

② grasses, trees and shrubs, Nala plugs → streams
check dams, pits,

Social Issues And The Environment/7

it to percolate into the ground. This is enhanced by growing grasses and shrubs and planting trees (mainly local species which hold the soil and prevents its erosion in the monsoon.) The next measure is to make nala plugs in the streams, so that the water is held in the stream and does not rush down the hillside. In selected sites several check dams should be built, which together hold back larger amounts of water.

5) Thus, following are the measures adopted for watershed management.

- i) Minimizing forest clearance and removal of plant cover. ~~Stop deforestation~~
- ii) Promotion of plant cover in general and in particular over the slopes of the hills. ~~Plantation, Afforestation~~
- iii) Adoption of sound farming and forestry practices to reduce surface runoff. ~~Proper Agricultural Practices~~
- iv) Erection of props, check dams and digging pits, trenches and small check dams so that more water is retained in the area.
- v) Conservation of wetlands in the way of river channels to enhance the natural surface storage capacity of river channels.

Q.3 Write on- 'Rainwater harvesting'.

Ans: 1) Rainwater harvesting is a technique of increasing the recharge of groundwater by capturing and storing rainwater.

As our world faces serious water shortage, every drop of water we can use efficiently becomes of great value.

- ① 2) Rainwater harvesting involves collection, storage and subsequent use of water deposited by rains. In water stressed, dry regions of the world, rainwater harvesting is an ancient practice.
- ② 3) One method is to manage rainwater in such a way that it is used at the source. If as much water as possible is collected and stored, this can be used after the rainy season is over. Stored water has to be kept pollution free and clean so that it can be used as drinking water. Stored water can grow algae and zooplankton (microscopic animals). This can be pathogenic and cause infections. Thus, keeping the water uncontaminated is important.
- 4) Current technologies of rainwater harvesting require that properly cleaned roof and terrace is used to pass down water into a covered tank where it can be stored for use after the monsoon.
- 5) Another way of using rooftop rainwater harvesting is to collect it so that it percolates into the ground to recharge wells instead of flowing over the ground into rivers. The water table rises and the surrounding wells retain water throughout the year.

Q.4 Water Conservation (08-09)

(Students can get the answer for this question by adding Q2 & Q3 ie. watershed management & rain water harvesting)

Q.5 Resettlement and rehabilitation of people.

Ans: 1) The problem of resettlement and rehabilitation of people can be arises due to various developmental projects, natural calamities, unfavourable living conditions.

2) Any major project like dams, mines, expressways, or the notification of a National Park disrupts the lives of the people who live in that area and often requires relocating them to an alternative site.

3) There are some situations where the people themselves request to be relocated to a new site when people live inside or on the periphery of national park or wildlife sanctuary where they can not leave peacefully due to the nuisance of wildlife.

4) The natural calamities such as earthquake, cyclone, storm, flooding of river, heavy rainfall, water scarcity, volcanic eruptions may force people to relocate somewhere else.

5) None of us would like to give up our homes. Uprooting people is a serious issue. It reduces their ability to subsist on their traditional natural resource base and also creates great psychological pressures.

6) Resettlement not only puts pressure on the project-affected people, that has been selected for settlement but also on the people who have been living in the area. Thus, both the communities suffer and conflict over resources is possible in the future.

7) Resettlement requires alternative land which in our overpopulated country is not easily available.

8) Re-habilitation involves more than just giving the land.

9) In India lakhs of people have been displaced by the thousands of dams created since independence. The Narmada Bachao Andolan movement has shown how bitter people can get over this issue. They have fought to save their lands for decades.

10) The Government is trying to find 'good' arable land to resettle these displaced persons and provide them with adequate re-habilitation package to recover from the disruption.

Q.4 Write on 'Global Warming' 08

Ans: 1) Global Warming is also known as Green House Effect and the gases responsible for it are called green house gases.

'It is a phenomenon which occurs due to the increase in green house gases emission in the environment which increase the average temperature of the earth.'

(A) 2) The system consisting of our globe and its atmosphere, there is a balance of the rate of absorption of solar radiations and its emission back to space as infrared and heat waves. The green house gases checks the passage of infrared and heat waves from earth's crust back to space and keep it warm and hospitable. The phenomenon is similar to that of greenhouse in which the glass-enclosed atmosphere gets heated up due to its insulation from the rest of the environment.

(B) [

Hence global warming is also known as **Green House effect**.

3) The insulation of earth's surface from the outer space caused by green house gases tends to become more and more effective as the concentration of these gases rises. More heat and infrared radiations are trapped by the gaseous mantle around the globe, which accelerates the pace of global warming.

4) **Carbondioxide, methane, chlorofluorocarbons (CFC), nitrogen oxide and water vapours** is responsible for causing noticeable rise in the mean global temperatures.

5) Carbon dioxide is one of the most important green house gas which contribute 55% of global rise in temperature. It is released by various human activities.

6) **Consequences** - i) Global warming leads to melting of ice on the earth which lead to rise in mean sea level. Due to this large stretches of low-lying areas shall be submerged, ii) It shall bring Changes in wind and precipitation patterns within a single century, iii) High temperature shall cause a rise in evapo-transpiration and ground water table may be affected, iv) There will be losses of genetic resources on large scale, v) Insects and pests may increase as warmer condition could be more favourable to their growth and coupled with higher humidity pathogenic diseases shall multiply. vi) In the troposphere, green house gases provide an effective thermal insulation while in stratosphere many of these gases causing ozone depletion.

7. **Control measure**- i) Aforestation campaign, planting of herbs, shrubs, grasses, lowering of vehicular and industrial pollution is helpful in lowering the effect of global Warming.

Q.5 Acid Rain (07)

Ans: 1) Acid rain means, the presence of excessive acids in rain waters. The phenomenon of acid rains is a consequence of accumulation of huge amounts of oxides of sulphur, nitrogen and fine particulate materials or aerosols.

2) Sulphuric acid, nitric acid, various sulphate and nitrates are the main chemical constituents of these rains, though small amount of other acids like hydrochloric acid and their salts may also be present.

3) When fossil fuels such as coal, oil, and natural gas are burned, chemicals like sulfur dioxide and nitrogen oxides are produced. These chemicals react with water and other chemicals in the air to form sulfuric acid, nitric acid and other harmful pollutants like sulfates and nitrates. These acid pollutants spread up- word into the atmosphere, and are carried by air currents, to finally return to the ground in the form of acid rain, fog or snow.

- possible level if observes act of poaching or see a poached animal.
ii) Don't use wildlife products and convince other not to buy them.
iii) Reduce the use of wood and wood products.
iv) Avoid misuse of paper because it is made from bamboo and wood, which destroys wildlife habitat.
v) Do not harm the animals or birds.
vi) Create awareness about the wildlife and its conservation.

EPA

Q.10 Environment (Protection) Act, 1986. (08)

- Ans: 1) This Act is made to provide for the protection and improvement of environment and for matters connected therewith.
2) Whereas decisions were taken at the United Nations Conference on the Human Environment held at Stockholm in June 1972, in which India participated, to take appropriate, steps for the protection and improvement of human environment.
3) This Act may be called the Environment (Protection) Act, 1986.
4) It extends to the whole of India.
5) It gives power to Central Government to take all such measures for the purpose of protecting and improving the quality of the environment and preventing, control-over and abating environmental pollution.
6) By this Act Central Government may appoint officers with such designations for the purpose of this Act.
7) By this Act no person carrying on any industry operation or process shall discharge or emit or permit to be discharged or emitted any environmental pollutant in excess of such standards as may be prescribed.
8) By this law, a person empowered by the central government have a right for entry and inspection of any place.
9) Thus this Act is a set of comprehensive legislation regulating activities which cause or are likely to cause damages to the environment.
10) **Penalty -** Offences under the Act are punishable with imprisonment for a term, which may extend up to **five years** or a fine, which may extend up to **one lakh rupees** or both. In cases where the Offence continues, an additional fine of rupees **five thousand for everyday** may be imposed. No one i.e. individuals, companies or government departments are exempted from purview of the Act.
11) If we want to protect our environment we need to implement this Act much more aggressively.
12) Public concern and support is important for implementing the EPA. This must be supported by the media, administrators, policy makers who together can influence and prevent further degradation of our environment. Each of us has a responsibility to make this happen.

Q.11 Write on Environmental ethics. (S-2008, 09)

Ans: Environmental ethics deals with the issues related to the rights of the individuals and are fundamental to the life and well-being.

It concerns with the needs of the present and future generation both. It also deals with the rights of every living creature on the earth. These include

- i) Right to utilization and distribution of resources.
- ii) It also includes the distribution of the resources at different levels. It concerns with who owns the resources and how they are distributed. For eg. It deals with the equity and disparity in the northern & southern Countries. People in the economically advanced nations use greater amounts of resources and energy. Also they create large amounts of waste.
- iii) It deals with the urban and rural equity issues. The common property of rural communities has increasingly been used to supply the needs of the urban sector. The rural sector supplies food and a part of energy needs i.e. fuel woods to the towns and cities.
- iv) The important issues included is the need for gender equality. It especially concerns with the rural sector, where the Women work longer hours than men, but paid less. Women have not been given an equal opportunity to develop & live better life.
- v) The rights of animals to live & flourish as a part of ecosystem etc. are also a part of environmental ethics.

Q. 12 Write on Forest Conservation Act (08)

Acs: i) The Forest Conservation Act 1980 was formulated keeping in mind the importance of the forest

- ii) It was amended in 1988. The act gave the Government and Forest department the power to create Reserved Forest, and the right use of the Reserved Forest. It also created protected forest also called village forests and these were governed by the local people or the village community.
- iii) Between 1952 & 1988, the extent of deforestation was increased and it became essential to formulate, a new policy on forests and their utilization.
- iv) The new policy helped to control the over exploitation of forests and conserve biodiversity.
- v) It also valued meeting the needs of common people for food, fodder & fuel wood.
- vi) The act was enacted to control deforestation. The act made it possible to retain greater control over the frightening level of deforestation in the country.
- vii) According to this act, No person is allowed to clear or cut forest, set fire to a reserve forest, collect timber, bark or leaves. It found to have such activity it is punishable with imprisonment of six months or fine which may extend to Rs. 500 or both.

Q.13 Write on The Air (Prevention & Control of Pollution) Act, 1981.

(08)

Ans: i) With the increasing industrialization and tendency of majority of industries to congregate in areas which are heavily industrialized, the problem of air pollution begun to felt. In view of increasing air pollution, a decision was taken at the June 1972 united nations conference held at Stockholm, the govt. decided to implement to decisions related to the

* Stockholm, the govt. decided to implement to decisions related to the

ii) Air (Prevention & control of air pollution) bill was introduced & passed by preservation of the quality of air & control of Pollution) bill was introduced & passed by both the houses of parliament and came into force on 16th may 1981 as Air

(prevention & control of pollution) Act 1981.

iii) It is an act to provide for the prevention, control & abatement of air pollution, for the establishment with a view to carrying out the aforesaid purposes, of Boards, for conferring on & assigning to such boards powers and functions relating mere to & for matters connected there with

iv) **WHEREAS** decisions were taken at the United Nations Conference on the Human Environment held in Stockholm in June 1972, in which India participated, to take appropriate steps for the preservation of the natural resources of the earth, which among other things, include preservation of the quality of air and control of air pollution.

v) It is considered necessary to implement the decision aforesaid in so far as they related to the preservation of the quality of air & control of air pollution

vi) It is enacted by parliament in the 32nd year of the Republic of India and called Air (Prevention and control of pollution) Act, 1981.

vii) It is Implemented by all the state pollution control boards & the CPCBS directs for the powers & function.

viii) It empowers the CPCB & SPCB to declare the air pollution control areas, to give instructions for ensuring standards for emission from automobiles. Restrictions on use of certain industrial plants.

ix) Powers to take samples of air or emission & procedure to be followed. Reports of analysis and appeals.

To imply the penalties and punishments regarding the violation of the act.

fine

all the aspects in the environment.

iii) GIS, Remote sensing and Aerial photography are helpful for gathering the information. Digitalized toposheets or satellite images helps the experts in land use planning, resources management, introduction of various environmental issues & find remedies.

iv) The internet with its website helps to get appropriate information for any study of environment management planning.

v) It assists students and scientists to help increase public awareness about pollution, population explosion, environmental degradation and other issues.

vi) Specialized soft wares are developed to analyze data for epidemiological studies, population dynamics, etc.

vii) Regarding the health issues it helps in providing the knowledge of infection rates, mortality rate, and etiology of a disease.

eg. Karnataka's GIS scheme, Bhoomi has helped the farmers in those areas to get the records of rights, finance & crops from a computerized information without any harassment & bribes.

viii) Karnataka has a computerized data of 20 million records of land ownership of 6.7 million farmers in the state.

Q. 8 Environment & Health (08,09)

i) Env. health, as defined by WHO, comprises the aspects of human health and the effects of the environmental conditions on the health.

ii) Environment changes are the grounds for various changes in the health are one of the most important triggers in increasing awareness, for better environment management.

iii) Modern development are a promising hand for up gradation & care of life, but at the same times is becoming a cause of environmental degradation. This degradation has increased the health problems.

iv) Modern medicine promise to solve many of these problems, but the resistance developed by the infections organisms again creates new problem.

These are determine by the physical, chemical, biological, social & psycho social factors in the env.

v) Climate & weather affects the human health. Public health depends on the two units of availability of good quality food, safe drinking water & adequate shelter. The natural disasters like storms, hurricanes, droughts, flood & anthropogenic hazards like the industrial gas missions, leakages, waste generated are responsible for the epidemics, killing many people every year. These factors triggers the epidemics of malaria & other water borne diseases.

iv) eg. Bhopal gas tragedy (on Dec. 2, 1984) due to the careless acting of industry & poor regulatory controls is stick the cause of ill-health in the urban center. It took lives of about 8000 people during the first week & another

8000 later, of the total exposed 5,20,000 people. The impacts on like survivors to visible even today.

xv) Tens of thousands of people in the world die due to traffic accidents owing to the mis management of traffic conditions, inadequate facilities for first aid, inability to reach the hospital in time and head injuries etc.

xvi) Population growth & the over burden on the resources, threaten the environmental integrity & directly affects the health of every individual.

Remedies & strategies:

- i) Sustainable use of natural resources.
 - ii) Strategies to provide clean potable water & nutrition to all.
 - iii) Provisions for clean energy sources and renewable energy resources that do not affect health.
 - iv) Changing agricultural patterns, using organic farming on IPM.
 - v) Adequate facilities for industrial workers and special methodologies for reducing emissions from industries..
 - vi) Key factor is to control human population and consume less environmental goods which could lead to health for all.
 - vii) Up raising the standard of living & proper environmental management.
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Unit - 4

NATURAL RESOURCES

Natural resources are important for the sustenance of life and existence of mankind. In this chapter we shall discuss.

- 1) Natural resources
- 2) Its associated problems.
- 3) Various resources
 - i) Food resources
 - ii) Mineral resources
 - iii) Land resources
 - iv) Forest resources
 - v) Energy resources
- 4) Problems caused by Dams
- 5) Soil erosion
- 6) Role of an individual in conservation of natural resources.

Q.1 Write on Natural resources and its associated problems. (08)

Ans. Natural resource:-

- 1) Anything which is useful to man or can be transformed into a useful Product or can be used to produce a useful thing, can be referred to as a **resource**. A natural resource is the resource obtained from nature.
- 2) The sum of all physical, chemical, biological and social factors which compose the surroundings of man is referred to as environment and each element of these surroundings constitutes a **resource** on which man depend in order to develop a better life.

3) Types of Natural Resources:- Natural resources are classified as i) Renewable and ii) Non-renewable resources.

Renewable resources are those which are reproducible and are obtained from the biomass of living organism, e.g. forest and fish. Resources which are not reproducible and are obtained from the limited non-living reserves are called **non-renewable resources**. E.g. coal and metals.

Natural Resources

Renewable

(perment harvest possible)
e.g. water, biological living resource

Non-renewable

(Once gone no replace)
e.g. coal, oil, natural gas.

Natural resources and associated problems:

- 1) Renewable resources though regenerated, but nature has its limitation to renew it. If our consumption rate is greater than the regeneration rate, these renewable natural resources tend to act as non-

renewable resources. 2) Increase in population rate also increase the consumption of various natural resources and deplete the resources.

3) **The unequal consumption of natural resources** :- Currently, a major part of our natural resources are consumed by the developed world. Per capita (per individual) consumption of resources of the developed countries is upto 50 times greater than in most developing countries. Energy from fossil fuels is consumed in much greater quantities in developed countries. Advanced countries also produce over 75 % of the global industrial waste and greenhouse gases.

To overcome the above problems following' strategies should be followed:

i) **Landuse Planning**:- Land is the basic of all the developments. It is necessary for food production, animal husbandry, industry, and for our growing human settlements. Intensive landuse are frequently extended at the cost of our forests, grassland, wetlands and deserts. Thus it is essential to evolve a rotational landuse policy that examines how much land must be made available for different purposes and where it must be situated. Scientists today believe that at least 10 % of the land and water bodies of each ecosystem must be kept as wilderness for the long term needs of protecting nature and natural resources.

ii) **The need for sustainable lifestyles** - Each one of us should adopt certain basic practices such as avoiding our wasteful behaviour towards various natural resources. Attitude of fair sharing of global resources among the living beings of the world, learning to live in harmony with nature, a stabilized population the long term conservation of biodiversity, the careful long term use of natural resources, and preventing the degradation and pollution of the environment.

Q.2 Write on food resources (06,07,09)

Ans: Each of us requires sufficient food to provide energy to carry out our day to day activities and materials from which our bodies can be built and maintained in healthy state. Today our food comes almost entirely from agriculture, animal husbandry and fishing. Though food comes from these sources. Each of these has its problems.

Following are the problems of various food sources:

a) **Agriculture** :- 1) Modern pattern of agriculture is polluting our environment and soil by overuse of chemicals in the form fertilizer and pesticides. 2) Continuous irrigation leads to the problem of salinization and water logging which affected the large amount of agriculture. 3) Most of our large farms grow single crops (monoculture). If this crop is hit by pest, the entire crop can be devasted leaving the farmer with no income, 4) Globally, 5 to 7 million of farmland is degraded each year. 5) The loss of genetic diversity in crop plants as out of 50,000 known edible plants, only 15

varieties are grown which fulfill 90 % worlds food. 6) With each generation, farms are being subdivided making unable to support a family on farm Produce alone.

b) **Animal Husbandry** - As living standard is improving, people prefer eating more nonvegetarian food. As people change from eating grain to meat, the world's demand for feed for livestock also increases which is also based on agriculture. This uses more land per unit of food produced and the result is that world's poor do not get enough to eat.

c) **Fisheries** 1) Fish is an important source of protein in many parts of the world. This includes both marine and fresh water fish. In several parts of the world fish catch has dropped due to overfishing. 2) In 1995, FAO reported that 44 % of the world's fisheries are fully exploited, 16% are overexploited, 6 % are depleted and. only 3 % are gradually recovering, 3) Mechanized trawlers and small meshed nets leads to over exploitation of fisheries and ultimately reduce the fish production.

To overcome these problems following measures can be implemented-

- 1) Available land acreage, should be properly and judiciously utilized.
- 2) Soil fertility should be increased through wise use of fertilizers and Organic manures.
- 3) High yielding and disease resistant plant varieties should be introduced.
- 4) Mixed cropping should be practiced wherever possible.
- 5) Integrated and balanced use of available water sources, surface and ground water should be made.
- 6) Integrated pest management practices should be preferred over total reliance on chemical pesticide.
- 7) Soil erosion and loss of nutrients should be prevented by maintaining vegetation cover throughout the year.
- 8) Exotic.(foreign) varieties should be introduced only after due consideration of long term impacts.
- 9) Co-operative farming practices can be helpful.
- 10) Population control through family welfare program should be implemented.
- 11) Equitable distribution of food to all to avoid future food conflict and food security.
- 12) Small farmers should be supported so that they remain farmers.
- 13) Growing multiple varieties of crops to avoid total failure.
- 14) Sustainable fishing.
- 15) Conservation of wild relatives of crop plants in national parks and wildlife sanctuaries.
- 16) Expanding the network and coverage of our protected areas.
- 17) Collections of germplasm, seed banks and tissue culture facilities to prevent extinction of wild relatives of crops.

fossil fuels can cause
fuels emits oxides of sulphur and nitrogen into the atmosphere.

COAL

It is essentially carbon and is mainly used as a combustion fuel. The large-scale use of coal began with the Industrial Revolution in the 19th century. As the number of industries increased, demand for more sources of energy grew. Coal is the product of plants, mainly trees that died tens or hundreds of millions of years ago. Due to water logging in low-lying swampy areas or in slowly sinking lagoons, dead trees and plants, did not decompose as they normally would. The dead plant matter was covered with water and protected from the oxidizing effect of air. The action of certain bacteria released the oxygen and hydrogen, making the residue richer and richer in carbon. Thick layers of this carbon-rich substance, called peat, built up over thousands of years. Pressure and temperature further compressed the material. This aided the process of producing coal as more gases were forced out and the proportion of carbon continued to increase. The carbon slowly metamorphosed into coal over millions of years.

There are three main types of coal: lignite, bituminous, and anthracite. Lignite and bituminous have a lesser percentage of carbon therefore burn faster. They release a great deal of pollutants into the atmosphere. Anthracite has about 98% carbons and therefore burns slowly and releases much less smoke. Coal of all types contains sulphur to some degree. Sulphur is the worst of the pollutants and causes damage to human health and to vegetation. Though petroleum gained importance over the 20th century and continues to do so, coal remains essential for the industrial sector. It is the principal heat source for electricity generation in most countries and is used directly in such heavy industries as iron and steel making.

Until recently, most coal came from underground mines. But now there are a large number of opencast mines. Underground coal mines are notorious killers due to roof falls and explosions. Accidents have resulted in the deaths of hundreds of miners. Almost 80% of today's coal comes from surface strip mines (opencast mines), which is much safer. Huge earth-moving equipment strips off the soils and rocks covering the buried coal seams. The land is backfilled and returned to normal after the coal has been removed, thereby repairing the landscape.

ECOSYSTEM

Q.1 What is Ecosystem ? Write the structure and function of ecosystem. (06, 08, 09)

Ans: Ecosystem :-

1) The living organisms and their non-living (abiotic) environment are inseparably inter-related and interact upon each other. (Any unit in which there is interaction between organisms and their physico-chemical environment is called ecosystem. Ecosystem is the functional unit of ecology.

2) The complex system, in which interactions between the different components of the environment occur, is referred to as an ecosystem.

3) "The living community of plants and animals in any area together with the non-living components of the environment such as soil, air, and water constitute the ecosystem."

4) An 'ecosystem' is a region with a specific and recognizable landscape form, such as forest, grassland, desert, wetland or coastal area.

5) Structure and function of ecosystem - The structural aspects of the ecosystem include various non-living (abiotic) and living (biotic) part that are linked to each other.

i) Abiotic components:

The non-living components of an ecosystem are the amount of water, inorganic substances (C, N, CO₂, H₂O) organic compounds (protein, carbohydrate, lipids) and climatic condition (temperature, light duration and intensity, etc.)

ii) Biotic components:

The living components of the ecosystem includes various plants, animals and decomposers. Plants are the producer of the ecosystem, as they manufacture their own food by using energy from the sun. Therefore these are 'Autotrophs' i.e. self food producing. In the forest, these form communities of plant life. In the sea, these include tiny algal forms to large seaweed. All other forms of life depend upon other so they are called 'Heterotrophs'. They are also called the consumers. The animals which live on the producers are called herbivorous animals or the primary consumers. The herbivorous animals include the hare, deer, elephants, etc. In the sea there are small fish that live on algae and other plants.

The animals which live on the herbivores are called carnivorous animals or secondary consumers. In our forest the carnivores are tigers, leopards, jackals, foxes and small wild cats. In the sea, carnivorous fish live

on other fish and marine animals.

Decomposer or detritivores are a group of organisms consisting of small animals like worms, insects, bacteria and fungi. Which break down dead organic material into smaller particles and finally into simpler substances that are used by plants as nutrition. Thus, decomposition is a vital function in nature, as without this, all the nutrients would be tied up in dead matter and no new life would be produced, the cycling of materials will stop and the earth will be full of dead organic matter.

- ★ **6) Functional aspects** - i) It includes energy cycles, food chains, nutrients cycles bio-geochemical cycles, diversity interlinks between organisms and evolution.
- ii) Every ecosystem has several interrelated mechanisms that affect human life. These are the water cycle, carbon cycle, oxygen cycle, nitrogen cycle and energy cycle. All the functions of the ecosystem are in some way related to the growth and regeneration of its plant and animal species,
- iii) The energy cycle is based on the flow of energy through the ecosystem. The energy from sunlight is transferred from producers i.e. plants to consumer i.e. animals through food chains. Food chain is the series of organisms fixing energy, eating and being eaten. Food chain can be traced in any ecosystem such as grass-grasshoppers-frogs-snakes and vultures in grassland. The energy in the ecosystem can be depicted in the form of a food pyramid or energy pyramid. The food pyramid has a large base of plants called producer. The pyramid has a narrower middle section that depicts the number and biomass of herbivorous animals. The apex depicts the small biomass of carnivorous animals,
- iv) When plants and animals die, this material is returned to soil after being broken down into simpler substances by decomposers, become available to plant again. Thus materials continually keep on cycling i.e. entering into the living system and through death and decay returning to soil and atmosphere. This process is called mineral circulation or the biogeochemical cycle.

Q.2 Describe ecological pyramids. (07, 09)

Ans: The transfer of energy from the source in plants through a series of organisms, by eating and being eaten, constitutes food chains. At each transfer a large proportion of energy is lost in the form of heat. These food chains are not isolated sequences, but are interconnected with each other. This interlocking pattern is known as the food web. Each step of the food web is called a trophic level. These trophic level together form the ecological pyramid. The ecological pyramids are of three categories 1) of number 2) of biomass and 3) of energy of productivity.

- 1) **Pyramid of numbers** - i) In pyramid of numbers the trophic structure is depicted in terms of numbers of organisms present per unit

area. ii) This deals with the relationship between the numbers of primary producers and consumers of different order. At the base of such a figure is always the number of primary producers and the subsequent structures on this base are represented by the numbers of consumers at successive levels. The top represents the number of top carnivores in an ecosystem.

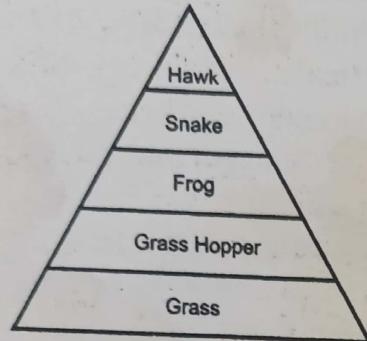


Fig. (a) Upright pyramid of numbers in herbaceous ecosystem

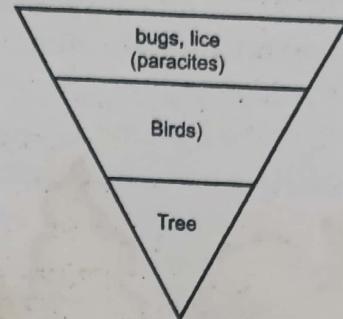


Fig. (b) Inverted pyramid of number in a tree ecosystem

iii) In fig. (a) The grass and weeds or the crop plants are in very large number or organisms forming a food chain. Fig. (b) illustrates an instance where the number of primary producers (a tree) is less than that of herbivore eg. birds feeding upon the trees fruits. The number of parasites like bugs and lice living and feeding upon the birds, body is still higher.

2] Pyramid of biomass- In pyramid of bio-mass the trophic structure is depicted in terms of biomass per unit area. When the total mass of individuals at each trophic level is plotted successively, a gradually tapering pattern emerges as long as the sizes of the component organisms do not differ significantly. In case where the size of individual is tremendously different, the pyramid of biomass is usually of inverted type.

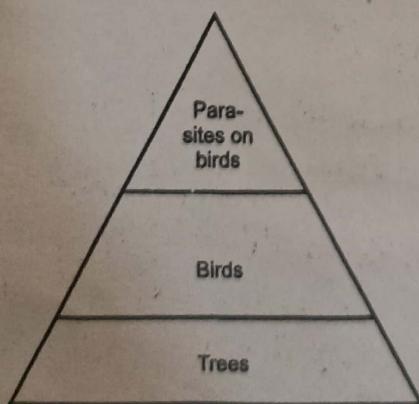


Fig. - Upright pyramid as the biomass of green plants are highest and decreases with successive trophic level

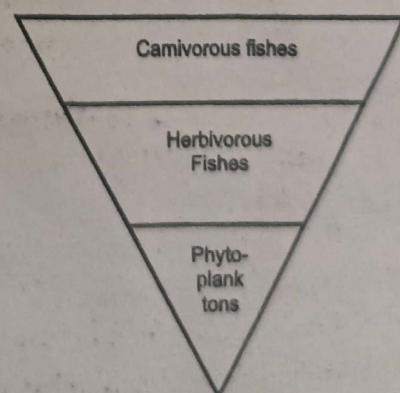


Fig. - Inverted pyramid as biomass of phytoplankton is less than consumers.

3] Pyramid of energy-

- i) As against the pyramids of numbers and biomass the shape of the pyramid of energy is always upright because in this the **time factor** is always taken into account. The pyramid of energy represents the **total quantity of energy utilised** by different trophic level organisms of an ecosystem per unit area over a set period of time (usually of energy utilized by different trophic level organisms of an ecosystem) per unit area over a set period of time. Pyramid of energy wherein the trophic structure is depicted in terms of rate of flow of energy or productivities,
- ii) In fig. Organisms of two ecosystems a **terrestrial** and an **aquatic** are shown. The **quantity of energy trapped** by green plants in an area over a period say one year is highest compared to that of organisms of other trophic levels and therefore the base of the pyramid is broad. In aquatic ecosystem the total energy content that the generations of phytoplanktons trap in course of a year is certainly much more than that of only a few generations of herbivores fishes in the corresponding time and space. The energy content of top carnivores is the least. Therefore the pyramid of energy can never be of any other shape except upright pyramidal.

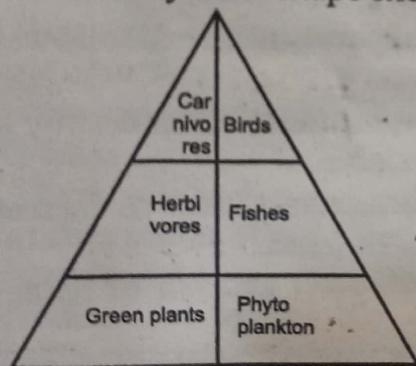


Fig. - Pyramid of energy - Total energy contents utilixed by primary producer is always higher compared to energy utilization by successive trophic level.

Q.3 Write on -forest ecosystem. (07,09)

Am: The word forest is derived from the latin word 'foris' meaning outside.

In ecology forest is defined as '**A plant community predominantly of trees and other woody vegetation usually with a closed canopy**'.

Forests are formed by a community of plants, which is predominantly structurally defined by its trees, shrubs, climbers, and ground cover.

The forest ecosystem has two parts-

- A) The non-living or abiotic aspects of the forest** - The type of forest depends upon the abiotic conditions at the site. The abiotic factors are
- climate or aerial factors** which includes light, temperature, rainfall, humidity, atmosphere,
 - Topographic or physiographic factor** which include altitude, direction of mountain chain and valleys, steepness,
 -

Edaphic factors which include soil, its physical and chemical properties.

B) The living or biotic aspects of forest - The plants and animals are the biotic aspects which form communities that are specific to each forest type. These include i) **Producers** - which includes trees, shrubs, herbs, grasses, ii) **Consumers** - Which include primary consumers, secondary consumers, tertiary consumers and iii) **Decomposers or Scavengers** - Which include bacteria, fungi, etc. which decompose dead plants and animals.

As plant and animal species closely dependent on each other, together they form different types of forest communities. Man is a part of these forest ecosystems and people depend on the various forest directly or indirectly.

Importance of Forest ecosystem:

- i) Forest provides variety of products including fuel wood or timber.
- ii) It plays an important role in controlling local climate and water regimes.
- iii) Forest provide fruit, roots, herbs, medicinal plants, fodder, fiber, cane, gum etc.
- iv) Forest product are of great economic value,
- v) Wood ash by burning branches and leaves act as a fertilizer for crops such as rice.
- vi) forest services include the control of the flow of water in streams and river.
- vii) Forest cover reduces the surface run-off of rainwater and allows groundwater to be stored.
- viii) Forest absorbs carbon dioxide and release oxygen, we breathe,
- ix) The wild relatives of our crop plants and fruit trees have special characteristics in their genes which are used to develop new crops and newer varieties of fruit.

Threat to the forest ecosystem -

- 1) If timber is felled beyond a certain limit, the nature can not regenerate it. Gaps in the forest change the habitat quality for its animals, and more sensitive species can not survive.
- 2) We are now creating more and more goods that are manufactured from raw materials derived from forest. This changes the ecosystem into a wasteland.
- 3) Rapid population growth, together with, urbanization, industrialization and increasing use of consumer goods, lead to the over utilization of forest produce.
- 4) India's forest cover has decreased from about 33 % to 11 % in the last century.
- 5) The increasing use of wood for timber, wood pulp for paper, results

in continual forest loss.

6) As the forest is fragmented into small patches its wild plant and animal species become extinct which can never be brought back.

Conservation of forest ecosystem:

- 1) We can conserve forests only if we use its resources carefully by using alternate sources of energy instead of fuel wood.
- 2) There is a need to grow more trees than are cut down from forest every year for timber.
- 3) Afforestation needs to be done continuously.
- 4) The natural forests with all their diverse species must be protected as national parks and wildlife sanctuaries.

Q.4 Write on-aquatic ecosystem.(06, 08)

Ans: The aquatic ecosystem comprise of the marine environments of the seas and the freshwater systems in lakes, rivers, ponds and wetlands. Lakes, ponds forms the **stagnant water ecosystem** and rivers, streams forms the **running water ecosystem**.

The special abiotic features are its physical aspects such as the quality of the water, which includes its clarity, salinity, oxygen content and rate of flow.

The biotic component involve **producers**- which includes phytoplankton, **primary consumers**- which includes zooplankton, tons **secondary consumer**- which includes insects and fishes, **tertiary consumers**- which includes large fishes, and **decomposers**- which includes bacteria, fungi, etc.

A) Freshwater ecosystem-

i) It may have **running water** (rivers, streams) or **stagnant water ecosystem** (pond, lake) The spectrum of inorganic salts, dissolved gases and organic matter in dissolved state in freshwater system is highly variable.

ii) **Primary producers** of aquatic systems are fresh Water algae. In shallow regions rooted plants occur. The zone of deeper waters is occupied by phytoplankton. In running waters those organisms predominate which have some attaching device to attach themselves to some substrate."

iii) Frogs, snakes and considerable variety of adult and larval insects populate the margins of water body. In deeper zones zooplankton, protozoans, fishes, amphibians and larger insects found. The zone near the bottom consists mainly of decomposers which live on dead and decaying organic matter.

B) Marine ecosystem - i) Covering more than 70 percent of the Earth's surface and with an average depth of 3750 m and with a salinity averaging

Percent, marine ecosystems are of singular ecological significance, ii) The Indian ocean, the Arabian sea and the bay of Bengal constitute the marine ecosystems around peninsular India. In the coastal area the sea is shallow with further away, it is deep. Both these are different ecosystems. The producers in this ecosystem vary from microscopic algae to large seaweeds. There are millions of zooplankton and a large variety of invertebrates which fish, turtles and marine mammals feed on.

Importance of Aquatic ecosystem-

- 1) Man uses aquatic ecosystems for the clean freshwater on which his life is completely dependent.
- 2) We need clean water to drink and other domestic uses.
- 3 Water is essential for agriculture
- 4) Fisher folk use the aquatic ecosystems to earn a living.
- 5) Fish, crabs, edible plants are used as food
- 6) Marshes and wetland provide fish, crustaceans, reeds, grasses and other produce.
- 7) Agriculture and industry are highly dependent on large quantities of water.
- 8) Dams are built across the rivers to generate electricity and for irrigating farmlands.

Threats to aquatic ecosystems-

- 1) Water pollution occurs from sewage and poorly managed solid waste in urban areas.
- 2) Sewage leads to a process called 'eutrophication' which destroy life in the water as the oxygen content is severly reduced.
- 3) In rural areas the excessive use of fertilizers causes an increase in nutrients which leads to eutrophication.
- 4) Pesticide used in adjacent fields pollute water and kill of its aquatic animals.
- 5) Chemical pollution from industry kills a large number of life forms in adjacent aquatic ecosystem.
- 6) Contamination by heavy metals and other toxic chemicals affects the health of the people which live near the aquatic ecosystems as they depend on this water.

Conservation of aquatic ecosystem-

- 1) For the sustainable use of aquatic ecosystem, water pollution must be prevented.
- 2) Changing the nature of the aquatic ecosystem by building dams from flowing water ecosystems to a static ecosystem destroy its natural biodiversity. So this should be prevented.
- 3) Aquatic ecosystems, specially wetlands need protection by including them in sancturries or national parks in the same way we

protect our natural forests. The wetland ecosystems are highly threatened.

Q.5 Write on- 'Grassland Ecosystem'.(08)

- Ans: 1) The grassland community covers vast stretches of land. These are areas characterised by plains and 10 to 30 inches of rainfall per year. The plant community is dominated by grasses, but it contains a great variety of other herbs as well. These are the producers of grassland ecosystem. The height of the grasses ranges from less than 2 feet to 6 feet.
- 2) The animal populations of grasslands are also rich and varied. The mammals such as bison, deer, antelope, insects such as grasshoppers etc. are primary consumers in the ecosystem. Animal populations of grassland are very rich and diverse. Carnivorous animals such as tiger, foxes, wild dogs etc. are the secondary and tertiary consumers in the grassland ecosystem.
- 3) The annual production of organic material in grasslands is great, organic accumulation is rapid and thick layer of humus is produced. Grassland soils are among the thickest and richest in the world. Roots of the grasses penetrate upto 6 feet in these rich soils.

Importance of Grassland:

- 1) Grasslands represent some of the greatest agricultural areas of the world of cattle, corn and wheat farming.
- 2) Grasslands are the grazing areas of many rural communities.
- 3) Grass is also used to thatch houses and farm sheds.
- 4) The thorny bushes and branches of the few trees in grasslands are used as a major source of fuel wood.
- 5) Grasslands have diverse species of insects that pollinate crops.
- 6) Predators of insects like shrews, reptiles like lizard, birds of prey, amphibians such as frog and toads help to control pest in adjoining agricultural lands.

Threats to grassland ecosystem-

- 1) Grassland ecosystems have been extensively affected by human activity.
- 2) Over utilization and changes in land use has lead to their degradation.
- 3) A main threat to natural grasslands is the conversion of grasslands into irrigated farmlands.
- 4) After continuous irrigation such land becomes saline and useless in few years.
- 5) More recently, many of these residual grassland tracts have been converted into industrial areas.
- 6) Cattle, sheep and goat grazing and lighting repeated fires all affect the grassland adversely.

7) Rapid increase in the number of domesticated animals and their grazing has put severe strain on these systems as a consequence of which much of the grasslands have shrunk to isolated patches.

8) There has been an appreciable reduction in the number of species of plants and animals and insects which live in these systems.

Conservation of grassland ecosystem:

1) Grasslands should not be over grazed and some areas of the grasslands should be closed for grazing.

2) A part of the grassland in an area must be closed every year, so that a rotational grazing pattern is established.

3) Fires must be prevented and rapidly controlled.

4) In hilly areas, soil and water management in each micro catchment will help the grassland to return to a natural, highly productive ecosystem.

5) To protect the most natural undisturbed grassland ecosystem, sanctuaries and national parks must be created.

6) Their management should focus on preserving all their unique species of plants and animals.

7) They should not be converted into plantations of trees because it will result in the destruction of this unique habitat for wildlife.

BIODIVERSITY

1. Introduction

- i) Genetic diversity
- ii) Species diversity
- iii) Ecosystem diversity

- 2. Values of biodiversity
- 3. Hotspots of biodiversity
- 4. India as a mega-diversity nation
- 5. Threats to biodiversity
- 6. Conservation of biodiversity

*Variety & variability
amongst different organisms
in ecosystem.*

Q.1 What is biodiversity? Explain genetic, species and ecosystem diversity (07).

Ans: Biological diversity deals with the degree of nature's variety in the biosphere.

★ 'Biological diversity is the total variety of life on our planet.'

'The sum total of various types of microbes, plants and animals present in a system is referred to as biological diversity or simply as biodiversity.'

This variety can be observed at three levels - 1) the genetic variability within a species. 2) The variety of species within a community and 3) the organisation of species in an area into distinctive plant and animal communities.

1) Genetic diversity :-

i) 'The diversity in the genetic make up of a species is referred to as Genetic diversity.'

Genes are the biochemical packages passed on by parents to their offspring. Within a species, we often find a number of varieties or races or strains which slightly differ from each other in one, two or number of characters such as shape, size, quality of their product, resistance to insects, pests and disease etc. These differences are due to slight variations in their genetic set-up.

ii) This genetic variability is essential for a healthy breeding population of a species. If the number of breeding individuals is reduced the dissimilarity of genetic makeup is reduced and in-breeding occurs. This leads to genetic anomalies and eventually to the extinction of that particular species.

iii) The diversity in wild species forms the 'gene pool' from which our crops and domestic animals have been developed. Modern biotechnology manipulates genes to develop better types of medicines and a

*Venkatesh
O Reilly
O Reilly
O Reilly*

*Crops
domestic animals
Medicines
Industrial products*

variety of industrial products.

2) Species diversity :-

i) The richness of species in an ecosystem is usually referred to as species diversity.

'The number of species of plants and animals that are present in a region constitutes its species diversity.'

ii) This diversity is seen both in natural ecosystems and in agricultural ecosystem. Some areas are richer in species than others. The commercial value of a natural forest, with all its species richness, is much greater than a plantation.

iii) At present, scientists have been able to identify and categorize about 1.8 million species on Earth. India is among the world's 15 nations that are exceptionally rich in species diversity.

3) Ecosystem diversity:-

i) There are a large variety of different ecosystems on Earth, each having their own complement of distinctive interlinked species based on the differences in the habitat.

ii) Ecosystem diversity can be described for a specific geographical region or political entity such as country, state or taluka.

iii) Distinctive ecosystems include landscapes like forest, grasslands, deserts, mountains etc. as well as aquatic ecosystems like rivers, lakes, and seas.

iv) An ecosystem is referred to as 'natural' when it is relatively undisturbed by human activities or 'modified' when it is changed to other types of uses, such as farmland or urban areas. Ecosystems are most natural in wilderness areas.

v) If natural ecosystems are overused or misused, their productivity eventually decreases and they are then said to be degraded.

Q.2 Write on values of Biodiversity .(06,08,09)

Ans: 1) Biodiversity provides a variety of environmental services that are essential at the global, regional and local levels. The production of oxygen, reduction of carbon dioxide, maintaining the water cycle and protecting soil are some important services.

2) Food, clothing, energy medicines are all resources that are directly or indirectly linked to the biological variety present in the biosphere.

Following are the various values of the diversity--

a) Consumptive value -

1) A straight forward example is the direct utilization of timber, food, fuel wood, and fodder by local communities.

2) The biodiversity contained in the ecosystem provides food, building

3) material, fodder, medicines, fishes, edible aquatic animals and plants and various the products.

b) **Productive value-**

commercial values. Related to industry.

- 1) This category comprises of marketable, good.
- 2) The biotechnology uses bio-rich areas to 'prospect' and search for potential genetic properties in plants or animals that can be used to develop better varieties of crops and livestock.
- 3) To the pharmacist, biological diversity is the raw material from which new drugs can be developed.
- 4) Biodiversity is useful for the industrialist to develop new products.
- 5) Biodiversity helps agriculturists to develop better crops.
- 6) Thus biodiversity should be preserved for industrial growth and economic development.

c) **Social Values-**

1) Along with the local use or sale of products, biodiversity has a social aspect.

2) The consumptive and productive value of biodiversity is closely related to social concern

- 3) The reverence given to the various products of biodiversity in our festivals, culture, religion reveals the social value of biodiversity.
- 4) Our cultural and religious sentiments are closely linked to the biodiversity.

d) **Ethical and moral value-**

1) ethical values related to biodiversity conservation are based on the importance of protecting all forms of life.

- 2) Every religion teaches us that we should have reverence for all forms of life, all forms of life have the same right to exist on Earth.
- 3) Along with the economic importance of conserving biodiversity, there are several, cultural, moral and ethical values, which are related to the sanctity of all forms of life.

e) **Aesthetic value-**

Natural Beauty, Nature Related Values

- 1) Biodiversity enhances the beauty of landscape. It is a beautiful and wonderful aspect of nature. This is the aesthetic value of biodiversity.
- 2) Dew drops on the petal of a rose, the azure sky, the blue lake, starry night, rolling waves, crescent moon, the shade of trees, chirping of birds, the insects, the breeze, the wild. It is magnificent and fascinating. It is aesthetic value of biodiversity which enliven our lives.
- 3) Our religious and cultural symbols belong to the biodiversity such as lion of Hinduism, the elephant of Buddhism, deities such as Lord

- 3) Our religious and cultural symbols belong to the biodiversity such as lion of Hinduism, the elephant of Buddhism, deities such as Lord

Ganesh, vehicles of several deities are animals and birds which are respected for thousands of years. The sacred 'Tulsi' has grown in the courtyard of each household for centuries.

f) Optional value-

1) Keeping future possibilities open for their use is called the option value.

2) It is impossible to predict which of our species or traditional varieties of crops and domestic animals will be of greatest use in the future.

3) To continue to improve cultivars and domestic livestock, we need to return to wild relatives of crop plants and animals.

4) Thus biodiversity should be preserved.

Q.3 Write in detail about threats to Biodiversity. (06,07,08)

Ans: Following are the threats to Biodiversity-

(A) Destruction of natural ecosystem :-

Man has begun to overuse or misuse most of the natural ecosystems. Due to unsustainable resource use, once productive forests and grasslands have been turned into deserts and wastelands. Human population growth, industrialization and changes in landuse pattern are major reasons leading to destruction of natural ecosystems which is contributing to destruction of biodiversity.

(B) Adverse changes in Biotic or Abiotic Environment :-

Following are the reasons for the undesirable changes in Biotic or Abiotic Environment.

(1) Environmental pollution - Various environmental pollution adversely affect the biotic community. Due to this, weak and susceptible species are eliminated. Entry of various toxic materials eliminating number of species. More damage is done by substances which persist in toxic state for long duration.

2) Over Exploitation of selected species - Merciless hunting or collection of a selected group of living organisms for food, economic benefits or recreation is the major cause of extinction of some species. Even today hunters and collectors are significant threat to a number of species. Over exploitation is one of the main causes of disappearance of plants of scientific and medicinal value. Over-harvesting offish, especially by means of large trawling boats is leading to the serious depletion offish stocks.

3) Habitat fragmentation - Various developmental activities are fragmenting wild biological communities into small patches. Railway tracks and highways across the forest are responsible for cutting it into small segments. Fragmentation of habitat reduces the capacity to support the viable populations of different species and excess number of species are removed and vulnerable species become extinct.

4)Introduction of exotic species - Exotic species are foreign species which is deliberately or accidentally introduced into the system.

Introduction of species from one area into another disturb the balance in existing communities and may lead to the extinction of many local species. Some common examples are lantana bushes, congress grass, etc.

5)Natural Calamities - Natural calamities like floods, drought, forest fires, earth quakes, volcanic eruptions, epidemics, etc. sometimes take a heavy toll of plant and animal life.

C)Chain Extinctions -

In an ecosystem, everything is related to everything else. The component species are maintained by the interactions among enumerable life forms as well as between the life forms and the abiotic factors of the environment. Extinction of component species, therefore results in a chain of events affecting a number of other species adversely. Those form which are obligately dependent on the extinct species have to die out Thus chain extinctions ultimately reduces the biodiversity.

Q.4 Write on: A) Hotspots of Biodiversity

B) India as a Mega - diversity Nation

Ans : A): Hotspots of Biodiversity :-

1) 'Areas that are rich in species diversity are called as 'Hotspots' of diversity'. In the Hotspots we find the endemic species.'Endemic species are those species which are confined only to a particular locality'.

2) Such organisms are very important from the point of view of conservation as their disappearance means extinction of the species as they are not found anywhere else.

3) This makes the habitats in which endemic species thrive very important.

4) Naturally the endemic species and the habitats which are likely to be lost for ever should receive urgent conservation attention.

5) It has been estimated that 50,000 endemic plants, which comprise 20% of global plant life, probably occur in only 18 'hotspots' in the World.

6) Our globally- accepted national 'hotspots' are in the forest of the North-East and the western Ghats, which are included in the world's most bio-rich areas.

7) The Andaman and Nicobar Islands are extremely rich in species and alone have 2200 species of flowering plants and 120 species of ferns.

8) Out of 135 genera of land mammals in India, 85 (63%) are found in North-East.

- 9) A major proportion of amphibian and reptile species, especially snakes, are concentrated in Western Ghats.

B) India as a Mega-diversity Nation:-

1) Areas that are rich in species diversity are called 'hotspots' of diversity. It has been estimated that 50,000 endemic plants are occur in only 18 'hotspots' in the world.

2) Countries which have a relatively large proportion of these biodiversity hotspots are referred to as 'mega-diversity nations'.

3) Megadiversity countries possess a wide variety of plant and animal species.

4) India is one of those countries.

5) Among the bio-rich nations, India is among the top 10 or 15 countries for its great variety of plants and animals, many of which are not found elsewhere. India has 350 different mammals (8th in the world), 1200 species of birds (8th in the world), 453 species of reptiles (5th in the world) and 45000 plant species.

6) India has 50,000 known species of insects, including 13,000 butterflies and moths.

7) Among amphibian found in India, 62% are unique to this country. Among lizards, 153 species are recorded, 50% are endemic.

8) The traditional cultivars included 30,000 to 50,000 varieties of rice Gene banks have collected over 34000 cereals and 22,000 pulses grown in India.

9) India has 40 breeds of sheep, 22breeds of goats, and 8 breeds bu

10) Many of these today have died out or are dying out due to misguided adoption of all 'foreign' things.

Q. 5 Write on 'Conservation of Biodiversity'.(09)

Ans: Conservation of Biodiversity involves-

- A) In-Situ Conservation
- B) Ex-Situ Conservation
- C) Information and Education

A) In-Situ Conservation :-

1)'In-Situ conservation is the conservation of species in its own environment by creating national parks and wildlife sanctuaries

2)The best way to protect species is to protect habitats. The conservation of a species is best done by protecting its habitat along with all the other species that live in it in nature. This is known as in-situ conservations

CHAPTER 7

Give an account on Air Pollution.

(S-15, W-16 for 12 Marks)

Explain sources, effects and control measures of Air pollution.

(W-19 for 12 marks)

7.1 Introduction

7.1.1 Air Pollution

A physical, biological or chemical alteration to the air in the atmosphere can be termed as pollution. It occurs when any harmful gases, dust, smoke enters into the atmosphere and makes it difficult for plants, animals and humans to survive as the air becomes dirty.

Air pollution is the release of air pollutants particles and gases into the air.

Causes:

- Human activities, such as coal-burning plants and emissions from cars, planes and boats.
- Air pollution also comes from natural sources. Volcanoes are a great example of a natural pollution source
- Forest fires are a natural process that also produces large amounts of potentially harmful gas and particulate matter.
- Exhaust from factories and industries: Manufacturing industries release large amount of carbon monoxide, hydrocarbons, organic compounds, and chemicals into the air thereby depleting the quality of air.

Agricultural activities: Ammonia is a very common by product from agriculture related activities and is one of the most hazardous gases in the atmosphere.

Few of the major pollutants are carbon monoxide, sulphur dioxide, Nitrogen oxides, greenhouse gases like methane, CFCs (Chlorofluorocarbons).

Effects of Air Pollution:

- It creates respiratory and heart Problems.
- Another direct effect is the immediate alterations that the world is witnessing due to Global warming.
- **Acid Rain:** Acid rain can cause great damage to human, animals and crops.
- **Effect on Wildlife:** Just like humans, animals also face some devastating effects of air pollution.
- **Depletion of Ozone layer:** As ozone layer will go thin, it will emit harmful rays back on earth and can cause skin and eye related problems. UV rays also have the capability to affect crops.

Measures:

- Use public mode of transportation
- Conserve energy
- Emphasis on clean energy resources
- Use energy efficient devices
- Never burn household waste
- Don't smoke

Write on sources, effects and control measures of water pollution. (S-15/19 for 12 Marks)

Write in detail on Water Pollution.

(S-17/18 for 12 Marks)

Describe the causes, effects and control measures of water pollution. (W-17 for 12 Marks)

7.1.2 Water Pollution

Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds.

Water they say is life, and indeed they were right. With about 70% of the earth's cover being water, it undeniably becomes one of our greatest resources.

Water is used in almost every important human chores and processes. It is an important element in both domestic as well as industrial purposes.

When toxic substances enter lakes, streams, rivers, oceans, and other water bodies, they get dissolved or lie suspended in water or get deposited on the bed. This results in the pollution of water whereby the quality of the water deteriorates, affecting aquatic ecosystems.

Causes

- Disease causing worms, bacteria, viruses that enter water from domestic sewage and untreated human and animal wastes.
- Inorganic plant nutrients: There are water soluble nitrates and phosphates.
- Water soluble organic chemicals: These are acids, salts and compounds of toxic metals such as mercury and lead.
- Acid drainage into rivers.
- Urban runoff of untreated or poorly treated waste water storage and garbage Industrial waste storage located above or near aquifer.

Effects

- Large amount of human waste in water increase the number of bacteria which cause gastro intestinal diseases. Water borne diseases diarrhea, typhoid etc.
- Eutrophication due to inorganic pollutants.
- Some pollutants like sodium can cause cardiovascular diseases, while mercury and lead cause nervous disorders.
- Oil does not dissolve in water; instead it forms a thick layer on the water surface. This can stop marine plants receiving enough light for photosynthesis. It is also harmful for fish and marine birds.

Measures

- For controlling water pollution from point sources, treatment of waste waters is essential before being discharged.
- Sewage treatment, or domestic wastewater treatment, is the process of removing contaminants from wastewater and household sewage, both runoff (effluents) and domestic.
- Any wastewater contaminated shall not be discharged into an open drain or the sewer. Such wastewater may be reused or disposed of properly.
- Run the dishwasher or clothes washer only when you have a full load. This conserves electricity and water.
- DO NOT dispose of household chemicals or cleaning agents down the sink or toilet.

What is soil pollution? Write causes, effect and control measures of soil pollution.
(S-16, W-15 for 12 Marks)

7.1.3 Soil Pollution

With the rise of concrete buildings and roads, one part of the Earth that we rarely see is the soil. It has many different names, such as dirt, mud and ground. The main reason why the soil becomes contaminated is due to the presence of man-made waste.

Natural and synthetic materials can adversely affect the physical, chemical and biological properties of soil. Soil is getting heavily polluted by toxic materials and dangerous microorganisms, which enter, through air, water and food chain.

Causes

- **Industrial Activity:** Whether it is iron ore or coal, the by products are contaminated and they are not disposed off in a manner that can be considered safe. About 90% of oil pollution is caused by industrial waste products.

Improper disposal of waste contaminates the soil with harmful chemicals. These pollutants affect plant and animal species and local water supplies and drinking water. Also, when these are evaporated and falls again in form of acid rain, soil gets polluted.

Agricultural Activity: Huge quantities of fertilizers, pesticides, herbicides etc. are used to increase the crop yield. Pesticides also harm plants and animals by contaminating the soil.

Waste Disposal: Finally, a growing cause for concern is how we dispose of our waste. While industrial waste is sure to cause contamination, there is another way in which we are adding to the pollution. Every human produces a certain amount of personal waste products.

Human Activities: The human activities responsible for soil erosion are (i) land use changes (removal of forest and grassland covers for increase in agricultural fields, dams etc.) (ii) Farm practice changes (greater use of machines and harvesting).

Effects

Soil pollution causes huge disturbances in the ecological balance and health of living organisms at an alarming rate. It majorly affects the human health, growth of plants and its vegetation, decreased soil fertility, toxic dust, etc.

- Reduced nitrogen fixation
- Loss of soil and nutrients
- Increased soil erosion
- Creation of toxic dust
- Loss of natural nutrients in soil.
- Imbalance in the flora and fauna of the soil.
- Reduced soil fertility hence decrease in soil yield.
- Reduced soil fertility due to industrial chemicals and gases.
- Foul odor due to industrial chemicals and gases.
- Increase in soil salinity, makes it unfit for cultivation.
- Alteration in soil structure can lead to death of organisms in it.