

B.Tech.

FIRST SEMESTER EXAMINATION, 2009-10

ENVIRONMENTAL AND ECOLOGY

(EAS-105)

Time : 2 Hours]

[Total Marks : 50

Note : (1) Attempt all questions.

Write true or false against following statements :

SECTION - A

1. Write the Correct answer of the following multiple choice Questions.

(a) The Part of Environment Where life forms of Earth including human being live is

Ans. Biosphere.

(b) The Science that deals with the study of the individual organism or an individual species is known as :

Ans. Auto Ecology.

(c) The main cause of eutrophication of lakes is the enrichment of lake water with :

Ans. Nutrients.

Fill in the following blanks with suitable words :

(d) The Part of atmosphere, where maximum concentration of ozone is generally found is

Ans. Stratosphere.

(e) The transfer of Food energy from the source in plants through a series of organisms with repeated eating and being eaten up is referred to as

Ans. Food Chain.

(f) The unit of measurement of sound Pressure level is

Ans. Decible.

(g) Anaerobic digesation of sludge takes place in the presence of oxygen.

Ans. False

(h) Gastroenteritis is a water borne disease.

Ans. True.

(i) Match list I with list II and select the correct sequence of answers using the codes given below the lists :

Ans. (3) 3, 4, 2, 1

(j) The atmosphere is divided in the following four layers.

Ans. (B) 4, 2, 1, 3

SECTION - B

Q. 2. Attempt any three parts of the following : $5 \times 3 = 15$

(a) Define Environment. Discuss the need of Public awareness for the conservation and protection of Environment.

Ans. The term Environment which etymologically means surroundings is considered as a composite term for conditions in which organism live and this consists of air, water food and sunlight, which are basic requirements of all living being and plant life to carry on their life functions in other words, Environment consists of biotic as well as abiotic substances.

Need for Public Awareness : Environmental study has Evolved as an interdisciplinary subject that seeks to solve

problems, which have arisen due to exploitive nature of men and increased pressure on natural resources for multiple benefits. Any organization or government at its own level can not achieve that goal of sustainable development until the public has a participatory role in it. Public Participation is possible only when the public is aware about the Environmental issues or problems related to Environment. The public has to be educated about the fact that if we are polluting own environment. We are actually harming ourselves. If we want to manage our planet's Earth's Environment we have to make all the human being Environmentally conscious.

Q. 1. (b) What are the basic components of an Ecosystem ? Outline the concept of balanced Ecosystem ?

Ans. The term Ecosystem was proposed by A.G. Tarsley in 1935. He defined it as "the system resulting from the integration of all living and non living & factors of the environment. All the Ecosystem are made up of two main components namely Biotic and abiotic.

(1) Abiotic Components : Abiotic Components means the non living components of Ecosystem. These components not only

affect the distribution and structure of organisms also their behaviour and inter relationship it includes organic substances, organic compounds and climate factors.

(1) Inorganic substances : These includes nutrients and their compounds. These substances are involved in mineral cycles.

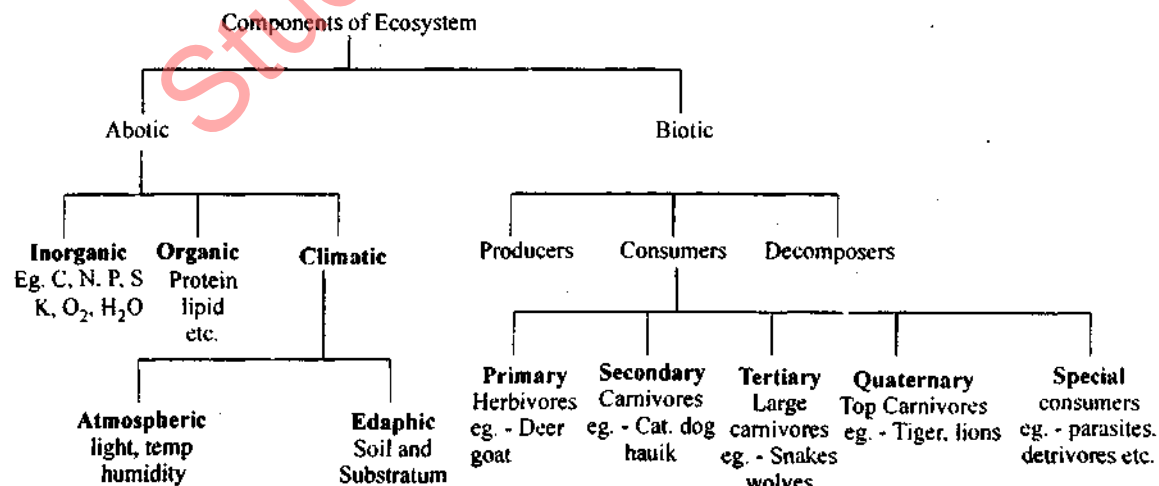
(2) Organic Substances : These includes, carbohydrates, fats, lipids proteins etc. These are present in the Biomass. These are broken down by the action of decomposers in to inorganic substances for recycling.

(3) Climatic factors : These are two types :—

(a) Atmospheric : Includes light, temp, humidity, rain, snowfall etc.

(b) Edaphic : Includes soil and substratum topography minerals, pH etc.

(2) Biotic Components : Means the living organisms present in an Ecosystem. These includes plants, animals, and micro organisms that are interdependent upon each other in Ecosystem. Removal of even a single species can upset the whole Ecological balance. These living organisms are inter connected through food. Food supplies both the energy and materials for the substance of life.



All organisms in a balanced Ecosystem require energy for their life process and materials for the formation and maintenance of body structure. For the long term survival of Ecosystem the balanced Ecosystem must have representative from there functional and metabolic groups viz primary producers, consumers and decomposers.

Q. 1. (c) What is deforestation ? Give the main causes and adverse effects of deforestation.

Ans. Deforestation : Deforestation is defined as the reckless felling of trees by human beings for their ulterior ends. Forests are burned or cut down for various reasons, like clearing of land for agriculture, harvesting of timber, expansion of cities, and many more; but the aim behind all these reasons is 'economic gains'. But we forget that these economic gains are short-lived, while the long-term damaging effects of deforestation are disastrous and irreversible. At present we are losing forests at the rate of 1.7 crores hectares annually worldwide.

Causes of Deforestation : Although broad issues of poverty, rapidly increasing population pressures, unequal political power, lack of opportunities to make a living, landlessness and inadequate knowledge and means to exploit the tropical forest without destroying it are at the root of deforestation, but there are more specific causes too, such as :

(i) Shifting cultivation (also called, Jhum Cultivation), that is slash and burn agriculture, practices by landless indigenous people or tribals who clear trees to grow subsistence crops is the principal cause of deforestation in the tropics, accounting for 70, 50 and 35 per cent respectively in Africa, Asia and tropical America. Because of low productivity of most tropical forest soils, the farmers move to new sites after few years leaving behind abandoned patches (called 'forest fallow'). These forest fallows may

revert back to forest if left undisturbed; however, because rising populations and the ensuring competition for land are forcing farmers to return to these fallows at increasingly shorter intervals.

(ii) Deforestation also occurs due to overgrazing and conversion of forest to pasture for domestic animals.

(iii) Fuel wood gathering is also an important deforestation agent in dry forests.

(iv) Commercial logging is another deforestation agent. It may not be a primary cause of deforestation in the tropics (except in parts of West Africa) because the number of trees left after logging may be sufficient to classify the site as forested. However, it is often a secondary cause because new logging roads permit shifting cultivators and fuel-wood gatherers to gain access to logged areas and fell the remaining trees. Further, if logging is performed poorly, it results in a degraded forest.

(v) Deforestation also occurs due to mining, quarrying, irrigation and industrial projects.

(vi) Expansion of agribusiness that grows oil palm, rubber, fruit trees and ornamental plants has also resulted in deforestation.

(vii) Finally, government-sponsored programmes that resettle landless farmers on forested sites have contributed to deforestation all around the world.

The forest resources are thus threatened due to overgrazing and other forms of over-exploitation, both for commercial and household needs, encroachments, unsustainable practices like unscientific cultivation and development activities.

Effects of Deforestation : Deforestation adversely and directly affects and damages the environment and humans

both. Some of the ill-effects of deforestation (due to timber extraction, mining, construction of dams, etc.) on forests and tribal people are as under :

(i) **Soil erosion** : In the absence of forests/trees, especially on slopes, the soil gets washed away with rain water.

(ii) **Expansions of deserts** : Denuded land mass gradually gets converted into sand deserts due to the action of strong winds laden by fragmented rock dust. This effect is more pronounced in rain scarced areas.

(iii) **Migration of local and tribal population** from deserts to other fertile land in search of food, leaving behind vast tracks of sands only.

(iv) **Decrease in rainfall** : Forests bring rains due to high rate of transpiration and precipitation. In the absence of forests, rainfall declines considerably.

(v) **Loss of fertile land** : Less rainfall results into the loss of fertile land owing to less natural vegetational growth.

(vi) **Effect on climate** : The climate of region is mainly controlled by the rainfall, snowfall, etc. Deforestation causes decrease in rainfall, which in turn increases the climatic temperature.

(vii) **Lowering of water table** : Decrease in rainfall results into a lowered water table due to lack of recharging of underground reservoirs.

(viii) **Economic losses** : Deforestation will cause loss of industrial timber and non-timber products and loss of long-term productivity on the site.

(ix) **Loss of flora and fauna** : Certain species of flora and fauna are getting extinct from the face of planet, mainly due to deforestation.

(x) **Loss of biodiversity** : Loss of flora and fauna has resulted into loss of

biodiversity, leading to disturbance in ecological balance worldwide.

(xi) **Loss of medicinal plants** : There are many species of plants which have medicinal and other advantages, like Neem (Indian Margosa) which has been used in India for centuries as insecticide, fungicide, in medicine and in biofertilizers. Deforestation may lead to the extinction of these types of valuable plants.

(xii) **Environmental changes** : The air we breathe, is purified by forests. So, deforestation will lead to increase in carbon dioxide and other air pollutants concentration. This will lead to global warming, which is a serious effect as well as threat.

(xiii) In many places the lack of fuelwood due to deforestation challenges local/tribal people especially where fuelwood had already been scarce.

(xiv) Agriculture may be negatively impacted if deforestation causes soil loss or compaction, of sedimentation of irrigation systems.

(xv) Indigenous people may be forced into a new way of life which they are unprepared.

Q. 1. (d) Discuss some important issues relating to Municipal solid waste management in India ?

Ans. Disposal is the last stage of the waste management cycle. This situation in India is of great concern in collection and transportation. About 90% of the municipal waste collected by civic authorities is dumped in law lying areas outside the city/town limits, which have no provision of leachate collection and treatment and landfill gas collection and use. As a result the leachate containing heavy metals finds its ways to the underground water, rendering it unfit for drinking. The landfill, gas too escape into the atmosphere

adding to the green house gas emission and the loss of utilizing the same alternatively as a thermal fuel or for electricity productions.

Due to the absence of standards and norms for handling municipal waste, it is the municipal workers who are most affected by the occupational health hazards of solid waste handling. The following are some of the current problems associated with disposal of solid waste in India.

(1) Contaminated leachate and surface run off from land disposal & facilities affecting down gradient ground and surface water Quality.

(2) Volatile Organic Compounds and dioxins in air emission Increasing Cancer Incidences.

(3) Drain Clogging due to uncollected waste leading to stagnant water hence mosquito breeding.

Section-C

Attempt any two parts from each question.

5×5 = 25

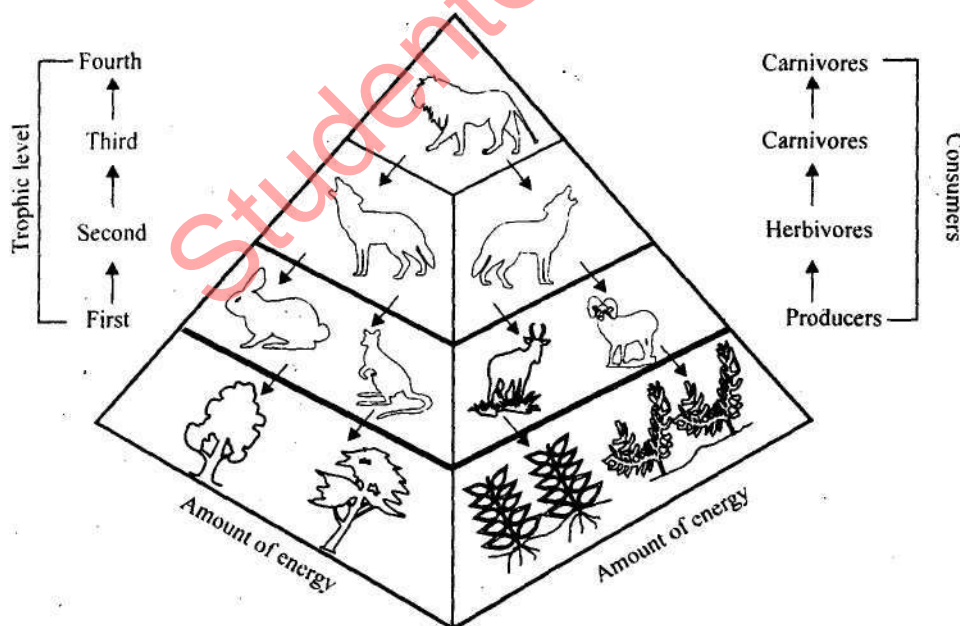


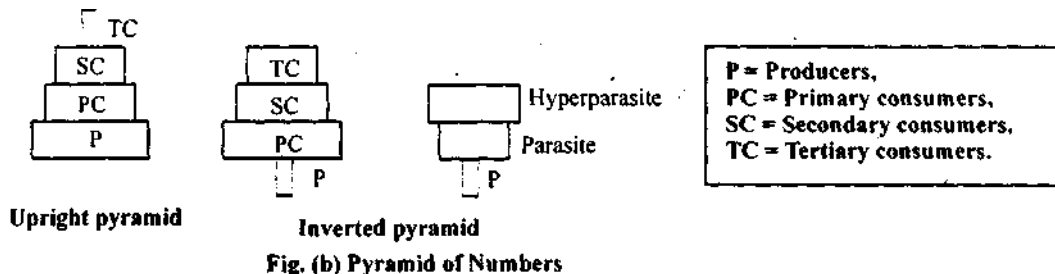
Fig. (a) Ecological pyramid

Q. 3. (a) What are Ecological Pyramids ? Explain the differential types of Ecological Pyramids giving suitable examples.

Ans. Ecological Pyramids : The interaction of the food chain phenomena (energy loss at each transfer) and the size metabolism relationship results in communities having a definite trophic structure, which is often characteristics of a particular type of ecosystem (lake, forest, coral reef and pasture etc). Trophic structure may be measured and described in terms of the energy fixed per unit area at successive trophic levels. Trophic structure and also trophic function may be shown graphically by means of ecological pyramids in which the first or producer level are the tiers which make up the apex.

Ecological pyramids may be of following three general types :

(1) **Pyramid of Numbers :** When plotted, the relationships among the number



of producers, irrespective of their taxonomic position, primary consumers (herbivores), secondary consumers (carnivore-1), tertiary consumers (carnivore-2) and so on, in any ecosystem, forms a pyramidal structure called the pyramid of numbers. The shape of this pyramid varies from ecosystem to ecosystem. In aquatic ecosystems and herbaceous communities, the autotrophs are small in size and present in large numbers per unit area. In a forest ecosystem the size of a producer is large and per unit area their density of population may not be so large. In grassland or aquatic ecosystems the numerous tiny autotrophs support a lesser number of herbivores (insects, cattle and zooplanktons), which support fewer carnivores [Fig. (b)]. Hence, the pyramidal structure is **upright**. In a forest ecosystem the number of herbivores are supported who in turn support a fewer number of carnivores. Hence, the pyramidal structure is essentially upright, although in parasitic food webs we observe **inverted**

hyperparasites thus, two types of pyramids of numbers are found : (i) Upright, and (ii) Inverted.

(2) **Pyramid of Biomass** : The difficulty faced in comparing disparate objects is removed to a large extent if biomass of a trophic level is considered in place of numbers. Thus, we have the pyramid of biomass if we plot the biomass of producers, herbivores, carnivores, and so on [Fig. (c)]. The upright and inverted types of pyramids of biomass are found. If a larger weight of producers support a smaller weight of consumers, an **upright** pyramid results. The upright biomass pyramid is found in most ecosystems. If a smaller weight of producers supports a larger weight of consumers, as in the English Channel and some aquatic ecosystems, an **inverted** biomass pyramid results. This situation is possible because of a differential rate of production at different trophic levels. The rate of production is higher

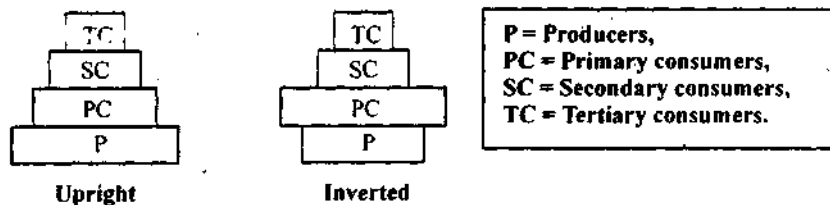
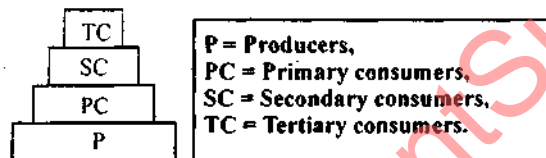


Fig. (c) Pyramid of Biomass

pyramids because one primary producer may support numerous tiny parasites, which in their turn may support still more

and faster at the producer trophic level in these ecosystems than at the consumer trophic levels.

(3) Pyramid Energy : The pyramid of energy is drawn after taking into consideration the total quantity of energy utilized by the trophic levels in an ecosystem or in a unit area over a given period of time. Since the quantity of energy available for utilization in any of the herbivore, C_1 and C_2 trophic levels will always be less than its previous trophic level (according to the laws of thermodynamics, there will be loss of energy in each transfer), the energy pyramid will always be **upright** [Fig.(d)]. The energy units provide a unifying concept, a method of expressing the productivity of different trophic levels and between different ecosystems. The pyramid of energy is based on the rate of energy flow in different trophic levels and hence the difficulties encountered in the pyramid of numbers and pyramid of biomass are removed here.



Upright

Fig. (d) Pyramid of Energy

Q. 3. (b) Give a Brief account of Environmental effect of modern agriculture.

Ans. Impact of Agriculture : The dawn of human civilization can be traced back to the discovery of agriculture almost 10,000 years ago. In the early period, man used the primitive practice of **slash and burn cultivation** or **shifting cultivation**, which is still prevalent in many tribal areas, as in North-East India in the hill regions.

The two modes of agriculture —traditional and modern—are described below along with their impacts.

(1) Traditional agriculture and its impact : It involves small plots, simple tools, natural water, organic fertilizers and several

crops. The yield is, however, low but it is still used by about 50% of the world population. The impacts of this type of agriculture are as follows.

(i) Depletion of nutrients : During slash and burn of trees in forests, the organic matter in soil is destroyed and within a short period most of the nutrients are taken up by the crops. Thus the soil becomes deficient in nutrients and compels the cultivators to shift to another area.

(ii) Deforestation : Forest land is cleared by slash and burn of trees in forest for cultivation purposes. Frequent shifting of cultivation plots leads to deforestation, i.e. loss of forest cover.

(iii) Soil erosion : As a result of deforestation, soil gets exposed to the weathering forces, i.e., rain, wind and storms and is subjected to erosion. The net result is loss of top fertile soil.

(2) Modern agriculture and its impact : It is based on high input-high output technique using hybrid seeds of high-yielding variety and abundant irrigation water, fertilizers and pesticides. This is the basis of "Green Revolution" which boosted the production of wheat and India became self-sufficient in food. But the fallout from Green Revolution has become evident since the 90s (1990) as shown below :

(i) Impacts from HYV (High-Yielding varieties) : Application of seeds of HYV gave rise to monoculture i.e., the same species (genotype) grown over vast areas. Such monoculture is vulnerable to attack by some pathogen, which spreads like wild fire, devastating crops over large areas.

(ii) Fertilizer problems : Essential micronutrients —nitrogen, phosphorus and potassium (NPK) are supplied by chemical fertilizers. Indiscriminate use of chemical fertilizers causes micronutrient imbalance in the soil which ultimately loses productivity.

(iii) Nitrate pollution : From agricultural fields nitrogenous fertilizers leach into the soil and finally contaminate

groundwater. When the nitrate level of groundwater exceeds 25mg/ L, they can cause a serious health hazard known as 'Blue Baby Syndrome', which affects mostly infants even leading to their death.

(iv) **Eutrophication** : Agricultural run-off water contains fertilizer components, particularly nitrogen and phosphorus, which reach nearby water-bodies and cause their overnourishment. Excessive use of these fertilizers leads to over-nourishment of the lakes/water bodies and gives rise to the phenomenon of eutrophication (eu = more, trophication = nutrition).

As a result, there is excessive growth of algal species, which is known as algal bloom. The water-body or lake soon gets filled up with algal species which quickly complete their life cycle and die thus adding a lot of organic matter. Dissolved oxygen in the lake is consumed and fish get killed so that the lake becomes a dead pool of water devoid of plants and animals. Thus the lake ecosystem gets degraded due to eutrophication.

(v) **Waterlogging** : Excessive irrigation of croplands for good growth of crop leads to waterlogging. In the absence of adequate drainage, excess water is accumulated which seeps into underlying water table. Pore spaces in the soil get fully drenched with water and soil-air becomes deficient. The water table rises and the roots of plants have insufficient air for respiration. There is decline in crop yield with decrease in the soil strength.

(vi) **Salinity problem** : In addition to waterlogging, salinity also rises from excessive irrigation water. The latter contains dissolved salts which under dry conditions evaporate leaving behind salts in the upper soil profile. Saline soils are characterized by accumulation of soluble salts such as sodium chloride, sodium sulphate, calcium chloride, magnesium chloride etc., in the soil profile.

Salinity causes stunted plant growth and reduces crop yield. Thousands of hectares of land in Haryana and Punjab have been affected by soil salinity.

The best method for getting rid of salinity is to flush out by applying fresh water to such soils.

Q. 3. (c) What is Environmental Impact assessment ? Discuss its importance in planning and implementation of Engineering Projects.

Ans. An EIA is a study of the probable changes in various socio-economic and Bio Physical characteristics of the environments, which may result from a proposed action. It is a documentation of an environmental analysis which includes, identification, Prediction and mitigation of impacts by a proposed action or projects. This EIA is then utilized to provide a basis for review of project impacts and is designed to provide adequate information for Judging whether an environmental impact statement (EIS) should be prepared. While assessing the environmental impact of a given project the major elements involved are :

- (1) Determining Environmental attributes (elements)
- (2) Determining environment Impacts
- (3) Reporting the Findings.

EIA is a handy tool to assess the environmental (compatibility of the projects in terms of their location suitability of technology, Efficiency or resource utilization. Waste recycling etc. EIA helps in the Identification of the Env. Factors that are likely to be adversely or beneficially affected by the project action.

Q. 4. (a) Discuss the adverse impacts of urbanisation and Industrialization and suggest suitable remedial measures ?

Ans. Impact of Urbanisation : Unplanned rapid Urbanisation has been identified as Health hazard over crowding contaminated water, poor sanitation air pollution and exposure to mosquitoes-conditions which are favourable to the spread of serious diseases. Urbanisation is increasing in both the developed and developing countries. Housing conditions are good

indicators of the level of the standard of living of the people. But due to overpopulation a large proportions of houses lack even the most basic sanitary facilities.

Impact of Industry : Rapid industrialisation is the major source of environmental degradation. The Central Pollution Control Board (CPCB) has identified 17 categories of most polluting industries. About 77% of inorganic industries and produces SO_2 , SO_3 , H_2SO_4 , mist NO_2 , NH_3 , HF , HCl and H_2S etc. A variety of hydrocarbons and several solvents like C_6H_6 , $\text{C}_6\text{H}_5\text{CH}_3$, CHCl_3 , CCl_4 are emitted into the atmosphere by synthetic organic chemical industries. Petroleum refineries are the major source of gaseous pollutants. The chief gases are SO_2 and NO_x . Mathura based petroleum refinery is posing threat to Taj Mahal in Agra and other monuments of Fatehpur Sikri. Cement factories emit plenty of dust, which is potential health hazard. There are many food and fertilizers industries which emit gaseous pollutants. During last 10 years the number of industrial units in Delhi, increased from about 20,000 to 55,000. About 40,000 of these are located in predominantly residential areas which are creating environmental pollution.

Iron and steel industry emit sulphur dioxide, metal oxides, carbon monoxide and carbon dioxide as pollutants.

Fluoride industry concerns manufacturing compounds of fluorides have serious effect on human beings, animals and plants. Cattle and sheep are susceptible to fluorine poisoning. The fruits and leaves of plants are destroyed by hydrogen fluoride.

Fertilizer industries release oxides of nitrogen and dust particles. Dust particles are formed from processes such as drying, burning, grinding, mixing etc. In urea manufacturing industry, the urea dust from drilling tower is the main air pollutant in that area.

Pulp and paper industry releases many pollutants. Sulphur bearing malodorous gases

such as H_2S , methyl sulphides, mercaptans are emitted from below tanks, evaporators and recovery furnaces. Other than this, combustion of wood waste results in large particulate emissions in air.

Nitric acid plants release oxides of nitrogen as pollutants to the atmosphere. They form toxic substances in polluted urban areas. They also consume a good quantity of ozone of the atmosphere.

Therefore we can understand that rapid industrialization is disturbing the balance of environment, which is not good for sustainable development.

Q. 4. (b) Write a short note on Sustainable development.

Ans. "Sustainable development is the meeting the need of the present mankind without compromising the needs of future generation". This term was defined by the world commission on Environment and development in its reports of 1987.

When we see our history then we recognize the fact that human beings have depended on natural and biological resources for their continued well being. It is necessary to fulfil our present requirements which are required for survival. Now-a-days world is a global village. So every country is trying to develop their economy. For the development of economy, they are doing the over-exploitation of natural resources. Over-exploitation of natural resources without thinking about the future is called unsustainable development. This unsustainable development is creating the problem of global warming, green house effect, ozone layer depletion, acid rain, etc. which are fatal for our future.

The important components of sustainable development are :

- Population stabilisation (growth below 0.5 per cent)
- Integrated land-use planning.
- Conservation of biodiversity.
- Air and water pollution control.
- Renewable energy resources.

- Recycling of wastes and residues.
- Environmental education and awareness at all levels.

Q. 4. (c) Discuss the importance of Fluoride in drinking water. Briefly discuss "Nalgonda technique" of defluoridation of water control the problem of fluorosis.

Ans. Fluoride Problem in Drinking Water : Fluoride is one of the very few chemicals that has been shown to cause significant effects in people through drinking water. Fluoride has beneficial effects on teeth at low concentrations in drinking water, but excessive exposure to fluoride in drinking water, or in combination with exposure to fluoride from other sources can give rise to a number of adverse effects. Fluoride is down to occur at elevated concentrations in a number of parts of the world and in such circumstances can have, and often has, a significant adverse impact on public health and well being.

Fluoride is found in all natural waters at some concentration. Sea Water typically contains our 1 mg L^{-1} while rivers and lakes generally exhibit concentrations of less than 0.5 mg L^{-1} . Ground waters, however, low or high concentrations of fluoride can occur depending on the nature the rocks and the occurrence of fluoride bearing minerals.

High fluoride concentrations may therefore be expected in groundwater from calcium-poor differs and in areas where fluoride bearing minerals are common. Fluoride concentrations may also decrease in groundwaters in which cation exchange of sodium for cadmium occurs.

Nalgonda Technique : Excess fluoride in drinking water causes dental and skeletal fluorosis. The process comprises of addition of aluminum salt, lime and bleaching powder to the raw water followed by flocculation, sedimentation and filtration. The domestic level treatment is performed in a bucket or any plastic container. For community level fill and

draw type plants are used with Capacity up to $400 \text{ M}^3/\text{day}$.

Q. 5. (a) Enumerate Various types of pollutants that cause pollution of water bodies, also discuss how water bodies can be saved from ill effects of uncontrolled discharge of waste water in to them.

Ans. Water is used for various purposes including bathing excretion, washing, cooking, Industrial operations and many more. After using it is discharged as waste water which is contaminated by various pollutants. The various types of water pollutants can be broadly classified in to :

(1) Organic Pollutants : Most of the substances of which living things are composed are organic compounds. But their Presence in water is not desirable as they not only Impact taste, odour and colour of water but some of the chemical compounds discharged by industries are toxic and carcinogenic too.

(2) Inorganic pollutants : All surface water and Ground water sources contain a variety of Inorganic Chemicals. Geological formations, with which water comes in contact are major sources of Inorganic chemicals other sources include Inorganic salts, minerals acids, metal or metal compounds etc.

(3) Radioactive pollutants : Radioactivity found in water is mainly due to natural sources, but there is also a threat of radio nuclide contamination from various industrial and medical process.

(4) Suspended solids and sediments : Soil, sand and other solids washed in to water bodies due to soil Erosion and disposal of sewage and industrial Effluents in to water bodies resulting in contamination of water, which increases turbidity of water.

(5) Heat : Water is widely used for dissipation of waste heat in power plants and industries. This heated water is then discharged in to water bodies, where it has harmful effects on the aquatic life.

Control : (1) Developing proper sewage and Industrial effluent systems can reduce incoming point source of pollution.

(2) Domestic and industrial waste water should be disposed of after treatment.

(3) No intermixing of solid waste or effluent in water source should be done.

(4) Excess use of fertilizers, pesticides, insecticides should be discouraged.

(5) Ponds, lakes etc. should be regularly cleaned of aquatic weeds and plants.

(6) Legislative controls should be more punitive.

Q. 5. (b) Discuss how switching over to a low carbon economy can help in our to words fighting against the problem of Global warming and climate change.

Ans. A low carbon Economy is concept that refers to an Economy which has minimal output of Green house Gas emissions into the biosphere but specifically refers to the Green house gas CO_2 . Recently most of the scientific and public opinion has come to the conclusion there is such an accumulation of GHGs in the atm. due to the anthropogenic causes that the climate is changing. Some nations are low carbon societies which are not heavily Industrialised or Populated. In order to avoid climate change at any point in the future, all nations considered carbon intensive societies and societies which are heavily populated should become zero carbon societies and Economics. Nations seeks to become low carbon Economics as a part of National global warming mitigation strategy. A comprehensive strategy to Mange Global warming is carbon neutrality Geo Engineering and adaption to Global warming. The aim of low carbon economy is to integrate all aspects of itself from its manufacturing, agriculture, transportation and power generation etc. around technologies that produce energy and material with little GHG emission.

Q. 5. (c) Discuss the Environmental aspects of Animal Husbandry ?

Ans. Modern Practices of raising animals for food contribute to air and water pollution, land degradation, climate change and loss of biodiversity on massive scale. Some of the environmental issues concerned with animal husbandry are :

(1) Human Health Hazards or nuisances : Animal pests and possible contamination of water supplies by animal manure and urine may be the cause of diseases like tetanus, rabies, brucellosis, anthrax and fever in humans.

(2) Degradation of Surface and Ground water Quality and quantity : The quality of Surface water and Ground water may be degraded by disposal of organic waste and liquid Effluents from the farmhouse used to keep livestock whereas their quantity may be affected large by scale and requirement of livestock.

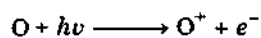
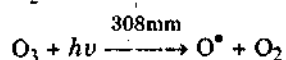
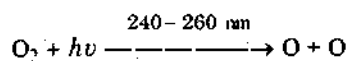
(3) Soil degradation : Overpopulation of livestock leads to soil degradation due to overgrazing, trampling, compaction of soil. Excess harvesting of fodder and forage, removal of vegetation and solid Erosion.

(4) Degradation of Ecosystem and loss of Biodiversity : The expansion of livestock industry has Increases the degradation of terrestrial as well as aquatic ecosystem and the rate of species extinction.

(5) Air pollution : Ruminants produce significant quantity of Green house gas emission. Ruminant is the most important source of methane production in cattle.

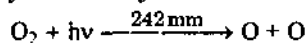
Q. 6. (a) Discuss the problem of Ozone layer depletion and present a summary of international efforts taken up so far to address the problem?

Ans. Ozone Chemistry : In the upper atmosphere the species of oxygen are O_2 , O , O^+ , O_2^+ and O_3 and O_3 , i.e. molecules, atoms, ions and excited atoms and molecules respectively. UV radiation causes the photochemical dissociation of O_2 into O and O^+ for example,



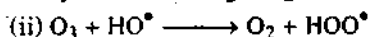
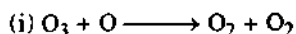
Ozone is an important species present in the stratosphere with maximum concentration around 100 ppm at an altitude of 25-30 km. The ozone layer in the stratosphere acts as a protective shield for life on earth, it absorbs the harmful solar radiation such as UV rays, which are harmful to life causing DNA mutation and skin cancer. Also in absence of this layer the temperature of the lower atmosphere will rise to such an extent that the biosphere will turn into a blast furnace.

Formation of Ozone Layer : It is formed in the stratosphere by a photochemical reaction, followed by third body reaction :



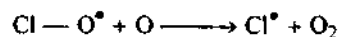
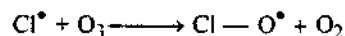
The third body (M) absorbs the excess energy liberated by the above reaction and thereby stabilizes the O_3 molecule. The thickness of the ozone layer is measured in Dobson units (DU), where $1\text{DU} = 0.01 \text{ nm}$ of the compressed gas at 0°C and 760 mm Hg pressure. Average thickness varies marginally with latitudes because of different atmospheric conditions. The thickness is found comparatively low in polar region.

Depletion of Ozone Layer : Ozone layer is believed to be depleted by reaction with atomic oxygen, reactive hydroxyl radicals and nitric oxide.



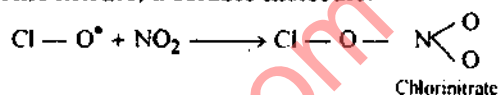
Apart from the above mentioned species, chlorine free radical (Cl^\bullet) also plays

an important role in depletion of ozone in the stratosphere in the following manner :

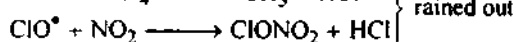
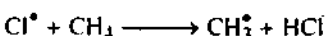
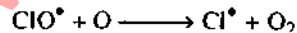
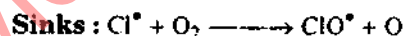
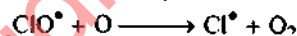
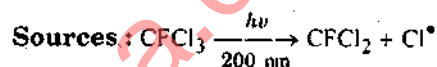


All seen Cl^\bullet atoms are regenerated, so a long chain process is involved.

The following reaction helps in decreasing the concentration of Cl^\bullet by forming chlorine nitrate, a soluble molecule.



The various sources and sinks of chlorine are as below :



Consequences of Ozone Layer

Depletion : Ozone layer depletion leads to more UV radiation reaching earth causing similar climate changes as in greenhouse effect and also these are harmful to man causing skin cancer, swelling of skin, sun burns, skin ageing, leukemia, breast cancer, cataract of eyes, oedema, haemorrhage, lung injury, lung cancer, visual impairment, DNA mutation and many more adverse effects.

Q. 6. (b) Briefly discuss the problem of automobile pollution and suggest suitable ways and means to control it ?

Ans. Automobile Pollution : Internal combustion engines need a mixture of air and fuel to burn and produce energy to move the vehicle. Mixtures of gases that spew from automobiles pollute our atmosphere, and are fast making the environment a place unfit for living. A combination of unburnt Hydrocarbons,

Carbon Monoxide, Oxides of Nitrogen combine to spread an obnoxious mixture.

It is these burnt gases which come out of the exhaust have the potential to cause pollution. In petrol engines the gases comprise of a mixture of unburnt hydrocarbons (HC), Carbon Monoxide (CO), Oxides of Nitrogen (NO_x).

When in excess quantity, these tend to cause automobile pollution. Within a certain range they are acceptable, but when the engine is not turned properly, or a vehicle uses obsolete technology, or the quality of fuel is not good, all these result in a higher level of emission of all the gases.

If the air fuel mixture ratio is not correct then it increases the chances of pollution as it leads to inefficient. Also it leads to reduced power and fuel wastage, which in turn means less efficient performance of the engine along with lower fuel economy.

It's a long, dusty road ahead, Pollution has cast its ominous shadow across the length and breadth of India; there is smog everywhere. It is a choking sensation every time one ventures out into the streets. Delhi is one of the most polluted cities of the world, with Mumbai coming a close second.

Steps to Check Pollution : In an effort to check automobile pollution in this country, the Government of India has made mandatory the use of unleaded petrol for the petrol fuelled engine. They are as follows :

1. Change engine oil at manufacturer recommended intervals or if the vehicle has been lying unused for a long period.
2. While changing lubricant, make sure you use the recommended brand and more importantly, the grade of oil example, 40SW 10. Never use the wrong grade of oil.
3. If it is a carburetted vehicle, clean and tune the carburettor and adjust the idling speed every 3000 kms.
4. Check and adjust tappet clearance.

5. Inspect spark-plug clearance, clean and adjust gap. Replace plugs if necessary.
6. Check the ignition timing and set as per the manufacturer recommendation.
7. Check tyre pressure regularly because low tyre pressure causes drag which increases fuel consumption.
8. If the vehicle has been parked unused for a long time, have the engine tuned and the engine oil replaced.

Some do's and don'ts

1. Avoid unnecessary revving or idling of the engine, it not only increases your fuel consumption but also increases pollution.
2. Switch off the engine at red-lights, or where you are likely to stop for more than two minutes.
3. Try and drive around the speeds of 50-60 kmph in top gear.
4. Speeding increases fuel consumption and this in turn increases pollution.

Q. 6. (c) Discuss the role of government in environmental protection highlighting legislative and legal aspects?

Ans. Environmental acts and laws can encourage satisfactory performance, enable authorities to punish those who infringe environmental legislation, or confiscate equipment that is misused or faulty, or close a company; it may also be possible for employees, bystanders and product or service users to use for damages if they are harmed. They are essential and important for environmental management because :

- (i) They help in regulating the use of resources and environment.
- (ii) They help in the conservation and pollution of various facets of the environment like forests, wildlife, pollution control, waste management, etc.

- (iii) They help in protection of the quality of existing environment from further deterioration.
- (iv) They help in the gradual restoration of the quality of degraded environment.
- (v) They help in mediation, conflict, resolution and conciliation between the concerned parties.
- (vi) They help in the formulation of stable, unambiguous undertakings and agreements.

An environmental law has a unique feature among subject matters of law. It is essentially a Global matter. However peculiar an issue might look to an area or nation, it always has international/global repercussions. There are several national and international laws, policies, conventions and treaties to help in the conservation of environment. The passing or establishment of a legislation or act to protect environment does not necessarily mean that the environmental problem is addressed. Once on environmental legislation is made at the national or international level, it has to be implemented. Without effective implementation of the legislation, the resource use, pollution control, conservation and most field of human activity are likely to fall in chaos and conflict. Therefore, for successful implementation of environmental legislation, there should be an effective agency which can collect relevant data, process it and pass it on to a law enforcement agency. If the laws or rules are broken by an individual or institution, this has to be punished through the legal process. Realising this, an organisation called International Union for Conservation of Nature and Natural Resources (IUCN) was set up in the year 1948. The main task of IUCN is the practical implementation of the various Environmental Laws passed by various countries throughout the world.

Some of the international conventions and treaties enacted for protection of environment are as under :

- International Plant Protection Convention, 1951.
- International Convention for Prevention of Pollution of Sea by Oil 1954.
- Nuclear Test Ban Treaty, 1968
- Convention on Wetlands of International Importance, 1971.
- Convention on International Trade in Endangered Species, 1973.
- Vienna Convention for the Protection of Ozone Layer, 1985.
- International Convention in Biological Diversity, 1992.
- Basal Convention on the Trans-boundary Movement on Hazardous Wastes, 1992.
- Stockholm Convention on Persistent Organic Pollutants, 2001.

Apart from international conventions and treaties, every country has enacted its own environmental laws and regulations for the protection and conservation of environment. In India, Apart from constitutional provisions, there are various Acts that have been enacted for the protection and conservation of environment. Some of the prominent Indian Environment Laws are :

- (i) The Wildlife (Protection) Act, 1972
- (ii) Water (Prevention and Control of Pollution) Act, 1974
- (iii) Forest (Conservation) Act, 1980
- (iv) Air (Prevention and Control of Pollution) Act, 1981.
- (v) Hazardous Waste (Management and Handling) Rules, 1985
- (vi) Environment (Protection) Act, 1986.
- (vii) The Motor Vehicles Act, 1938 (Amended in 1988).
- (viii) Recycled Plastic Manufacture and Usage Rules, 1999.

- (ix) Noise Pollution (Regulation and Control) Rules, 2000.
- (x) Ozone Depleting Substances (Regulation and Control) Rules, 2000.
- (xi) Municipal Solid Wastes (Management and Handling) Rules, 2000.

All these Environmental Laws concern regulation (protection or prohibition) of activities affecting the environment. The salient features of some of the above states environmental acts are discussed in the subsequent sections of this chapter.

Q. 7. (a) Explain how initiatives taken by NGO are helpful in creating the public awareness and implementation of Environmental protection programmes.

Ans. There are many kinds of Non-Governmental Organizations (NGOs) engaged in working towards the improvements of the social, economic, environmental and political conditions of the country. They include citizen's associations, professional societies, foundations, some universities and research centres, and networks of experts of institutions.

With the passage of time, Non-Governmental Organizations (NGOs) have equipped themselves adequately and come up enthusiastically in providing services like relief to the blind, the disabled and disadvantages and helping the government in mother and child health care, including family planning programmes.

The National Population Policy (NPP) 2000 and National Health Policy (NHP) 2002, state that there should be greater involvement of NGOs in the implementation of different health and family welfare programmes in the country.

There is a wide spectrum of Environmental NGO's categorizable in terms of their specific fields levels of operation and the extent to which they work to influence the government. There are some groups which lobby for more stringent legislation and work to influence and inform public official other groups

specialize in research, training, public education, information disseminator acquisition and management of protected areas, or convening of stake holders in environment conflicts.

WWF India was the first NGO in India to promote nature conservation on a nationwide basis a time when this was regarded as an eccentric elitist whim. Through its Conservation Action Support Programme (CASP), WWF India supports grassroots level activities taken up by the smaller NGOs since 1984, WWF India has been a part of the Environmental Information System (ENVIS) of the Ministry of Environment and Forests.

The spectrum of 'Missions' as provided by the different listed NGOs ranges from :

- Promoting environmental education.
- Conducting awareness camp;
- Safeguarding environment through social mobilization and community participation.
- Biodiversity and wild life conservation.
- Promotion of renewable energy.

Various other research activities and movements.

Q. 7. (b) Discuss the importance of women education for the success of the schemes relating to Environmental Quality Management and Public health.

Ans. Today, the need of the hour is environmental education and awareness among women environmental protection. Women, particularly poor village women, are the worst victims environmental degradation. Their days start with a long march in search of basic items like fuel, food vegetables and water so, there must be stringent legislation about women education.

- Women should be given better educational opportunities.
- Woman should be educated about environmental deterioration and its protection.

United Nations recognized the need of women in decision making process, in planning of natural resources use, protection of green cover and in population stabilisation. Women have been the significant factor in environmental movements. By education, women can learn :

- How to handle environmental issues.
- How to lead a better life with less population.
- How to prevent the ecological crisis.
- How to ensure socio-economic development and make this earth a better place to live in for the present and future generations.

Q. 7. (c) What is RainWater harvesting ? Discuss its advantages and limitations ?

Ans. Rain Water Harvesting : In urban areas, the construction of houses, footpaths and roads has left little exposed earth

this water can be held back, it can seep into the ground and recharge the groundwater.

This has become a very popular method of conserving water especially in the urban areas. Rainwater harvesting essentially means collecting rainwater on the roofs of building and storing it underground for later use. Not only does this recharging arrest groundwater depletion, it also raises the declining water table and can help augment water supply. Rainwater harvesting and artificial recharging are becoming very important issues.

Some of the benefits of rainwater harvesting are as follows :

- Increases water availability
- Check the declining water table
- Improves the quality of groundwater through the dilution of fluoride, nitrate, and salinity.
- Prevents soil erosion and flooding especially in urban areas.

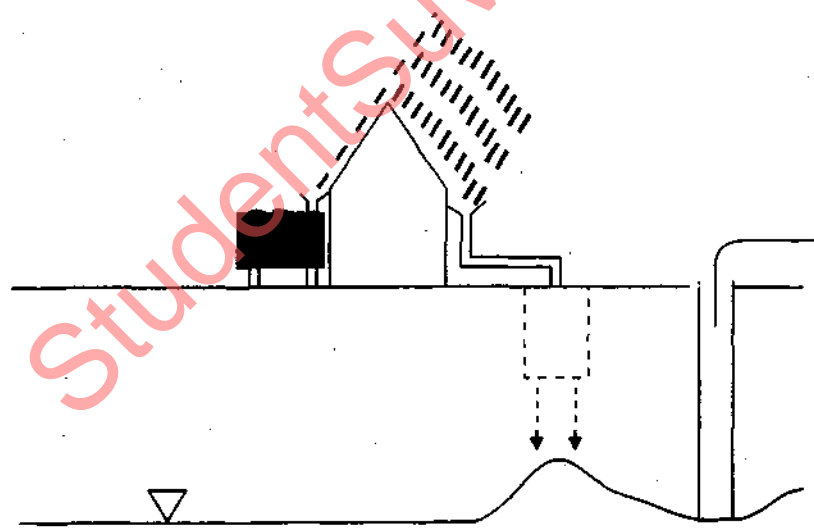


Fig: Rain water harvesting

for water to soak in. In parts of the rural areas of India, floodwater quickly flows to the rivers, which then dry up soon after the rains stop. If