

ARYAN SCHOOL OF ENGINEERING & TECHNOLOGY

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LECTURE NOTE

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CHAPTER-1

1.1-DEFINITION OF ENVIRONMENT::-

The environment is a collective term for biotic and abiotic components and their interrelations. Environment is defined as "A Person's environment consists of the sum total of the stimulation (a., physiological or nervous activity) which he receives from his conception (creation in the womb) until his death." It means that environment includes various types of forces, such as physical, intellectual, economic, political, cultural, social, moral and emotional. Environment is the sum total of all the external forces, influence and conditions, which affect the life, nature, behavior and the growth, development and maturity of living organisms.

OR

The environment is a collective term of all external forces, influences and conditions which affect the life, nature, behavior and the growth, development and maturity of living organisms.

SCOPE OF ENVIRONMENTAL STUDIES::-

The scope of environmental studies is very vast. Both the living and non-living objects contribute to the scope of this branch such as follows:

(i) Natural resources :-

This constitutes the living components like plants, animals, etc. and the non-living components, such as air, water, soil, forest, mineral, food, energy, sunlight, atmosphere, climate, nutrients, etc.

(ii) Ecosystems :-

The system formed by the interaction of community of organisms (i.e., the region occupied by a group of interacting organisms) with their physical (abiotic) environment, is called ecosystem. A part of a large ecosystem is called a Biome. Biomes cover huge area and are characterised by their climate and the types of plants and animals existing. Mainly two types of biomes are: Natural biomes and Artificial biomes. Terrestrial biomes, Rain, deserts, cultivated lands, etc. and aquatic biomes, e.g., marine, fresh water, estuary, etc. come under the category of natural biomes. Pond biomes are included in the artificial biomes.

(iii) Biodiversity :-

Biodiversity we mean the whole variety of life on earth. It includes genetic, species, ecosystem and landscape diversity.

(iv) Pollution :-

The pollution is manifested in various forms, such as air, water, soil, noise, radioactive, marine, magnetic, thermal, solid waste, medical waste, electronic waste, economic system, political system, e-pollution, etc.

(v) Conservation of natural resources : These include conservation of animals (wild fauna) and plants (wild flora) in their natural habitat (i.e., in-situ conservation) and

conservation of animals and plants away from their natural habitat, such as in zoos, and sanctuaries, respectively (ie., ex-situ conservation).

(vi) Ethical and Aesthetic Problems :-

The environmental studies can also be made for the following problems : agriculture, economic growth, green revolution, global warming, greenhouse effect, rainwater harvesting, acid rain, diseases, ozone hole, industrialisation, urbanisation, consumerism, etc.

(vii) Other Problems :-

Various issues, e.g., weather affects, climatic changes, flood disaster, earthquake disaster, cyclone disaster, etc. give scope of environmental studies.

All these above fields are interdisciplinary. The studies of these fields provide greater scope to environmental scientists.

IMPORTANCE OF ENVIRONMENTAL STUDIES:-

The objective of the environmental studies is to examine various factors which lead to pollution of air, water, food, soil, etc or cause environmental damage. It is, therefore necessary to create awareness about the environment, pollution and related harmful effects on health. Importance of environmental studies lies in the fact that one can be very much cautious of maintaining good environment for leading a healthy and long life. The requirements of a good environment are as follows:

(1) Pure air:-

The air should be pure and free from the harmful gases and suspended matter. Since we get air from the atmosphere, it cannot be cent percent pure. the acceptable limits of various constituents for maintaining quality of air are the following

Sulphur dioxide (SO₂): 3018/

Carbon monoxide (CO): 1000 pg/ml

Nitrogen dioxide (NO₂): 30 e/?

Suspended particulate matter : 100 pg/m

(2) Pure water:-

Bacteria and pollutant free water should be used for drinking purpose. The sceptile values of various parameters of water are as follows

Ph value 7,

acidity 4 ppm,

Hardness: 19 ppm,

Turbidity: 5 to 10 ppm on silica scale

Odour intensity: threshold number should be below 1.

(3) Pure food:-

Food should be pure and palatable, and should not be adulterated. In addition to maintaining a good environment.

(4) Increased Pollution:-

Human activities cause air, water, soil and noise pollution. It of much importance to find out the causes of such pollution and the effective questions for their reduction and prevention.

(5) Global Environmental Issues :-

Environmental issues like global warming, ozone depletion, acid rain, marine pollution and biodiversity are threatening the survival of mankind on earth. Environmental studies are of much significance to tackle these issues with great effort.

(6) Problems arising in the wake of Development :-

In the wake of development, urbanization, industrialization, agriculture, transportation systems and housing, etc. are increasing which cause environmental problems. In order to solve these problems, wise planning of development and alternative solutions are needed. Keeping in view of these environmental issues, environmental studies should take care of wise planning for environmentally sustainable development.

PUBLIC AWARENESS:-

Increasing growth of population, and urbanization and industrialization contribute towards air pollution, water pollution, land (soil) pollution and food pollution. In other words, the environment becomes polluted because of human activities. The polluted environment causes health hazards and exerts threats on economic, aesthetic and cultural activities of human beings. It is, therefore, essential to make the public aware of the alarming consequences of the environmental degradation. Since we are facing various challenges, it is of much importance to make the public aware of these challenges so as to act eco-friendly. Some of these challenges are:

(1) Growing Population :-

Population is growing at the rate of 2.11% every year. It puts considerable pressure on the natural resources and hampers in the development.

Hence, the greatest challenge before us is to limit the population growth.

(2) Poverty :-

The population growth is related with poverty. The poverty and environmental degradation are interrelated. The vast majority of our people are dependent on the natural resources for their basic needs of food, fuel, shelter and fodder. Environmental degradation adversely affects the poor who depend

environment. Thus, these are the greatest challenge before us on the resources of their.

(3) Air and Water Pollution :-

As air and water are the essential components for the survival of the living organisms, it is a great challenge for solving the air and water pollution problem on problems.

(4) Agricultural growth :-

There is agricultural growth in the high yielding varieties. But, due to this, the physical structure of the soil and nature of the soil (due to increased salinity) have been spoiled. In view of this, the people must be acquainted with the methods to sustain and increase agricultural growth without damaging the environment.

(5) Land Degradation :-

Water and wind erosion causes land degradation. Pasture lands are overgrazed by livestock. Such degradation is to be avoided.

Ground Water Problem :-

The human activities like discharge of community wastes, industrial effluents, chemical fertilizers and pesticides used in agriculture have polluted surface water and affected the quality of groundwater. It is an important challenge to restore the water quality of the water bodies for the benefit of the living system.

(6) Preservation of Forests::-

Because of the increased population, industrialization, and urbanization, forests are destroyed. The deforestation invites famine, drought and damages flora and fauna for which development is hampered. The strategies for the management of forests should be evolved so as to develop the economic growth of the country.

(7) Reduction of Genetic Diversity::-

The rapid industrialization and urbanization causes deforestation. This results in the decrease of wild genetic stocks and hence the loss of genetic diversity. Remedial measures are to be taken to check the decreasing genetic diversity.

(8) Impact of Urbanization::-

Because of industrialization, urbanization is growing rapidly. Hence, a major challenge is to cope with the rapid urbanization.

CHAPTER-2

2.0 NATURAL RESOURCES::-

We learnt that human beings for their survival need the life supporting materials like air, water, land, fish, forests, fuels, minerals, etc. All these materials exist in nature, are created by nature, and are called natural resources.

2.1 RENEWABLE RESOURCES::-

These are the resources (materials) that can be renewed (i.e, replenished or replaced by natural processes within a time framework (i.e., grow again ,if exhausted before the required time). If these resources are excessively used, they are not going to be exhausted. That is why these resources are called inexhaustible resources. Renewable resources can renew themselves and be used indefinitely if they are not overexploited. Renewable natural resources may be further classified into (i) living and (ii) non living resources. Living renewable natural resources are the biological resources which include biological organisms, such as fish, crops, goat, lamb, forest, etc. Biological organisms are self renewing. Non-living renewable natural resources include soil, air, water tides, solar radiation, biogeochemical cycles, geothermal sources, etc.

Renewable resources which are available below a certain minimum level may be bed and non-renewable resources.

2.1 NON-RENEWABLE RESOURCES::-

The resources which cannot be renewed or replaced, after they are completely exhausted, within a time framework are termed as non-renewable natural resources. Once exhausted, these types of resources cannot be replaced within any useful time framework. That is why these resources are also known as exhaustible resources.

OR

Renewable resources which are available below a certain minimum level may be bed and nonrenewable resources.

2.1.1 NATURAL RESOURCES AND ASSOCIATED PROBLEMS:-

(a) FOREST RESOURCES:-

USES OF FOREST:-

• The functions of forest may broadly be classified into following categories

1. CONSUMPTIVE USE.
2. PROTECTIVE VALUE.
3. REGULATIVE USE OR VALUE.

1 CONSUMPTIVE USE:-

- Food like roots, fruits, tubers, fish, mushrooms, animal meat e.t.c.
- Fodder for cattle.
- Fuel Wood: The wood is used as fuel for cooking and other purposes by poor people.
- Construction material like poles, thatching leaves.
- Fiber for weaving baskets, ropes, nets, mats.
- Medicinal plants for treating common diseases.
- Timber: Wood used for commercial purposes like for making furniture and other items like boats, bridges and other day to day uses.
- Fruits, fiber, honey, gum e.t.c.
- Cane and bamboo products.
- Raw material for wood based industries: forest provide raw material for various wood based industries like paper and pulp, sports goods, furniture, match boxes etc.

2 PROTECTIVE VALUE:-

- (i) The Forest provide shelter and protect the wild life.
- (ii) Forest also protects the endangered species of flora and fauna in the form of national parks.
- (iii) The plants, trees, herbs, shrubs, grasses, etc. in the forests prevent soil erosion and prevent water flow to save soil from desertification and increase the groundwater level.
- (iv) Forests also protect the fertility of the soil because of leaf litter, humus and other organic material present in the forest floor.
- (v) Forest preserve biodiversity providing shelter to many birds, animals and endangered species.

3 REGULATIVE USE OR VALUE:-

- (i) Gaseous balance : Forests act as air purifier as the plants and trees absorb carbon dioxide for their photosynthesis process and release oxygen which the animals and humans need for their respiration. Thus, forests help in balancing the gases like oxygen and carbon dioxide.
- (ii) Energy flow:- Solar energy is the source of all energy. Plants, the producers prepare the food in the photosynthesis by absorbing solar energy.
- (iii) Mineral cycles : The decomposers (i.e., micro-organisms like bacteria, fungi, etc.) decompose the dead organisms which become the nutrients in the soil. The plants take up nutrients from the soil and then the plants are consumed by the herbivores followed by carnivores. Thus, the nutrients and other minerals are cycled.
- (iv) Maintaining Air humidity: The moisture content of air is called humidity

which varies from place to place. The relative humidity in the open ground is less than in the forest. The plants get water from the soil which receives water from the rain. In this way, the humidity of air in the forest is maintained.

(v) Forests also influence local, regional and global climate.

(vi) Wild animals and plants living in the forests balance the nature itself.

(vii) Forests buffer the human beings against noise and absorb air pollutants thereby reducing pollution drastically.

OVER-EXPLOITATION OF FOREST RESOURCES:-

Forests are overexploited in different ways. The most important ways of overexploitation are deforestation, mining and dam building. When the area under the forest cover decreased due to certain reason, the overall prosperity of the country must suffer. Moreover, the tribal people who depend on the forests for their livelihood are most affected.

CAUSES OF DEFORESTATION:-

The destruction of forest area may be due to natural causes, or due to human activities

These causes are

(1) Population growth and poverty:

The rapid growth of human population force

the people to move to the forests for their shelter and food. Moreover, the landless

poor people shift to the forests to do cultivation for their survival.

(2) Mining:-

It is also one of the causes of deforestation. Open pit mining and small scale mining cause damage to the forests.

(3) Road construction and dam building:

For the construction of roads through

the forest for transporting timber, deforestation started. Further, the dam building also causes deforestation.

(4) Shifting cultivation:

This type of cultivation is carried on when the soil fertility of the area near the forest decreases.

For this reason, the forests are cleared and the people start cultivation.

(5) Cattle grazing:

People living around the forests leave their cattle for grazing in the forests. As the tops of the plants are eaten by the cattle, the reproduction of the plants is affected. Moreover, the surface soil in the forests becomes hard under the hooves of the animals, as a result, the soil becomes hard and dry for which water percolation decreases. In this way, forest land becomes barren and thorny bushes grow.

(6) Forest fires : Forest fires may be natural or man-made. Because of this, large forest areas are burnt and people start cultivation of cash crops like tea, coffee, sugar cane, pine apples, etc.

(7) Natural calamities: Natural calamities like hurricanes, floods, etc. destroy forests.

Termites and pathological diseases also attack forests.

(8) Fuel wood: Many people use firewood as a source of energy for cooking and

heating, for which there is massive cut of forest cover contributing to the degradation of forest resources.

CASE STUDIES:-

POSCO Project in Odisha:-

Because of POSCO Project, a vast area with small forests, betel vines, bushes, etc. is made bare for setting up of Iron and Steel Industry. The adverse effects of this project will be faced by the people living in future.

TIMBER EXTRACTION:-

Extraction is the process of transporting cut timber from the place where it was growing to a point where it can be removed from site.

MINING AND ITS EFFECTS ON FOREST:-

- Vast areas of forests are directly cleared to accommodate mining sites, construction of roads, processing units and townships for workers.
- Destruction is vast in case of open cast mines.
- Forest land is also used to store the waste materials that remain after the extraction of usable ores.
- Mining also facilitates soil erosion, thereby decreasing the fertility of land leading to land degradation.
- Pollution of both air and water is common effect of mines.

DAMS AND THEIR EFFECTS ON FOREST

AND TRIBAL PEOPLE:-

- When a dam is constructed across any river a huge artificial lake is developed in the catchment area of that dam. It is also known as backwaters. The backwaters covering a large surface area. Create a lot of ill-effects on the living environment. They are as follows:
- Waterlogging and Salinization affects perhaps half the canal irrigated land in the country, with varying degrees of severity.
- Several sps of wild animals and plants such as river dolphin *Platanista gangetica* and Hilsa *ilisha* have been pushed to threatened status by dams and associated impacts.
- About 50% of the total 18 million people displaced by dams in India are tribals. The lives and livelihoods of these indigenous people suffered heavily. Their forest based spiritual and cultural existences were also lost when they were forced to come out of the forest.
- Dangerous diseases like malaria developed rapidly in the command areas of reservoirs which severely affected the health condition of tribals living in nearby forest areas.

(b)WATER RESOURCES:-

Major Water Sources on the Earth's Surface

Water exists on earth in 6 ways Surface water, (ii) Ground water, (iii) Atmosphere, (iv) Oceans, (v) Glaciers, ice caps, and snow, and (vi) Wetlands.

USES OF WATER:-

Surface water and groundwater are equally important for sustenance of life on earth.

Water used in industries, transports, domestic washing purposes, for agricultural processes, drinking, cooking, etc. Oceans used for navigation, tidal power, and rivers for hydroelectric power, pisciculture, etc.

Ground water has many advantages. It can provide a cheap, convenient and

continuous supply of water. That is why the groundwater is used by a large number of users.

OVER-UTILIZATION OF WATER USE:-

Over-utilization of water use will cause the depletion of water resources from both surface and underground water. This causes the depletion of groundwater table which in turn affects the soil moisture of topsoil and damages the vegetation cover. The continuous depletion of groundwater in the coastal regions results in the running of sea water into the freshwater regions thereby spoiling the water quality of the wells.

Groundwater exploitation also affects the wetlands. Besides depletion of groundwater, water logging and the pollution of aquifer, because of human activity give rise to the groundwater challenge.

- Waste and byproduct from industries
- Disposal of municipal waste in river cause major loss of clean water
- Agriculture waste, pesticide, fertilizer.

FLOODS::-

- Floods damage to water supply, sewage disposal system.
- Affect human health.
- Damage properties and infra.
- Rapid speed leads to landslide
- It causes respiratory diseases due to consumption of polluted water.
- Increase physical and emotional stress.
- Disturbed transport system, food shortage
- Releases of chemical.
- Migration

Floods refers to the presence of unusually large amount of water at any place or more water that can be handled by the drainage of the area.

The various types of floods are

- (1)Flash Floods.
- (2)River floods.
- (3)Coastal Floods.

DROUGHT::-

A drought is a condition in which a region suffers from a severe scarcity in its water availability.

- Water resources depleted.
- Loss of livestock affect local economy.
- According to United Nations Food and Agriculture Organization, 1.2 billion people, 20% of the earth 's population suffered.
- Draught change in routine weather patter.

WATER CONFLICT::-

Control of Water Resources:

where water supplies or access to water is at the root of tensions.

Military Tool:-

where water resources, or water systems themselves are used by a nation or state as a weapon during a military action.

Political Tool:-

where water resources, or water systems themselves are used by a nation, state, or non-state actor for a political goal.

Terrorism:-

where water resources, or water systems, are either targets or tools of violence or coercion by non-state actors.

Military Target:-

where water resource systems are targets of military actions by nations or states

Development Disputes:-

where water resources or water systems are a major source of contention and dispute in the context of economic and social development.

BENEFITS OF DAMS:-

1. Dams are built to control floods and store flood water.
2. Sometimes dams are used for diverting part or all of the water from the river into a channel.
3. Dams are used mainly for drinking and agricultural purposes.
4. Dams are built for generating electricity.
5. Dams are used for recreational purposes.
6. Navigation and fishery can be developed in the dam areas.

PROBLEMS OF DAMS:-

Dams may face problems:-

1. Displacement of tribal people.
2. Loss of non-forest land.
3. Loss of forests, flora and fauna.
4. Landslides, sedimentation and siltation occurs
5. stagnation and waterlogging around reservoirs retards plant growth.
6. Breeding of vectors and vector-borne diseases
7. Reservoir Induced Seismicity (RIS) causes earthquakes.
8. Navigation and aquaculture activities can be developed in the dam area.

(c):MINERAL RESOURCES:-

WHAT ARE MINERALS:-

Any naturally occurring solid material obtained from mines is called a mineral

Mineral may be a single element, such as gold, silver, diamond (carbon) and sulphur, or an inorganic compound, such as salt, mica, quartz, etc. Thus, any solid naturally occurring material containing compounds of metals in the combined state along with the impurities and found in the mines is a mineral. The minerals from which metals are extracted commercially and economically are called ores. The minerals and ores are differentiated in the sense that all ores are minerals but all minerals are not ores.

USES OF MINERALS:-

Metallic:-

1. Aircrafts, utensils, electric cables, etc.
2. Moderator in nuclear reactors.
3. Impact resistant steel
4. Oxidation resistant ferrous alloys.
5. Conductors, wires, etc.
6. Ornaments, electrical contacts of computers.
7. Lightweight structures, aircraft parts.
8. Rock crushing machinery.
9. Alloys, magnets, coins, radiators.
10. Jewellery, photography, electricity.
11. Jewellery, catalytic converters in cars.
12. Breathing apparatus, photography.
13. Radiotherapy for cancer.
14. Making soaps, glass, as nuclear coolant.
15. Batteries, paint, alloys, gasoline.
16. Soldering, chemicals, tin plates.
17. Alloys, pigments, aircraft.
18. Nuclear bombs, electricity generators, tinting glass.
19. Galvanizing, chemicals, soldering, die-casting 2.

Non-metallic:-

1. Fertilizers, acid, phosphor bronze.
2. Fertilizers, acid, iron and steel industry.
3. Roofing, insulation, clutch and brake lining.
4. Cutting tools, jewellery.
5. Insulation.
6. Propellants, acid, refrigerants, flux.
7. Ceramic flux, artificial teeth.
8. Abrasives.

OVER-EXPLOITATION OF MINERAL RESOURCES:-

Mineral resources are used for various purposes and also overexploited in the following way:

- (i) Sodium and iron are used at a rate of about 0.1 to 1.0 billion metric tons per year.
- (ii) Zinc, copper, aluminium and lead are used at a rate of about 3 to 10 million metric tons per year.
- (iii) Gold and silver are used at a rate of about 10 thousand metric tons per year.
- (iv) Nitrogen, sulphur, potassium and calcium are used for fertilizers at a rate of

about 10 to 100 million metric tons per year.

(v) Of all the metallic minerals, iron alone is consumed about 95 %.

The non-metallic minerals are consumed at much greater rates than are the elements used for their metallic properties.

ENVIRONMENTAL EFFECTS OF EXTRACTING AND USING MINERAL RESOURCES:-

Environment is affected adversely due to extraction processing and disposal of minerals. These are :

- (i) Land become degraded. The land destroyed by mining are called mine spoils. The mine spoils can be reclaimed by extensive plantation.
- (ii) Surface and ground water resources become polluted due to release of harmful trace elements like cadmium, cobalt, copper, lead and others, by leaching, even if drainage systems are there.
- (iii) Due to leaching of trace elements and minerals, growth of vegetation is seriously affected.
- (iv) Mining causes many diseases like black lung diseases. Inhalation of dust by miners disturbs lungs causing respiratory diseases and cancers.
- (v) The disposal of minerals results in the solid waste disposal of all types.
- (vi) Air pollution due to release of dust and gases.
- (vii) Deforestation leads to loss of flora and fauna.
- (viii) Historical monuments and religious places are adversely affected.
- (ix) Local ecological systems are damaged.
- (x) Ecosystem stability with respect to nutrient cycling, species diversity, total biomass, etc. is disturbed.
- (xi) Rehabilitation affected population is hampered.

CASE STUDIES:-

A part of the Aravalli range is preventing the spread of Thar Desert into the plains. These mountains are rich in mineral resources. They are our mission. The mountain ranges play a role in the climate control and drainage system in the region. These range a mini-watershed from where streams are originated. But, because of there are adverse effects on water, land and forest. The mining leads to water depletion in the wells and also destroys the land fertility. As a result of which the people are forced to work in the mining as daily wage labourers. That is why the honorable Supreme Court had banned mining activities in the Aravalli hills on 6 May 2002. The Honorable Supreme Court has intervened in stopping the mining and concentration of iron ores at Kudremukh in Karnataka.

(d)FOOD RESOURCES:-

WHAT IS FOOD:-

Food is any substance consumed to provide nutritional support for the body. Food is usually of plant or animal origin. It contains essential nutrients, such as carbohydrates, proteins, fats, vitamins, or minerals. The substance is ingested by an organism and assimilated by the cells of the organism for producing energy, maintaining life and stimulating growth during infancy, childhood, adolescence and adulthood.

WORLD FOOD PROBLEM::-

Before the 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 techniques, seed etc. Later on when population pressure starts, the new ways of food production, using fertilizers, pesticides, insecticides etc. are discovered to increase the yield. In 1999 International Food Policy Research Institute (IFPRI) reported an increase in world food consumption by 2020, discussing the impact of this on both developed and developing countries. The report considers the six emerging issues, nutrition, grain prices, WTO, agroecological approaches to small scale farming, biotechnology,

CHANGES CAUSED BY AGRICULTURE::-

Agriculture is the main source of the food. With the increased population, there has been a continuous demand for increase food production. For the croplands, new lands are explored leading to deforestation with many environmental problems. In the absence of pastures, grasslands, etc. the cattle graze in the remaining forests and totally destroy the forest floor vegetation, shrubs, and under shrubs, and finally desertification occurs.

CHANGES CAUSED BY OVERGRAZING::-

Overgrazing can occur under continuous or rotational grazing. It can be caused by too many animals on the farm or by not properly controlling their grazing activity. Overgrazing spoils leaf areas which reduces interception of sunlight and plant growth. Plants become weakened and have reduced root length and pasture sod weakens. The reduced root length makes the plants more susceptible to death during dry weather. The weakened sod allows weed seeds to germinate and grow. If the weeds are unpalatable or poisonous, major problems can result.

EFFECTS OF MODERN AGRICULTURE:-

This change was due to technological innovations.

development of hybrid strains and other genetic improvements and a fourfold increase in the use of pesticides and fertilizers. Not only in America, all over world productivity and means of farming were changed. Thus the agriculture has become more intensive producing higher yields per acre. It also has become more expensive, relying on purchase of machinery and chemicals to replace heavy labour requirements of the past. To remain competitive farmers have been forced to become more efficient.

1. Soil erosion from farmland threatens the productivity of agriculture fields
2. and causes a number of problems elsewhere in the environment.
3. An average of 10 times as much soil erodes from American agricultural fields as is replaced by natural soil formation processes.
4. Because it takes up to 300 years for 1 inch of agricultural topsoil to form, soil that is lost is essentially irreplaceable.
5. The consequences for long-term crop yields have not been adequately quantified.
6. The amount of erosion varies considerably from one field to another, depending on soil type, slope of the field, drainage patterns, and crop management practices; and the effects of the erosion vary also.
7. Areas with deep organic loams are better able to sustain erosion without loss of productivity than are areas where topsoils are shallower.

8. Erosion affects productivity because it removes the surface soils, containing most of the organic matter, plant nutrients, and fine soil particles, which help to retain water and nutrients in the root zone where they are available to plants.
9. The subsoils that remain tend to be less fertile, less absorbent, and less able to retain pesticides, fertilizers, and other plant nutrients.

FERTILIZERS PROBLEMS:-

Nutrients are lost from agricultural fields through runoff, drainage, or attachment to eroded soil particles. The amounts lost depend on the soil type and organic matter content, the climate, slope of the land, and depth to groundwater, as well as on the amount and type of fertilizer and irrigation used.

PESTICIDES PROBLEMS:-

The trend toward intensive crop production in modern farming has led to increased potential for damage by pests and diseases. Predators that would be present in a mixed biological community are not supported by large fields of a single crop; so farmers, instead, rely on chemical measures for crop protection. Use of pesticides on U.S. farms has risen 10-fold over the past 40 years as agriculture has become more intensive. One drawback to this is that pesticides generally kill not only the pest of concern, but also a wide range of other organisms, including beneficial insects and other pest predators. Once the effect of the pesticide wears off, the pest species is likely to recover more rapidly than its predators because of differences in the available food supply. Previously unimportant species may also become significant crop pests when their natural predators were killed by pesticide applications.

WATERLOGGING:-

Another problem associated with excessive irrigation on poorly drained soils is water logging. This occurs (as is common for salinization) in poorly drained soils where water can't penetrate deeply. For example, there may be an impermeable clay layer below the soil. It also occurs on areas that are poorly drained topographically. What happens is that the irrigation water (and or seepage from canals) eventually raises the water table in the ground - the upper level of the groundwater from beneath. Growers don't generally realize that waterlogging is happening until it is too late tests for water in soil are apparently very expensive.

SALINITY:-

In many areas of India, crop production is limited because of salinity or alkalinity or both. It is estimated that about 7 million hectares in the country have either gone out of cultivation or this area produces low yield of crops. Three classes of saline and alkali soils are recognized. They are

SALINE SOILS:-The soils containing toxic concentrations of soluble salts in the root zone are called saline soils. Electrical conductivity in the saturation extract of such soils taken as a measure of salts is greater than 4.0 mmhos/cm. Exchangeable sodium percentage is less than 15 and the pH is less than 8.5. The soluble salts mainly consist of chlorides and sulphates of sodium, calcium and magnesium. Because of the white encrustation due to salts, the saline soil is also called white alkali.

CASE STUDIES:-

(i) Due to recurring floods, droughts and other political and economic crisis, food output has been low in Zambia, Zimbabwe and Malawi. This caused starvation

death of about 13 million people in these regions. About 3.4 million tons of deficit in food grains have been observed in these regions.

(ii) Because of excessive use of pesticides (biocides) in the croplands, people suffer from acute pesticide poisoning. Farmers use nitrate fertilizers, pesticides nitrates, etc. that enter into the water bodies. Several children died in Rajasthan due to nitrate poisoning. In 1976, nitrate poisoning of cattle occurred in Nagpur. The chronic accumulation of pesticides in the human body entering through food chain played a role in kidney malnutrition in. The minamata epidemic caused several deaths in Japan. The tragedy occurred due to consumption of heavily Mercury (27 to 102 ppm) contaminated fish by the people.

(e) ENERGY RESOURCES :-

ENERGY :-

Energy is needed for domestic purposes, in the industrial sector, power plants, militia uses, space technologies and in the transportation sector. Energy resources can be classified as Conventional or non-renewable resources, and Non-conventional renewable resources.

GROWING ENERGY NEEDS :-

Energy is the prime input of a country. It is converted into heat & electricity For every activity to be performed required energy in the form of heat, light, electricity and even food in the form of energy) for our body Food energy is measured in calories. India has a fast growing developing economy with the GDP growth rate exceeding 6% in recent years. Xth plan projected 8% growth rate economy. This growth has been accompanied by a steady increase in energy consumption. Primary commercial energy demand grew at an annual rate of 6% upto 2001. It will go more rapidly than in the past as country's reforms process accelerates. As the economy grows, energy intensity rises following corresponding increase in energy consumption.

RENEWABLE OR NON CONVENTIONAL OR INEXHAUSTIBLE ENERGY SOURCES.-

These sources are continuously replenished by natural processes. For example, solar energy, wind energy, bio energy, hydropower etc. These energy systems convert such energy into a form which we can use. Renewable energy sources are essentially flows of energy. At present total potential of 126000 MW assessed by different non-conventional energy sources.

NON-RENEWABLE OR CONVENTIONAL OR EXHAUSTIBLE ENERGY SOURCES.-

Examples of this are coal, petroleum, natural gas and nuclear power. These are traditional sources available to us. All the sources are limited and takes millions of years for formation. As a result of unlimited use, we will exhaust one day. Therefore we should conserve these for longer period.

USE OF ALTERNATIVE ENERGY SOURCES :-

Alternative energy is any energy source that is an alternative to fossil fuel. In a general sense, alternative energy as it is collectively conceived, is that which is produced or recovered without the undesirable consequences inherent in fossil fuel use, particularly high carbon dioxide in global warming

Following are examples of alternative energy sources:

- Coal is an alternative to wood.
- Petroleum is an alternative to whale oil.
- Alcohol is an alternative to fossil fuels.

- A coal gasification is an alternative to petroleum.

Common Types of Alternative Energy:

1. Solar energy is the use of sunlight.
2. Light can be changed into thermal (heat) energy and electric energy.
3. Wind energy is the generation of electricity from wind.
4. Geothermal energy is the use of the earth's internal heat to boil water for heating buildings or generating electricity.
5. Biofuel and ethanol are plant derived gasoline substitutes for powering vehicles.
6. Nuclear bond energy uses nuclear fission to release energy.
7. Hydrogen is burnt and used as clean fuel for spaceships and some cars.

CASE STUDIES:-

Wind and bio-energy

(i) Wind farm at Muppandal in Tamil Nadu of capacity 150 MW.

(ii) Rice-straw based thermal plant at Jhalkari in Punjab. It is a BHEL project of capacity 10 MW

Natural energy resources

The power plants are installed at Tarapur, Kalpakkam, Narora, Trombay and Kakapora having generating capacity of 1940 MW.

Solar energy resources

Solar power plant at Solajipally village in Andhra Pradesh has capacity of 22 KW.

Solar pond at Bhuj in Kutch district of Gujarat has capacity of 125 MW/year.

(f) LAND RESOURCES:-

Land as a resource:-

As described earlier, lithosphere is one of the segments of biosphere of which is constituent. Land is a renewable resource on which humans, plants and animals exist. Land resources occupy nearly 20% of the earth's surface. It covers around 13000 hectares of area. The houses, roads, and factories occupy nearly one third of the land. The forests occupy another one third of the land. The rest of land is used for ploughing, and for meadows and pastures. The soil forms the surface layer of land which covers more than 80% of the land. The soil is defined as the natural body which keeps on changing and allows the plants to grow. It is made up of organic and inorganic molecules. The branch of science which deals with the formation and distribution of soil in different parts of the world is referred as pedology. The professional which deals with the soil is known as the pedologist.

LAND DEGRADATION:-

Land degradation means the loss of the natural potential of the land in terms of loss of fertility and water holding capacity. As a result of which, the soil quality is degraded, vegetation is decreased, biomass production is reduced and the biodiversity is decreased. Finally, the land becomes useless.

The major causes of land degradation are due to human activities, such as:

- (i) urbanization,
- (ii) pollution,
- (iii) over-irrigation and use of huge amount of chemical fertilizers,

- (iv) removal of topsoil leading to depletion of nutrients,
- (v) land clearing and deforestation, and
- (vi) overgrazing.

LANDSLIDES:-

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

Landslides 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 exist.

TYPES OF LANDSLIDES:-

1. Shallow, disrupted landslide-Example of this type is the Santa Susana Mountains and the mountains north of the Santa Clara River Valley. Here more than 75% of the slope area was decided by landslides triggered by strong shaking.
2. Deep, Coherent Landslides-These triggered by the earthquake were far less numerous than disrupted slides, they contributed significantly to the total volume of landslide material because they tended to be much larger. Some of these landslides are
 - (a) Sam Martinez Guard Landslide
 - (6) Rancho Camulos Landslide

MAN INCLUDED LANDSLIDES:-Man can also cause slides by mining the earth, underground excavation, pumping and draining groundwater levels or overdeveloping hillsides. Man induced landslides are generally done for the development purposes i.e. industrial, forming roads, agricultural use, homes, etc. The heavy explosives for that. In this case no serious casualties or damage occur because proper warning earlier to shift in safer place.

Effects : No heavy damage occur in man induced landslides but thousands of people affected and killed due to landslides. Many houses can be damaged and the loss of public properties is also noticed. Roads and rail communications may remain cut off from the rest of the regions. Thunderstorms cause debris flows on hill slopes leading to deposits of mud. Heavy rain at the same time may worsen the situation.

SOIL EROSION:-

Soil erosion means the removal of material from the surface of the soil by the agency of running water wind or even by gravity. Since the superficial layers of the soil are the richest in plant food and thus the feeding ground of plant roots, the process of soil erosion involves a definite loss of valuable plant nutrients and if it becomes sufficiently intense, may lead to the complete destruction of the soil as the seat of plant growth. Where soil erosion is intense, the natural soil profile is destroyed or truncated and indeed, may never attain full development.

DESERTIFICATION:-

Desertification is defined as a process of land degradation in arid, semi-arid and sub-humid areas due to various factors including climatic variations and human activities. Or, to put it in

another way, desertification results in persistent degradation of dryland and fragile ecosystems due to man-made activities and variations in climate. Desertification, in short, is when land that was originally of another type of biome turns into a desert biome because of changes of all sorts. A huge issue that many countries have is the fact that there are large pockets of land that are going through a process that is known as desertification.

Overgrazing is the major cause of desertification worldwide. Other factors that cause desertification include urbanization, climate change, overdrafting of groundwater, deforestation, natural disasters and tillage practices in agriculture that place soils more vulnerable to wind. Desertification affects topsoil, groundwater reserves, surface runoff, human, animal and plant populations. Water scarcity in drylands limits the production of wood, crops, forage and other services that ecosystems provide to our community.

2.1.2 NATURAL RESOURCES AND ASSOCIATED PROBLEMS:-

Being most highly developed evolved animal, man possesses certain special characteristics.

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 design more efficiently. This is how they develop new technologies for utilization of natural resources. As we have seen, natural resources are exhaustible and inexhaustible, the exhaustible resources are renewable and non renewable, therefore proper utilization of our natural resources is the need of today. Human beings utilize most of resources like air, water, land, minerals, flora, fauna, fuels, energy etc. for their growth and development.

Now the problem is, how and to what extent human beings should utilize various resources.

Resources are valuable gift of nature. Hence use of natural resources should depend on knowledge, availability, type, quantity, value, necessity etc. The use of resources should be in limit not to exhaust them so that ecological balance within nature should also remain undisturbed.

2.1.3 ROLE OF INDIVIDUAL IN CONSERVATION OF NATURAL RESOURCES:-

As stated forests, grasslands, wetlands, water resources and land resources are the natural resources. The rapid change of climate, mineral cycles, land cover and biotic communities causes anthropogenic global change radically. Moreover, because of overexploitation of the natural resources, these have reached beyond their generation capacity. Finally, the future generation will be deprived of the natural resources. In order to pass on the resources to the future generation, each individual should reduce consumption levels, control population increase, cultivate vegetables and fruits for their needs in their own land, and finally, should lead a simple life.

2.1.4 EQUITABLE USE OF RESOURCES FOR SUSTAINABLE LIFESTYLE:-

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. But it does not mean that people of developed countries are rich and having good life style, and less developed countries people are poor. Less developed countries also have rich and poor both but facing the problem of population and available natural resources.

