

SECOND SEMESTER EXAMINATION, 2008-09

ENVIRONMENT AND ECOLOGY

Time : 2 Hours]

[Total Marks : 75

Section A

This question contains 10 question of multiple choice/fill in the blanks/true-false/matching correct answer type questions. Attempt all parts of the question.

$10 \times 1 = 10$

Q. 1. Fill in the following blanks with suitable words :

(a) Chlorofluorocarbon releases a chemical harmful to ozone is **CIO**

(b) Green house effect is related to **global warming**.

(c) The world AIDS day is recalled on 1 Dec.

(d) Increasing industrialization is causing much danger to man's life by **Pollutants**.

(e) Overgrazing result in **Land degradation**.

(f) Major purpose of most of the dams around the world is **water conservation**.

(g) Green plants are also called the **producers**.

(h) A fuel cell in order to produce electricity burns **hydrogen**.

Indicate True or False of the following statements :

(i) Biosphere is made of atmosphere, hydrosphere and lithosphere. **True**

(ii) Hydropower energy and Biomass Energy are renewable energy sources. **True**

Section-B

Q. 2. Attempt any three parts. All parts carry equal marks : $5 \times 3 = 15$

Q. 2. (a) Explain the multidisciplinary nature of Environmental studies ?

Ans. Although the study of Environmental Sciences Implies single subject, but its essences multidisciplinary in study. It includes various applied and basic disciplines. These are : studies related to natural science such as Physics, Chemistry, Biology, Mathematics, Engineering, Technology etc. Study related to humanities such as Arts, Religion, History, Sociology, Economics, Anthropology, Philosophy, Literature etc. Studies related to social sciences such as Ethics Ecology, Management, Laws, Planning etc.

Thus to understand the entire spectrum of relations between mankind & environment, one has to go through various disciplines and their input an each other. The main among these are briefly given as follows :

Botany : Mainly deals with plants, trees etc..

Zoology : Mainly discusses about animals etc.

Anthropology : Refers to the effects of deforestation on life of tribels, forest dwellers etc.

Geography : Deals with the landscape, hills valley, weather and climate etc.

Hydrology : Deals with the study of state distribution and circulation of water available in atmosphere, underground and above the ground.

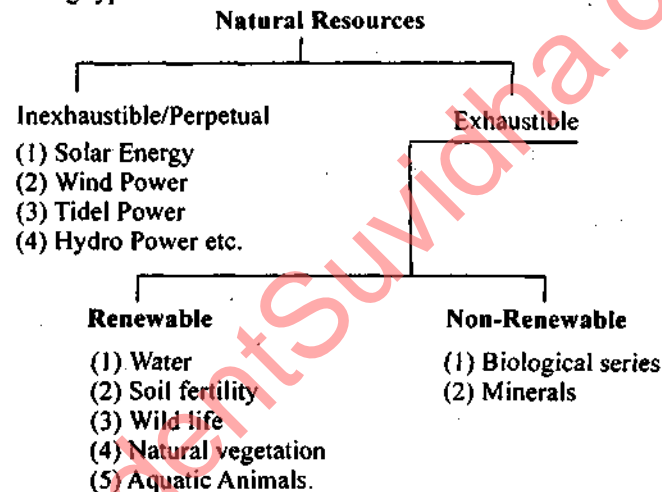
Hydraulics : Deals with the study of flow of water reources and functions of water structure such as dams, pipelines, rivers, channels irrigation canal etc..

Oceanography : Deals with the science, biology, geography, behaviour etc. of oceans.

Soil Sciences : Deals with the composition structure, types and behaviour of soil under different conditions, natural and man-made.

Q. 2. (b) Explain the different between renewable non renewable and perpetual natural resources with the help of suitable examples ?

Ans. The word resource means a source of supply that is generally hold in reserve. In other words the natural resources are the materials, which living organisms can take from nature for the sustenance of their life. The natural resource can be a substance, an energy unit, or a natural process or phenomena. For example, land, soil, water, forest, grassland etc. The natural resources are not only source of food, fodder and shelter, they also provide recreational opportunities and even inspiration to man kind. The quantity and quality of natural resources vary Greatly in their locations. For instance particular type of forest and grass land occur only in certain countries. Depending upon the availability and abundance, natural resources are of following types :



(1) Inexhaustible Resources/Perpetual : These resources are present in unlimited quantity in the nature and they are not likely to be exhausted by human activities. Some inexhaustible resources remain unaffected by human activities, while many other may show some changes in their quality. These resources can not be exhausted significantly at global level due to human activities.

(2) Exhaustible : These resources have limited supply on the earth and are therefore liable to be exhausted if used indiscriminately.

These resources are of two types :

(A) Renewable Resources : These resources have the capacity to reappear or replenish themselves by Quick recycling, reproduction or replacement. Soil, water and living organisms however, if the consumption of these resources continue to exceed their rate of renewal, not only their quality becomes affected, they may even totally exhausted.

(B) Non-renewable Resources : These resources lack the ability of recycling and replacement. The substances with a very long recycling time, are also regarded as non renewable resources.

Many abiotic resources are non renewable. The fossil fuels/coal, Petroleum and Natural gas and metals once extracted can not be regenerated.

Q. 2. (c) What do you understand by water Pollution ? Suggest various remedial and control measures to minimize water Pollution ?

Ans. : Generally speaking water pollution is a state of deviation from the pure condition. Whereby its normal properties and function are affected, water pollution can be defined as the presence of some foreign substances or impurities in water in such quantity so as to constitute a health hazard by lowering the water quality and making it unfit for use.

Usually, water pollution is studied under the three sub headings viz. fresh surface water pollution, Ground water pollution, and marine water pollution and it is the fresh surface water pollution which is most important.

Sources of Water Pollution : The main sources of water pollution are natural. Agricultural mining, municipal, industrial and accidental.

(1) Municipal Pollution of water will be due to sewage obtained from domestic sources, institutions, commercial and industrial buildings.

(2) Mining Pollution of water will be due to fines from ore washing. Suspended solids soluble toxic materials and acid drainage.

(3) Agricultural Pollution of water will be due to soil and silt washing from land surfaces, fertilisers, insecticides, pesticides and weed killers.

(4) Natural pollution may be due to aerial contaminants entering the water body due to rainfall, decaying of plant and animal bodies.

(5) Accidental spillage of chemicals during loading and accidental leakage from industrial storage tanks, oil refineries etc.

Control of Water Pollution :

(1) Separate ponds and tanks to be used for cattle and animals.

(2) Use of pesticides, insecticides and fertilisers should be done judiciously. Rapid biodegradable substitutes for pesticides should be employed.

(3) In towns where sewage facilities are not available, septic tanks should be made in the houses.

(4) Rivers and lakes should not be used for bathing or washing as it contaminate water.

(5) Domestic sewage and industrial wastes should be treated before discharging them in to drains.

Treatment of Waste Water : Domestic sewage and Industrial waste should be properly treated before release in the natural drains and rivers. Treatment involve following steps :

(1) **Primary Treatment :** The larger and suspended particles are removed by simple physical methods such as sedimentation and filtration.

(2) **Secondary Treatment :** Air is supplied to promote bacterial decomposition of the organic matter (biological oxidation). This process is carried out in oxidation ponds. It result in release of CO_2 and formation of sludge. The sludge is continuously created for further oxidation.

(3) **Tertiary Treatment :** Turbidity in waste water is removed by Physico-chemical process. This step involve chemical oxidation of waste water by chlorine gas, O_3 gas and UV radiations.

After this the waste water can be discharged in to natural water or used for irrigation.

Q. 2. (d) What are Green house gases ? Name and discuss their contribution to Global warming. What can be the effects of Global Warming ? What are the remedial measures ?

Ans. : In the context of environment green house effect refers to "selective energy absorpton by some atmospheric gases. Which allow short wave length energy to pass through but absorb longer wave length and reflect heat back to the earth. These gases are known as green house gases. These include carbon dioxide (CO_2) methane (CH_4), Nitrous oxide (N_2O).

Chlorofluoro carbon (CFC) Ozone (O_3) and water vapour.

Though CO_2 contribute maximum to the green house gases effect on the earth methane, and CFC are potent green house gases even though their contribution in the atmosphere are much less than that of CO_2 .

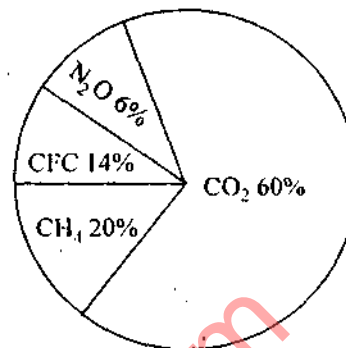
(1) CO_2 : CO_2 is most abundant green house gas in the atmosphere. It is chiefly produced by burning of fuels. It is also released by plants and animals during the process of respiration.

(2) **Methane (CH_4)** : Methane is product of incomplete decomposition caused by a group of bacteria called methanogens under anaerobic conditions. It is produced from Garbage dumps, flooded rice fields and enteric fermentation in cuttles. It is also produced by Biomass burning.

(3) **Chlorofluorocarbon (CFC)** : CFC are synthetic gaseous compounds of carbon and halogens and are widely used as refrigerants aerosol, propellants, insulators etc. The main sources of CFC in the atmosphere are leaking AC and refrigeration units.

(4) **Nitrous Oxide (N_2O)** : Main sources are Biomass burning and industrial processes. It is produced by breakdown by nitrogen rich fertilizer in the soil, burning of nitrogen rich fuel, live stock waste etc.

Relative contribution and Effects of Green House Gases : Different Green House Gases do not contribute equally to the global warming. CO_2 contribute the maximum, which amounts to be 60% of the total global warming. The contribution of CH_4 and CFC is 20% and 14% respectively. A smaller contribution i.e. 6% is made by N_2O .



Effects : The increasing concentration of Green House Gases leads to the Global Warming. Some of the predicted effects of Global Warming are describe below :

(1) The average temperature of the earth may increase by $1.40^{\circ}C$ to $5.8^{\circ}C$ by the year 2100 from year 1900. The moisture carrying capacity of the atmosphere is also expected to increase due to warming. The human diseases will increase particularly in tropical and sub tropical countries due to increase in disease vectors.

(2) The global warming also contribute to rise in sea level due to thermal expansion of ocean and melting of glaciers and ice sheets the level of sea has been rising by 1 to 2 mm per year during the 20th century.

(3) Each plant and animal species occurs with in a specific range of temperature. The global warming will shift the temperature ranges. Which would affect distribution Pattern of Organisms. Many species may disappear as they are unable to migrate fast enough to track temperature changes.

(4) Global warming will reduce crop production due to increased incidence of plant diseases and pest. Explosive growth of weeds. The overall world's crop productivity will decrease due to global warming.

Remedial Measures : Some of the strategies which could reduce global warming are given below :

(1) Reduction in green house gas emission by reducing the use of fossil fuels and by developing alternative renewable sources of energy.

(2) Increase of the vegetation cover, particularly forest for photosynthetic utilization of CO_2 .

(3) Reduction in N_2O Emission by minimising the use of nitrogen fertilizers in agriculture.

(4) Development of substitutes of CFC.

(5) Improved Agricultural techniques like zero till farming etc.

(e) Discuss the role of NGO's in Environmental Protection ?

Ans. : NGO's (Non Governmental Organisations) initiate environmental awareness among people and act as a catalyst for environment protection. The ministry of environment and forest extends support to NGO activities and conducts many of its programmes through them.

Initiatives taken by NGO's :

(1) Environment education and awareness among people.

(2) Environment pollution control.

(3) Protection of forest wealth.

(4) Afforestation and social forestry.

(5) Recycling and waste utilisation.

(6) Rural development and eco development.

(7) Population stabilisation and family planning.

(8) Conservation of biological diversity.

(9) Encouraging the use of biofertilizers.

(10) Sustainable development.

Some Important NGO's and their Initiatives

Kalpavriksh (KV). This organisation started in 1979 as a movement opposed to the destruction of Delhi's green areas. KV is mainly

conducting research on environmental subjects, such as an impact assessment study of the Narmada Valley Project, pesticide use in India, air pollution in Delhi and mining activities. KV is functioning as a resource group for NCERT and other agencies on environment education.

Kerala Sastra Sahitya Parishad. KSSP is an important national institution with a membership of over 25,000 with around 900 units spread over the state of Kerala. The activities of the Parishad encompass eco development, creating an awareness on water and energy conservation, encouraging the use of non-conventional sources such as smokeless chulhas.

World Wide Fund for Nature, India (WWF India). WWF has approximately 200 volunteer associates and 10,000 subscriber supporters. The major activities of this organisation are conservation of the country's natural heritage to research, field project, education and training.

Bombay Natural History Society (BNHS). BNHS has contributed significantly in saving the valuable tropical forests of Silent Valley in Kerala.

Other NGO's

- Indian Environmental Association, Delhi (1980).
- Indian Society for Naturalist (INSONA) Gujarat (1975).
- Society for Clean Environment (SOCLEEN) Maharashtra.
- Himalayan Research and Development Group (HRDG) Nainital (1982).
- People Association for Himalayan Area Research (PAHAR), Nainital (1982).
- Uttarakhand Research Institute, U.P. (1975).

All questions are compulsory. Attempt any two parts from each question.

Q. 3. (a) Define Ecosystem. Give an account of the structure and function of Balanced Ecosystem ?

Ans. The term ecosystem was introduced by Sir Arthur Tansely (1935). An ecosystem can be defined as a structural and functional unit of biosphere or a segment of nature consisting of community of living beings and physical environment both interacting and exchanging material between them.

An ecosystem may be natural or man made, temporary (pond) or permanent (forest). Aquatic (pond, ocean etc.) or terrestrial (grassland etc.) Fresh water (pond, lake, stream) or salt water (marine, estuaries etc.)

Structure and Function : The structure and function are the two major aspect of an ecosystem, together they illustrate the organisation of an ecosystem.

Every ecosystem has two major components viz. Abiotic and Biotic.

(1) Abiotic Components : It include physical factor (soil, light, water etc.) and chemical factors (organic and inorganic substances) including C, H, N, K, P, S etc. and protein, carbohydrate, lipid etc.

(2) Biotic Components : It include living component of Ecosystem. The living components includes :

(A) Autotrophic Components (Producers) : It is the component in which fixation of light energy. Use of simple inorganic substances and build up of organic substances predominate. Eg. Green Plants, Algal, Photosynthetic Bacteria etc.

(B) Heterotrophic Components (Consumers) : It is the component in which utilization and decomposition of complex organic substance predominate. They consume organic material build up by producers they are further categorised as :

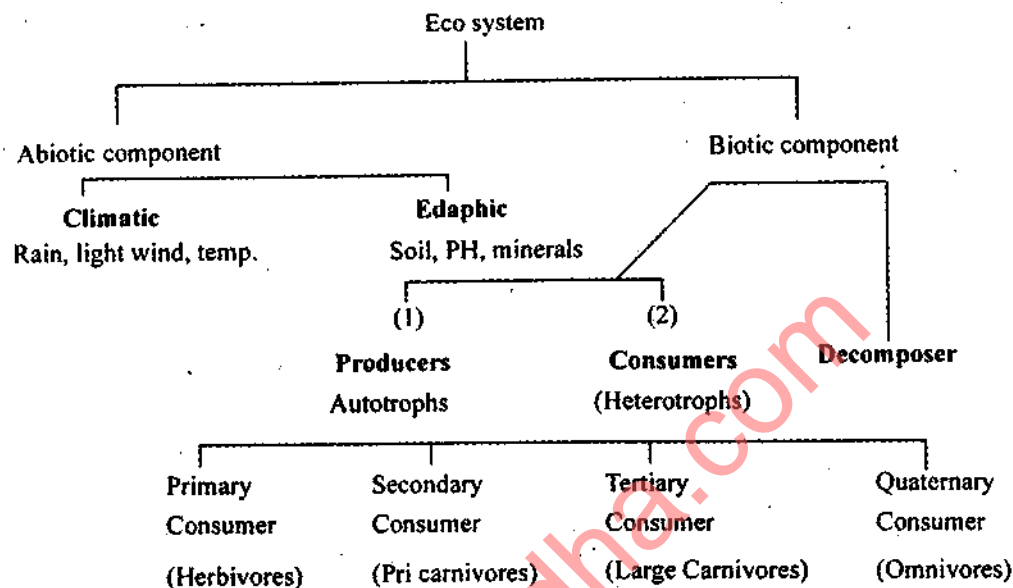
(i) Primary Consumers : These are animals that feed on primary producers and are called herbivores. E.g. Deer, Goat, Cattle etc.

(ii) Secondary Consumer : These are the animals that feed on herbivores and are called as the primary carnivores e.g. hawk, owl, lizard etc.

(iii) Tertiary Consumer : These are large carnivores that feed on primary carnivores e.g. snakes, wolves etc.

(iv) Quaternary Consumers : These are largest carnivores feed on tertiary consumers and are not eaten up by any other animal e.g. lion, tiger etc.

(v) Decomposers : Those organisms which feed on dead organisms and transform complex organic compounds back into simple inorganic compounds e.g. fungi bacteria etc.



Functions : (1) Primary and secondary productivity.

(2) Energy Flow.

(3) Rate of nutrient cycling.

(4) Food chain relationship.

(5) Biological regulation of both.

Organism by the Environment and environment by organisms.

Q. 3. (b) Write an explanatory note on the issue of food and shelter security ?

Ans. With the development of science and technology, man continued plunder natural resources and polluted the environment. The craze of progress in industry, agriculture and transportation has jeopardised the existence of man himself. Today man equipped with a variety of skills and superior technology has ruined the natural environment.

Food Security : The need of increased food production as a result of global population explosion led to manipulation of land resources causing a stress in the natural environment. The food production and protection technologies are, however, so interwoven and interdependent that it is impossible to visualise a shoot up in crop production individually. The use of excessive fertilizer, pesticides harming the environment in various ways. The use of pesticide helped in Eradication of diseases pests and in boosting crop production. But the pesticides endangered our life by actually affecting man, animals, plants, soil fertility as well as aquatic life. In a nutshell if we continue to rely upon broad spectrum of pesticides for crop production, the recovery of natural forms of control will become impossible.

Shelter : Shelters for human living are increasing exponentially with the increasing population. A good share of land which once was cropland, wetland, forest or fallow land has been converted to concrete shelters adversely affecting the ecosystem.

Q. 3. (c) Explain the concept of sustainable development. What are the major obstacles in the path of sustainable development in India ?

Ans. The term sustainability refers to keeping an effort going continuously. Sustainable development may be defined as the successful management of resources for development to satisfy the changing human needs, while maintaining the ability of environment, and conserving natural resources.

G. H. Brundtland (1987) former prime minister of Norway and Director of World Health Organisation (WHO) defined sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs". "The issue of sustainable development was discussed in detail for the first time at international level in the UN Conference on Environment and Development 'held at Rio De Janeiro (Brazil) in 1992. There are two aspects of sustainable development (i) Inter-Generational Equity (to hand over a safe healthy and resourceful environment to our future generation) (ii) Intra Generational Equity (Technological Development which Promote Economic Growth of the Poor Countries so as to narrow the wealth gap between different nations.)

As a concept sustainable development draws upon two often opposed, intellectual traditions. One concerned with the limits nature present to humans, the other with the potential for human material development. The interpretation varies a lot :

(1) Some people see it as a quest for harmony between human and their environment.

(2) Some fail to accept that in a finite world there cannot be unlimited growth.

(3) Some feel that there can be a shift to less environmentally damaging improvements in the quality of human life.

(4) Some hope that science and technology will allow limits to be stretched.

There are many situations where ill thoughts out appeals for sustainable development are made. This harm the concept risking its

dismissal by the public and decision makers as shallow, unworkable and so on. There are cases where sustainable development is being used as cunning deceit to mislead people. Environmental management must police the use of the concept to prevent its misuse or it will become devaluated, which could make its responsible use difficult if the public loses trust.

Sustainable development thus is a moderate position between the extreme of no growth versus unlimited growth and is based on the use of renewable resources in harmony with ecological system.

Q. 4. (a) Discuss the Environmental effects of extracting and using mineral resources ?

Ans. The mining, processing and disposal of minerals have negative effect on environment. The main harm caused by mining are as follows :

(1) The top soil is removed from the mining area to get access to the deposit. It disturbs and damages the land and results in defacing of landscape. Such a land is called as mine spoil.

(2) Mining disturbs the natural hydrological processes and also pollutes ground water as well as surface water.

(3) Extraction and processing of areas emits enormous quantities of air pollutants such as suspended particulate matter (SPM), metal particles etc. leading to serious environmental hazards.

(4) Miners often suffer from serious respiratory and skin diseases like asbestosis, silicosis, black lung disease etc.

(5) Mining often causes ground subsidence which results in tilting of buildings, cracks in houses, bending of rail tracks, leaking of gas from cracked pipelines leading to serious disasters.

(6) Tribal people may be forced into new ways of life for which they are unprepared.

(7) Migration of tribal people from mining areas to other areas in search of land and food.

(8) Rehabilitation problem of local inhabitants especially tribal people.

(9) Occupational Health hazard.

(10) Acute scarcity of fuel wood and other forest products for tribal people.

Q. 4. (b) Write explanatory note on fluoride problem in drinking water ?

Ans. Fluoride is one of the very few chemicals that has shown to cause significant effects in people through drinking water. Fluoride has beneficial effects on teeth at low concentration but excessive exposure to fluoride in drinking water or from other sources can give rise to number of adverse effects. Fluoride is found in all natural water at some concentration. High fluoride concentration may therefore be expected in ground waters from calcium poor aquifers and in areas where fluoride bearing minerals are common.

The effect of the long term exposure to naturally occurring fluoride from drinking water and other environmental sources are the major concern with regard to human health.

Effects on teeths : High level of Fluoride present in concentration up to (10 mg l^{-1}) were associated with dental fluorosis/yellowish or brownish striation or mottling of the enamel) while low level of fluoride were associated with dental decay.

Skeletal Effects : Endemic skeletal fluorosis is primarily associated with the consumption of drinking water containing high level of fluoride.

Crippling Skeletal Fluorosis, which is associated with the higher level of exposure can result from osteosclerosis.

Q. 4. (c) Hydrogen as an alternative future source of energy. Explain it.

Ans. Hydrogen is the simplest element known to man. Each atom of Hydrogen has only one proton. In the sun's core hydrogen atom combine to form helium atom. This process is

called fusion gives off radiant energy. This radiant energy sustain life on earth. Since hydrogen does not exist on earth as a gas, we must separate it from other element. The two most common methods for producing hydrogen are steam reforming and electrolysis.

Steam reforming is currently least expensive method of producing hydrogen. It is used in industries to separate hydrogen atom from carbon atom in methane (CH_4). Electrolysis is a process that splits hydrogen from water. It results in no emission but it is currently a very expensive process.

NASA is the primary uses of hydrogen as an energy fuel. Hydrogen batteries called fuel cells power the shuttle's electrical system.

Future of Hydrogen : Hydrogen has great potential as an environmentally clean energy fuel and as a way to reduce reliance on imported energy sources.

There are currently about 200 hydrogen fuelled vehicles in the United States. They store hydrogen gas or liquid on board and convert the hydrogen into electricity using a fuel cell. Only few vehicles burn the hydrogen directly. Before hydrogen can play a bigger energy role many new facilities and systems must be built.

Q. 5. (a) Define land pollution. Discuss the causes of land pollution and their control ?

Ans. Rapid urbanization with the consequent increase in population has result in reduction of land for the waste to be disposed land in getting polluted day by day due to increase amount of waste. The soil is getting heavily polluted by toxic materials and dangerous microorganism which enter the air, water and food chain.

Causes of land pollution :

(1) Industrial Waste : Industrial effluents mainly discharged from pulp and paper mills, chemical industries, oil refineries, sugar factories

tanneries, mining activities, drug, glass, cement are responsible for land pollution.

(2) **Radioactive Materials** : Radioactive substances resulting from explosion of nuclear devices atmospheric fall out from nuclear dust penetrate the soil and accumulated there resulting soil pollution.

(3) **Agricultural Practices** : With the advance in agro technology, huge quantities of fertilizers, pesticides, herbicides, weedicides are employed to increase crop yield, these all material contribute in land pollution.

(4) **Chemical and Metallic Pollutants** : A number of industries four their hazardous effluents in soil and water creating disastrous effect on living organism.

(5) **Biological Agents** : Soil gets large quantities of human, animal and birds excreta which constitute a major source of land pollution by biological agents.

(6) **Soil Sediments as hand Pollutants** : Soil sediments refers to the depositions of trace metals such as Hg, Ar, Sb, Pb, Cd, Ni, Co, Mo, Cu and Cr. The process of sedimentation is a comprehensive natural Geomorphological process which operate through the chain of erosion of soil, transportation of sediments and deposition of these eroded materials is different paths of water bodies.

Inscientific agricultural and forestry practices, on controlled dumping of effluents mismanagement of water sheds, ship mining construction of dams, road, overgrazing and other practices contribute to sedimentation.

Control of Land Pollution : The various approaches to control the soil pollution are as follows :

(1) Use of natural fertilizer (compost, manure) should be promoted.

(2) Ban must be imposed on toxic chemicals.

(3) Using Biological weapons to control soil pollution.

(4) Launching extensive afforestation and community forestry programmes.

(5) Conservation of soil to prevent the loss of precious top soil from Erosion.

(6) Sponsoring more intensive R & D efforts on bio-fertilizers, microbial degradation of waste utilization of waste by recovery, reusing and recycling, safer treatment and disposal of hazardous waste.

(7) Security land fill have to be constructed for permanent disposal of hazardous and industrial waste.

Q. 5. (b) What is Air Pollution ? What are its effect on human health ?

Ans. Air Pollution may be defines as the presence of one or more contaminants in the atmosphere in such a quantity and of such duration as is or tend to be injurious to human health, animal or plants or properties or would unreasonable interfere with enjoyment of life and property.

Effects on Human Health : The impurities in the inhaled air can affect human health in number of ways, depending upon the nature and concentration of pollutants, duration of exposure and age group of receptor. Depending upon the chemical nature of pollutants, some pollutant may be harmful when present in high concentration and other even in their small concentration. The various health effects are as under :

(1) Eye irritation can be caused by many air pollutants such as NO_x , O_3 , PAN, SMOg etc.

(2) Nose and throat irritation can be caused by SO_2 , NO_x , insecticides, pesticides etc.

(3) Gaseous pollutants like H_2S , SO_2 , NO_2 and hydrocarbons can cause odour nuisance even an low concentration.

(4) Irritation of the respiratory tract can be caused by SO_x , NO_x , O_3 , CO etc.

(5) A variety of particulate, particularly pollen can initiate asthmatic attack.

(6) CO, which is 200 times more reactive than O₂, combines with haemoglobin in the blood and consequently increases stress on those suffering from cardiovascular pulmonary diseases.

(7) Hydrogen Fluoride can cause fluorosis and mottling of teeth.

(8) Air pollutants such as polycyclic organic compounds, aliphatic hydrocarbons etc. can cause cancer.

(9) Dust particles can cause dust specific respiratory diseases such as silicosis (associated with silica dust) asbestosis (associated with asbestos dust) etc.

(10) Heavy metals like lead, may enter the body through the lungs and can cause poisoning. Its high concentration can damage liver and kidney and can cause abnormality in fertility and pregnancy, and mental development of children gets affected.

(11) Exposure to radioactive Isotopes like Iodine 131, Phosphorus 32, Cobalt 60, Radium 226 etc. can cause anaemia (Iron Deficiency), Leukaemia (RBC deficiency), cancer and Genetic defects.

Q. 5. (c) What do you understand by the term solid waste ? Discuss in brief the various types of solid waste ?

Ans. All solid and semi solid waste arising from human and animal activities are discarded as useless or unwanted are included in term solid waste. It includes garbage, rubbish, ashes and residues, demolition and construction waste, dead animals, radioactive waste etc.

Classification of Solid Waste : Solid waste may be classified based partly on content and partly on moisture and heating value. A typical classification is as follows :

Municipal Solid Waste : Municipal solid waste consists of household waste, construction

and demolition debris, sanitation residue, and waste from streets. This garbage is generated mainly from residential and commercial complexes. They may be categorized as :

Garbage : Refers to the putrescible solid waste constituents produced during the preparation or storage of meat, fruit, vegetable etc. These wastes have a moisture content of about 70% and a heating value of around 610^6 J/kg.

Rubbish : Refers to non-putrescible solid waste constitute, either combustible or non-combustible. Combustible waste would include paper, wood, scrap, rubber, leather etc. non-combustible waste are metals, glass, ceramics etc. These wastes contain a moisture content of about 25% and the heating value of the waste is around 1510^6 J/kg.

Hospital Waste : Hospital waste is generated during the diagnosis, treatment, or immunization of human beings or animals or in research activities in these fields or in the production or testing of biologicals. It may include wastes like sharps, soiled waste, disposables, anatomical waste, cultures, discarded medicines, chemical wastes, etc. These are in the form of disposable syringes, swabs, bandages, body fluids, human excreta, etc. The moisture content is 85% and there are 5% non-combustible solids. The heating value is around 2510^6 J/kg. This waste is highly infectious and can be a serious threat to human health if not managed in a scientific and discriminate manner.

Industrial Waste : They include chemicals, paints, sand, metal ore processing, fly ash, sewage treatment sludge etc. Manufacturing industries produce wastes which are solid or semi-solid. This waste can be self-igniting, explosive, toxic or radio-active. Chemical process industries generate a variety of waste, both organic and inorganic, which are mixtures with wide range of component concentration.

Agricultural Waste : These include farm animal manure and crop residue etc. animal and vegetable waste contain valuable minerals and nutrients. Humus from agricultural wastes contains nitrogen, phosphorus, potash and trace elements which are vital to the fertility of the soil and optimum plant growth. Burning of wastes as fuel in the conventional manner makes poor use of the leaf content of the fuel burnt and further, leads to loss of valuable nutrients. In India, agricultural wastes contain around 2kg/person/day.

Q. 6. (a) Name and discuss the major periods of Growth of human population ?

Ans. The growth of human population can be viewed in four major periods :

(1) An Early Period of Hunters : This period ranges between the first evolution of humans on this planet to the beginning of agriculture. During this period, it is estimated that total population was probably less than a million.

(2) Early Pre-Industrial Agriculture : This period began sometime between 9,000 BC and 6,000 BC. The first major increase in population came during this period. The average rate of growth was probably about 0.03% which was large enough to increase human population from approximately 5 million in 10,000 BC to about 100 million in 1 AD.

(3) The Age of Industrial Revolution : The second and much more rapid increase in population started about 400 years ago with the industrial revolution associated with the advance in medicine and health care. The main reason of rapid increase in population were discovery of causes of diseases, invention of vaccines, improvement in sanitation and advances in agriculture.

(4) The Modern Era : Though the rate of population growth has slowed down in developed countries but population still continues to increase rapidly in many parts of the world. Particularly

developing countries. According to projections the global population will be approximately 8 billions by 2025 and 10 Billions by 2050 AD.

According to world bank projections the world population may stabilize between 101 to 125 billions. Developed countries would only increase from 1.2 billion today to 1.9 billions, but developing countries would increase from 5 billion to 9.6 billions.

Q. 6. (b) Discuss the phenomenon of Green House Effects. What are its effects ? What are its remedial measures ?

Ans. Green House Effect is warming of the earth's surface and lower atmosphere that tends to intensify with an increase in atmosphere carbon dioxide. The atmosphere allow a large percentage of rays of visible light from the sun to reach the earth's surface in the form of long wave infrared radiations, much of which is absorbed by molecules of CO_2 and water vapour in the atmosphere which is re-radiated back to the surface as heat. This is roughly analogous to the effect produced by the glass panes of a green house, which transmit sun light in the visible range but hold in heat. The trapping of this infrared radiation causes the earth's surface and lower atmospheric layers to warm to a higher temperature.

An increase in atmospheric concentration of other trace gases such as CFC, NO_x , and methane, due again largely to human activity may also aggravate green house condition. The capacity of atmosphere to keep the earth warm depends on the concentration of green house gases. The excessive increase in concentration in the atmosphere would retain more of the infrared radiation resulting in enhanced green house effect.

Effects : Same as in Ans. 2(d) section-B.

Q. 6. (c) What is animal husbandry ? State and discuss environmental concern of animal husbandry ?

Ans. Animal Husbandry : "The greatness of a nation and its moral progress can be judged by the way its animals are treated."—Mahatma Gandhi—Mahatma Gandhi

Animal Husbandry is an understanding of how to care for and manage domestic animals so that the animal's requirements for good health and welfare, and man's requirements for the use of these animals are met.

Animal Husbandry plays a very important part of the agriculture. Animal Husbandry and Dairying **activities continue to be integral part of human life.** Cattle rearing for milk and milk products, leather and flesh are an important occupation for most of the people living in any place. Animal husbandry plays a very important part in the rural economy.

Animal Husbandry and Dairying sector plays an important role in the national economy and in the socio economic development of the country. The contribution of this sector is estimated to be about 25 per cent of the total value of output of agricultural sector. This sector also plays a significant role in supplementing family incomes and generating employment in the rural sector, particularly among the landless, small and marginal farmers and women, besides providing cheap and nutritious food to millions of people. The employment in the livestock sector was approximately 98 million in principal status, and another 86 million approximately in subsidiary status according to the National.

Sample Survey of 1993-94. India's milk output in 1997-98 was 705 million tonnes and it is targeted to reach the level of 75 million tonnes in 1998-99 making India perhaps the largest producer of milk in the world.

Export earnings from the livestock sector and related products rose to Rs. 1925 crore in 1996-97 from Rs. 792 crore in 1988-89. The export of meat and meat products during 1996-97 was Rs. 693 crore which accounted for about 36 per cent of the total exports from the livestock sector. For the rapid growth of the livestock and fisheries sector, the Department of Animal Husbandry and Dairying has formulated proposals of Rs. 167788 crore for the Ninth Plan (1997-2002). The major thrust would be on genetic upgradation of livestock to improve productivity and production of major livestock products. To achieve

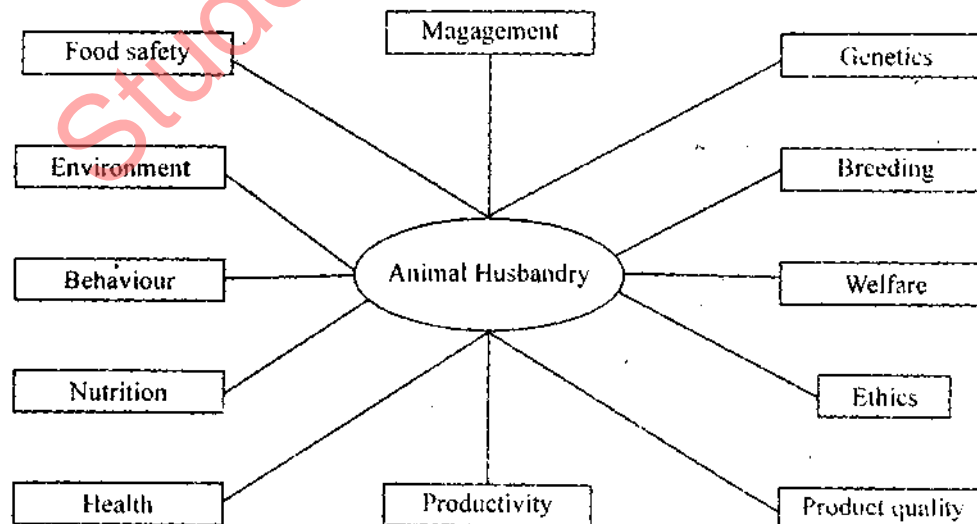


Fig. Animal husbandry and the environment

these objectives, emphasis would be laid on development of requisite infrastructure, feed-management, and, better health care services. For realising the full potential of this sector, the allocation of the Dept. of Animal Husbandry and Dairying for 1998-99 was stepped up to Rs. 38190 crore, a 70 per cent increase over revised estimate of last year.

To provide additional impetus, two new plan schemes have been conceived and introduced during 1998-99. These are :

(a) formation of new dairy cooperatives in Operation Flood areas to bring under the cooperative fold 35 lakh members in addition to the 90 lakh members now being served by dairy cooperatives; and

(b) providing vocational opportunities and fostering entrepreneurship among dairy science student trainees to equip them with and experience to take up dairying as a profession.

Q. 7. (a) Environment education can play an important role in environmental protection". Explain it.

Ans. Environment education is a life long process. That encourages exploring raise questions, investigate issues and seek solutions to environmental and social problems.

Environment education refers to organized efforts to teach about how natural environment function and particularly how human being can manage their behaviour and ecosystem in order to live sustainably. The term is often used to imply education within the school system, from primary to post secondary. It is sometimes used more broadly to include all effort to educate the public and other audiences, including print materials, websites, media, campaigns etc.

Environmental Education is a process of recognizing values and clarifying concepts in order to develop skills and added tools necessary to understand and appreciate the inter-relationship among man, his culture and his biophysical

surrounding. It creates an overall perspective, which acknowledges the fact that natural environment and man-made environment are interdependent. It should consider the environment in its totality and should be a continuous lifelong process beginning at the pre-school level and continuing through all stages. It should be inter-disciplinary and examine major environmental issues from local, national and international points of view. It should utilize various educational approaches to teach and learn about and from the environment with stress on practical activities and first hand experience. It is through this process of education that people can be sensitized about the environmental issues.

Ever since its inception in 1969, WWF-India's Environment Education (EE) programme has come a long way in achieving its mission : strengthen human and institutional capacity in nature conservation and environmental protection on a long term basis, with the help of environment education and awareness activities. Knowledge creates awareness, and the right attitude is the prerequisite for sustainable social action. This in essence is how environment education can pave the way to a sustainable future.

WWF-India believes that environmental education is a life long process to seek relevant solutions of environmental and social issues. It strives to strengthen individual and institutional capacity for nature conservation and environmental protection, by promoting education and awareness within the social structure.

WWF-India seeks mitigate environmental degradation by fostering teamwork and ecological sensitivity by initiating the process of discovering and appreciating the wonders of nature.

Objectives : Develop mechanisms and institutions for enhancing outreach activities through Nature Clubs of India, Eco clubs and Interpretation Programmes.

Increase our presence and influence in formal education system at the primary and higher levels through policy advocacy with the Central Boards and the National Council for Education and Research Training.

Develop a comprehensive teacher training programme that includes recapitulation.

Develop and implement environment sensitisation programmes or modules for key target groups.

Advocate research on EE in the formal education to enhance impacts on policies related to increased focus on EE.

Q. 7. (b) Discuss the role of Government and legal aspects of Environmental Protection ?

Ans. Important legal aspects in Government's Environmental policy for ensuring environmental protection are listed below :

(1) Conservation of natural resources by direct action such as declaration of reserve forest, wet lands and mangroves.

(2) Protection of grazing land.

(3) Scientific land use and enforcing strict reclamation regimes.

(4) Checking further degradation of land and water through wasteland management and restoration of river water quality programmes.

(5) Biosphere reserves for conservation of different ecosystems.

(6) Designating areas valuable for serving as **hot spot screening nurseries** and gene sanctuaries.

(7) Protection of endangered species.

(8) Control of toxic and hazardous substances.

(9) Prevention of denudation of forests.

(10) Monitoring development through Environmental Impact Assessment studies of major project proposals.

(11) Penal measures for industries which violate Pollution Control Act.

The Ministry of Environment and Forests have aimed at creating a comprehensive **legal and institutional infra structure** for safe guarding the environment. This includes framing of rules, notification of standards, recognition of environmental laboratories, delegation of powers, identification of agenda for management of **hazardous** chemicals etc. The existing acts, laws, rules etc. are also amended to make them more effective.

Legislative Measures

India embarked a series of legislative measures and more than 200 Central and State Acts/Laws for the protection of environment. These are :

- The Water (Prevention and Control of Pollution) Act, 1974, amended in 1988.
- The Water (Prevention and Control of Pollution) Cess Act, 1977, amended in 1991.
- The Air (Prevention and Control of Pollution) Act, 1981, amended in 1988.
- The Environment (Protection) Act, 1986.
- The Forest Conservation Act, 1980, amended in 1988.
- The Wild Life (Protection) Act, 1972, amended in 1983, 1986, 1991 and 2002.
- The Motor Vehicle Act, 1988.
- The Biological Diversity Act, 2002.

Notifications

- Environmental Impact Assessment Notification, 1994.
- **Eco Mark** Notification, 1994.
- Environmental Audit Notification, 1997.

Important Rules Framed by the Central Government

- Hazardous Waste (Management and Handling) Rules, 1989, 2002.
- Biomedical Waste (Management and Handling) Rules, 1998, 2002.
- Plastic Waste Rules, 1999.
- Hazardous Micro-organisms and Genetically Modified Organisms Rules, 1999.

The National Environmental Tribunals Act, 1995 and **National Environmental Appellate Act, 1997** have been enacted with the objective of strengthening the provisions of environmental laws and **protection against environmental aberration.**

The Environment (Protection) Act, 1986 : EPA was introduced in the wake of Bhopal disaster, 1984. EPA is the most comprehensive Act, incorporating all possible aspects related to environment protection. In fact, it is an **umbrella legislation** which provides a frame work for the coordination of Central and State Governments and authorities established under Water and Air Acts.

EPA empowered the Central Government to issue orders for closing down industries for non-compliance, imposing on them heavy penalty etc. Under the provision of EPA, every State has to set up **Green Bench** court to attend to Public Interest Litigation (PIL) cases concerning environmental hazards affecting the quality of life of citizens.

Q. 7. (c) Briefly describe the various schemes launched for Women Education in India ?

Ans. Women constitute nearly half of the available human resource, it would be advantageous to optimise these resources not only for the development of the individuals but also for the nation. Access to Education has been one of the most pressing demands of the women's right movements. Women's education in India has also been a major preoccupation of both the

government and civil society, as educated women can play a very important role in the development of country. For the social, educational and economic empowerment of women, the government of India has undertaken following measures :

(1) Started a number of programmes for empowering the women like support to training cum employment for women (STEP), condensed courses of education and vocational training (CCE and VT), Rural women's development and empowerment project (called Swashakti Project) Indira Mahila Yojna, Balika Samridhi Yojna etc.

(2) Various department and ministries of the central government identify component plans for women and ensure expenditure of money in various programmes meant for women.

(3) Provision for free and compulsory education for girl child.

Gender discrimination still persists in India and lot more needs to be done in the field of women's education in India. The gap in the male-female literacy rate is just a simple indicator. While the male literacy rate is more than 75%, according to the 2001 census the female literacy rate is just 54.16% Prevailing Prejudices, low enrollment of girl child in the school, engagements of girl children in domestic works and high drop out rate our major obstacles in the path of making all Indian women educated.

United Nations recognised the need of women in decision making process in planning of natural resources use, protecting of green cover and in population stabilisation. Women have been the significant factor in environment movement by education women can learn :

- (1) How to handle environmental issues.
- (2) How to lead a better life with less pollution.
- (3) How to prevent the ecological crisis.
- (4) How to ensure socio-economic development and make this earth a better place to live in for the present and future generation: