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LECTURE NOTES

Name of the Subject: Environmental Studies

Semester: 3rd **Year:** 2nd

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ENVIRONMENTAL STUDIES

What is environment?

The word environment is derived from the fresh word "environment" which means to "encircle or surround".

Definitions:

All the factors such as physical, geographical, chemical, biological, ecological which affects human life and its existence on this planet are called environment.

The environment includes earth, lakes, forests, farms, vegetarian and other biological life such as animas, plants, bacteria and micro-organs etc.

All the components of environment are basically divided into two parts.

1.) Biotic
2.) Abiotic

Biotic: includes all living organism and biological life such as animals, birds, forest, insects, bacteria, micro-organs, like algae and fungus etc.

Abiotic: includes all non-living organisms such as land, mountain, river, air, water, temp, humidity, vapors, sand dust, etc.

Segment of environment

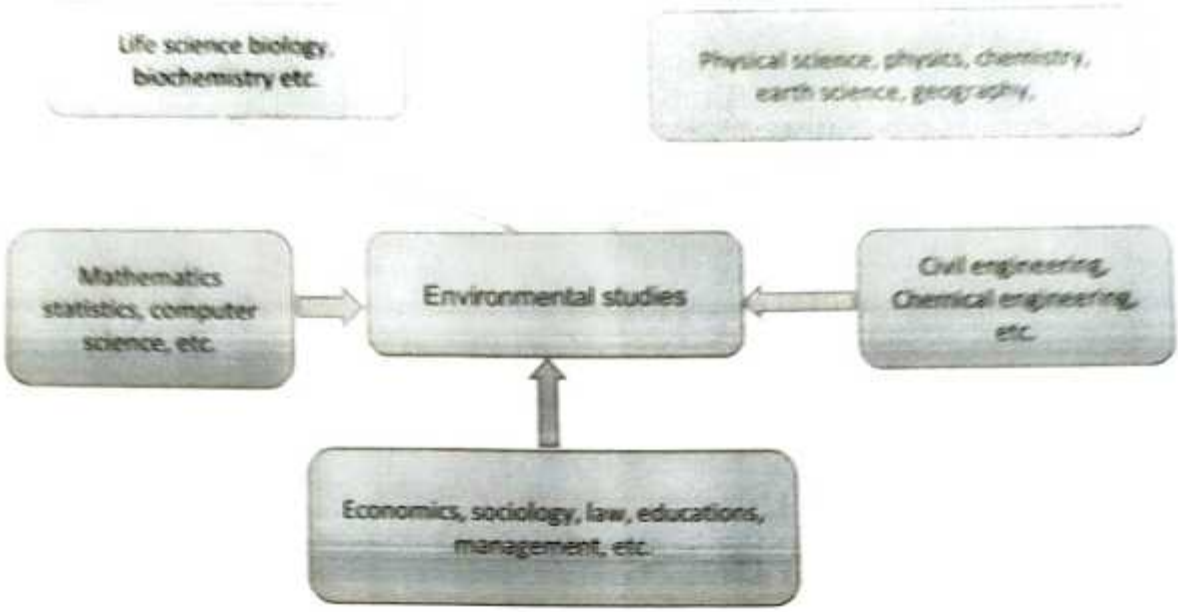
Environment consists of 4 segments.

1.) Atmosphere - blanket of gases surrounding the earth.
2.) Hydrosphere – various water bodies preset on the earth.
3.) Lithosphere – contains various types of soil and rocks on the earth.
4.) Bio- sphere- composed of all living organisms and their interactions with time environment.

Environment studies:

Environment studies describe the interactions among organisms, the environment and all the factors, which influence life on earth including atmospheric conditions, food chains, the water cycle etc.

It is a basic science about our earth and its daily activities, and therefore this science is important for one and all.



Environmental studies deal with every issue that affects a living organism. it is essentially a multidisciplinary approach that an appreciation of our natural world and human impact on its integrity.

Scope

1.) The study creates awareness among the people to known about various renewable and non-renewable resources of the region. The endowment or potential platforms of utilization and the balance of various resources available for future use in the state of the country are analyzed in the study.
2.) It provides the knowledge about ecological system and cause and effect relationships.
3.) It provides necessary information about biodiversity richness and the potential dampers to the species of plants, animals and micro-organs in the environment.
4.) The study enables one to understand he cause and consequences due to natural and main indued disasters(flood, earthquake, landside, cyclone etc.) and pollutions and measures to minimize the effects.
5.) It enables one to evaluate alternative response to environment issues before deciding an alternative course of action
6.) The study enables Environmentally literate citizens (by knowing the Environmental acts, rights, rules, legislation etc.) to make appropriate judgements and decisions for protection and improvement for the earth.
7.) The study exposes the problems of over population, health, hygiene, etc and the role of arts, science and technology in the eliminating/minimizing the evils from the society.
8.) The study tries to identify and develop appropriate and indigenous eco-friendly skills and technologies to various Environmental issues.
9.) It teaches the citizen the need for sustainable utilization of resources as these resources are inherited from our ancestors to the younger generating without destroying the quality.
10.) The study enables the theoretical knowledge into practice and multiple uses of the Environmental.

IMPORTANCE

- To understand the impacts of development on the Environment.

Development results in the industrial growth urbanization, expansion of the telecommunication and transport system, hi-tech agriculture and expansion of housing.

- To realize the environmental problems are global.

These global problems include climate change acid rain, impacts on biodiversity and marine life to tackle these problems there is a needed effort from across the world

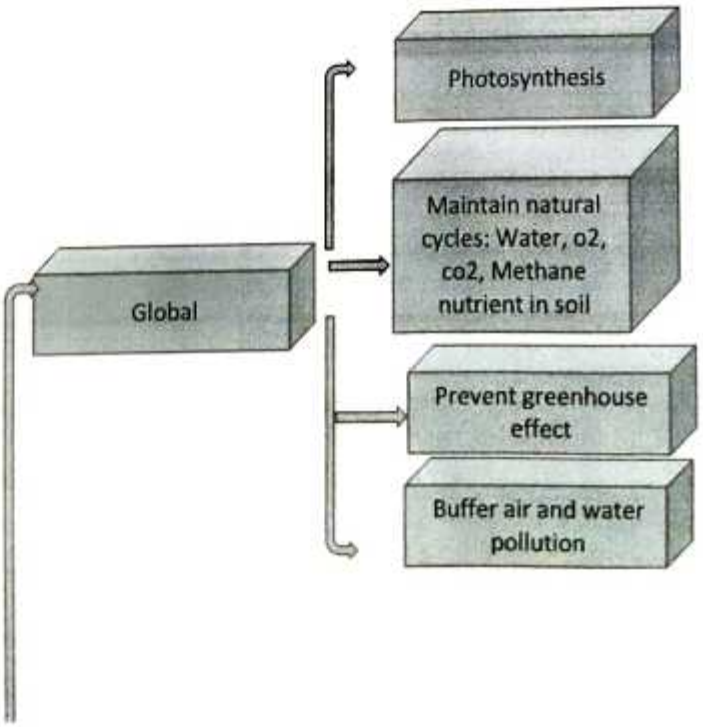
- To discover the sustainable ways of living present resources in a manner that conserve their supplies for the future.

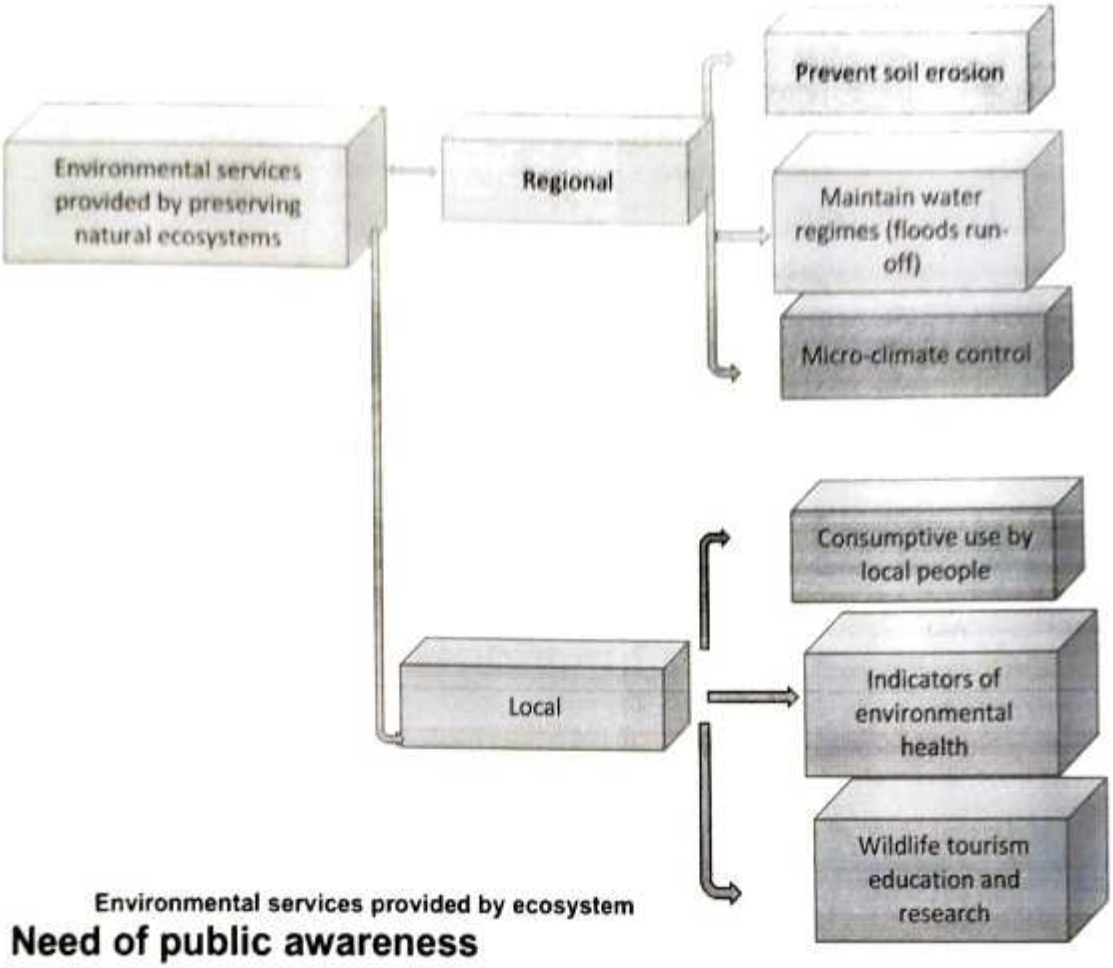
- Minimize the household energy consumption.
- Eating locally.
- Growing your own food.
- Using disposals to dispose of waste.
- Cycling more
- Drinking from the tap.
- Drive less your personal care.
- Use public transport and conserving hour hold water.

- To utilize natural resources efficiently

- Environmental science teaches us to use natural resources efficiently by using the right tools to explore resources. Adding value to our resources through training of human resources.

- Using right techniques to minimize exploitation.





Environmental services provided by ecosystem

Need of public awareness

It is only possible when public are aware about the ecological and environmental issues.
Example: ban of plastic bags can't be successful until the publicunderstand the environmental implications of the same.
Public should understand about the fact that if we are degrading our environment, we are harming ourselves.
Govt alone can't not do anything, it is the duty of educated people to educate the others about the adverse effect on environment.

World forest day – March 2021
Earth day – April 22
World environmental day June 5

Institutions in India that are working for environmental awareness

Indira Gandhi National Forest Academy (IGNFA)
Indian Institute of Forest Academy (IIFA)
Centre for Environmental Education. (CEE)
Centre for Mining Environment. (CME)
Forest survey of India. (FSOI)

QUESTIONS

1. Define Environment.
2. Explain, "Environment science is a multidisciplinary science."
3. Discuss some measure issue, which help in solving the problems in environmental science.
4. Define ecology?

Long Answer questions:

1. Discuss in details the scope and importance of environment.
2. Write an essay on "public awareness to protect our environment".

Unit -2

Natural resources

The environmental provides us with a verity of goods and services necessary for our day-to-day life. These natural resources include air. Water, soil and minerals, along with the climate and solar energy which form the nonliving or "abiotic" part of nature. The "biotic" or living parts consists of plants and animals, including microbes.

Natural resources can be defining as – Things/materials of the nature, that can be put to some use by human beings for their growth, development, comfort and other necessities are called as "Natural sources".

Example air, water, soil, forests, animals, minerals, metals, energy and other substances are some examples of natural resources that are utilized by human beings.

Type of natural resources

All the natural resources can be divided into two categories.

(i) Exhaustible natural resources.
(ii) Inexhaustible natural resources

Exhaustible naturalresources are soils, forests, water, coal, petroleum, natural gas, minerals etc. these are consumed or exhausted though continuous use or misuse.
Exhaustible natural resources can be further divided into two parts.

a. Renewable natural resources.
b. Non-Renewable natural resources.

Inexhaustible natural resourcesare those which can't be exhausted through continuous use or misuse. Example- air and sunlight etc.

Renewable resources:

The natural resources which are consumed/exhausted/depleted through continuous use and can be recovered by very hard efforts taken up for long periods are called Renewable resources are replenished through natural cycles or manually. For example,

oxygen in air is replenished through photosynthesis. Forest is maintained themselves and manually. Similarly, fresh water is available through cycles and manually too.

Most of the removable resources are interdependent to each other. Forests maintained the environment/climate, plants need to check soil erosion and soil is needed for plants. Air and insects or indirectly by recent photosynthetic activities. Thus, the renewal of these resources will continue at as long as photosynthesis continues this planet. These resources are the life support system which can fulfill all human needs. But its productivity/renewability is limited or depend upon availability of water, nutrients, and environmental conditions.

Non-Renewable resources:

Nonrenewable resources are not replenishable or we can not get back our coal and petroleum reserves in our lifetime if ones they are consumed/exhausted completely. Non-renewable resources are metals (iron, copper, zinc etc.) etc.
Minerals are often called the 'STOCKS' resources because their new materials can only be extracted from the earth's crust once.

Coal, petroleum and natural gas are called as 'FOSSIL FUELS' because they are formed from, they are burnt to give off energy. Coal has a high heating value, hence it is useful fuel. Since fossil fuels are non-renewable sources of energy.

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 desire more efficiently. This is how they develop new technologies for utilization of natural resources. As we have seen natural resources are exhaustible and non-exhaustible, 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 up to what extend 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 the nature should also remain undisturbed.

In the past, the man was not so advanced and was satisfied with what he received from the nature due to his limited needs. Thus, there was a complete balance among all the components of the natural environment in the past. At present, the story has become very different due to human activities of consumption and misuse of natural resources and the explosion of population. Therefore, nature has lost its capacity of tolerance. Fast growth in human population has led to the fast rate of consumption of natural resources and creation of wastes. Human activities of cutting trees, killing animals, damaging and mixing poisonous wastes in air and water are creating severe crisis in the environment and natural resources. To some extent nature tries to recycle some of these resources. But, because of spurt in population these are used up faster than these are replenished, leading to their depletion.

Directly or indirectly, there are some problems from the over exploitation of natural resources. They are, lowering of water label, extinction of wild animals, soil erosion, siltation of rivers, floods, climatic change, interruption of water cycle, loss of aquatic plants/animas, various diseases, ozone layer depletion, global warming, acid rains, green house effects, shortage of food, problem of housing, fossil fuels etc. using wood as fuel not only cause severe damage to earth but also produce pollution.

Oceans are also provide different types of food materials and minerals. Large quantities of petroleum and natural gas are also obtained from oceans.Thus they are

traditional medicines.

valuable contributors in the development and prosperity of human beings. But due to human activities, oceans have been put under heavy condition of serious stress.

Now the conservation of natural resources should be the priority of everyone citizen. Methods of conservation management should be followed.

Natural resources include those resources that are derived from the environment water, air, minerals, oil and products gained from forest are some examples of natural resources.

❖ The unequal consumption of natural resources

a) A major part of our natural resources are consumed in the technologically advanced or "developed" world usually called "North".

The 'developing nation' of 'south' including India and china, also overuse many resources be of their human population.

However, the consumption of resources per capita of developed countries is up to 50 times greater than that developing country.

b) Energy from fossil fuel is consumed is much greater in developed countries. Their per capita consumption of food and other products is also much greater, resulting in larger quantity of waste.

c) Producing animal food for human consumption require more land than that require for growing crops. Thus, continuous that are highly dependent on mean-based diets need much larger areas for pasture than those where people are mainly vegetarian. These consumption pattern mainly measured in terms of ecological footprints.

❖ Planning land use

Land itself is a most important resource is necessary for food productions, animal husbandry, industry and for our growing human settlements. These forms of intensive land use are frequently extended at the cost of 'wild land' – our remaining forests, grasslands, wetlands, and deserts.

Thus,it is essential to involve a rational land use policy that examines how much land.

Land as a resource is now under serious pressure due to an increasing 'land hunger' -to produce sufficient quantities of food for an exploding human population. It is also affected by degradation due to misuse. Land and water resources are also polluted by industrial waste and rural and urban sewage, apart from being diverted for short-term economic gains to agriculture and industry. Natural wetlands of great value are being drained for agriculture and other purposes and semi-arid land is being irrigated and overused.

The most damaging change in land use is demonstrated by the rapidity by the rapidity with which forests have vanished in recent times, both India and in the rest of the world. in the long term, the loss of forests and the services they provide is far greater than the short-term gains produced by converting forested lands to other uses.

The need for sustainable lifestyles:

The quality of human life and the quality of ecosystems on earth are indicators of the sustainable use of resources. There are some clear indicators of sustainable lifestyles in human life such as:

- Increased longevity.
- An increase in knowledge, and

- And enhancement of income

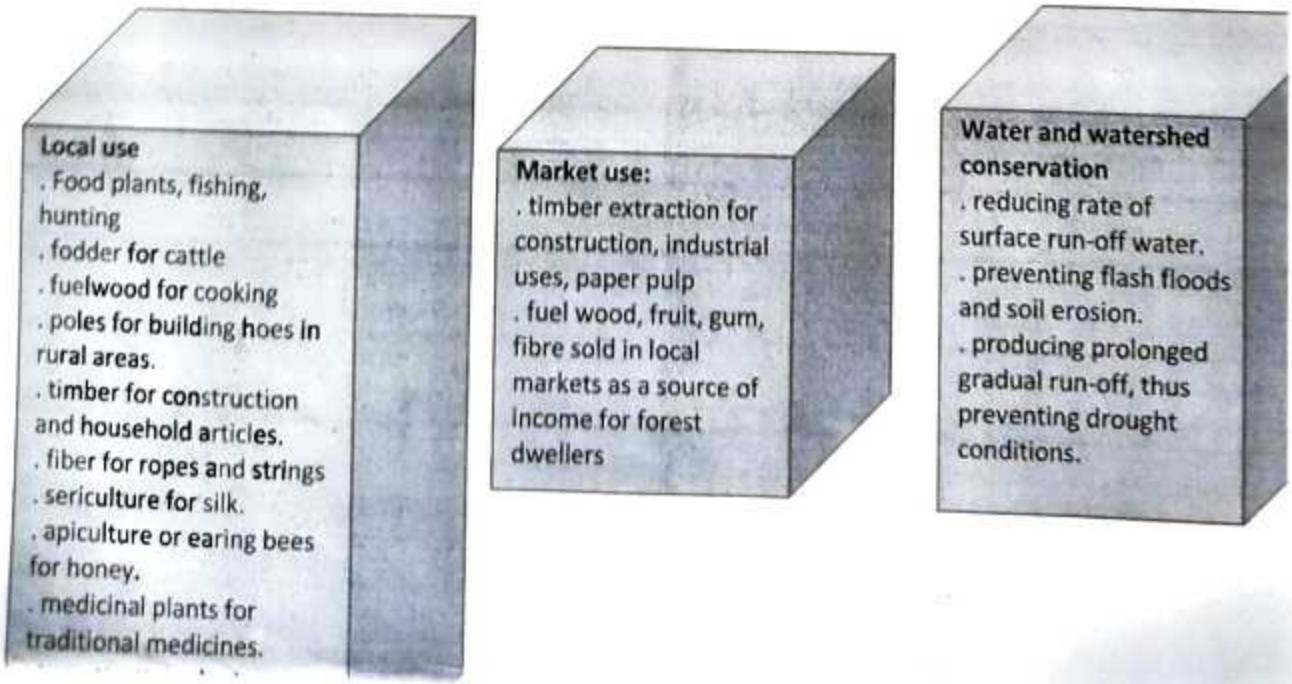
These three together are known as the 'Human Development index'
The indicators of the quality of the ecosystems are more difficult to assess. They are:

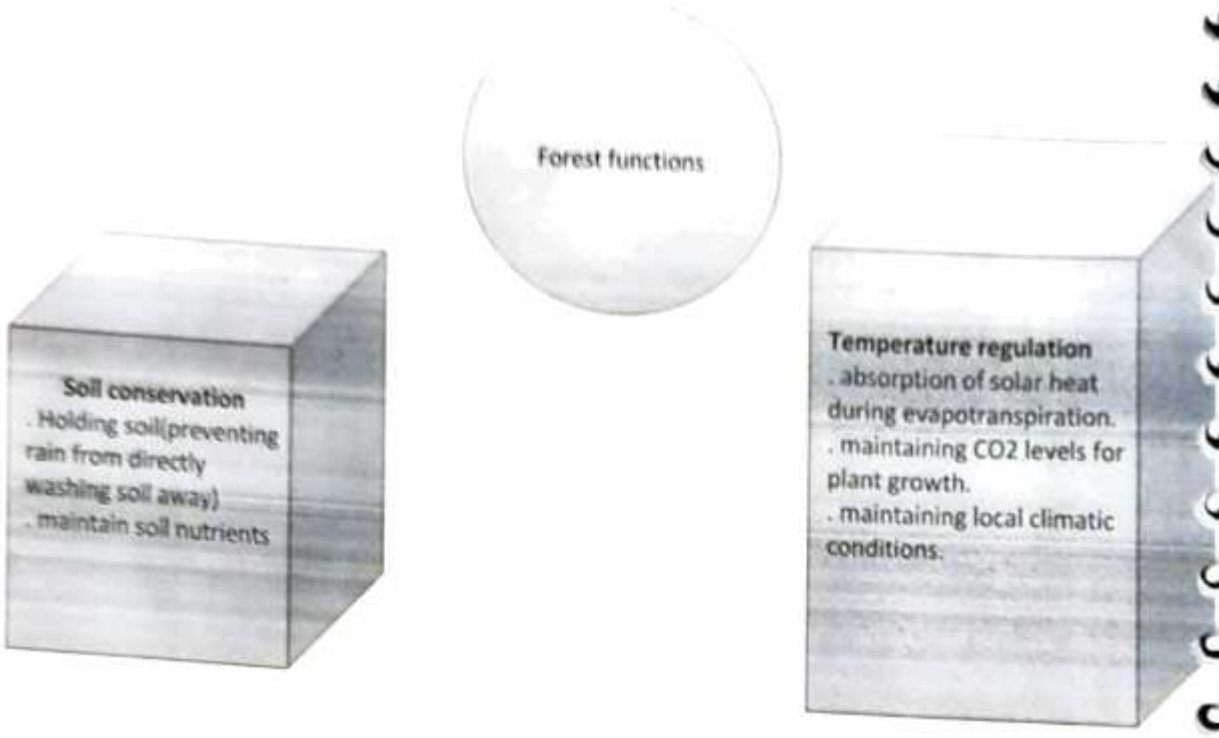
- A stabilized population or the percentage of species loss,
- Species diversity in ecosystems, and
- The state of 'naturalness' of the ecosystems.

Renewable resources:

Forest resources: -

People who live in or near forests know the value of forest resources first-hand, because their lives and livelihoods depend directly on these resources. However, the rest of us also derive great benefits from the forest, which we are rarely aware of. The water we use depends on the existence of forests on the watersheds around river valleys. Our homes, furniture and paper are made from wood from the forest. We use many medicines that are based on forest produce and we depend on plants for the oxygen they emit and to remove the carbon dioxide we breathe out from the air.





Deforestion-

The conversion of forested areas to non forest is deforestation. Historically,this meant conversion to grassland or its artificial counterpart ,grainfields;:however, the Industrial Revolution added urbanization and technological uses Generally this removal or destruction of significant areas of forest cover has resulted in a degraded environment with reduced biodiversity.

Deforestation (wether deliberate or unintended is the removal of trees without sufficient reforestation.There are maycauses,ranging from extremely slow forest degradation to cover for agriculture or urban development.or it can be an unintentional consequence of uncontrolled grazing(which can prevent the natural regeneration of young trees)

While tropical rainforest deforestation has attracted most attention,tropical dry forests are being lost at a substantially higher rate,Primarily as an outcome of slash-and-burn techniques used.

DEFINITION OF DEFORESTATION

Deforestation is the loss or continual degradation of forest habitat due to either natural or human related causes.Agriculture urban sprawl unsustainable forestry practices; mining and petroleum related causes.Agriculture urban sprawl unsustainable forestry practices ,mining and petroleum exploration exploration all contribute to human caused deforestation.Natural deforestation can be linked to tsunamis,forestfires,volcaniceruptions,glaciation and desertification.The effects of human related deforestion can be mitigated through environmentally sustainable practices that reduce permanent destruction of forests or even act to preserve and rehabilitate disrupted forestland.(See Reforestation and Treeplanting).

The term deforestion is often the source of disagreement between various interested groups Conservation groups often use broad definition while groups seeking to maintain the status quo often use a narrow definition.

Deforestion defined broadly can include not only conversion to non-forest, but also degradation that reduces forest quality-the density and structure of the trees ,the ecological services supplied,the biomass of plants and animals,the species diversity and the genetic diversity.Narrow definition of deforestation is :the removal of forest cover to an extent that allows for alternative landuse.The United Nations Research Institute for Social Development (UNRISD)uses a broad definition of deforestation, while the Food and Agriculture organization of the UN(FAO)uses a narrow definition.

Definition can also be grouped as those which refer to changes in land cover and those which refer to change in land use.

Land cover measurements often use a percent of cover to determine deforestation.This type of definition has the advantage in that large areas can be easily measured,for example from satellite photos. A forest cover removal of 90% may still be considered forest in some cases..Under this definition areas that may have few values of a natural forest such as plantations and even urban orsuburban areas may be considered forest.

Land use definitions measure deforestation by a change in land use.This definition may consider areas to be forest that are not commonly considered as such.An area can be lacking trees but still considered a forest.It may be a land designated for afforestation or an area designated administratively as forest.

USE OF THE TERM DEFORESTATION--:

The term deforestation has been used to refer to fuel wood cutting, commercial logging and the slash and burn technique, a component of some shifting cultivation agricultural systems. It is also used to describe forest clearing for annual crops, for grazing and establishment of industrial
Forest plantations. The meaning of the term is ambiguous enough and so charged with emotiton that the use of a more precise term might be better suited in specific case Related terms are forest decline forest tragmentation and forest degradation. Loss of forest cover and landuseconversion.The term also has a traditional legal sense of the conversion of Royal forest land into purlieuor other non-forest land.

CAUSES OF DEFORESTATION

Present Causes

While short-sighted market-driven forestry practices are often one of the leading cause of forest degradation the principal human–related causes of deforestation are agricultural and livestock grazing , urban sprawl mining and petroleum extraction. causes include demand for farm land and fuel wood underlining causes include poverty lack of reform. The causes of deforestation are complex and often differ in each forest and country. Government policies
Such as ones in Brazil,make it a priority to resettle some of the country"s numerous landless people.The largest cause as of 2006 is slash-and-burn activity in tropical forest.Slash-and-burn is a method sometimes used by shifting cultivators to create short term yields from marginal soils.When practiced repeatedly,orwithoutinterveng fallow periods, the nutrient poor soils may be exhausted or eroded to an unproductive state. Slash-and-burn techniques are used by native populations of over 200 million people worldwide.

Prehistory

Deforestation has been practiced by humans for thousands of years.Fire was first tool that allowed humans to modify the landscape.The first evidence of deforestation show up in the Mesolithic.Fire was probably used to drive game into more accessible areas.with the advent of agriculture fire became the prime tool to clear land for crops.In Europe there is little solid evidence before 5000 BP.Mesolithicforagers used fire to create openings for red deer and wild boar.In Great Britain shade tolerant species like oak and ash are replaced in the pollen record by hazels .brambles,grasses and nettles.Removal of the forests led to decreased transpiration resulting in the formation of upland peat bogs.Widespread decreased in elm pollen across Europe between 6400-6300 BP and 5200-5000 BP,starting in southern Europe and gradually moving north to Great Britain , may represent and clearing by fire at the onset of Neolithic agriculture.

Pre-industrial history

The historic silting of ports along the southern coasts of Asia Minor e.g Clarus and the examples of Ephesus,Priene and miletus, where harbors had to be abandoned because of the silt deposited by the Meander) and in coastal Syria during the last centuries BC,and the famous silting up of the harbor for Bruges, which moved port commerce to Antwerp all follow periods of in increased settlement growth (and apparently of deforestation) in the river basins of their hinterlands.In early medieval Riez in upper Province,alluvial silt from two small rivers raised the riverbeds and widened the floodplain, which slowly buried the Roman settlement in alluvium and gradually moved new construction to higher ground, concurrently the headwater valleys above Riez were being opened to pasturage.

A typical progress trap is that cities are built in a woody area providing wood for some industry (e.g.shipbuilding,pottery) which start consuming it so fast-and without proper replanting –that it becomes impossible to obtain it close enough to remain competitive, leading to the city"s abandonment, as happened repeatedly in Ancient Asia Minor.Especially the combination of mining and metallurgy went along this self-destructive path.

Meanwhile most of the population remaining active in (orindirectlydependend on) I agricultural sector,the main pressure in most areas remained land clearing for crop and cattle farmin fortunately enough wild green was usually left standing (and partially used e.g. to collect timber and fruits,or to graze pigs) for wildlife to remain viable,and the hunting privileges of elite(nobility and higher elergy) often protected significant woodlands.

Industrial Pressure : The massive use of charcoal on an industrial scale was a new accelerat of the onslaught on western forests.

ENVIRONMENTAL EFFECTS

Atmospheric pollution

Deforestation is often cited as one of the major causes of the enhanced green effect Trees and other plants remove carbon (in the form of carbon dioxide)from the atmosphere duration the process of photosynthesis.Both the decay and burning of wood releases much of this store carbon back to the atmosphere.A.J.Yeomans asserts in Priority One (http://www.yeomansplow.com priority-one.htm) that overnight a stable forest releases

exactly the same quantity of carbon diox back into the atmosphere.Other state that mature forests are net sinks of CO2(see carbon diox sink and Carbon cycle).

WILDLIFE

Some forests are rich in biological diversity.Deforestation can cause the destruction of habitats that support this biological diversity-thus causing population shift and extinctions.

. their canopies intercept precipitation, some of which evaporates back to the atmosphere (canophy interception)

. their litter, stems and trunks slow down surface runoff;

. they roots create macropores-large conduits-in the soil that increase infiltration water;

. they reduce soil moisture via transpiration;

. their litter and other organic residue change soil properties that affect the capacity of to store water.

As a result , the presence of absence of trees can change the quantity of water on the surface the soil or groundwater,or in the atmosphere.This in turn changes erosion and the available of water for either ecosystem functions or human services.

The forest may have little impacts on flooding in the case of large rainfall events who overwhelm the storage capacity of forest soil if the soil are at or close to saturation.

Soil erosion

Deforestation generally increases rates of soil erosion,by increasing the amount of turn off reducing the protection of the soil from the tree litter.This can be an advantage in excessive leached tropical rain forest soils.Forestry operations themselves also increase erosion through development of roads and the use of mechanized equipment.

China"s Loess Plateau was cleared of forest millennia ago.Since then it has been erodicreating dramatic incised valleys, and providing the sediment that gives the Yellow River its yellow color and that causes the flooding of the river in the lower reaches (hence the river"snick-na:China"s sorrow).

Removal of trees does not always increase erosion rates. In certain regions of southwest UShurbs and trees have been encroaching on grassland.The trees themselves enhance the loss of grass between tree canopies.The bare intercanopy areas become highly erodible.The US Forest Service, in Bandelier National Monument for example,is studying how to restore the former ecosystem.and reduce erosion.by removing the trees.

Landslides

Tree roots bind soil together. and if the soil is sufficiently shallow they act to keep the soil in place by also binding with underlying bedrock.Tree removal on steep slopes with shallow soil thus increases the risk of landslides, which can threaten people living nearby.

CONTROLLING DEFORESTATION

Farming

New methods are being developed to farm more food crops on less farm land, such as high-vieldhybrid crops, greenhouse, autonomous building gardens, and hydroponics. The reduced farm land is then dependent on massive chemical inputs to maintain necessary yield. In cyclic agriculture,cattle are grazed on farm land that is resting and rejuvenating. Cyclic agriculture actually increases the fertility of the soil.Selective over farming can also increase the nutrients by releasing such nutrients from the previously inert subsoil. The constant release of nutrients from the constant exposureof subsoil by slow and gentle erosion is a process that has been on going for billions of years.

FOREST MANAGEMENT

Efforts to stop or slow deforestation have been attempted for many centuries because it has long been know that deforestation can cause environmental damage sufficient in some cases to cause societies to collapse. In Tonga paramount rulers developed policies designed to prevent conflicts between short-termn gains from converting forest to farmland and long-term problems forest loss would cause,whilst during the seventeenth and eighteenth centuries in Tokugawa Japan the shoguns developed a highly sophisticated system of long-term planning to stop and even reverse deforestation of the preceding centuries through substituting timber by other products and more efficient use of land that had been farmed for many centuries.In sixteenth century Germany landowners also developed silviculture to deal with the problem of deforestation. However,these policies tend to be limited to environments with good rainfall,no dry season and very young soils (through volcanism of glaciations) .This is because on older and less fertile soil trees grow too slowly & silviculture to beconomic whilst in areas with a strong dry season there is always a risk of forest fires desrtroying tree crop before it matures.

AFFORESTATION

To day in China where large scale destruction of forests has occurred, the government has required that every able –bodied citizen between the age of 11 and 60 plant three to five year or do the equivalent amount of work in other forest services. The government claims that at least 1 billion trees have been planted in China every year since 1982. In western countries, increasing consumer demand for wood products that have been produced and harvested in a sustainable manner are causing forest landowners and forest industries to become increasingly accountable for their forest managemen and timber harvesting practices.

CASE STUDIES

Brazil

In Brazil the rate of deforestation is apparently driven by commodity prices. Recen development of a new variety of soyabean has lead to displacement of beefranches and slash and

INDONESIA

There are large areas of forest in Indonesia that are being lost as native forest is cleared by large multi-national pulp companies and being replaced by Plantations.

UNITED STATES

Upon arrival Europeam –Americans began clearing large areas of forest for wood and agriculture Beginning in about 1850 farm land began to be abandoned because of soil exhaustion and competitior from the mid-west.Also,mechanization allowed land formerly used as pastures for horse to rever to forest.From 1850 to about 1920 the amount of forest land in the United States actually increased. Today the trend in forest cover increase has reversed as urban sprawl causes conversion of forest as the forest is transformed to suburbs.

TIMBER EXTRACTION

Once world bank study in 1989 has argued that tree crop estates are a better employment generating option than even forest plantations, not with standing the high density of useable timber in the plantations. IN Malaysia timber using industry i.e timber extraction is on large scale.In Indonesia timber manufacturing employment is as high as 3.7 million.Newspaper Kompas (24 Oct to 1989)reported that small regional sawmills alone were employ 200,000 people in Indonesia. Even in Sarawak ,employment in the timber industryis about 55000 indirect timber extraction, plus a large number in associated tasks (ITTC1990)

In 1980, there was a serious attempt to developed woodbased industry in sabah Sawmills, veneer and playwood mills all increased sharply in number. Although sawn timber production increased by 40% during the same period, the same period , the total volume of exports fell by almost one third. The situation in peninsula is less serious than that in Sabah only because of the much greater diversity of theeconomy.For the timber and timber using industries,it is worse.

With good prices, production expanded, and at the end of 1980s the peninsula had 681 sawmills 43 veneer and playwood mills and more than 1200small woodworking plants,furniturefactories..There has been increasingly servere shortage of timber for mills,for the building industry, for exporters of sawn timber and playwood and for the down streamfactories.The future of the big plans for timber manufacture is not withstanding optimism uncertain and is potentially in conflict with the conservationist goals now formally adopted by the GOVT.

Unlike Sabah and peninsula,Kalimantan and Sarawak have shortage of timber due to exploitation of forest. They have banned export for time being. If it is , then on very high rate. In Indonesia has been warned not exceed an animal capacity of 10 million m3, other wise real stortage of raw material could arise.

MINING

Mining

Mining is the extraction of valuable minerals or other geological materials from the earth.
Usually (but not always) from an ore body, vein or (coal)seam.Materials recovered by mining meludebaxite, coal, diamonds,iron, precious metals ,lead, limestone, nickel,phosphate rock salt

STEPS IN THE MINING PROCESS

1. PROSPECTING TO LOCATE ORE
2. EXPLORATION TO DEFINING THE EXTENT AND VALUE OF ORE WHERE IT WAS LOCATED
3. CONDUCT MINE PLANNING TO EVALUATE THE ECONO MICALLY RECOVERABLE PORTION OF THE DEPOSIT
4. CONDUCT MINE PLANNING TO EVALUATE THE ECONOMICALLY RECOVERABLE PORTION OF THE DEPOSIT.
5. CONDUCT A FEASIBILITY STUDY TO EVALUATE THE TOTAL PROJECT AND MAKE A DECISION AS WHETHER TO DEVELOP OR WALK AWAY FROM A PROPOSED MINE PROJECT.THIS INCLUDES A CRADLE TO GRAVE ANALYSIS OF THE POSSIBLE MINE, FROM THE INTIAL EXCAVATION ALL THE WAY THROUGH TO RECLAMATION
6. DEVELOPMENT TO CREATE ACESS TO AN ONE BODY
7. EXPLOITATION TO EXTRACT ONE ON A LARGE SCALE
8. RECLAMATION TO MAKE LAND WHERE MINE HAD BEEN SUITABLE FOR FUTURE USE .

ENVIRONMENT EFFECTS AND MITIGATION

Environmental issues can include erosion ,formation of sinkholes loss of biodiversity and contamination of groundwaters by chemicals from the mining process and products.

Modern mining companies in many countries are required to follow strict environmental and rehabilition codes ensuring the area mined is returned to close to its original state or an ever better environmental state than before mining took place. In some countries with pristine environment such as large parts of Australia this impossible despite the best intentions past mining method have had and methods used in contries with lack of environmental regulations can continue have devastating environmental and public health effects.

- WATER FOR DRINKING AND INDUSTRIAL USE
- IRRIGATION
- FLOOD POWER GENERATION
- INLAND NAVIGATION
- RECREATION

Water for drinking and industrial use

- Due to large variations in hydrological cycle , dams and reservoirs are required to be constructed to store water during periods of surplus water availability and conserve the same for utilization during lean periods when the water availability is scarce .
- Properly designed and well – constructed dams play a great role in optimally meeting the drinking requirements of the people .
- Water stored in reservoirs is also used vastly for meeting industrial needs.
- Regulated flow of water form reservoirs help in diluting harmful dissolved substances in river water during lean periods by supplementing low inflows and preserving quality of water within safe limits.

Irrigation

- Dams and reservoirs are constructed to store surplus waters during wet periods , which can be used for irrigation arid lands. one of the major benefits

of dams and reservoirs is that water flows can be regulated as per agricultural requirements of the various regions over the year.

- Dams and reservoirs render unforgettable services to the mankind for meeting irrigation requirements on a gigantic scale.
- It is estimated that 80% of additional food production by the year 2025 would be available form the irrigation made possible by dams and reservoirs.
- Dams and reservoirs are most needed for meeting irrigation requirements of developing countries, large parts of which are arid zones.
- There is need for construction of more reservoir bested projects despite wide spread measures developed to conserve water through other improvements in irrigation technology.

Flood control

- Floods in the rivers have been many a time playing havoc with the life and property of the people. Dams and reservoirs can be effectively used to control floods by regulating rivers water flows downstream the dam
- The dams are designed constructed and operated as per a specific plain for routing flood through the basm without any damage to life and property of the people.
- The water conserved by means of dams and reservoirs at the time of flood can be utilize for meeting irrigation and drinking water requirements and hydro power generation.

Hydro power generation

- Energy plays a key role for socio-economic development of country. Hydro power provide a chap, clean and renewable source of energy.
- Hydro power is the most advanced and economically viable resource of renewable energy.
- Reservoir bestedhydro electric projects provide much needed peaking power to the grid .
- Unlike thermal power stations , hydro power stations have a few year technical constraints and the hydro machines are capable of quick start and taking instantaneous load variations.
- While large hydro potentials can be exploited through mega hydro electric projects for meeting power needs and on regional or national basis , small hydro potentials can be exploited through mini / micro hydel projects for meeting local; power needs of small areas. Besides hydro power generation, mutli purpose hydro electric projects have the benefit of meeting irrigation and drinking water requirements and controlling floods etc.

Inland navigation

- Enhanced inland navigation is a result of comprehensive basic planning and development utilizing dams , locks and reservoirs that are regulated to play vital role in realizing large economic benefits of national importance.

recreation

- The reservoir made possible by constructing a dam presents a beautiful viem of a like in the areas where natural surface water is scarce or- existent , the reservoirs are a grate source of recreation.
- Alongwith other objectives, recreational benefits such as boating ,swimming, fishing etc linked with lakes are also given due consideration at the planning stage to achieve all the benefits of an ideal multipurpose project.

While dams provide a yeoman service to the mankind, the following impacts of the construction of dams are required to be handled carefully:-

- Resettlement and Rehabilitation
- Environment and forests
- Sedimentary issues
- Socio economic issues
- Safety aspects

The above problems related to the construction of dams may be resolved successfully in case the approach of management is objective, dynamic progressive and responsive to the needs of the hour.

Problems from Dams

We have seen the benefits of dams, but the otherside of coin is also not good when such projects are undertaken and hundred crores of public money is spent, individual or organisations in the grab of PIL can not be permitted to challenge the policy decision taken. For such developmental projects thousands of acre land is acquired, results the public become landless.As far as relief and rehabilitation are concerned, people are not given properly. Therefore, if the interests of any affected persons are not protected in terms of the approved mechanism,they certainly have the right to.

Natural Resources

Approach appropriate authorities of even the supreme court in case its directions are not complied with . Later on people go on strike & other demonstration NamadaBachaoAndolam, Chipko movements etc are such movements which work for the relief&rehabilationof effected people.

Due to these dams, most affected are tribals .poor ,labour class people etc. They can not oppose of their own. As regards relifs& rehabilitation detailed and exhaustive plans have been drawn by the states. The conditions of the rehabilitation are such the affected families are to be affered choices that should. In fact, make the quality of their lives better then the conditions they encountered in their original inhabitation . elaborate mechanisms have also been established to moniter and ensure compliance and even a grievances redressal mechanism has been put in place , govt , also take more then adequate to protect the interests of the oustees.

WATER RESOURCE

Water is an indispensable natural resource on our earth on which all life depends about 71% of the earth's surface is covered by water from which 96.5% is salty ocean water and 35% is fresh water in the form of rivers, lakes, frozen water locked up in glaciers and poles (2% in glacial form ,1.5% usable drinking water).

- Most of the animal and plants have 62-65% water in their body.

Use of surface and ground water:

Consumptive use: -

In such uses, water is completely utilized and can't be re-used.

Ex: - Domestic, Industrial and Irrigational use.

Non-consumptive use: -

In such uses, water is not completely utilized and re-used again.

Ex: -hydropower-plant.

Other uses: -

- Water is used for domestic proposes like washing, bathing, cooking, drinking etc.
- Water is used in commercial establishment like hotels, theatre, educational institutions, offices etc.
- Almost 60-70% of fresh water is used for irrigation.
- Water plays a key role in moderating climate change and diluting pollutants.

Over utilization of surface and ground water:

Therapid increase in population and industrial growth leads to severe demands on water resource.After using all available surface water resource to maximum point, human beings using ground water to meet their needs.

Effects of over-utilization of water:

- The increase in extraction of ground water in excess leads to decreasing ground water level.
- Building construction activities seal permeable soil zone and reduce the area for percolation of rain water thereby increasing surface run-off.
- Over-utilization of ground water in arid and semi-arid regions for agriculture disturbs equilibrium of reservoir in that region causing problems like lowering of water table.
- Over-utilization coastal area needs to rapid intrusion of salty water from the sea which causes un-suitability of drinking water.
- Over-utilization causes dry of borewells and dug well.

FLOODS

Flood is an overflow of an express of are that submerges land.in the senses of flowing water the word 'flood' may also be applied to the inflow of the tide.

Causes of flood:

- Heavy rainfall, melting of ICE, sudden release of water from dams often causes flood on the low laying coastal areas.
- Pro-longed heavy rain fall can also cause the over flowing of rivers and lakes resulting floods.
- Reduction in carrying capacity of the river channels due to abstraction built on flood ways.

- Deforestation, overgrazing, mining increases the run off from rains causing flood.

Effect of flood:

- Water spreads in the surrounding areas and submerges them causing various problems in mankind.
- Plain surface gets eroded and silted with mud and sand thereby affecting cultivated land areas.
- Extinction of civilization in some coastal area also occurs.

Flood management:

- Floods can be controlled by constructing dams and reservoirs.
- Channel management and embankment also control floods.
- Encroachment of flood ways should be banned.
- Flood hazard may be reduced by forecasting or flood warning.
- Flood hazard may be reduced by reduction of run-off and this can be archived by increasing infiltration through appropriate.....
.....

DROUGHT

Drought is mainly happened at the place of scarce of water. Drought is nothing, but scarcity of water.

Drought cause due to:-[cause of drought]

- When annual rainfall is below normal and less than evaporation, drought occurs.
- High population also leads to drought. population growth leads to poor lands to poor land use and worsens the situation.
- Deforestation leads to desertification and drought. Deforestation leads to top soil exposed to erosion by heavy rains, wind and the sun.
- Over exploitation of surface water resources by digging wells or bore well for high predicting also causes drought.

EFFECTS OF DROUGHT:

- Drought causes hunger, malnutrition and scarcity of drinking water. also degrades the quality of drinking water.
- Drought causes wide spread crop failure leading to acute storage of food.
- Drought indicates the initiation of desertification.
- Drought accelerates degradation of natural resources.

Drought Management:

- Indigenous knowledge in control of droughts and desertification is very useful for dealing with drought problems.
- Construction of large capacity reservoirs is essential in drought-prone areas.
- Rainwater harvesting program me is very useful technical to conserve water.
- Deforestation activities improve the potential of water in drought-phone areas.
- Mixed cropping is an essential method to minimize drought.

Benefits of dams:

1. **Water for drinking and industrial use:**

   Due to large variation in hydrological cycle, dams and reservoirs should be constructed to store water during the periods of surplus water availability. Water store in reservoirs is also used for various industrial uses.

2. **Irrigation:**

   Dams are constructed to store surplus water during wet periods, which can be used for irrigating arid lands. One of the major benefit of dams is that water flow can be regulated as per agricultural requirements throughout the year.

3. **Flood control:**

   Flood on the rivers have been many times playing and property of the people. Dams can be effectively used to control floods by regulating rivers waterflow downstream of the dam.

4. **Hydropower Generation:**

   Energy (electric) plays a key role for socio-economic development of a country, Hydropower provides a cheap, clean and renewable source of energy.

   Hydropower is the most advanced and economically viable resources of renewable energy.

Inland avigation:

Advanced inland Navigation is a result of comprehensive basic planning and development of dams. Dams plays a vital role in realizing large economic benefits.

Problem of Dams:

Soil erosion:

One of the vital problems with the dams is erosion of land of local areas and forest.

A major example of soil erosion problem is near "Aswan dam".

Species intinction:

Fisheries become an increasingly important sources of food supply. More attention to be paid to the harmful effects of dams on many fish and other aquatic animals.

There are no bypass systems for these animals are not including in many of dams. So, the fishermen are interfering with their life-cycle.

Spreading of Diseases:

Dams in tropical areas, due to their slow movement are literally breeding grounds for mosquitoes, snails and flies. These are the vectors that carry malaria and various disease.

Siltation:

It is the outcome of silt being deposited at the bottom of the reservoirs which affects by utility of dams.

Salinization of Water:

1st Irrigation increases the salinity of surface water when evaporation removes water but leaves salt behind. This occurs when irrigation water contains some salt and irrigation rates are not high enough to flush the salt away. Saline water may cause soil pollution.

CONFLICTS OVER WATER:

The term "water conflict" is used to describe tensions or disputes between states, countries or people groups for the utilization, consumption or control of water resource.

Only 0.4% of the worlds drinkable water is accessible to humans. With a growing population of 7billion peoples, disputes over portable water sources comes specially in scarce region of water.

Whenever a water source such as a lake, river or an underground aquifer process national border, rightful ownership is.....

MINERAL RESOURCES

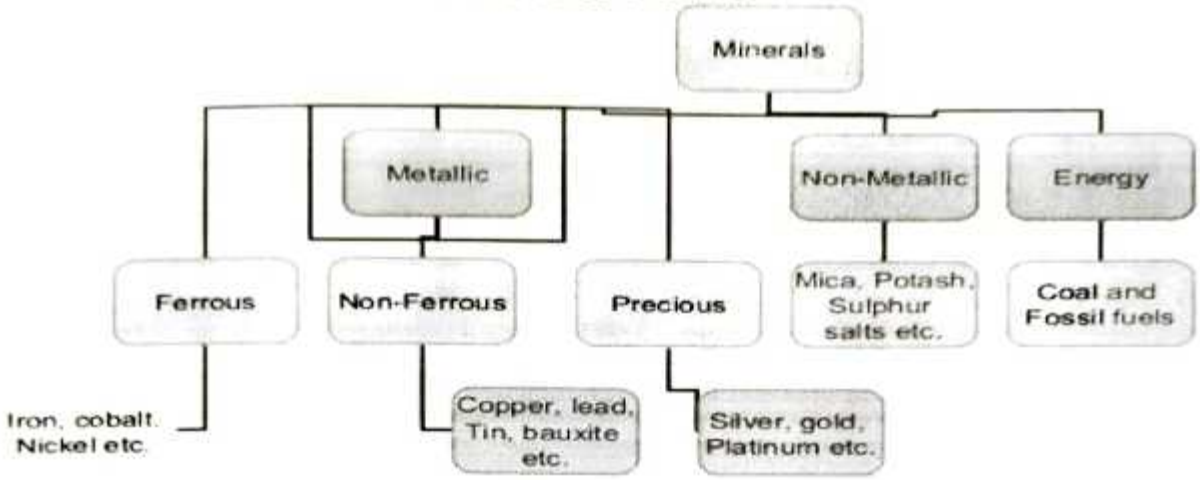
[Mineral: - Homogeneous, Metal: - Not-Homogeneous]

Mineral:

A mineral is a pure inorganic substance that occurs Naturally in the Earth's crust.

- More than 2000 minerals are identified till date. Among all the minerals, the following 8elements contains the most i.e, O, Si, Al, Fe, Ca, Na, K, Mg (Na, K non-metal). Minerals are valuable Natural resources being finite and non-renewable.
- Study of mineral is called Mineralogy.

Classification Of Mineral resources



- For different equipments, weapons etc.
- For transportation means.
- For communication i.e., telephone wires, cable, Electronic devices.
- Medicinal system (Particularly in Ayurvedic system).
- Formation of alloys for various purposes.
- Jewelry and ornaments that is Gold, silver, platinum and Dimond etc.
- For agricultural means as Fertilizers, seed-dressing etc.

Environmental Effect of extracting and using minerals resources:

- Land degradation due to lowering of surface levels. The loss of valuable soil cover.
- Deforestation in the mining areas.
- Erosion of soil is enhanced.
- The agricultural lands are affected by silt.
- Materials mined but not recovered.
- The disturbance caused to the floral and faunal population is increased.
- Mine drainage has polluted streams, rivers, lakes and even seas.

FOOD RESOURCES

- Food is defined as any substance consume to provided nutritional support for our organism.

- Food is an essential requirement for our life.

MAJOR COMPONENTS OF A COMPLETE AND BALANCED DIET

COMPONENT Protein	COMPONENT Fats & Lipids	COMPONENT Carbohydrates	COMPONENT Vitamins	COMPONENT Minerals
FUNCTION *Essential for tissue growth, repair and for metabolic regulation process. Also used as an energy source.*	FUNCTION *A rich source of energy. fats have twice the calorific value of proteins and carbohydrates. Also a key component of cell membranes.*	FUNCTIONS *Used for energy.*	FUNCTION *Diverse roles associated with physiological and metabolic activities. Some vitamins play an important role in immunity and the resistance to stress.*	FUNCTION *Major structural elements of bones and teeth. Also play a role in blood formation and functions. Present in cell fluids and other tissues.*
MAJOR SOURCES IN AQUARIAN FISH FOODS **Fish meal**	MAJOR SOURCES IN AQUARIAN FISH FOODS **Fish oil**	MAJOR SOURCES IN AQUARIAN FISH FOODS **Wheat Starch**	MAJOR SOURCES IN AQUARIAN FISH FOODS **Vegetables Vitamin levels are boosted using natural & synthetic vitamin premixes**	MAJOR SOURCES IN AQUARIAN FISH FOODS **Various raw components Levels boosted using a premix**





not available, but they cannot afford it.

Global Food Price

Rising G.F.P affects people's ability to buy enough to feed their families, especially urban poor.

Uncontrolled Population

The balance of production and consumption of food is another reason of world food problem.

Under Nourishment

It is the lack of sufficient nutrition or calories of food. According to FAO a man needs 2500 calories food per day. People wo received less than this value is under Nourished.

MAL Nourishment and over nourishment are also affects the world food problem vastly.

Effects/changes by agriculture and over grazing

Soil erosion

When grasses are removed by cattle, top soil become loose and get eroded b wind and water.

Land degradation

The human content of soil decreased and fertility of soil affected.

Soil loses in filtration capacity by trembling of cattle.

Flooding

Soil erosion by over grazing also result flood.

Pollution of river

Chemicals and fertilizers flown by wind and irrigation water and at list pollution our water resource.

Desertification

The poor agricultural practice like shift cultivation and slash and burn cultivation results desertification.

Over grazing also result reduction of plant diversity.

Effects of modern agriculture:

- It leads to soil erosion.
- Alternation in fertility of soil
- Leads of soil pollution
- HYV (High yield varieties) encourage mono culture in highly populated areas.
- Increases disease of crop and attack of pathogen.
- Water logging condition may occur by modern agriculture practice through root zone of the crops con not get enough water.
- Salinization of crops.

Fertilizer and pesticide problem

A) Micro nutrient imbalance: -

Most of the chemical fertilizer used in modern agriculture are consist of nitrogen, potassium and phosphorous which are very essential for the crops. Excessive use of fertilizers causes micronutrients imbalance in our body.

B) Nitrate Pollution:

Nitrogenous fertilizer applied in the field often leach in to the soil and contaminate the ground water.

If excessive nitrogen of 25mg per liter appeared in water causes "BLUE BABY SYNDROME".

C) Eutrophication:

A large proportion of N and P used in crop field is washed out by run-off water to various water bodies.

Causes over nourishment of lakes and ponds etc. The process is known as eutrophication.

Due to this various algal bloom's population increases and toxic products of fertilizers affects the life in water.

D) Creating resistance in pests:

Various species of pastes are now known which can resist various types of pesticides and pesticides become immune to them. These types of pastes are known as super pastes.

E) Biological Magnification:

Many of pesticides are non-biodegradable and keep on accumulating food chain and the process is known as bio-logical magnification and the magnified pesticides are very harmful to the life system.

F) Death of non-target organism:

Many insects which are very useful for the crops are also killed by various pesticides along with the dangerous pestis.

Water logging:

Definition: If water stands on land most of the year it is called water logging.

Causes:

- Excessive water supply.
- Excessive rain.
- Poor drainage system.

Effects: In water logging conditions poor voids in the soil get filed by water and through roots of crops cannot balance their respiration and cannot get enough air to survive.

Prevention:

- Avoid excessive irrigation
- Sub-surface drainage technology

Salinity: When logging water or irrigation water i.e., Absorbed by soil and evaporated leaving behind a thin layer of dissolved salt on top soil is called salinity of soil.

Salinity effects low yield of crops and affects the soil fertility. Various salts i.e.(Nacl, $Cacl_2$, $Mgcl_2$, $Naso_4$, Na_2co_3)

ENERGY RESOURCE

Energy may be defined as the property can be converted to work.

OR

The capacity of doing work is known as energy.

Energy is available in earth in various forms and both energy production and utilization indicate countries progress.

Growing energy needs:

- Approx. 80% of worlds energy is produced by fossil fuels.
- With the growth of population and their demand the needs of energy resource are also increasing.
- In India coal, oil, water is the main source of energy.

- Commercial consumption of energy from coal is 56% and petroleum is 36% and other from natural gas and water.
- Industrial sectors consuming about 50% of total commercial energy.
- Ex-fertilizer industry, cement, paper textile, aluminum, still etc.
- The growing needs purely shown in the following lines.

ENERGY (per house-hold)	In (1970-71)	In (1991-95)
Electricity	7kwh	53kwh
Kerosine	6.6kg	9.9kg
coking gas	0.33kg	3.8kg
Firm sector	3.9%	32.5%
Energy consumption	1951	1997

Renewable energy resource	Non-renewable energy resource
These resources can be generated continuously and inexhaustible.	These resources cannot be regenerated once they are exhausted.
Ex-solar energy, wind energy, hydro-power, Geo-thermal energy etc.	Ex-coal, petroleum, natural gas, and nuclear fuel(uranium).

Advantage:

- It is eco-friendly.
- It is a in-exhaustible source of energy.
- Leads to lob creation.
- Less maintenance facilities.
- They are abundant and affordable.
- They cannot be exhausted in short period.
- The products are very easy to use.
- This energy has a great role to stabilize global energy price.

Disadvantage:

- Electricity generation capacity still not enough for demand.
- It may be unreliable.
- Requires a huge financial outlay (money for starting)
- They cannot be replacing if they exhausted once.
- The mining of these resource cause environmental pollution.
- Fossil fuels burning generates co_2 which causes global warming.

Use of alternative energy resources:

Alternative source of energy is generally referring to any group of non traditional fuel sources that does not burn fossil fuels or use of any type of natural resources which will damage/harm to the environment.
It provides many benefits over fossil fuels as less harmful and cheaper fuel price.

Solar energy:

- It is the biggest domestic use alternative energy resource till now.
- The radiation of sun light is converted to electrical energy by photo-Voltic cell or pv panel etc.
- The heat energy of sun can also be use in solar pool heating system in swimming poll cases.

Wind energy:

- Wind energy is derived from the movement of the air via wind mills and turbines etc.
- Wind energy is all about converting the kinetic energy of wind in to mechanical energy for driving pumps and machines and then in to electrical energy to power our homes.

Geothermal energy:

- This type of energy derived from the extreme heat of inner protection of the earth.
- Water heated by geothermal heat below the earth surface are pumped out to generate electricity or to heat buildings.
- Ex-Hot spring (geo-thermal heat)

Hydrogen energy:

- Hydrogen is completely clean burning fuel. Once produced, Hydrogen gas cell emit only water vapors and warm air after use.
- The major issue about this energy i.e.; mostly derived from use of natural gas &fossil fuels, so it is not as popular as other alternative energy resource.

Biomass energy:

- It is derived from the wood industry, agricultural crop, raw material from forest, house hold waste.
- Burning wood has been used as a source of fuel.
- Bio-mass energy is used in the form of bio-gas.

LAND RESOURCE

Land as a resource:

Land is a very valuable resource. It provides food, wood, fibre, medicine& many more.

- Soil is a compound of organic (dead material and plant materials) &in-organic materials (Rocks, minerals)
- The top layer of the land is called soil.

Uses:

- Land provides food, wood, minerals etc.
- Land acts a dustbin for the wastes of the modern society.
- Land nurtures (protection, care) plants and animals that when something growing provides us food and shelter.
- Land is used for constructing road, buildings, industries, statues etc.

Land degradation:

It is defined as the process of decay into quality of the soil or loss of fertility.

Causes:

- Increasing population and due to their increase food need.
- Urbanization- It causes land degradation as Agricultural land and forest get clear.
- Fertilizers and pesticides use in excess also causes land degradation.
- Human activity like deforestation, overgrazing, mining, population form industries also cause for land degradation.

Effects:

- Soil temperature (inner shape) structure are collapse.
- Loss of fertility.
- Water logging.
- Salinity of soil.
- Loss of soil economic and biodiversitylevel.

Landslides:

It is defined as the sudden collapse or downward movements of rocks, earth from a slopy ground.

Man induces landslides: (Role of human in landslides)

- Underground mining.
- Forming road in unstable slopes.

- Over-expiation of ground water.
- Movement of heavy vehicle in weak, slopy road causes landslide.

Soil erosion:

It is a process of removal of super fiscal layer of soil. The most valuable part of the soil washed in this process.

Types of soil erosion

Normal soil erosion	Accelerated soil erosion
The soil erosion caused by gradual remove of top soil by natural process.	Erosion caused by manmade activities.
The rate soil erosion is very slow in this process.	The process is very rapid than the formation of soil.

Causes of soil erosion:

- Water: Causes soil erosion in the form of rain, runoff and flood.
- Wind: Its caries away the fine particles of soil and contributes it soil erosion.
- Over grazing, mining is also causing soil erosion.
- Deforestation leads to soil erosion.
- Land slides s also a part of soil erosion.
- Construction of dams, buildings, roads etc. remove the protective vegetal cover causes soil erosion.

Effects:

- Loss of soil fertility.
- Loss of soil ability to hold water and sediments.
- Leads to complete destruction of plant growth.
- Sediment (Waste) runoff can pollute water.

Prevention:

- Contour farming.
- Terrace Farming.
- Agroforestry.
- Wind breaks.
- No till farming method.

Desertification:

It is the process by which productivity potential arid or Sami arid landfalls. The decreasing productivity is varying from 10-50%.

Causes:

- Deforestation.
- Over-grazing (increasing in cattle population).
- Mining and quarrying activities.
- Salinization.

Effect ofdesertification:

- ✓ Conversion of irrigated crop landed to desert.
- ✓ Depletion of ground water.
- ✓ Soil erosion.
- ✓ Loss of vegetal cover.

Prevention of desertification:

- ✓ Afforestation in arid areas.
- ✓ Eco friendly mining.
- ✓ Use of organic fertilizer gypsum.

Role of individual in conservation of Natural resource:

- We should follow 3R rule (Reduce, reuse, recycle).
- We should save water which is so vital for survival.
- We should save Electricity as we need Electricity in our daily life.
- To save fuel is very essential for our feature.
- Use of plastics should be in limits It takes thousand of years to decompose.
- Trees are rightly called Lungs of earth, so we should plant trees.
- We should use renewable source of energy for power generation.
- We should use natural resources judiciously.
- Public awareness is very essential for conservation of natural resources.

Equitable use of resource for sustainable life style:

- The equal distribution of natural resources should be for all irrespective of rich or poor.
- There is must be balance b/w the need and consumption, particularly for water, fuel (coal, petroleum) soil, food etc.
- The developed countries are utilizing maximum number of natural resources compared to developing countries. for ex-Japan, USA, Canada, Australia has 22% of world's population are using 86% of natural resources.
- In this process rich are becoming richer and poor to poorer.
- This process should be strictly avoided.

QUESTIONS

1. What do you understand by "Natural Resources"? Give its types.
2. State and explain the renewable and nonrenewable resources.
3. What are fossil fuels? give Examples.
4. Write note on the "problem of Natural resources".
5. Discuss the Environmental effects on deforestation.
6. Describe the benefits of dams.
7. What are effects on mining?
8. Differential between surface and Ground water.
9. What are the consequences of over exploiting of water?
10. Explain overgrazing.
11. Write about non-conventional energy sources.
12. What are the alternative service of energy?

Long Answer type Questions: -

1) Write an essay on "Natural resources".
2) Explain Deforestation. Describe its causes and control measures.
3) What is the India's water resources? Differentiate in to surface and Ground water.

4. What are mineral resources? Explain their uses. How mining affects the environment?
5. How the modern agriculture affects on the environment?
6. What are energy sources? Are they fulfilling the growing needs of energy?
7. Write an essay on coal and petroleum are main source of energy?
8. Explain soil erosion. How it happened? Give its types.
9. To explain the importance of water resources, describe the the problems from over exploitation, drought and floods.

10. Write an essay on forest resources.

11. Define the role of an individual in conserving natural resources.

UNIT-3

ECO-SYSTEM

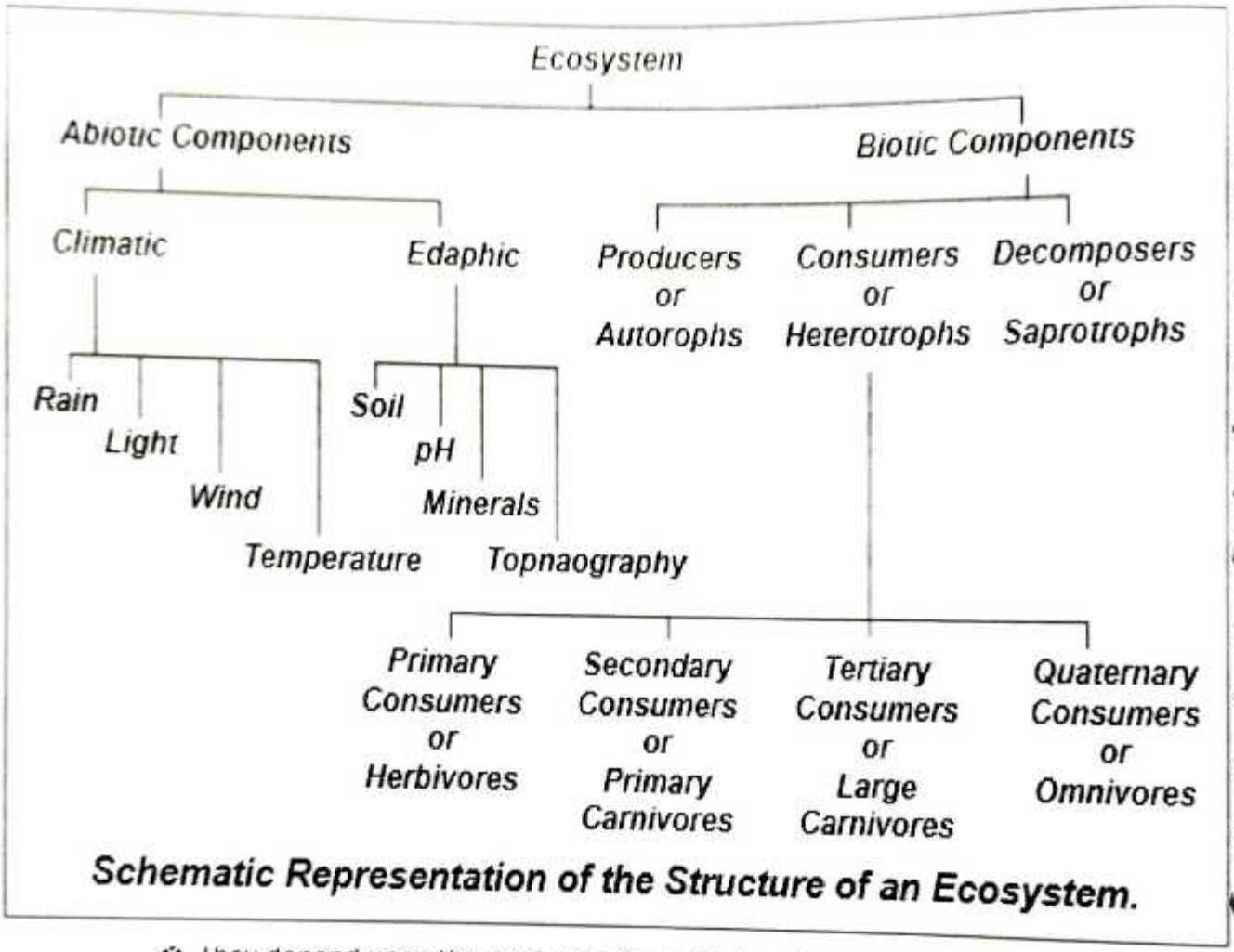
Eco-system is defined as a community of both living and non-living components in a particular area.

A system involving the interaction b/w a community of living organism with its non-living environment in a particular area.

Ecology: The study of inter relationship b/w living and non-living components in an ecosystem.

❖ A.G. Tauslay coined the word Ecosystem.

Structure of ecosystem /components of ecosystem



Schematic Representation of the Structure of an Ecosystem.

- ❖ They depend upon the producers to derive their food directly or indirectly.
- ❖ They digest their food in to simple substance to metabolize their body & release the waste to the environment.

Primary consumers:

- ❖ They are also called herbivores
- ❖ They directly depend upon producers to derive their food and survival.
- ❖ Ex-deer, cow, grass hoper, goat etc.

Secondary consumers:

- ❖ They are also known as carnivores.

- They are meat eater in nature and comparatively small in size.
- Ex-Birds, Cats, Frogs

Tertiary consumers:

- They are the large carnivores which fed on secondary consumers.
- Ex-Snakes, Jackal's, Wolves etc.

Quaternary consumers:

The large carnivores to depend upon meat for their survival are quaternary consumers.

e.g.-Tiger, lion, crocodile, shark, whale etc.

Omnivores: A animal/person eating both plants & meat is called omnivores.

Ex-Man, Bear, Dog etc.

Decomposer: They are living components which break down the complex compound of dead plants and animals into simple organic compound and ultimately into in-organic nutrients.

Ex-Bacteria, Fungi(mushroom)

Abiotic structure:

- The organic matter like carbohydrates, lipids, protein, amino acid etc. Are some important factors of abiotic structure.
- The inorganic compounds such as water, minerals, atmospheric gases etc. are some important factors of abiotic structure and have an important role in ecosystem.
- It also includes climatic factors like moisture, wind, rainfall, solar radiation etc.
- .....
  .....

Functions of ecosystem:

Producing bio-mass:

- The trees are producing bio-mass and those trees are utilized by carnivores.

Energy flow: The living components get energy by producers.

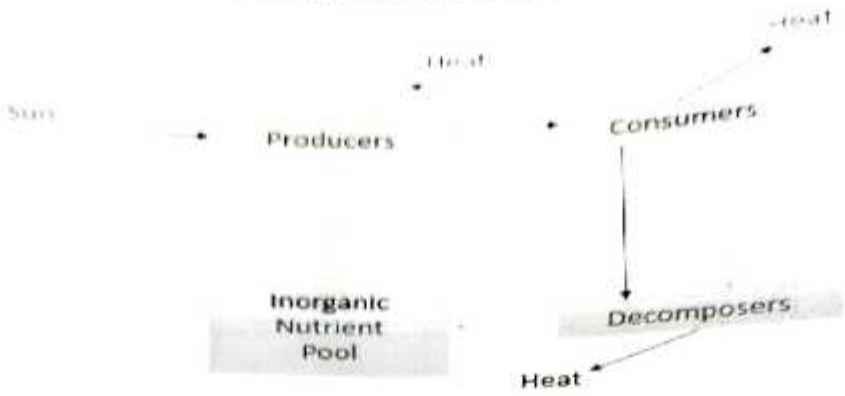
Decomposition:

As the decomposers decomposes all the waste products which helps to clean the environment.

Nutrient cycle:

- The decomposed items gradually/ultimately give us nutrition.

Energy flow in Eco-system:



- This energy store in plant tissue and then transformed in to mechanical and heat energy due to metabolic activities.
- Here, energy flows from sun to the producer and then to consumer.
- This total process is based on the 2laws of thermodynamics.

1stly:

- Energy can never be created nor be destroyed. It only transfers from one trophic level to another level.

2ndly:

- When energy is passed in an eco-system from one trophic level to the next. Only 10% of the energy will be passed on.
- [Trophic level is the position of an organism in to food chain or energy pyramid.]

Food chain:

- A food chain is a chronological pathway or an order that shows the flow of energy from one tropical level to another tropical level.
- In a community which has producer, consumer, and decomposer, the energy flows in a pathway.
- The food chain shows a single pathway of eater and eaten.
- Ex:- Grass-Deer-Tiger
  Grass-Grasshopper-Frog-Snake

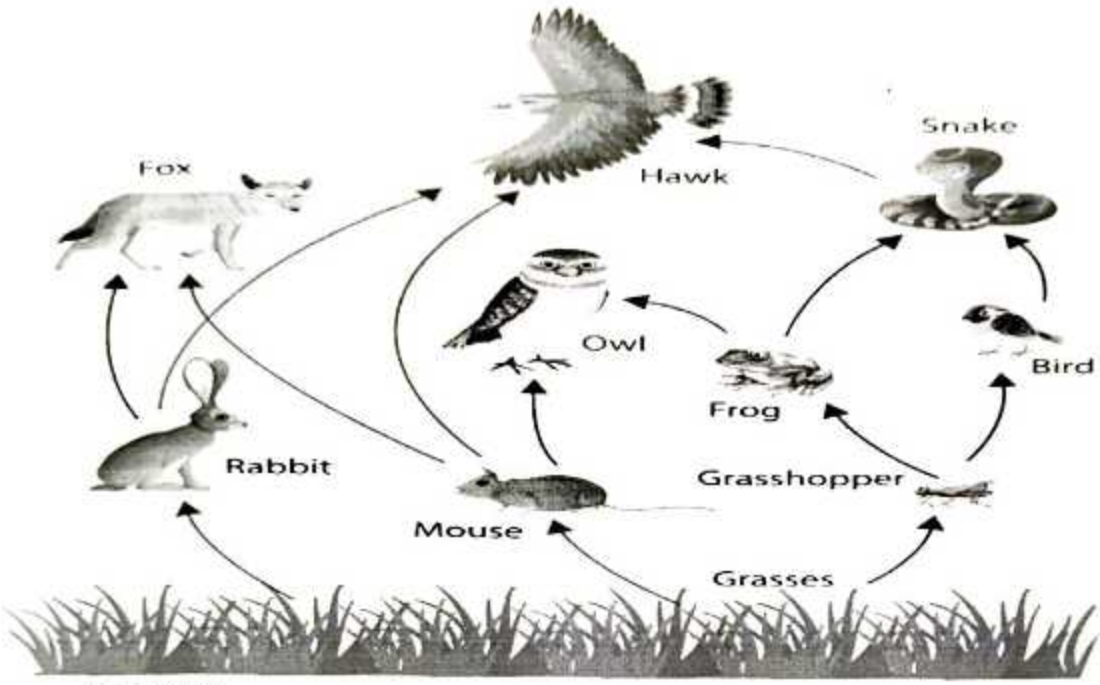
Food chain is generally two types.

- Grazing food chain
- Detritus food chain

Food web:

- Many interconnected food chains make up a food web.

- A network of food chains where different types of organism is connected at different trophic level, so that there are a number of options of eating and being eaten at each trophic level.

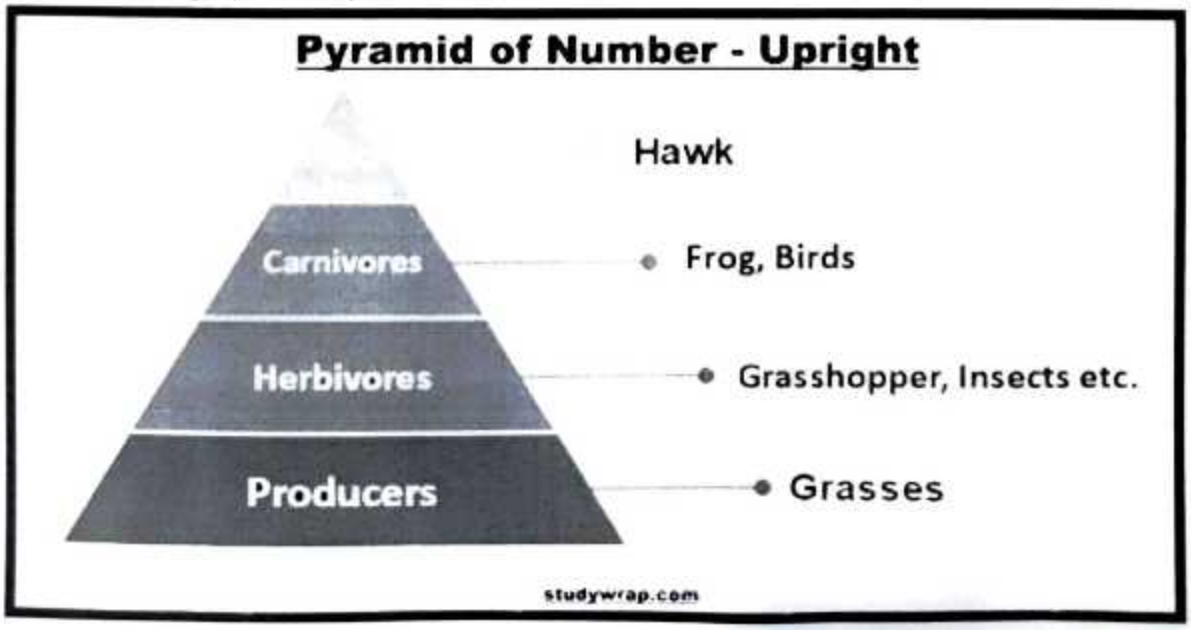


is variable.

- Pyramids represents the sequential order of eaten and eater consumer, producer etc.
- There are three types of ecological pyramids-
  1.Pyramids of number
  2.Pyramids of biomass
  3.Pyramids of energy

Pyramids of number:

- It is graphical representation

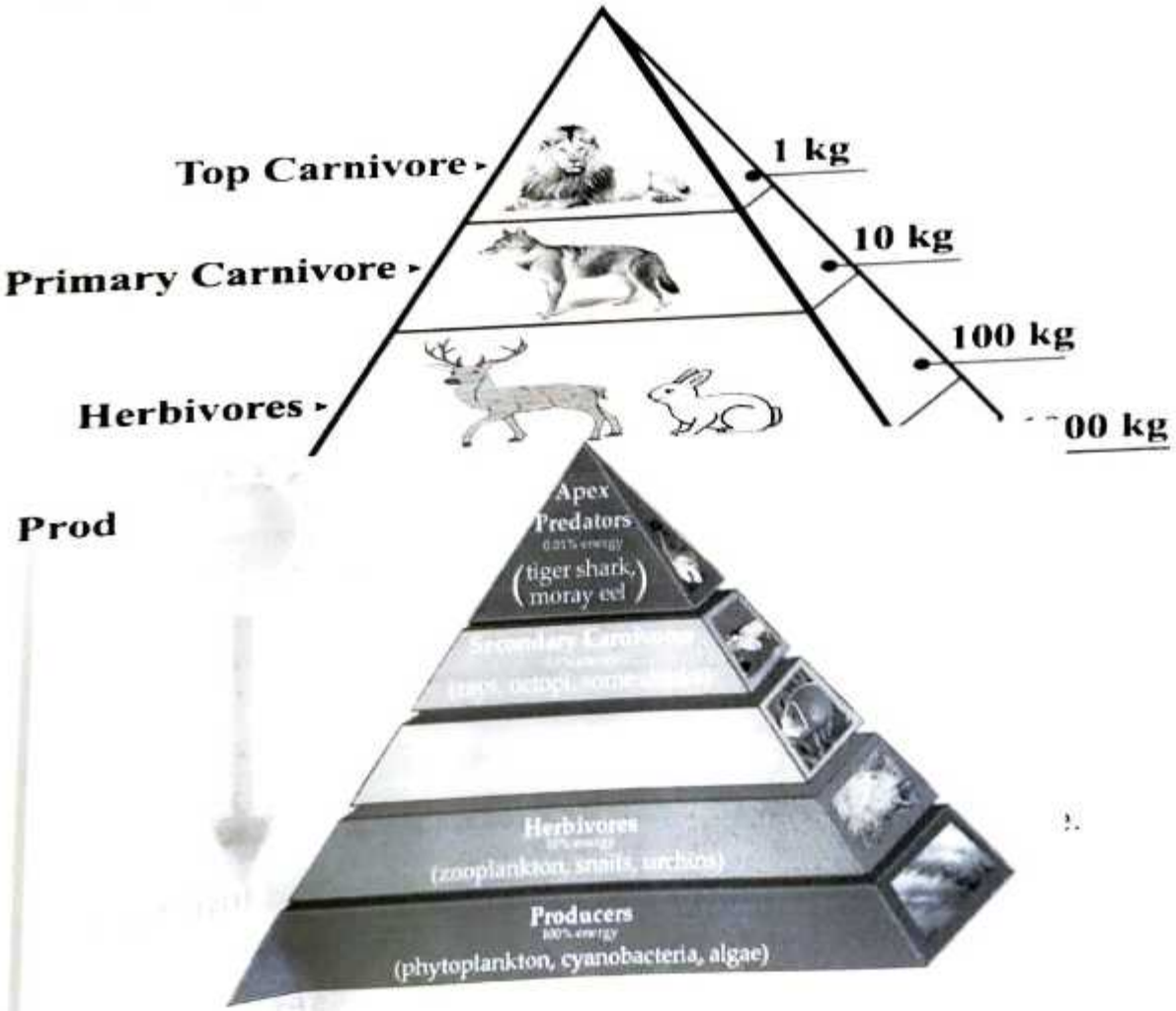


- Land number of producers are tended to form the base.
- Lower number of top carnivores occupy the tip.

Pyramid of biomass:

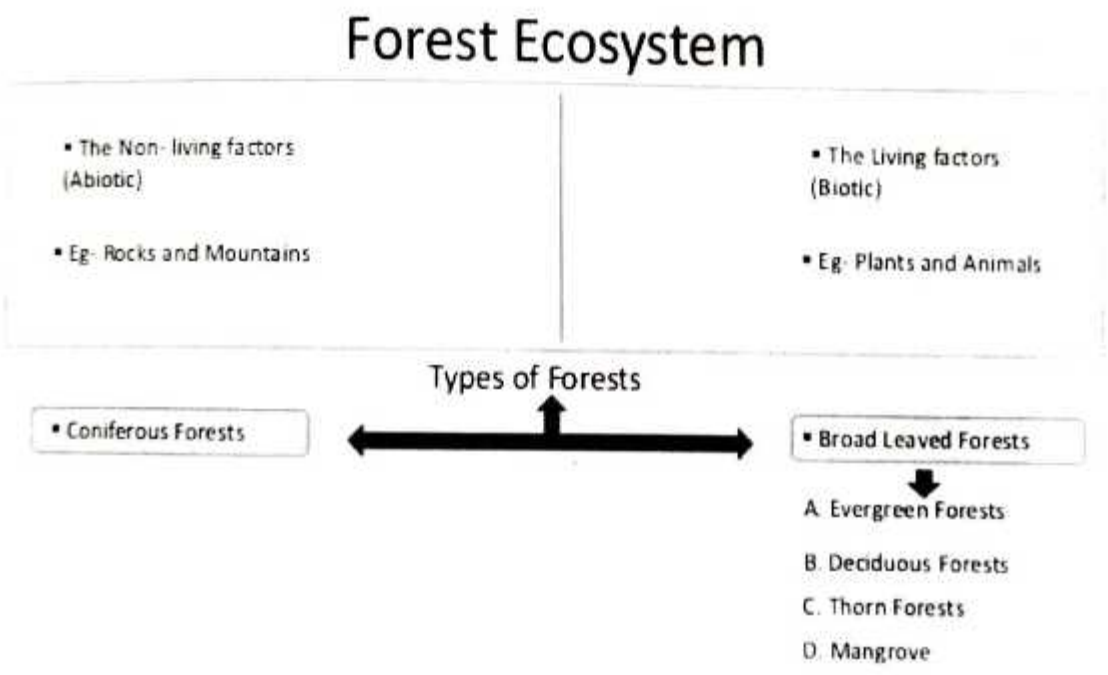
It is the graphical representation of biomass present per unit area of different trophic levels. With producers at the base and top carnivores at the tip. Biomass is calculated by the mass of each individual x numbers of individuals at each tropic level. ($g.m^{-2}$ or gn^{-3}).

Upright Pyramid of Biomass in a Terrestrial Ecosystem



Forest ecosystem:

- A forest ecosystem is a community of organism that lives without a forest.
- A forest is usually defined as a large group of trees
- In India one tenth of total forest of the world is available.
- Roughly 35% of the land is occupied by forest.



Coniferous forest:

- These forests grow in the Himalayan Mountain region.
- Temperature is very low in these areas.
- Have tall trees with needle like leaves and downward sloping branches.

Broad leave forest:

Ever green forest:

- Grow in highly rainfall area of western ghat, north eastern region of India and Andaman.
- No leafless phase.
- Only state loving trees can grow in ground layer of these type of forest. (because of the canopy overlap)

Deciduous forest:

- These are fond in a region with a balanced amount of seasonal rainfall.
- Sunlight can penetrate easily onto the forest floors.

Mangrove forest:

- Grows along the coast especially in river deltas.
- They are able to grow in both fresh and saline water in muddy area.
- These have breathing roots.

Throne Forest:

- These are found in semi- arid region.
- Have a long and fibrous root to reach water at a great depth.
- Thrones of these plants protected it self from herbivores.

Characteristics Forest of forest ecosystem:

- A distinct community of organism is available.
- A sizeable group of trees are found.
- Generation of numbers of lakes and ponds.
- Protection to biodiversity.
- Forest soil is reach in organic matter and nutrient.
- Since penetration of sunlight is low, the conversion of organic matter into nutrient is very first.

Structure and function of forest ecosystem:

Biotic component/structure:

- All living organism present in the food chain or web are biotic component.
- Three function group of a forest ecosystem are:

➢ Producers

These are of different kinds depending upon the type of forest developed in that climate.

The main species of trees in major type of forest resource are-

- Tectura grandis
- Acer(maple) pine
- Betula
- Piceagconiferous

- Consumer:

i)primary consumer: These are herbivorous which feed directly on producers.
Ex-Ants, Beetles, Spider, Grasshopper, etc.
Lager animals such as elephants, deer, giraffe.
ii)Secondary consumer: These are carnivores and feed on primary consumer.
E.g.-Birds, Lizards, Frogs, Snakes, Foxes.
iii)Tertiary consumer: These are secondary carnivores and feed on secondary consumer.
Ex-Lion, Tiger.

C)Decomposer: These include a wide variety.
Ex: Bacteria, Fungi
Rate of decomposition in tropical &subtropical forest is more Rapid than temperate forest.

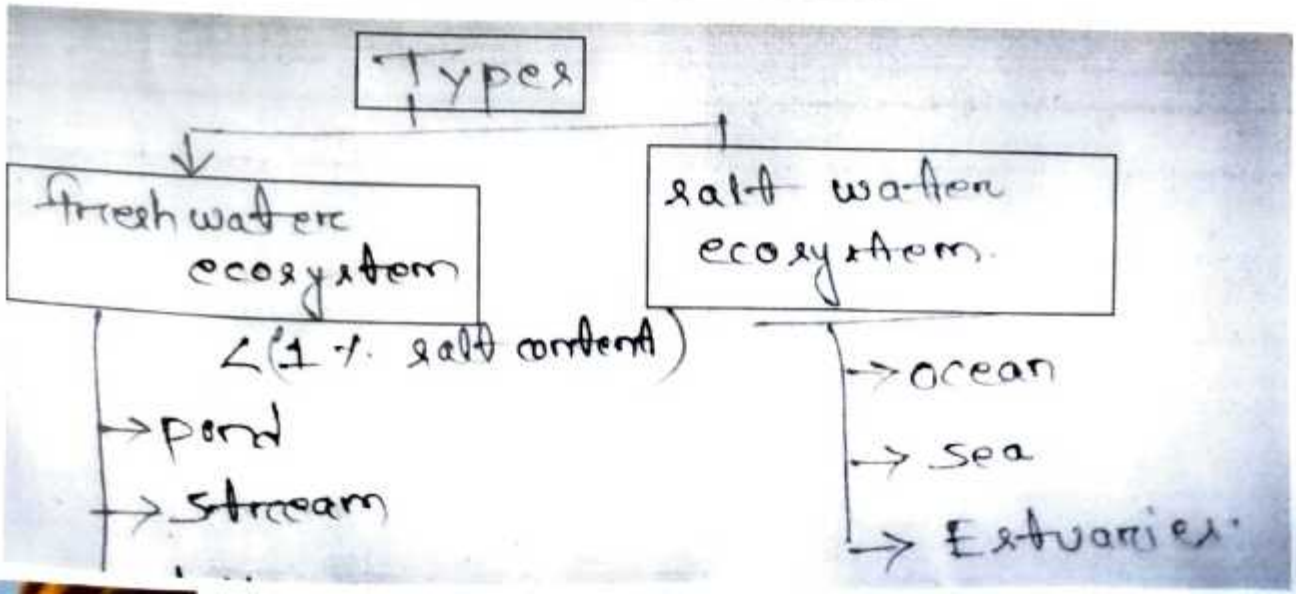
Abiotic structure:

These include basic organic and inorganic compounds present in the soil and atmosphere.

Aquatic ecosystem:

- An aquatic ecosystem is an ecosystem in a body of water.
- Communities of organism that are dependent upon each other and on their environment live in aquatic ecosystem.

TYPES OF AQUATIC ECOSYSTEM



Characteristic feature of aquatic ecosystem:

A) Special abiotic feature includes physical aspects such as quality of water.

- ✓ Clarity
- ✓ Salinity
- ✓ Oxygen content
- ✓ Rate of flow

➢ Biotic features like-

- ✓ Wet land plants may produce in dense canopies of water.
- ✓ Grown number of herbivores like snails geese and mammals which are balancing the ecosystem.
- ✓ A huge source of food production and can stabilize the economy of country.

POND ECOSYSTEM:

- ✓ An enclosed body of water that houses different living and non-living components.
- ✓ It may be artificially enclosed or naturally enclosed.

Characteristics:

- ✓ Still water
- ✓ Surrounded by bank
- ✓ Different tropical level

Structure /Component of pond ecosystem:

- ✓ Producers present as several species of algae rooted and float aquatic plants.
- ✓ Primary consumers are grazing snails, insects, small fishes etc.
- ✓ Secondary consumers like fishes and other amphibians.
- ✓ Abiotic components consist of light, nutrients, temperature etc.

River or stream ecosystem:

A large natural flow of water that crosses an area of land and goes in to an ocean or sea etc.

Usually, rivers are well oxygenated as it absorbed oxygen from air.

Characteristics of stream /river ecosystem:

- ➢ It is fresh water and free flowing water system.
- ➢ Due to mixing of water dissolved oxygen content is more.
- ➢ River deposits a large number of nutrients.

Structure of river/stream ecosystem:

- Temperature, light, nutrient and dissolved oxygen are the major abiotic component.
- Producers i.e., phytoplankton, algae etc.
- Primary consumers like snails, insects etc.
- Secondary consumers like fishes, mammals etc.
- Various bacteria are the major decomposer.

Lake ecosystem:

This is the ecosystem whose large area surrounded by the land expect a little space for the flow of water.

Lake ecosystem are may be of salty water or fresh water.

Types of lake:

- Tectonic lake-Glacial Lake
- Fluvial lake--Volcanic Lake
- Land side lake

Characteristics:

- Still water
- Surrounded by banks
- Different trophic level

Component of lake ecosystem:

- Producers present in the form of algae, phytoplankton.
- Snails, insects, etc. are the primary consumer.
- Bluegill, small fishes, Cary fish and frogs are the secondary consumers.
- Loons, grebes, herons and otters etc. are.....
- Nutrient, temperature, soil bed, light are the major abiotic components in lake ecosystem.

Sea /Ocean ecosystem:

- Oceans are the vast body of salty water that covers almost $3/4^{th}$ of the earth surface.
- It consists pf high concentration of salt and minerals.
- It also provides us iron, magnesium, phosphorous& natural gas.

Characteristics of salt water ecosystem:

- It occupies the large area of saline water.
- It helps human in commercial activities.
- It moderates (balance) the temperature of earth.

Structure /Components of sea/ocean ecosystem:

Biotic component:

- ✓ Producers are coral reefs, are mainly algae and phytoplankton, microscopic photosynthetic organism.
- ✓ Consumers (primary)are holoplankton, small fishes and crustaceans.
- ✓ Secondary consumer are fish, coral penguins, whales etc.
- ✓ Tertiary consumers are tuna, barracuda and.....

Abiotic components:

- ✓ Light
- ✓ Salts
- ✓ Temperature
- ✓ Nutrients

Estuaries ecosystem:

- ✓ An estuary is a partially enclosed coastal area at the mouth of river.
- ✓ They are highly abundant.
- ✓ They are very useful for the human beings due to high potential of food.

Characteristics:

- ✓ The zone that affects the tide of sea.
- ✓ Water characteristics are periodically change.
- ✓ The living organism in it heavy wide to relance level.
- ✓ Salinity remains high during summer and low during winter.

Structure/Component:

Biotic:

Producers are mainly photo planktons in this ecosystem.

- ✓ Primary consumers are fish, shellfish, fiter feeders etc.
- ✓ Secondary consumers are crabs, birds &small fishes.
- ✓ Tertiary consumers are fishes and birds, apex predators, humans, dolphins, snakes etc.

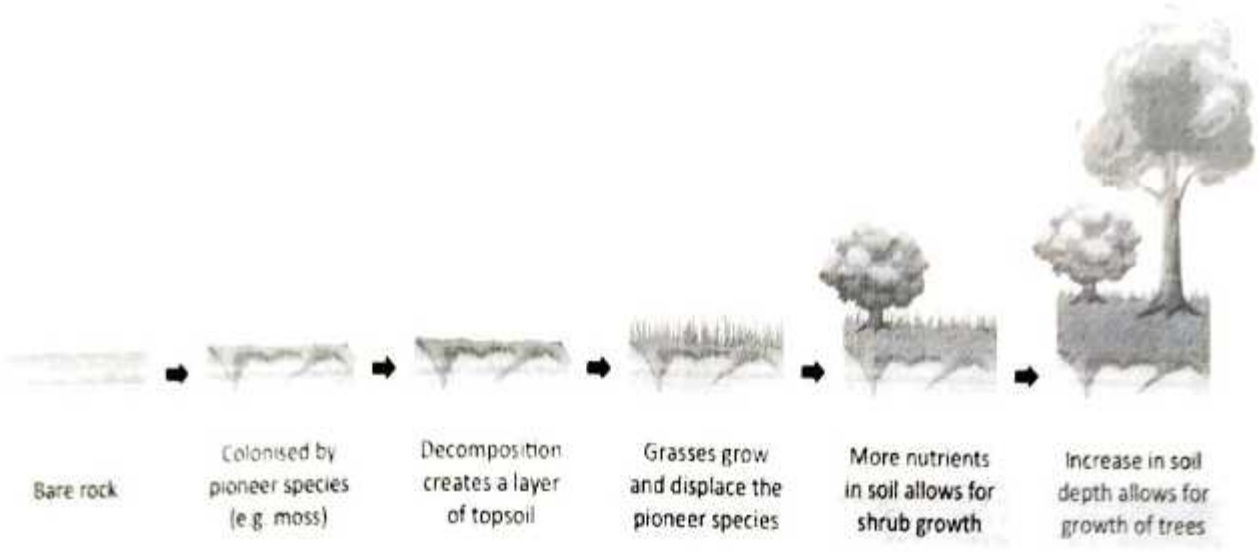
Abiotic components:

Sun light, water in estuaries,.....
Salt, temperature, dissolved oxygen, &minerals.

Ecological succession:

- ❖ It is a gradual process of change and replace.
- ❖ It can take 100 or 1000 of years.

❖ Each new community makes it harder for the previous one to survive.



Pioneer stage ⟶ Intermediate stage ⟶ Climax stage

QUESTIONS

1) Explain the concept of ecosystem.
2) Describe the structure of Ecosystem.
3) What do you mean by pyramid of energy?
4) Discuss Lake ecosystem in brief.
5) Write a note on ocean ecosystem.
6) Write about food web.
7) Give a definition of ecosystem.

Long answer type questions

1) What do you mean by producers, consumers and decomposers?
2) Taking example, describe the energy flow in ecosystems.
3) What do you mean by food chain and food webs?
4) Discuss the different types of ecological pyramids.
5) How may types of ecosystems are? Discuss the grass land types of ecosystems.
6) Write short notes on-
    i. Ecological succession
    ii. Pyramid
    iii. Estuaries
    iv. Streams

7) Write an essay on food chain.
8) Write an essay on structure on ecosystem.
9) Types o ecological succession.

UNIT-4

BIO-DIVERSITY

Bio-diversity is the shorter form of the world.

- Biodiversity which means diversity in the biological world.
- Thus, one can define bio-diversity as the degree of verity in nature which regards to biological species.
- WALTER G. ROSEN coined the word BIODIVERSITY.

Types of bio-diversity:

- ✓ Genetic diversity
- ✓ Species diversity

- ✓ Ecosystem diversity

1. Genetic diversity:
   - ✓ It induced the difference in DNA composition alonge individuals within a species.
   - ✓ This level of biodiversity refers to the total number of genetic characteristics in the genetic makeup of a species.
   - ✓ EX-Types of frogs, various dog breeds, colorful roses.
2. Species biodiversity:

   It is the effective number of different species that are represented in to a collection of individuals.

   Ex-Trees, Tiger, Various animals in forest.
3. Ecosystem biodiversity:

   It refers to the diversity present in a place at the level of ecosystem depending largely upon the availability of abiotic resources & conditions.

   Ex-Grassland, lakes rivers, pond etc.

Biogeographically classification of India:

- ➢ India is one of the 12 mega diversity countries in the world.
- ➢ The wide variety of physical feature and climatic conditions have results in a diversity of ecological habitat like forest grassland, desert etc.
- ➢ It has 47,000 species of plants and 1000 species of animals approximately and great marine diversity due to 7000 km long coastline.
- ➢ India mainly has 13 biogeographical regions.

1.Himalaya
2.Thar desert
3.Gangetic plain
4.Western ghat
5.Coromondal Malandain
6.Marine coast
7.Decan peninsula
8. Malabar
9. Laccadive island
10. Bengaline forest
11. Andaman island
12. Microbar
13. Maldives island

Value of biodiversity:

Bio diversity is a valuable nature resources for the survival of mankind. Many plants and animals including wild life and very important for human beings. They can used directly or indirectly to have consumptive, productive, social, ethical, aesthetic, option value and lie in terms of money.

Consumptive use:

Direct utilization of timber, food, fuel wood and fooder by localcommunities provides daily needs that is food, building material, medicines, herbs etc.

Productive use:

Bamboos grasses, essential oils, gums, drug, poison, insecticides, Rudra Sha, seeds, mahua etc. have their high commercial value various animals body parts are sold in commercial market at both National and international level.

Social value:

Bio diversity has been preserved by traditional societies. Their societies valued it as resource and believed that it is depletion would be great loss to their society.

Ethical value:

It is based on the principle of live and let others live. It is also related to biodiversity conservation and the important of protecting all forms. Al forms of life have the right to exit on earth. All species have an inherent right to exit.

Aesthetic value:

It means appearance. It involves appreciation of the presence of biodiversity for its beauty as well as for the contribution. People from far and wide spend a lot time and money to visit the beautiful areas where they can enjoy the aesthetic value of biodiversity.

Option values:

These values include the potential of biodiversity that are presently unknown and need to be explodes. The option value of biodiversity suggests that any species may prove to be a miracle spice someday.

Biodiversity at global, national and local levels:

A) Biodiversity at global level:

.....

c)Biodiversity at local level:

- The biodiversity of local levels can be well understand by locating points, places and zones that rich in biodiversity.
- From the following aspects we can study the biodiversity at local levels.
- Richness of species at a given place.
- Physical characteristics of habitat and vegetation in particular area.
- Change in species composition across different habitat.
- Rate of change in gradient and conditions.

Threats of biodiversity:

The following are the major causes and issues related to threats of biodiversity.

- Poaching of wild life
- Man, wildlife conflicts.

Habitat loss

- Habitat loss due to human activities and other disturbances are well known factors.
- Due to pollution and the presence of toxic and hazardous pollutants, our fresh water resources have suffered and many species of aquatic birds, fish and mammals have been threatened.
- The natural forest and grasslands which were the natural homes of thousand species are going clear day by day for conversion in to agriculture land, development products, building etc.
- Rain forest, tropical dry forest, wet land are threatened by desertification.
- Problems of acid rain and global climate change are also well known for habitat loss.

Poaching of wild life: (Poaching: - illegal exercise)

- Poaching is another threat of wild life.
- From ancient (Old) periods, hunters, collectors and smugglers are the major threat to a number of species including endanger species.
- They collected furs, horns, herbal products and a smuggled for millions of dollars.

- The alarming point in this case is that for one animal they killed more than one. It is an illegal thread and internationally banned.
- It is advised that do not poach the parts and products made from wild animals specially endangered species.

Man wild life conflict:

"Struggle for existence"

This is applicable for both man and wild animals.

- Due to habitat loss animals come out of the forest and destroy the crops and livelihood and later on they become danger to human beings.
- At last affected people killed them.
- There are so many cases of conflict b/w man and wild life. In these conflicts the group of animals are under in a vast stress.
- They suffer in pain and turn violent and destroy everything they see.
- There are number of cases, when man eating tiger was reported several people because they like human flesh rather than animal flesh.

QUESTIONS

1) Define the term "Bio diversity".
2) What do you mean by genetic, species and ecosystem diversity?
3) Define aesthetic value.
4) Discuss the biodiversity at local level.
5) What are the measure threats to biodiversity?
6) Explain the importance of biodiversity.

Long Answer type Questions?

1) Describe the detail the biological classification in India.
2) Explain values of Biodiversity. Give an account of different types of values.
3) Discuss the biodiversity of various level.
4) Write an essay on "Hot spot of Biodiversity".
5) What is conservation of biodiversity? Describe in-suit and ex-suit conservation of Biodiversity.
6) Describe Biodiversity at Global level.

Unit-5

ENVIRONMENTAL POLLUTION

Air pollution

Air pollution may define as the presence of one or more contaminants of some specific quantity for a specific duration in the outdoor atmosphere which injurious to human, plant or animal life.

Those substances which leads to air pollution are known as air pollutants.

Air Pollutants – i) Primary pollutants
ii) Secondary pollutants

i) Primary pollutants

These are directly emitted in to atmosphere and are found directly. Ex. Co, No_2, So_2, etc.

ii) Secondary pollutants

These are derived from the primary pollutants due to chemical or photo chemicals reactions in the atmosphere. Ex. Ozone, PAN (peroxy-acyl nitrate), photo chemical smog.

Cause of air pollution

There are various causes of air pollution, such as:

A) The burning of fossil fuel:
   - Sulphur dioxide emitted from the combustion of fossil fuels like coal, petroleum and other factory combustibles are the major cause of air pollution.
   - Carbon monoxide emitted from vehicles (car, bikes, jeeps trucks by incomplete combustion of fuel causes air pollution.
   - Nitrogen oxide which obtained from both natural and artificial process also causes air pollution.

B) Agricultural activities:
   - Ammonia is a very common by product from agricultural related activity and is one of the most hazardous gases in the atmosphere.
   - Use of insecticides, pesticides, and fertilizers in agricultural activities emits harmful chemicals which pollutes air as well as water.

C) Exhaust from factories and industry:

- Manufacturing industries release a large amount of "Co", hydrocarbons, organic compound and chemicals in to the air which causes serios air pollution.
- Petroleum refineries releases hydrocarbon which pollutes air with land too.

D) Mining operation:

- During the mining process dust and chemicals are released to the air causes massive air pollution.
- This is also responsible for various diseases to the workers and local residents.

E) Indoor air pollution:

- Toxic states from air conditions and refrigerators
- Household cleaning product, painting supplies toxic chemicals in the air and hence causes air pollution.

Effects of air pollution:

A) Respiratory and heart problem: Air pollution cerates dangerous disease like cancer and other respiratory and heart problems.
Children in the polluted area suffers from pneumonia and asthma.

B) Global warming: Another direct effect of air pollution is global warming.

With increased temperature worldwide, increase in sea level and melting of ice takes place due to which displacement and loss of habitats will occur.

C) Acid rain: Harmful gases like No_2 and So_2 released to the atmosphere during the burning of fossil fuel.
When it rains, the water droplets combine with these air pollutants, becomes acidic and then falls on the ground in the form of acid rain.
Acid rain can cause great damage to human, animals and crops.

D) Effects of wild life: Toxic chemicals present in the air can force wild life species to change their habitats.
The toxic pollutants deposit over the water and can also affect aquaticecosystem.

E) Ozone layer depletion: Ozone exits in the earths stratosphere and is responsible for protecting humans from harmful ultra violate rays of sun.
It is getting depleted by CFC and hydro CFC gases.

So the layer is getting thin and allows the u-v rays of sun to earth which may causes eye and skin related problems.

Control measures/Solution of air pollutant:

Use public mode of potation:

- Encourage people to use more and more public modes of tars potation to reduce pollution.
- Try to "use carpooling system."

Conserve energy:

- Switch off all electrical appliance like ACs, Refrigerators etc. when they have no use.
- A large amount of fossil fuels.

Understand the concept of Reduce, Reuse, and Recycle:

When should not throw away items that have no. In fact, reuse them for some other purpose.

Use of energy efficient devices:

CFL lights consume less electricity compared to other. They live longer, consume less electricity and help to reduce pollution by consuming less energy.

Focus on clean energy resources:

Clean energy technology like wind and geothermal should have greater use than fossil fuel.

Govt. of various countries also grants solar panels for the private homes.

Control air pollution at source.

Control air pollution by vegetation.

WATER POLLUTION

Water pollution is the contamination of water bodies (like oceans, seas, lakes, rivers ground water) usually caused due to human activity.

Water pollution is any change in the physical, chemical, or biological properties of water that will have some adverse effect for the living organism.

Types of water pollution: 1) Ground water pollution

2)Surface water pollution

Causes of water pollution:

Sewage: Emptying the drains and sewers in fresh water bodies causes water pollution. This problem is severe in cities.

Industrial waste: Industrial waste containing toxic chemicals, acid, alkalis, metallic salts etc. are source of water pollution. They also cause thermal pollution of water.

Synthetic detergents: