also. Fish aquarium is also under this head.

Function of an Eco-system :

Functioning of an ecosystem is self regulating and self sustaining. This depends upon flow of energy, cyding of materials, etc.

It is recognized as a dynamic concept with structure bared on at least four functional phases.

i) A rapid release phase consisting of tightly bound resources replaced by a recognisation phase.

ii) A exploitative phase, which gradually transformed in to conservation phase .

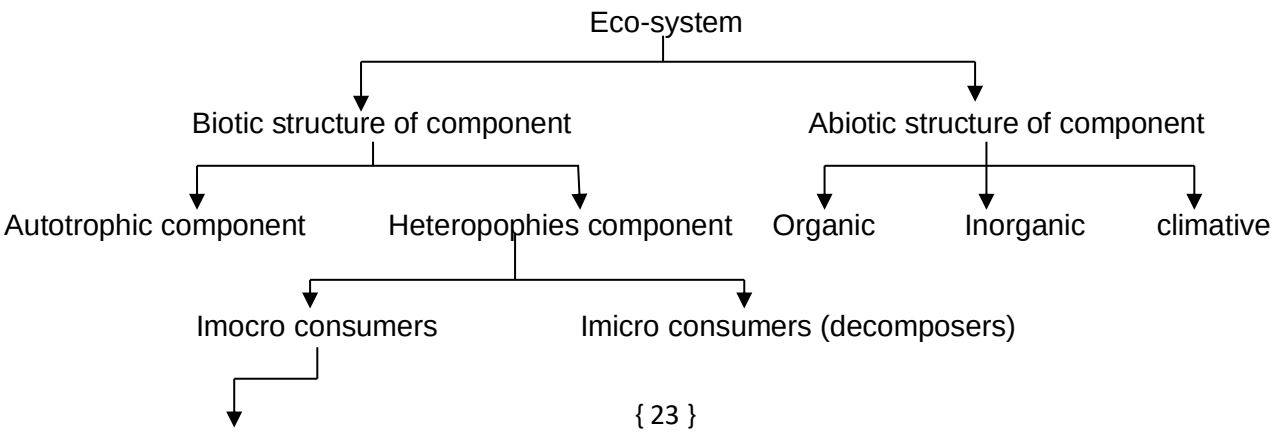
iii) Control of ecosystem function by nutrient flux & condition of physical envt. Called bottom up control.

iv) Function via tropic interactions called top-down control.

Structure of an Eco-system :

The structure of ecosystem provides information about the range of climatic conditions that present in the area, composition and organization of Biological communities and abiotic compounds.

From the food point of view an ecosystem has the following components



1. Primary consumers
2. Secondary consumers
3. Tertiary consumers
4. Quaternary consumers

1. Biotic structure of components :

Producers consumers and decomposers are components of biotic ecosystem. The biotic structure includes plants, animals and micro organisms present in an ecosystem.

a) Autotrophic components

Those who can prepar their own food by using sunlight and simple inorganic substances. There are also called as producers.

Eg: Green Pants

b) Heterotrophic components

Those who depends on green plants and other organisms to obtain their food. There are also called as consumers.

Eg : Human beings.

Producers :

All green plants are producers. They are living members of the ecosystem that utilize sublight as their energy source and inorganic materials from soil, air and water and transform them by photosynthesis into more complex energy rich chemicals as their food.

Consumers :

They derive their food directly or indirectly from the producers.

Types of consumers.

1. **Primary consumers :** There are also called herbivous which feed directly on the producers.
   Eg. A deer, giraffe in forest ecosystem.
2. **Secondary consumers :** They re called carnivores or meat eaters.
   Eg. Insects in a pond ecosystem eat primary consumers.
3. **Tertiary consumers :** In most of the ecosystem, some organism that eat other carnivores called tertiary consumers.
4. **Omnivore :** A person or animal eating plants and animals is called as omnivore .
5. **Top carnivores :** Some ecosystems have animals like lion which are not killed or rarely killed and eaten by other animals.
6. **Detritivores :** There are the bottom living which servive subsist on the rain of organic detritus broken rock from autotrophic layers eg. ants crabs, bectels, termites etc.

Decomposers :

They are also the living components, mainly bacteria and fungi which breakdown complex compounds of dead part of producers and consumers to simple organic compounds and ultimately into organic nutrients. The role of decomposer is very important in an ecosystem. They are responsible for completion ecosystem minerals cycles.

They are also called as micro consumers.

2. Abiotic structure of components :

The physical and chemical components of an ecosystem constitute its abiotic structure.

Energy flow in the Ecosystem :

Energy is needed for every biological activity. Solar energy is transformed in to chemical energy by a process of photosynthesis. This energy is stored in plant tissue and then transformed in to mechanical and heat from during metabolic activities. In the biological world the energy flows from sun to plants and then to all heterotrophic organisms like animals and man i.e. from producers to consumers.

There is no 100% flow of energy from producers to consumers. Some energy is always lost to environment so energy can only flow one way. The flow of energy follows the two laues of thermodynamics.

1. 2^{nd} Law of thermodynamics :

The law states that energy transformation involves degradation of energy from a concentrated to a dispersed from. There is loss of 90% energy, only 10% is transferred from one trophic level to the other.

2. 1^{st} Law of thermodynamics :

The law states that energy can neither be created nor be destroyed, but it can be transformed from one form to another

Ecological Succession :

Biotic communities are not states, They change with time. this change take place continuously in the community structure, organization, the arrociated animals and the environment at a place in the ourse of time, This phenomenon is called ecological succession. The succession is the “birth” of an ecosystem and subsequent “aging” of its abiotic and biotic features.

i) Primary succession : It is the process of species colonization and replacement in which the environment is initially virtually free of life, i.e. the process starts with base rock or sand or river delta with base rock or sand or river delta and it ends when climax is reached the score (complete ecological succession) involved in primary succession is called pressure.

Primary Succession oceers when a community begins to developed on a site previously un occupied by the living organisms.

ii) Secondary succession : Secondary succession refers to community development on locations previously occupied by well developed communities. It occurs where a surface is completely or largely devoid of vegetation. It may be due to earth quake, fire or even clearing of forest by man. The sere involved in secondary succession is called sub sore.

Depending up on moisture contents, Primary and secondary successions may be of following type.

A. Hydroch or Hydrosere : The succession when starts in the aquatic environment such as ponds, lakes etc.

B. Mesarch or mesosere : It is an intermediate type with adequate moisture. The succession when began in such area called mesarch.

C. Xerach or Xerosere : The succession when starts in xeric or dry habitat having minimum amounts of moisture such as rocks, dry deserts etc. is called xerach.

Three types are :

i) Lithosere – rock

ii) Ps ummosere – sand

iii) Halosere – Saline water or soil,

On the basis of community metabolism.

a) Autotrophic succession : It is characterized by early and continued dominance of autotrophic organisms like green plants.

b) Heterotrophic succession : It is characterized by early dominance of heterotrophs such as bacteric, fungi and animal.

General process of succession : The complete process of primary autotrophic ecological succession involves the following steps.

1. Nudation : The process of succession begins with the formation of a base area or nudation by several reasons such as volcanic eruption, floods, land slides. Fire etc. Some base areas are also created by managing walls, burnings, digging etc.

2. Invasion

The invasion is the arrival of reproductive bodies of various organisms and their settlement in the new of base area. Plants are the first invaders in any areas, because the animals depend on them for food.

It includes 3 steps.

i) **Dispersal or migration :** In this process the invaders leaves the parent plant and arriver the base area. eg. seeds reach the bare area through air, water etc.

ii) **Ecesis :** This is the success full establishment of migrated plant specious in to new area. It includes germination of seeds, growth of seedlings and starting of reproduction.

iii) **Aggugation :** This is the final stage of invasion, where immigrant species increase their number by reproduction aggregate in a large population in the area.

3. Competition : As the number of individuals grow, there is competition both interspecific and intra specific, for space, water and nutrition. They influence each other in a no. of ways called coactions

4. Reaction : When living organisms grow, use water and nutrients from the substratum and inhern they have a strong influence on the environment which is modified to large extent and in known as reaction.

5. Stabilization or climax : Eventually a stage is reached when a final terminal community becomes more or less stabilized for a longer period of time and it can maintain itself in the steady state with climate of that area.

Food chains: The sequence of enter and being enter, with the resultant transfer of energy is known as the food chain.

Thus in food chains, organisms of an ecosystem are linked together. Each step is called as trophic level.

Eg. (1) Grass – Rabbit – fox – wolf – lion.

(2) Lichens – reindeer – Man

(3) Plants – frog – Snake – Top

(Inserts) Consumer

Primary secondary tertiary

Consumer Consumer Consumer

1. Grazing food chains : This type of food chain starts from green plants and ends to carnivores by passing through herbivores.

Autotrophs primary ⟶ Herbivoures primary ⟶ Primary carnivores secondary

Producers consumers consumer

↓

so ⟵ Secondary carnivous

on tertiary consumers

2. Detritus food chain : The term detritus is given to organic wastes and dead matters derived from grazing food chain. The energy contained in this detritus is not lost to the ecosystem as a whole, rather it serves as the source of energy for a group of organisms (Detritivous) they differ from grazing food chain called detritus food chain.

Detritus ⟶ Detrivores ⟶ Detrivores consumers ⟶ small carnivous ⟶ Large carnivoures

Foods Webs

A food web is defined as "A network of food chains where different types of organisms are connected at different trophic levels, so that there are a number of options of eating and being eaten at each trophic level.

i) Grass – grass hopper – Hawk

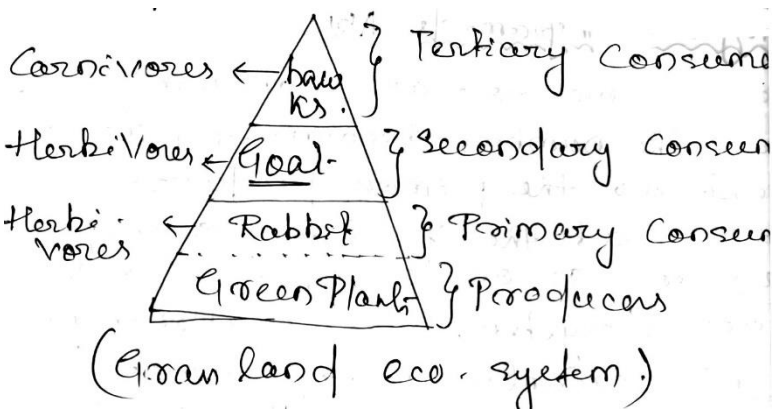
ii) Grass – Grass hopper – lizard – Hawk

iii) Grass – Rabbit – Hawk

Ecological Pyramids : There is some sort of relationship between the numbers, biomass and energy content of the primary producers, consumers of the first and second orders and so on to top, earnivous in any ecosystem. There relationships may be represented in diagrammatic ways and are referred to as the ecological pyramids.

The ecological pyramids are of three general types :

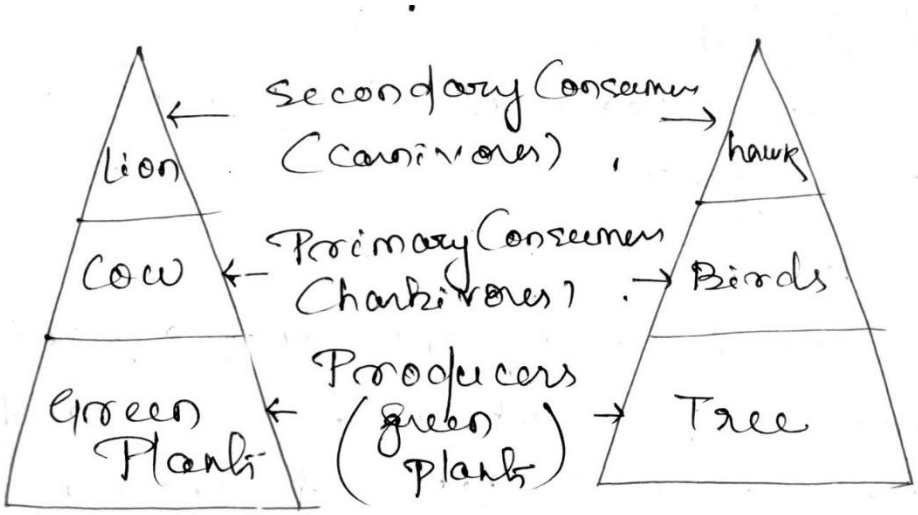
1. Pyramid of numbers : This deals with the relationship between the no. ofg producers, herbivous and carnivous at successive trophies levels.



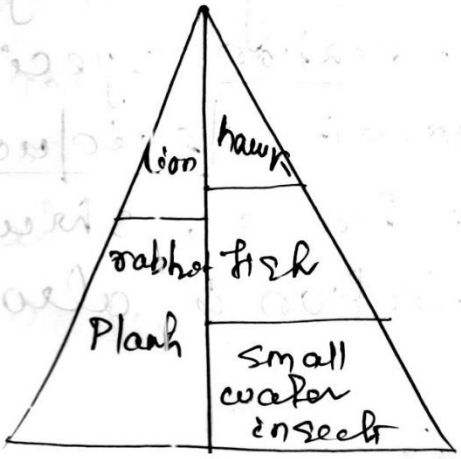
- The no. of primary producer is always at the base.
- … is the no. of consumers of successive level.

- The secondary consumers are less in no. then the primary consumers and the top consumers are least in number

2. Pyramid of bio-mass : Pyramids of biomass are more fundamental, as they instead of geometric factor, show the quantitative relationship.



Pyramid of energy : The energy pyramid give the best picture of overall nature of the ecosystem there time factor is taken in account always. It represent total quantity of energy utilized by different tropic level of an ecosystem per unit a



Forest Ecosystem :

The different components of a forest ecosystem are

a) **Abiotic component**

There are the inorganic and organic substances present in the soil and atmosphere. In addition to the minerals present in the forest we find the dead organisms.

b) Biotic component

The living organisms present in the food chain occur in the following order.

1. Producers : There are mainly trees that show much species diversity and greater degree of stratification specially in tropical moist deciduous forest. Beside trees, streets and ground vegetation is also present.

2. Consumers

a) **Primary consumers:** There are the herbivores that include the animals feeding on trees, leves as ant, flies, spiders etc.

b) **Secondary consumers :** There are the carnivores like enakes, lizards, birds, fox etc who feed on hubivour.

c) **Tertiary consumers :** There are the top carnivores like lion, tiger etc. that eat carnivores of secondary consumers level.

Decomposers :

There are wide variety of micro organization like bacteria, fungi etc. Rali of decomposition in tropical and subtropical forests is more rapid than that in the temperate ones.

Aquatic Ecosystem :

"Pond Ecosystem" The components of aquatic ecosystem are :

1. Abiotic Components : Apart from heat, light the basic inorganic and organic compounds, elements are water, oxygen, CO_2, nitrogen aminoacids etc. The amount of the minerals present at any time in the physical environment of the pond. The carbohydrates, lipid etc are also estimated for biomass determination.

2. Biotic components :

i) Producers : There are autotrophic, green plants and bacteria, They fix radiant energy and with the help of minerals from water and mud from complex organic substances like carbohydrates, lipids etc.

Producers are of the following types :

a) Macrophytes : There are mainly rooted larger plants which include partly or completely submerged floating and emergent hydrophytes.

Eg : Plants like typha, Hudrilla etc.

b) Phytoplankton :

There are minute, floating or suspended lower plants like cladophora, Volvox etc.

ii) Consumers :

a) Primary consumers :

There are herbivous, also known as "Primary macro consumers" feeding directly on living plants.

i) Benthos : There are the animals associated with living plants. It includes fish, cows, birds etc.

ii) Zooplanktons : There are the protozonas like euglena and crustaceans like Cyclops, etc who feed on phyloplanktons.

b) Secondary Consumers: There are carnivores like insects and fish which feed on primary consumers like zooplanktons.

c) Tertiary consumers: There are some large fish feed on smaller fish.

3. Decomposers: There are micro consumers, which absorb only a fraction of the decompoud matter. They decompose organic matter in simple forms. Thus they play an important role in return of mineral elements against to pond.

Eg. Bacteria

Fungi

Chapter – 04
Bio-diversity and its conservation

Introduction : The term "Bio divercity" is short form of "Biological Diversity" and was coined(like establish) by wapter G. Rosen in 1986.

- Biodiversity is neither the numbers of organisms present in any natural ecosystem nor a resource, but a property of living system.

Definition : (1) According to article (2) of conservation on Biodiversity (CB).

"Bio-diversity means the variability among living organisms from all sources including, terrestrial, marine and other ecosystems and the ecological complexes of which they are a part".

2) "Bio diversity is the total variety of life on our planet. Total no. of verities species i.e. sum total of various types of microbes, plants, animals present in a system is called as biological diversity or biodiversity.

Genetics, Species and Ecosystem Diversity :

Biodiversity is usually analysed at 3 levels.

i) Species

ii) Genetic and iii) ecosystem

Each of there has its own significance

1. Diversity of Biotic Communities and Ecosystem.

Depending largely up on the availability of abiotic resources and conditions of the environment an ecosystem develops its own characteristic community of living organism. A small pond for example, constitutes an ecosystem and possesses a set of flora and fauna different from a river which is another type of ecosystem. Different types of forests, grass- lands, lakes, ponds, rivers, wet- lands etc, represent diverse ecosystem each with a characteristic biotic community.

Diversity of species composition with in a community

The biotic component in an ecosystem may be composed of few species only or a large no. of species of plants, animals and microbes, which react and interact with each other and with the abiotic factors of the environment. The richness of species in an ecosystem is usually referred to as "Species Diversity".

2. Diversity of genetic organization within a species

With in a species there are after found a no. of varieties or races which slightly differ from each other in one, two or a no. of characters such as shape, size, quality of their product, resistance to insects, peats and diseases, ability to withstand adverse conditions of environment etc. There difference are due to slight variations in their genetic organization. This diversity in the genetic make up, of a species is referred a "Genetic diversity".

Biogeographically classification of India

India is are of the 12 mega diversity countries in the world. The country is divided into 13 biogeography regions. The wide variety in physical features and climatic conditions have resulted in a diversity of ecological habitats like forests, grass lands, wetlands, coastal and marine ecosystems and deserts which sustain immense biodiversity.

The following 13 biogeography regions have been found or identified in India.

1. Himalaya
2. The Desert
3. Decean Reninsula
4. Malabar
5. Andaman Islands
6. Nicober Islands
7. Gengetic planes
8. Laccadive islands
9. Maldive Islands
10. Western Ghats
11. Barman / Bengalian forests
12. Marine coast
13. Coromondal Mahanandian

Floristic / Biotanical Regions of India

The country has been divided into following 9 floristic regions w.r.t. flora diversity.

1. Western Himalayas
2. Eastern Himalayas
3. Indus plains
4. Gangetic plains
5. Central India
6. Malabar
7. Deccan plateau
8. Assam
9. Andamans

Values of Biodiversity: Biodiversity is a valuable natural resource for the survival of man-kind. Man has domesticated a number of economically important plants and animal species.

Consumptive value : Most of the developing countries obtain fuel wood from forests still more than 1500 million people cook their food by burning wood. About 1000 million cubic meter wood is used for fuel across the globe. This imposes heavy pressure on forests.

Hunting of wildlife, use of glass with some commercially important plants as fodder are of only completive way. Various tribal societies fully depend on forests for their habitation and livelihood. They use tubers roots, fruits, seeds and meat of wild animals as their food.

Productive value: Bamboos, grasses, cares essential oils, dyes, gums, drugs, poisons insecticides, soap substitutes, rudraksha, Lac, honey wax, Mahua seeds and other seeds are forest products, they have their high commercial value. In addition to these, various herts and animal body parts are sold in markets, both at national and international levels.

Some benefits like water quality, recreation, education, scientific research, regulation of climate etc. are indirect values to biodiversity that provide economic advantages to the people without

consumption of the resource. Many pharmaceuticals have traditionally been derived from plants and animal resources.

Social Values: Social values is one of the instrumental values where some thing has as a means to other's end. Materialistic use of biodiversity are the core of instrumental values. The biodiversity has district social value attached with different societies. Goods and services provided by the ecosystem to our society are as follows :

1. Provision of food, fuel
2. Provision of shelties (protective windows) and building materials).
3. Purification of air and water
4. Detoxification and decomposition of waste.
5. Generation and renewal of soil fertility, including nutrient cycling
6. Control of pests and diseases
7. Stabilization and moderation of earths climate.
8. Maintenance of genetic resources as key inputs to the Gop varieties.
9. Live stock breeds, medicines and other products etc.

Biological resources are the pillars up on which we bind civilization. The loss of biodiversity threatens our existence i.e. social life. Thus protecting biodiversity is in our self interest.

Aesthetic Value: The aesthetic value of biodiversity has been expressed in many ways through art, poetry, songs and dance. Forests are closely linked with our religion and culture. Human race has a great evolution any attachment with forests as our ancestors lived in the forests.

Many types of trees are worshipped in tribal and Hindu societies i.e. Peepal, Tulsi etc. some animals like cow is worshiped by Hindus in all over India.

Biodiversity at global level: It is estimated that there exists 5-30 million species of living forms on our earth and of there only 105 million have been identified and include 300000 species of green plants and fungi, 800000 species of insects; 40000 species of vertebrates (having a back bone) and 3,60,000 species of micro organisms. But present study shows that the no. of insects alone may be high as 10 million. The tropical forests are regarded as the riches in biodiversity According to the opinion of the scientists more than half of the species on the earth live in moist tropical forests which is only 7% of the total land surface Insects (80%) and primates (90%) make up most of the species.

IUCN and several other world authorities have identified 12 mega diverse countries and made comparative studies on flora-fauna, their endemism and protection efforts etc. The countries identified are:-

1. Brazil
2. Colombia
3. Venezuela
4. Peru
5. Ecuador
6. Indonesia
7. Democratic republic of Congo

8. India
9. China
10. Malaysia
11. Australia
12. Mexico

Bio-diversity of national level: India is located in sout Asia, between latitude 6º and 38º N and longitude 69º and 97º E. The Indian landmass extending over a total geographical area of about 3029 million hectors, is bounded by Himalayas in north, the bay of Bengal in the east, the Arabian Sea in the west, and Indian ocean in the south. The wide variety in physical features and climatic situation have resulted in a devoutly of ecological habitats. This richness in biodiversity is due to immense variety of climatic and altitudinal conditions coupled with varied ecological habitats. The Indian region having a vast geographical area is quite rich in biodiversity with a sizable percentage of endemic flora and fauna. There vary from the humid tropical western Ghats to the not desert of Rajasthan, from the cold desert of Ladakh and the icy mountain of Himalayas to the warm costs of peninsular India.

In India 1, 15,000 species of plants and animals have been identified and described for eg, the following crops arose in the country and spread throughout the world. rice, sugarcane, jute, mango, banana, several medicinal and aromatics. Hundreds of new species may be present in the country awaiting discovery. The western Ghats in Peninsular India, which extend in the southern states, are a treasure house of species diversity and has about 5000 species.

It is estimated that almost one third of the animal verities found in India have taken refuse in western Ghats of Kerla alone.

Bio diversity at Local level: The biodiversity at local level can be well understood by demarcating the points, places, zones rich in biodiversity. This can be understood as compositional i.e. rich in plants and animals of same habitats and genetic make-up

We can also study the local bio diversity on following lines.

1. Richness of species at a given place.
2. Physical characteristic of habitat and vegetation in particular area.
3. Change in species composition across different habitats.
4. Local diversity based on climate, geographical, ecological and other processes responsible for creation.
5. Rate of change across gradients and conditions.

It is said that environmental variables are responsible for diversity but temperature plays an important role in affecting the bio-diversity of an area. thus local areas are well affected in the heterogeneous and homogeneous habitats.

Threat to Biodiversity : One of the major threats to the biodiversity is space, food and raw material for expanding human and plant. Establishment probably early humans were directly responsible for extinction of many large and smaller mammals(feed milk to young).

But the elimination of species is a normal process of the natural world. when species die or extinct they will replace by others.

Due to human population and its impact in ecosystems thousands of species and sub species become extinct every year. Before man's appearance on this planet, the rate of extinction was one species per thousand years. However, the pressure of human activity has drastically changed the picture. Between 1650 AD and 1950 AD about 30 species of higher animals were lost.

It is said that, the current extinction rates are possibly 4 or 5 times more than the rates in the fossil record. The following are the major causes and issues related to threats to biodiversity.

Habitat Loss : Habitat loss due to human activities and other disturbances are well known factor. Varying human disturbances are changing ecosystems and are thus threatening the biodiversity. Due to habitat degradation wild populations become more vulnerable(unsefe) to predators (other animals) and diseases.

This is especially true for wild life, which suffer due to habitat loss and fragmentation (grouping) The natural forests and grassland, which were the natural homes of thousands species including wild life specifies, are going to be cleared day by day for conservation into agriculture lands, pastures, settlements or for developmental projects.

Due to pollution and persecute of toxic and hazardous pollutants, our fresh water resources have suffered and many species of aquatic birds, fish and mammals have been threatened. Electric power plants, which causes thermal pollution in the biosphere affected all aquatic communities and their natural food chains. Marine bio diversity is also under serious threat due to human intervention. Huge amount of habitat are lost each year as the world's forests are cut down. Problems of acid rains and global climate change are also well known for habitat loss.

Poaching of Wild life: Poaching is another threat to wild life. As on ancient period, hunters, collectors, and smugglers are the major threat to a no. of species including endangered species. They collected many body parts and herbal products and smuggled to others for millions of dollars. It is an illegal trade and internationally banned.

The cost of the animal parts are surprising. The cost of Bengal tiger coat is more than one lac dollars. The single orchid costs more than 5000 dollars, borns of the rhinoceros cost their weight in gold. There are some example by which we can understand the sitation of trading wildlife products, which is highly profit making for poaches.

Over collection and over exploitation are the main causes of disappearance of plants of scientific and medicinal value. The reduction of genetic diversity among the cultivated species drastically limit possibilities of creating new cultivation in the future which could be disastrous for human race.

Man-wildlife conflicts: "Struggle for existence". This is applicable for both, man and wild animal. Due to habitat loss animals come out of the forest and destroy the crops later on they become danger to human being. Villegers and affected people kill them. There are many cases of conflict between man and wild life. In there cases forest department could not pacify, resulted to lack of non-co-operation for wild life conservation from the affected people.

Animal are prone to infection when they are under stress. Animals held in captivity (imprisoned) are also more prone diseases. The elephants and other wild animals suffers pain and turn violent when they come to destroy the electric fancied crop field. It is noted thapl ill, weak and injured animals have

tendency to attack man. Man and wild life conflicts also occur during human encroachment into forest area. There are no. of cases, when man eating tiger was reported several men because they like human flesh rather than animal flesh.

Endemic Species of India: Endemis species of India is significant. Endemic species are the plants, which are limited in their distribution i.e. they are restricted to a small area and not found else where in the world. Eg-broad tailed grass bird. Forest owlet, Nilgiri

Causes 1. Poor adaptability of a species in a wide range of ecology.

2. Presence of some geographical barrier like sea, mountains etc.
3. Failure of dispersal of productive organs like seeds etc.
4. The species might have been comparatively young and not have enough time to spread.

Conservation of Bio-diversity: The geological history of biodiversity is about 3.5 to 4 million years old. It is sure that biodiversity in a source, once exist can not be regenerated again. Due to human activities and over exploitation of eco system, the most existinction has occurred. Our most important requirement is the conservation of biodiversity. Its our responsibility to conserve plants, animals and their wild relatives.

In view of the importance of biodiversity the urgent need for conservation of biodiversity was felt in Rio conference (1992). In the convention of Biodiversity (BD) which has 42 articles, Article 8 and 9 are about in situ conservation and ex situ conservation respectively. The objectives of CBD clearly stated the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the utilization of genetis resources. The conservation has to be ex-situ and also in situ. Both are complimentary to each other.

Ex-SITU Conservation: It means the wild life conservation in captivity under human case, In this the endangered plants and animals are collected and bred under controlled conditions in gardens, zoos, etc.

Many protected areas and habitats are too small and subject to frequent changes to sustain the viable populations of species they seek to preserve. As human enterprise expands and wild life habitats shrink numerous life forms will be lost. Whatever we do species shall continue to disappear and the biosphere shall continue to lose its constituents one after the other in near future.

Advantages

- The organisms are assured of food, water, shelter and security.
- They have long life span.
- Proper growth and development of the species.

Methods:

i) Long term captive breeding
ii) Short term propagation and release
iii) Animal translocation
iv) Animal Reintroduction.

Other methods:

i) Seed banks

ii) Gene banks

iii) In-vitro Test tube

iv) In vivo paramits

In-Situ Conservation: In situ means in the natural, original place or position, as in the location of the explants on the mother plant prior to removal or cutting. In situ conservation which include conservation of plant and animals in their native ecosystems, Where they naturally accrue. This type of conservation applies only to wild flora and fauna and not to domesticated animals and plant, because conservation is achieved by protection of populations in nature. This method of conservation mainly aims at preservation of land races with wild relatives in which genetic exists and in which the wild forms present hybrids with related cultivars.

In-situ conservation includes a system of protected areas of different categories i.e. National Parks, National Monuments, cultural landscape, Biosphere reserves etc.

Chapter – 05
Environmental Pollution
Air Pollution

According to U.S. Public Health service "Air pollution may be defined as the **presence** in the outdoor atmosphere of one or more **contaminants** or the combination there of in such quantities and of such duration as may be, or may tend to be injurious to human, Plant or animal life, or property, or which unreasonably interfere with the comfortable enjoyment of life or property, or the conduct of business."

OR

Air pollution occurs when **harmful substance** including particulates and biological molecules are introduced into Earth's atmosphere.

It may cause **disease, allergies or death of humans**. It may also cause harm to other living organisms such as animals and food crops, and may damage the natured environment.

Classification of Air-Pollutants: The pollutants may be classified in different ways as follows:

a) According to origin:

i) Primary pollutants which are directly emitted into the atmosphere and are found as such eg. CO, NO_2, SO_2 etc.

ii) Secondary pollutants which are derived from the primary pollutants due to chemical or photo chemical reactions in the atmosphere eg. Ozone, Photo chemical smog etc.

b) According to chemical composition:

i) Organic pollutants e.g. Hydrocarbons, Ketones and alcohols.

ii) Inorganic pollutants like carbon compounds (co and carbonate). Nitrogen compounds (No x and NH_3). Sulphur compounds (H_2o, SO_2 and H_2 SO_4)

c) According to state of matter:

i) Gaseous pollutants which gets mixed with air and do not normally settle out e.g. co, Nox and SO_2

ii) Particulate pollutants which comprise of finely divided solids or liquids and after exist in colloidal state as aerosols. Ex- smoke, fumes, dust, fog, smog and sprays.

Effects of Air pollution on man and his environment.

i) Damage to materials: The materials that may be affected by air pollutants include metals; building materials, rubbers, elastomers, papers glass and surface coatings. The types of possible damage to the materials include corrosion, abrasion, deposition, direct chemical attack and indirect chemical attack.

ii) Damage to vegetation: Air pollutants such as Sulphur dioxide, smog, oxidants and herbicide and sprays exert toxic effects on vegetation. The damages are in the form of visual injury. Such as banding, silvering of underside of the leaf. The extent of damage to a plant depends up on the nature of pollutant, soil and plant condition, stage of growth and extent of sunlight.

iii) **Damage to form animals:** Arsenic, lead and fluxes are the main pollutants which cause damage to live stock. There air borne contaminants accumulate in vegetation and poison the animals when they eat the contaminated vegetation.

Arsenic oceans as an impurity in coal and many ones. It is also used in insecticides. Livestock near smelting and other industrial operations suffer arsenic poisoning with symptom like salivation thirst, liver problems, and depression of central nervous system, cattle and sheep are particularly susceptible to fluorine toxicity which may cause fluorosis of teeth and bones.

iv) **Darkening of sky and reduction in visibility:** Sky darkening may be caused by heavy smoke and fog a by duet storms. The reduction in visibility may be due to smoke fog and industrial fumes which contain particulates in the size range of 0.4 to 0.9um that scatter height. The intensity of these effects depends up on the particle size, the angle of the sun, thickness of the affected air mass, and speed, humidity etc.

v) **Effect on human health and human activities:** The effect of air pollution on humans, animals and vegetation has already been discussed.

Air pollution can affect the health of workers in the industrial premises, causing sickness and drop in production. Industrial hygiene measures are being taken by many industrial managements to combats these occupational diseases.

Air pollution may cause sickness, among the workers and general lethargy, which naturally result in decrease in efficiency in all facets of human activity.

Measures to check(control) Air-Pollution: It is not easy to check the air pollution at reasonable cost, because if is not so simple. But we can check it by careful planning for industries, better design, operation of equipment and general awareness to do this. The following are the general methods of air pollution control:

1. Controlling the air pollution at source.
2. Site selection.
3. Controlling air pollution by devices / equipment / process modification.
4. Air pollution control by growing vegetation.
5. Air pollution control by fuel selection and utilization.

Water Pollution: Water pollution is the contamination of water bodies like lakes, rivers, ocean and ground water etc.

This form of environmental degradation oceans when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove harmful compounds.

Characteristics of Portable Water

1. It should be colorless, Odorless and tasteless.
2. It should be free from Turbidity and other suspended impurities.
3. It should be free from germs, bacteria and other pathogenies organism.
4. It should not contain toxic dissolved impurities, such as heavy metals, pesticides etc.
5. It should have a pH in the range 7-8.5.

6. It should be moderately. Soft, having hardness preferably in the range 50-100 PPm. Its hardness should not be above 150 PPm.
7. It should be aesthetically pleasant.
8. It should not be corrosive to the pipe lines and should not cause any in eructation's(damage) in the pipes.
9. It should not stain clothes.

Water Pollutants and their sources: The various types of water pollutants are:

a) Oxygen-demanding wastes: These include domestic and animal sewage, bio-degradable organic compounds and industrial wastes from food-processing plants, meat packing plants, paper and pulp mills etc. as well as agricultural run-off. All their wastes undergo degradation and decomposition by bacterial activity in presence of dissolved oxygen (D.O). This results in rapid depletion of D.O from the water, which is harmful to the aquatic organisms.

b) Disease causing wastes: There include pathogenic microorganisms which may enter the water along with sewage and other wastes and may cause tremendous waterborne disease such as cholera. Typhoid, dysentery, Polio and infections, hepatitis in humans. So disinfection is the primary step in water pollution control.

c) Synthetic organic compounds: There are the man-made materials such as synthetic pesticides, synthetic detergents, food additives, in pesticides, paints, plastics and other chemicals. There chemicals may enter the hydrosphere either during transport and use or accidental release of waste from their manufacturing establishments.

d) Sewage and run-off: Sewage and run-off from agricultural lands supply plant nutrients, which may stimulate the growth of plant and other aquatic week in the receiving water body, this unwieldy plant growth results in the degradation of the value of the water body intended for recreational and other uses.

e) Oil: Oil pollution may take place because of oil spills from cargo oil tankers on the seas, during off share exploration and production or oil, accidental fires in ship and oil tankers.

Oil pollution results in reduction of light transmission through surface water, thereby reducing photosynthesis by marine plants. Oil pollution in seas has been increasing due to the increase in soil-based technologies massive oil shipments, accidental oil spillages etc.

f) Heat: Considerable thermal pollution results from thermal power plants, particularly the nuclear power-based electricity generating plants. In such industries, where the water is used as a coolant, the waste not water is returned to the original water bodies. Hence the temperature of the water body increases. This rise in temperature decreases the DO content of water, which adversely affects the aquatic life.

Effects:

i) Tannery **effluents** contain several constituents which are dexterous, irrespective of the fact that where they are **discharged into river, stream, land or sea**.

ii) It impacts persistent dull brown colour to the receiving water causing aesthetic and other problems described earlier.

iii) **Highly repulsive odor** is imparted to the receiving water. The dissolved constituents like proteins are purifiable,

iv) The acidic or alkaline effluents are corrosive to concrete and metal pipes.

v) **Excess Nacl** in the effluent is also **corrosive** and renders the receiving water **unsuitable for irrigation.**

vi) The **effluents may contain pathogenic bacteria.**

vii) The suspended solids such as hair, Heels etc. interface with photosynthetic activities of the aquatic flora.

viii) The presence of excusive salt and cr. In the waste waters may **deteriorate the quality** of the ground water in the affected areas.

ix) **Volatile substances such as alcohols, aldehydes and gasoline** may cause **explosion** in sewers.

x) Suspended solids such as slit and coal may injure the gills of the fish and cause problems.

xi) Suspended solids may also cause had odour and tastes.

xii) **Radioactive isotopes are toxic to life-forms**.

Control of water pollution: The control of water pollution is difficult, but we may try for its prevention and minimization. We should adopt the respective safety measures to achieve acceptable water quality at the leant cost.

Some of these are:-

1. Scientific techniques are necessary to be adopted for the environmental c**ontrol** of areas of **rivers, lakes, ponds**.
2. Industrial plants should be based on **recycling o**perations.
3. The possible **reuse of sewage and industrial wastes** should be encouraged.
4. Minimum, appropriate quantity and concentration of **fertilizers, feticides and insecticides should be used to avoid** pollution.
5. There should be prop agenda for **water pollution control, on TV, newspaper** etc.
6. **Treatment plants should be constructed** and govt. should help by funding.
7. Water resources should be used in the best possible economic way.
8. Govt should encourage people to participate in research program. Like disposal of sewage etc.
9. Plants should be developed to recover metal from the metal bearing waste water.
10. **Destruction of forests should be discouraged.**

Soil Pollution: Soil pollution is the contamination of soil over the earth's surface.

Sources of soil pollution:

- The major sources include mining, smelting, fertilizers pesticides, etc.
- The metals like Cd, Pb, Hg, Ni, Cr etc. are toxic to plant and animal life.
- In discriminate dumping of industrial wastes and municipal wastes leads to soil pollution.
- Due to some modern agricultural practices, pesticides, insecticides etc. contaminate the land.
- Direct pollution of soil by dangerous pathogenic organism.
- Ash generated from thermal power plants, industrial wastes discharged into the surrounding land.

- Commercial and domestic carbon wastes consisting of sewage as well as garbage and rubbish materials such as plastic and glasses.
- Human and animal excreta, radioactive wastes etc.

Effects of Soil pollution

a) Effects of modern agricultural practice.

- Synthetic fertilizers are employed to increase the soil fertility and crop productivity. But their fertilizers concentrate the essential nutrients in layer of top soil.
- Excessive use of chemical fertilizers may reduce the ability of plants to fix nitrogen.

b) Effects of industrial effluents:

- Chemicals from various industries as such paper, iron and steel, contain a variety of pollutants such as toxic heavy metals, solvents, detergents etc. if they are not properly treated of source, they give rise to soil pollution.

c) Effects of urban wastes

- Millions tones of urban waste are produced every year from critically polluted cities. The untreated sewage not only cause health problem, but also pollute soil fertilely.
- Waste materials such as rubbish used plastic bags, garbage, tyres, shoes etc. also cause pollution on land or soil.

Control of soil pollution: The various approaches to control soil pollution are

1. Implementing proactive population control program.
2. Launching extensive of forestation
3. Implementing different measures against deforestation
4. Organizing formal and informal public awareness program.
5. Banning the use of highly toxic and resistant synthetic chemical pesticides.
6. Encouraging the use of bio pesticides.
7. Conservation of soil.
8. Effective treatment of domestic sewage.
9. Industrial wastes have to be properly treated at source.
10. Secondly landfills have to be constructed
11. Municipal wastes have to be properly collected.
12. Enfacing environmental audit for industries.
13. Avoiding exclusive use of chemical fertilizers and insecticides and providing more organic manure to the field.
14. Sponsoring more intensive R & D efforts on bio-fertilizers etc.

Marine Pollution: The addition of toxic and harmful chemicals, into the ocean, is called as marine pollution.

Source of Marine Pollution:

- Rivers are the main source of marine pollution. They carry wastes in their drainage and joins the sea/ocean.

- Catchment area like India and other countries too, many big cities and industries are situated along the coast line. So sewage from cities and industries mix with sea water.
- Ships which carry toxic substances, oil, paints, fuels and other chemicals, some time by accident or by leakage pollute the marine water.
- Test weapons, space aircrafts and other radio-active wastes when dumped in seas, causes heavy loss to the aquatic biosphere.
- Pesticides, insecticides when mixed with marine water causes. Harmful effects to marine life.
- Marine pollution also caused by oil drilling in seas, tourism activities and heat released from industries etc.

Effects of marine Pollution:

- Oil is most dangerous pollutant when mixed with water causes threat to marine life, especially fish, algae birds etc.
- Oil of se also effects sensitive flora and fauna.
- Plastic materials when dumped into sea, animal take it through their food into stomach which causes ulcer.
- Marine pollution effects the food chain in seas. Serious diseases like cancer are caused when affected animals are taken by man from ocean.
- Detergents are also responsible for high mortality of marine life.
- Heavy metals, minerals, acid and other chemicals are also major to marine life when mixed with sea water

Control of Marine Pollution:

a) Steps already in operation

- Port authorities are alert and introduced anti pollutant measures by creating pollution cell.
- Various research organizations, are working in this field to check the measure marine pollution.
- In most of the countries, the monitoring and survey in operation to control the marine pollution.
- Authorities have taken care of effective measures to check oil leakage from ships and tankers.
- Urban and courtlier corporations are trying to check the dumping of wastes into the water and helping to recycle or reuse of.

b) Suggested steps to control marine pollution

- Hazardous, toxic substances should be properly treated before damping them into the water.
- Drainage, sewage from industries should not be discharged into rivers.
- Developmental activities in the coastal areas should be minimized.
- Ships and ports should have certain facilities to reduce pollution.
- Certain biological methods should be followed to prevent pollution.
- We should develop awareness in people to reduce amount of waste in their daily life.

- Drilling should not be allowed in coastal area.

Noise Pollution: Noise pollution is the disturbing noise with harmful impact on the activity of human a animal life.

Effects of noise pollution:

a) Physiological effects: Loud sounds can cause an increased secretion of many hormones of the pituitary gland. A high sound level also has effects on respiratory system results in stress and vomit etc.

b) psychological effects: Loud continuous noise reduces the working efficiency, interferes with communication, increases the frequency of errors which may sometime cause accidents. Noise reduces the mental capability also, Noise interferer with deep sleep and interrupts slip. Sleep is important for emotional stability. Noise also increases any existing mental oiliness and psychological conditions.

c) Hearing Loss: Longtime exposures to loud noise can cause temporary or permanent loss of hearing. People working in noisy places after suffer from loss of heaving very loud. Sudden and impulsive noise such as bomb blast, are capable of causing damage to auditory system and cause hearing loss. High impulsive sound waves damage the ear drum and carry generation from eardrum to inner.

d) other health effects of noise pollution: Loud noise affects sleep, concentration and performance of an individual. It may cause headache, irritation etc. Our optical system also affected by loud noise. Loud noise also causes blood pressure, and reduce flow of blood to organs. Heart beat rate is also affected by noise pollution.

Control of noise pollution

a) Reduction of noise at the source: A little precaution can reduce much of noise caused. This can be achieved by replacement of noisy devices or machines with softer tone. Here noise level can reduce effectively, providing better state.

b) Application of sound proofing techniques: Sound waves are absorbed by process material, such as sheets and other objects just as putting cotton plugs in the ears reduces noise level for the individual concerned, sound barriers placed around the source of origin of loud noises drastically reduce the intensity of sound on the other side of the obstacle.

c) Keeping residential localities free of noisy industries, bus highways aerodromes: Residential localities should be established away from noisy industries, busy highways aerodromes or else their noisy establishments should be developed away from silent residential areas.

d) Enactment of strict legislation and its effective compliance: In most of the countries including our own, legal frame work against noise pollution has been developed. In most of the cases. Little efforts are made to enforce their rules and regulations effectively. If we ensure only effective compliance of their rules, much at bed noise pollution shall automatically he controlled.

e) Noise control methods in Industrial plants: Excessing noise is produced from various types of machines, pumps hydraulic system etc. It is always advantageous, economical and effective to identify the noise sources and noise problems and connection stages and implement the necessary noise control measures rather than attending to the problems at a later stage.

Thermal Pollution: Thermal pollution indicate the decremental effects of heated effluents discharged by various power plants.

Sources of Thermal pollution:

1. **Nuclear power plants:** Emissions from nuclear reactors and processing instruments are responsible for increasing the temperature of water bodies. Heated effluents from powerplants severely affect the aquatic flora and fauna.
2. **Coal-fired power plants:** The thermal power plants utilize coal as fuel and they constitute the major source of thermal pollutants. The heated coals are cooled with water from nearby lake or river and discharge the hot water back to the source and increase the temperature of water body. It decreases the dissolved oxygen content of water. It results into killing of fish and other marine organisms.
3. **Industrial effluents:** Industries require huge amount of cooling water for heat removal. To match with increased demand of electricity and rapid industrialization the no. of installations is raised which results in discharge of more volume of heated effluent and increase in temperature of water bodies.
4. **Hydro- electric power:** The generation of hydroelectric power, results in negative impaction water system as it constitutes to thermal loading.
5. **Domestic Sewage:** Domestic sewage is commonly discharged into rivers, lakes etc., without waste treatment. The municipal sewage normally has a high temperature. With increase in temperature of water the extent of dissolved oxygen decreases and demand of oxygen increases. Thus, the marine life depended on dissolved oxygen will die out and the quality of water is also adversely affected.

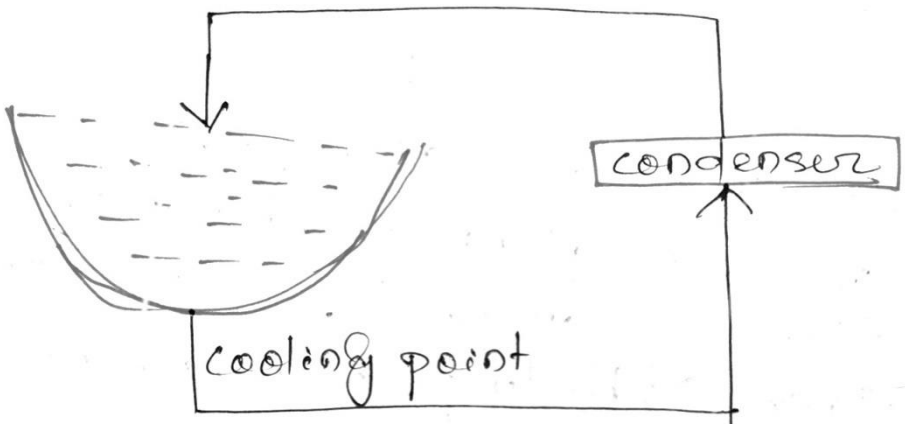
Effects of Thermal Pollution:

1. **Reduction in dissolved oxygen:** Concentration of dissolved oxygen decreases with increase in temperature of water, which affects the aquatic flora and fauna.
2. **Change in water properties:** A rise in temperature increases the toxicity of the poison present in water. The vapor pressure increases sharply, while viscosity of water decreases.
3. **Increase in toxicity:** The rising temperature increases the toxicity of the poison present in water.
4. **Interference with Biological activities:** The change in temperature totally changes the ecosystem. Because the life of aquatic animals involves several chemical reactions and the rate of their reactions varies according to change in temperature.
5. **Variation in Reproductive rate:** The increase in temperature triggers deposition of eggs by female.
6. **Changes in metabolic rate:** The respiratory rate, oxygen demand, food intake and swimming speed in fishes increase with an increase in temp.
7. **Effect on algae:** Excusive nutrients from washout water from thermal plants causes excessive algal growth and other undesirable changes.
8. **Effect on marine life:** Temperature also affects the growth of marine life. Some marine creatures cannot tolerate wide changes in temp, So they die at high temperatures.
9. **Effect on bacteria:** Due to the heated discharge from industries and plants, the bacteria are severely damaged. Effects include coagulation of body protein melting of cell fats, etc.

10. Invasion to destructive organisms: Thermal pollutants may permit the invasion of organisms that are tolerant to warm waters and highly destructive eg. invasion of ship worms etc.

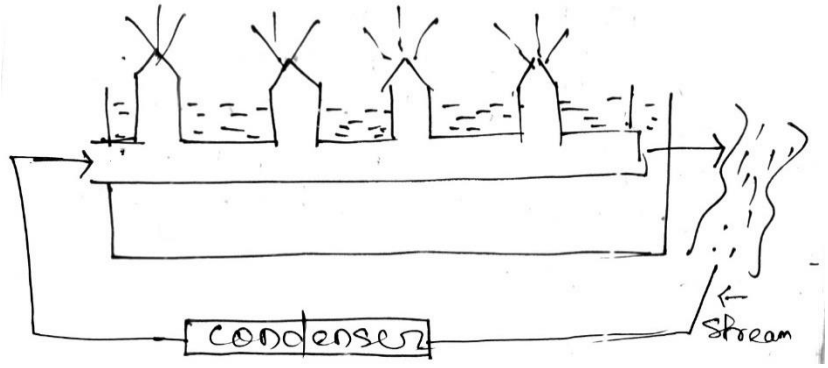
Control of thermal pollution: The following methods can be adopted to control high temperature caused by thermal discharges.

1. Cooling Ponds: The cooling ponds are beneficially used in removal of heat as shown in the figure:



The water from the condensers is stored in the earth like ponds whre natural evaporation brings down the temperature. The water is re-circulated again.

2. Spray Ponds: In spray ponds, the water is sprayed in the cooling ponds with the help of spray nozzles to convert it into fine droplets which provide more surface area to facilitate efficient heat transfer to the atmosphere.



3. Cooling Towers: In wet cooling towers, the heated water is brought in direct contact with continuously flowing water. The evaporation brings down the temperature. To increase the surface area of contact, the water is broken down into droplets by use of spray nozzles or by splashing it on the packing in the cooling tower.

4. To handle large quantities of heated effluents, large tanks or reservoirs should be constructed to retain the water for a little longer time. When water cool down to a tolerable temperature, it may be released.

5. The heated effluents discharge from the chemical industries and thermal power plants can be put into certain beneficial uses like green house, aquaculture, heating the buildings etc.

Nuclear Hazards: Hazard mean dangerous to human being by external source. This external source is from environment. When our environment s polluted then no one can escape from the pollution hazard. It has become a part of our life. A no. of atoms possesses the ability to emit radiations and thereby cause radioactive pollution.

Neutrons and protons constitute the mass while electrons revolve round the nucleus. Thus radioactive element is defined to be the collection of radioactive mass with the change of nucleus. The radio activity of a radioactive substance is expressed by the no. of nuclear transformations in unit time.

Sources of Radioactive Pollution:

a) Natural sources: The natural sources of radio activity are considered mainly of the radio received from space and the naturally occurring radio isotopes present in the environment and there contained within the body of the organisms, there are consists of particle with a very high energy.

b) Man-made sources

1. Nuclear weapons: atomic explosions are uncontrolled chain reactions. They give rise to very large neutron flux conditions that cause other materials in the surrounding environment to become radioactive,

2. Atomic Reactors and Nuclear fuel

The most common fuel used in the nuclear power plants are uranium plutonium. Uranium undergoes several processes.

At all stages of nuclear fuel cycle liquid, solid and gaseous radioactive wastes are released having a heavy potential to pollute the ENVT.

3. Radioactive Isotopes: Radioactive isotopes and their compounds find wide usage in research institutions contain varying amounts of radioactive materials. When this waste water reaches different water sources. They cause water pollution.

4. Other Sources: During medical treatments, varying concentrations of radiations enter the human body like X-rays are common for detecting skeletal disorders. It may be hazardous if not properly shielded.

Hazards Associated with radioactive pollution: Major hazards associated with radioactive pollution can be explained as:

1. No physical, chemical or biological process can influence the process of radioactive emissions. The unstable nuclei have to decay and attain a stable state.

2. A no. of radioactive isotopes has a very long life.

3. Most of the radiations have a high penetrating power. They can easily penetrate to organs and cause injury.

4. The entire food chain become contaminated.

5. Nuclear reactors are still continuing and a large amount of radioactive waste is accumulating every day.

Control of radioactive pollution: Control of natural radioactive pollution may not be possible. Out of all sources, only artificial radioactivity is the scope of invention. Some safety measures are

- The wastes are subjected to a treatment for removal of radio activity and then discharged in the water bodies.
- The wastes cannot be disbound freely in the environment.
- Wastes have to be concentrated and stored out of the reach of human's surrounding.

Solid Waste Management: The purposed of study of solid waste management is to.

i) Identify the various types of solid wastes and their sources.

ii) Examine the composition of wastes.

iii) Consider the elements involved in their management.

Sources of solid wastes: Sources of solid wastes can be …. Into following categories:

1. Residential
2. Commercial
3. Municipal
4. Open areas
5. Industrials
6. Agriculture
7. Hazardous wastes
8. Construction siter

Types of solid wastes:

Garbage: It includes the wastes from cooking, eating of food, fruits, vegetables etc.

Ashes and Residues: Materials remaining from the burning of wood, coal and other wastes.

Agricultural wastes: Wastes resulting from agricultural activities such as planting harvesting, production of milk etc.

Hazardous wastes: Chemical, biological, radioactive wastes that are harmful to human, plant and animal life.

Special Wastes: Waster such as street Sweeping, dead animals, vehicle wastes are categorized in to the special wastes.

Effects of solid wasters:

- Varieties of micro-organisms like bacteria, fungi, viruses etc, start growing in a very large number.
- Various types of germs develop in the waste and reach human through air, water and food.
- Harmful fumes from industries, effects eyes, skin etc.
- Waste materials when deposited here and there, disturbs the drainage system.
- Improper disposal of municipal wastes and throwing the house hold wastes here and there effects the community causing a bed smell.
- Wastes like cans, plastics, Batteries radioactive matters etc which can be recycled, cause serious effects on mankind in many ways. Animals are also affected when they take the wastes and polyethene.

Management of solid waste 10 methods of solid waste disposal

a) Physical removal: It is generally done by manual activities like collection of wastes and sorting out into reusable and decomposable or non-decomposable. Hence disposal becomes easy.

b) Dumping: Transfer of solid waste water from place of collection to the site of disposal is called dumping. Municipal bodies collect and dump them on some suitable areas.

c) Compaction and Boiling: The solid wastes are often spread on a plane and later pressed by Bulldozer is called compaction. The compacted layers are rolled and piled is called bailing. Now such said wastes are dumped for decomposition.

2. Reuse and recycle of solid waste:

a) Reduce of waste material: We should reduce the household wastes, by using maximum part of the goods. Before throwing outside we should select the part for reuse. We should avoid polyethene.

b) Reuse of waste materials: After selecting the waste, that can be used after proper treatment. We should not use cups, Plates, Papers etc. we can sell donate goods instead of throwing them out. We should utilize paper of their optimum use.

c) Recycling of waste materials: The drainage systems are, associated with treatment devices that reduces the toxic effect of sewage, before releasing it to the local water systems.

Role of individual in prevention of pollution: The major roles are:

1. One should start first in the field of environmental awareness to protect the pollution.
2. We should go place to place to teach the lesson of awareness.
3. Give the message to save environment through TV, Paper etc.
4. To promote for plantation and conservation of forest.
5. To organize seminars, on pollution.
6. Population growth is to be reduced.
7. Go on foot and use bicycle if possible.
8. We should not use materials contains CFL.
9. We should go in rural areas during festivals for general awareness.
10. World forest day, Environment Day should be organized for general awareness.

Flood: The term flood is generally defined as a relatively high flow in a river.

Earthquake: Earthquakes may be defined as a natural phenomenon which tends to create panic due to the trembling vibration of sudden undulation of a portion of earth is create caused by splitting of a mass of rock or by volcanic or any other disturbances.

Cyclone: Cyclones bring with them extremely violent winds, heavy rain causing floods and storm tides causing coastal inundation.

Chapter – 06
Social issues and the environment from unsustainable to sustainable development

More and more natural resources were consumed in the process of satisfying the rapidly growing needs of the habitat. Every development activity has some impact on the environment. For meeting the needs, the human cannot live without the development activities.

The sustainable development is the development in such a way that environment should not be polluted at least unsuitable development means the development of a few nations both in science and technology. Such developments are at the cost of our life supporting system like air, soal, water etc. If the growth continues in the same way very soon, we will face the collapse of the inter related systems of the earth.

Two aspects of sustainable development

i) Inter-generational equity: This emphasizes that we should stop ever exploitation of resources, reduce waste discharge and emissions and maintaining an economical balance.

ii) Intra-generational equity: This emphasizes that technological development should support economic growth of, the poor countries so as to reduce the exploitations between the nations.

Measures for sustainable development:

i) To promote environmental education and awareness: From childhood, we should develop a feeling, of belongingness to the earth. This can be possible by introducing environment as a subject in education from the primary state.

ii) Three 'R' approach: Three 'R' means, reduce, Reuse and Recycle. We should reduce the excessive use of natural resources, but use them again and again instead of passing it on to the waste stream.

iii) Appropriate technology: The technology should use less resources and produce minimum waste. It is over which locally adaptable, ecofriendly, and culturally suitable.

iv) To utilize resources as per carrying capacity of the environment:

a) Supporting capacity: It is formed of productive and protective system.

b) Assimilative capacity: It is formed of the systems which utilize the wastes produced by human activities on the earth.

Urban problem related to energy

Urban areas are developing very fast. Therefore, it is difficult to accommodate all the industrial, commercial and residential facilities within limit. As a result, cities are spreading into sub urban or to rural areas uncontrolled population, irregular development are the main factors for resisting the facilities in urban areas. The energy problem day by day becoming serious. People are facing 'power cut' Energy demand is higher than production.

There are following main causes of energy problem.

1. Increasing use of energy for domestic and commercial purpose.
2. Industrial plants using a big proportion of energy.
3. Non. Renewable resources of energy like coal, petroleum and natural gases are decreasing.

4. Increasing of transport means.
5. Decreasing production of Hydroelectricity due to insufficient rains.
6. Transmission loss due to defected power distribution systems

How to solve energy problems.

1. To control urbanization.
2. To develop renewable resources like wind power, solar power etc.
3. Welcoming the awareness programs
4. Effective measures for energy theft.
5. Nonrenewable energy resources should be used only when no. nonconventional sources of energy are available.

Water Conservation: Water is needed in almost every sphere of human activity. Without water life is not possible. In many aspects the properties of water are unique. It is called universal solvent. No other liquid can replace it. The global distribution of fresh water on earth's creat including ground water and water present as its vapor in atmosphere. Water is required for direct consumption or indirectly for watching cleaning, cooling transportation or even for waste disposal. Important sectors of human activity, which require water can be grouped an

1. irrigation
2. Industries
3. Livestock management
4. Thermal power generation
5. Domestic requirements
6. Hydro-electric generations and recreational activities.

Steps should be taken for conservation of water

1. **Water economy, Reuse and Recycling:**
   If water meters are installed and charged properly the consumption of water in domestic establishment and industries shall drastically decline.
2. **Agricultural run-off from fields:**
   This can be used to irrigate cropland down the stream, while an efficient use of water with conditions of proper drainage can reduce the agricultural run offs.
3. **Efficient distribution system:**
   Water resources are not distributed evenly. Some localities have plenty of water and others have little.
4. **Reduce evaporation losses:**
   Water losses through evaporation and seepage are enormous both from the reservoins and distribution system.
5. **Desalination of sea water:**
   A huge store of water exists in our oceans. If the salt content of sea water is removed, we can use of this can be done by desalination plants.
6. **Afforestation and Reforestation of hill slopes to check loss of water in flood.**

7. Artificial rain making and precaution of water pollution.

Rain water harvesting: Water is an essential natural resource for sustaining life and environment. The available water resources are now under pressure due to increase demands and time is not for when water, will become a scarce commodity.

Rain water harvesting is control and utilization of rain water. It consists of some basic components

1. Catchment area, the surface upon which rain falls.
2. Gutters, the transport channels from catchment surface to storage.
3. Roof washers, which remove the contaminants.
4. Storage tanks where rain water is stored.
5. Water treatment, the filters and equipment as well as additives to settle, filter and disinfect.

The main causes of fall in ground water level.

1. Non-availability of sources of water.
2. excusive pumping of water
3. Mixture of water
4. Un reliability of municipal water supply.

The method and technique include:

1. Roof top rainwater harvesting.
2. Harvesting run off in the catchments by construction check dams etc.
3. Water sheds in villages ponds.
4. Direct irrigation through recharge ponds.

The main objectives of RWH are:

1. To restore supplies.
2. To improve supplies
3. To store excess water for future use.
4. To improve quality of the ground water.
5. To reduce soil erosion.
6. To prevent salinity
7. To recycle waste water.

The expected advantages of RWH are:

1. Rise in ground water levels
2. Increased availability of water
3. To prevent decline in water level
4. Improve in water quality
5. Effective use of water
6. Upgrading the environmental status

Water shed management:

Watershed is a drainage area on earth's surface from which runoff, resulting from precipitation flows past a single point into a large stream, a river, a lake or ocean. The watershed can range from a

few square kilometers to few thousand square km. in size. Damodar valley corporation in 1949 adopted let integrated watershed management.

Objectives are:

1. To increase agricultural production.
2. Utilization of natural resources.
3. To minimize the risk of floods.
4. To develop the rural areas and their life style.
5. Manages development activities

Measures for watershed Management:

1. Scientific mining must be done because hills loose stability.
2. Water harvesting to be used in dry reason in low rainfall area.
3. A forestation should be promoted.
4. Some mechanical measures, are used to minimize runoff and soil erosion.
5. To promote soil binding plants like vitex.
6. People's participation should be ensured including formers and tribals in WSM program.

Resettlement and rehabilitation of people

- Sometimes for the development of projects like construction of dams, mining, creation of parkers during natural calamities like earthquake, landslides, floods, cyclones, the problem of resettlement and rehabilitation arise.

For example, recently the Tsunami cyclone affected thousands of families and the families were displaced and rehabilitated to other nearby places.

This caused permanent loss of the benefits and facilities. This disturbed socioeconomic and ecological base of local community which are generally forest and tribal people.

Families are disintegrated and also lost ancestral link between people and environment.

Environmental Ethics:

The issues, principles and guidelines relating to human interaction with their environment or human obligations towards the environment and living beings are caused environment ethics or earth ethics.

Ethics constitute the basic codes of civilized behavior, without which our environment as we know would be impossible.

Certain environmental ethics for checking environmental price & a better future

- One should love and honor the earth.
- We should celebrate the turning of the seasons of the earth.
- Do not waste or exploit the natural resources.
- To bring about awareness regarding conservation of life support systems.
- There should be fairness in sharing of resources.
- We should respectful to plants and animals which provide us food.
- We should conserve the ecosystem and promote appropriate sustainable development
- WE should not do anything at the cost of nature.

- We should consume the natural resources in moderate amounts so that all may share this treasure.
- We should concentrate on general awareness regarding environmental ethics from primary education.

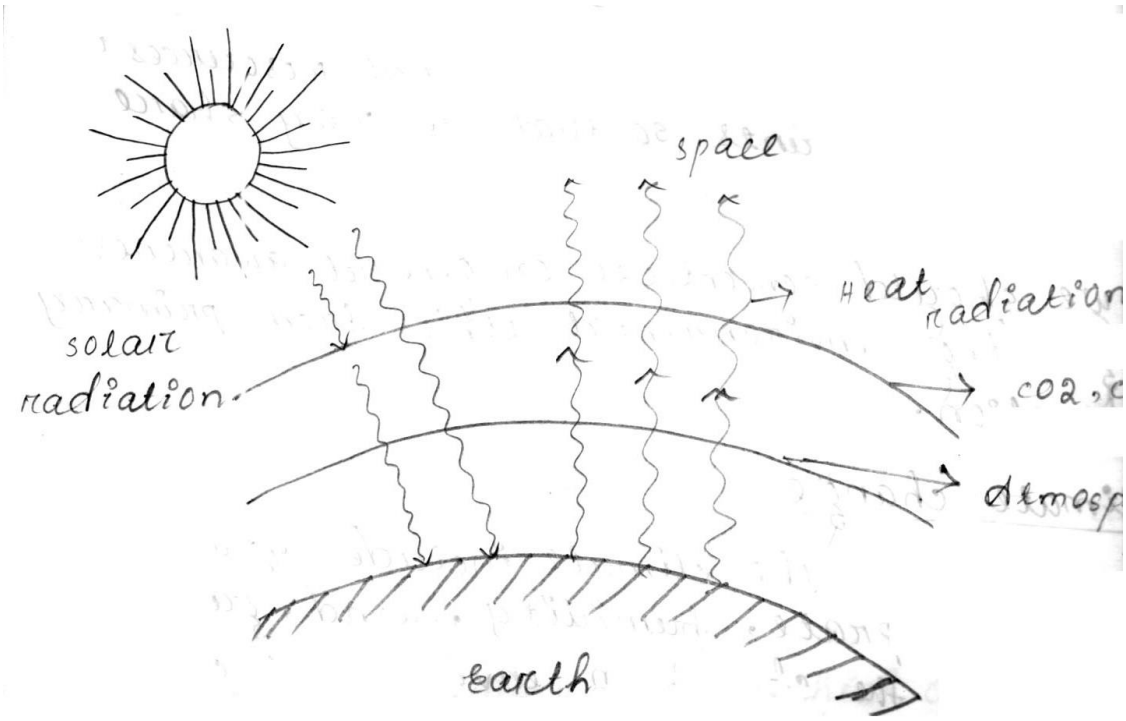
Climate change

The climate includes quantity of light, temperate, humidity, wind, gases, water etc. Thus, the change in environment conditions of an areas over a long period of time is called as climate change.

These changes affect the agriculture, migration of animals, hydrological cycle, thermal gradient between the poles and equator, wind pattern, distribution of rainfall etc.

Global Warming

The average global temperature is 15º the lower most layer of the atmosphere troops the heat by a natural process due to the presence of certain gases called greenhouse gases. They are carbon dioxide, ozone, methane and water vapors etc. The excessive warming of earth climates due to increase concentration of greenhouses gases is called greenhouse effect. This effect contributes a rise in temperature up to 33º this is called as global warming.



Impact of global warming

i) Climatic change (increasing in global temperature)
ii) Effects on sea level
iii) Reduction of biodiversity
iv) effect on agriculture
v) Effect on human health
vi) Ecological disturbances
vii) Effect on arctic ecosystems.

Measures to check global warming

1) Plant more trees
2) Control population growth
3) Cut down the current rate of fossil full
4) Use of non-conversional source of energy
5) Shift from coal to natural gas.
6) To trap and use methane as a fuel.
7) Reduce beef production
8) Efficiently remove CO_2 from smoke
9) Adopt sustainable agriculture.
10) Use energy more efficiently.

Acid rain

Normal rain water is always acidic because the fact that the CO_2 present in the atmosphere get dissolved in it forming carbonic acid. Because the presence of sulphur dioxide and nitrogen oxide gases as pollutants in the atmosphere the pH of the rain water is further lower. This is known as acid rain. Literally the acid rain means the presence of excessive acids in the rain water. Acid rain is a mixtures of acid H_2SO_4 and HNO_3.

Ozone layer depletion creation of ozone layer:

Ozone is naturally occurring gas found throughout atmosphere with a maximum mixing ratio at the attitude ranging from 15-30 km above the earth. This region is known as ozone layer. Ozone can be toxic to the plants and animals but increased concentration has a beneficial effect. Both atmosphere and earth surface are subjected to radiation from sun. These radiations are absorbed by atmospheric gases. Thus, the Ozone layer strongly absorbed or blocks the short wave ionizing ultraviolent rays and so protect the life on earth.

Effect of Ozone depletion

i) With the ozone layer depletion, there is a danger of increased in ultraviolent radiation over the earth biosphere.
ii) The UV radiation can cause skin cancer.
iii) The UV radiation any cause eye defects.
iv) Ozone at ground level is very much harmful for the lungs.
v) Ozone is reported to be highly toxic to fish.
vi) The loss of fish population would directly affect the coastal areas.
vii) Ozone reacts with many fibers, such as cotton etc.
viii) Ozone reduction also causes decrease in soil moisture contents.

Nuclear accidents

In Japanese towns of Hiroshima and Nagasaki the first atom bomb was exploded about 580 meters in the atmosphere over ill-fated Hiroshima on august 6, 1945 and the second atom bomb was detonated 507 meters high in air over Nagasaki. At least 100,000 people were reported killed, severely injured and missing in Hiroshima alone, where the bomb virtually demolished all structures and

buildings in about 15 square km area. In Nagasaki 49000 peoples were killed, injured and disappeared while an area of 6 to 7 km was devastated.

The atom bomb exploded on Hiroshima used uranium (u-235) with a half-life period of 8.5 $x10^8$ years, while the Nagasaki bomb had plutonium (pu-239) as an explosive man-made radio-nuclide with half-life of 24,000 years.

The first hydrogen bomb was exploded in 1954 on Bikini Island in the pacific. The radioactive fallout from this explosion severely affected the crew of a Japanese fishing boat, the lucky dragon about 150km. several persons were hospitalized, killed and disappeared.

In 1961, Russia detonated a bomb of 57 megatons that could obliterate a city more than 300 times the size of Hiroshima.

The air act 1981 (prevention and control of pollution)

With increasing industrialization and the tendency of majority of industry to concentrate in areas which are already heavily industrialized, the problem of air pollution had begun to be felt in the country. The various pollutants discharged from human activities connected with traffic, heating, use of fuel etc. also have affected the health of the people and animals also.

In view of decisions taken at the June 1972 united nation conference, the govt. decided to implement those decisions related to preservation of quality of air and control of air pollution. Accordingly, the air bill was introduced in the parliament and passed by both the houses of the parliament. It came into force on the 6th day of May 1981 as THE AIR ACT.

An act to provide for the prevention and control of air pollution, for the establishment and assigning to the powers and functions relating to all matters over the biosphere. It is considered necessary to implement the decisions so far as they relate to the quality of air and control of air pollution.

The water act 1974 (Prevention and control of pollution)

As the result of growth of industries and the increasing tendency to urbanization, the problem of pollution. Of rivers and streams assumed considerable. It had become essential to ensure that the domestic and industrial effluents are not allowed to be discharged into the water without any treatment.

To give effect to these problems, the water bill was introduced in the parliament and passed by both the house on 23rd march 1974.

An act to provide for the prevention and control for water pollution and maintaining a healthy mass of water for the establishment. Parliament has no power to make loss for the state with respect to any of the matters. The constitution resolutions have been passed by all the states like Assam, Bihar, Gujarat, Haryana, Kerala, Karnataka, Rajasthan etc.

Chapter – 07
Human Population and the environment

Population growth variation among nations.

(Developed and developing countries)

The population of Europe was 163 million in 1750 and increased to 276 million in 1850. The mortality conditions in Europe began to improve as a result of socioeconomic development, due to advances in medical technology and public health.

- The share of North America was 2 million in 1750 but by 1900 reached to 82 million and by 1999 to 303 million This is mainly by immigration.
- The population of Asia was 502 million in 1750 and increased to 809 in 1850 or to 1402 million by 1950.
- The growth rates are not uniform in the world.

AD 2000 crude birth rali and death rate

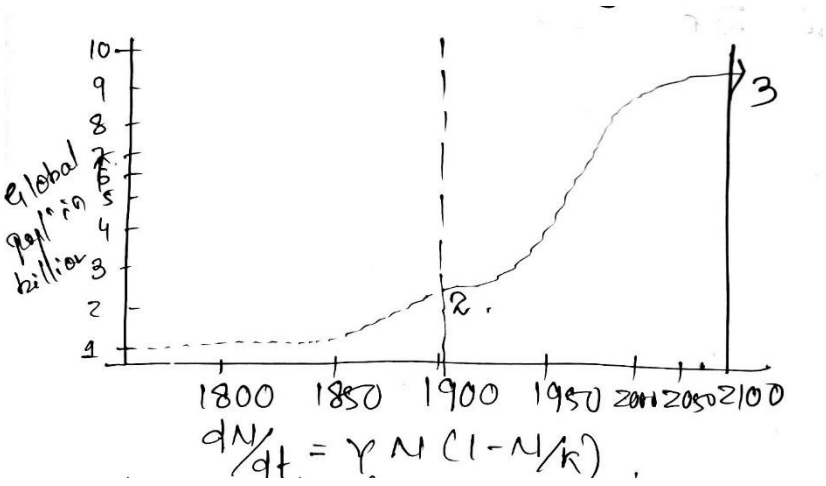
Country	BR	DR	GR%
India	24	9	1.5%
China	16	7	0.9%
Pakistan	36	8	2.8%
USA	14	8	0.6%
Germany	9	11	-0.2%
UK	12	11	0.1%
France	12	9	0.3%
Afghanistan	52	21	3.1%

Population Growth: Population growth is the capacity of increase in individual members. It can be defined on the following ways:

i) Logistic growth:

When a population is allowed to grow in a limited space of shows logistic growth.

If we plot a graph between no. of bacteria or cell against time, we find a typical 's' shaped sigmoid curve called population growth curve



Y –rate of increase

N – Population size

K – Carrying capacity of population

(I-N/K) – depended factor.

ii) Exponential Growth: When a population growth curve quickly begins to rise very steeply, the population shown an exponential growth. It is I shaped.

$N_t = N_o e^{nt}$

Nt = The no. of individuals in the population after t units of time

No – Intial population size (t=0)

r = exponential growth rate

e = the base of the natural logarithm (2072)

iii) Geometric Growth: Geometric growth is defined as the population growth in which the rate of increase is proportional to the no. of individuals in the population at the beginning of the breeding session. When young are added to the population only at specific times of the year during well-defined reproductive periods, the population is said to be hv gear, growth

$Nt = No\lambda$

Where λ - the geometric growth rate

Population Explosion:

$$\textbf{Growth rate (r)} = \frac{\text{No. of birth(b)} - \text{No. of death(d)}}{\text{Avg. populaiton in time interval}}$$

Eg : In 20th century population growth increased too much in world.

National family welfare program: Previously this was known as **national family planning** program in the year 1977 the name was changed to National family welfare program family planning program was launched in India in 1952. India was the first country to do so. Beginning of the program was modest i.e. establishment of few FP clinics and distribution of FP educational materials and research.

A separate department of FP was created in 1966 in the ministry of health. In 1972, the MTP medical termination of pregnancy act was passed. In April 1976, National population policy was framed.

Importance of family welfare program

- It occupies an important position in the nation's socioeconomic development.
- To check the increasing population growth. Country has laid down long term demographic goal.
- Acceptance of family welfare services are made voluntary
- The prog. was 100% centrally sponsored scheme. FP program was integrated with the MCH service.

MCH- Maternal and child health.

Environment and Human health: Environment are the main determinant of health status of a community. So, it is the entire medium in which the population lives and interacts.

The environment may be divided into four components.

i) Physical environments: It is defined as "All those non-living things and physical forces present around man". "The main components are air, water, noise and temperature etc."

ii) biological environment: It is defined as "All those living things present around us". The main components are plants, animals, insects etc.,

iii) social environment: It is defined as "Social interactions between the individual such as their socio-economic status, religion and the way of living, standard of living and availability of health care facilities.

iv) Cultural environment: It is the culture in which the individual lives. It includes their knowledge, attitude, beliefs, practices, behavior etc.

Human Rights Movement:

The political and religious traditions in other parts of the world also proclaimed announced what have come to be called as human rights, to justify the rulers to rule over people's lives, property and activities of their citizens.

In the eighteenth and nineteenth centuries in Europe several philosophers proposed the concept of "natural rights" rights belong to a person by nature and because he was a human not by virtue of his citizenship in a particular country or membership in a particular religious or ethnic group. This concept was vigorously debated and rejected by some philosophers as baseless.

In the late 1700 two revolutions occurred which drew heavily on this concept. In 1776 most of the British colonies in North America proclaimed their independence from the British Empire in a document which still debate, the U.S. declaration of Independence.

In 1789 the people of France overthrew their monocle and established the first French Republic. Out of the revolution came the "Declaration of the Rights of man".

In 1961 a group of lawyers, journalists, writers and others, affined and frustrated by the sentencing of two Portuguese college students to 20years in prison for having raised their glasses to "Freedom" in a bar, formed Appeal for Amnesty, 1961.

Recognition for the human rights movement, in particular, grew during 1970s and gained a permanent status of observation.

Value Education:

Man acts to satisfy his needs or wants. Anything which satisfy a human need becomes thereby a thing of value. It is the element of desirability and satisfaction that is common to all values, material or non-material. In psychology, the term value is generally employed to designate a dominant interest, motive or broad attitude. Human behavior is governed by his values. There are socially approved desires or goals. Cooption's or standards by which things are approved or dis approved. Value is a dynamic term used in different aspects.

Indian philosophy has used it in sense of state free from pleasure and pain, and also it is the sense of "use of time," energy and money.

The progress and development of a nation depends upon the quality of the values cherished by its citizens. One of the serious criticisms against our educational system is that of lacks value orientation. Our 1986 National Policy on education and its modifications have strongly advocated value education".

Important values:

i) religious value: It is defined in terms of faith in God. The outward acts of behavior expressive of this value are going on pilgrimage (tour to god's place.), is linking in simple life having faith on religious leaders, worshipping God and speaking the truth.

ii) social value: It is defined in terms of charity, kindness, love and sympathy for the people, efforts to serve God through the service of mankind. Sacrificing personal comforts and gain to relieve the needy and affected of their misery.

iii) Economic Value: This stands for desire for money and material gain.

iv) Knowledge value: This value includes the love of knowledge or theoretical principles of an activity and love for the discovery of truth.

v) Power value: It is defined as the conception of desirability of ruling over others and also of leading others.

vi) Health value: It is the consideration for keeping the body in a fit state for carrying out one's normal duties and functions. It also implies the consideration for self-preservation.

HIV / AIDS

AIDS – Acquired Immune deficiency syndrome

HIV - Human Immunodeficiency virus.

Transmission cycle of HIV

HIV

Human being is the host

↓

HIV transmission through

- Blood
- Vaginal fluid
- Seminal fluid
- Breast milk
- Other body fluids.

↓

Infects other uninfected reasons through

- Unprotected sexual contact
- Transfusion of contaminated blood
- Use of unsterilized syringes, needles and other piercing instruments
- Mother to child (during delivery, in utero, and breast feeding)

↓

HIV infected reasons increase

↓

AIDS cases

HIV is not transmitted by shaking hands, hugging, sneezing, coughing, dry kissing, toilet sharing, mosquito bite, playing together or even by living in same room.

Role of information technology in Environment & Human Health

Just as chemical or metallurgical and electrical technologies enable the processing of raw materials into usable goods, to satisfy man's and societies need, so does information technology (IT) help the storage, processing, transmission and exploitation of information to satisfy persons, company's, society's and Govt's needs for information. Information covers voice as in telephony, text as in fax, images as in video and data as in computers.

Information technology as commonly picturized by computers in extending man's mind or brain. Its devices like microprocessors are becoming mass appliances from pace makers for the heart, hearing aids and efficiency enhances in engines and devices to steer space vehicles on the moon.

Like banking, trading, learning and teaching or other human activities, it has tremendous use in the field of environment and human health. The print media has also highlighted and participated in the field of environment and human health through some of the issues and helped in making the people aware healthy studies facilities like interest, world wide web, Geographical information system (GIS), information through satellites is also developed. There are all helpful in the study of environment and human health.

With the help of computers and internet, not only we can have knowledge of the patients, at a glance within no time, but also, we can get information's about the diseases their medicines and alternative medicines. For awareness, songs, drama, bhajan advertisements in TV, radio, cultural programs should be exhibited in urbans and rural sectors both.