

# **ENVIRONMENTAL HISTORY**

## **Subject Code: 18KP3HELH4**

### **ENVIRONMENTAL POLLUTION**

#### **DEFINITION**

Pollution of the environment is one of the most horrible ecological crises to which we are subjected today. We know that three basic amenities for living organisms are air, land or soil and water. In the past these amenities were pure, virgin, undisturbed, uncontaminated and basically most hospitable for living organisms. But the situation is just the reverse today, because progress in Science and Technology has led to pollution of environment and serious ecological imbalance which may prove disastrous for mankind has been created.

Environmental pollution is the result of urban industrial technological revolution and speedy exploitation of every bit of natural resources. The quantum of progress in agriculture, industry, transportation and technology is taken as the general criterion of development of any nation. Such activities of man although desirable for human development and welfare, lead to generation and release of objectionable materials into the environment thus turning it foul and making life miserable, unhealthy and unsafe.

Rapid industrialization has left with us polluted rivers, contaminated soil, depleted wild life and exhausted natural resources. Today the environment has become foul, contaminated, undesirable, and therefore, harmful for the health of living organisms, including man. The root cause of environmental pollution has been man's misbehaviour with the nature under the false ego that he is the master of nature. This undesirable situation created by man has threatened the survival of man himself and other living on the earth.

#### **Definition of Pollution**

Now we need to clarify the definition of pollution. The word pollution is derived from the Latin word pollutionem which means to defile or make dirty. Modern ecologists, however, point out that there are various factors, such as human population explosion, rapid industrialization, deforestation, unplanned urbanization, scientific and technological advancement, etc. which are mainly responsible for the pollution crisis on earth. Pollutant

Any material that causes pollution is called pollutant. Pollutant is a physical or biotic component which adversely alters the environment by altering the growth rate of species, interferes with the food chain, health, comfort, amenities or property value of man. According to Holdgate, "Pollutants are undesirable substances which are present in the wrong place, and at the wrong time and in the wrong quantity. The most important and common pollutants are gases, chemical compounds, toxic metals, fertilizers, sewage, radioactive substances, noise and heat. These pollutants have adverse effect on plants, animals and human beings. Classification of Environmental Pollution

Environmental pollution is classified into various groups. For instance, pollution of air is termed as atmospheric pollution and the pollution of hydrosphere or water is termed as water pollution. In addition to these we have pollution of lithosphere or land, called soil pollution. Pesticide residues contribute towards soil pollution. Urban areas are beset with the menace of noise pollution. We have also marine pollution, thermal pollution and radioactive pollution.

These pollutions which may be natural or artificial originate due to activities of man. Our environment is simple as well as complex. It is simple so long as it remains clean. It gets complex when industrial activities grow. A concerted effort has to be made to keep our environment clean. It will lead to betterment of our lives and peaceful existence.

## **AIR POLLUTION.**

Air, which is a mixture of gases, moisture and some inert material, controls life on earth. It is a reservoir of oxygen needed by man and other animals and of carbon dioxide essential for plants. Any contamination in the air may disturb the whole atmospheric system. Without air there would be no clouds, no winds, no rain, no snow and no fire. In other words there would be no life on earth. Amongst the various types of pollution, air pollution is of the greatest importance. It is readily noticed and it causes immediate health problems.

### **Contents of Atmosphere**

For a long time, we have known that the atmosphere contains numerous gases. The major constituents of the atmosphere are Nitrogen (N<sub>2</sub>), Oxygen (O<sub>2</sub>), argon, Carbon dioxide (CO<sub>2</sub>) and water vapour. Smaller amounts of at least forty 'trace gases' are normally present as well including ozone, helium, hydrogen, nitrogen oxide, sulphur dioxide and neon.

In addition aerosols are present in the atmosphere - microscopic liquid and solid particles such as dust, carbon particles, pollen, sea salts, and microorganisms, originating primarily from land and water surfaces and carried up into the atmosphere.

Air pollution may be defined as the imbalance in the quality of air so as to cause ill effects. The industrial, automotive and domestic activities have resulted in increasingly outrageous insults to the atmosphere. The different types of pollutants are continuously introduced into the atmosphere and are removed by natural process of cleansing. But when pollution exceeds the atmosphere's self-purifying capacity accumulation of pollutants occurs causing serious harm to the human beings. The most conspicuous cause of environmental degradation is the air pollution.

The Indian Air (Prevention and Control of Pollution) Act 1981, gives the following definition for air pollutant and air pollution. a) Air pollutant means any solid, liquid or gaseous substance present in the atmosphere in such concentration, as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. Air pollution means the presence of any air pollutant in the atmosphere. In general air pollution may be defined as the presence of substances in such concentration that makes the air harmful or dangerous to breathe or to cause damage to plants, animals and properties.

### **Major Air Pollutants and Their Impact**

The following seven pollutants have been identified as most widespread and serious.

#### **a) Suspended Particulate Matter**

This is a complex mixture of solid particles and aerosols suspended in the air. We see these particles as dust, smoke, fumes, fly ash, mist, spray and haze. Particulates may carry any or all of the other pollutants dissolved in or absorbed to their surfaces, and when they are inhaled, the particles impair many respiratory functions.

#### **b) Volatile Organic Compounds (VOCs)**

These include materials such as gasoline, paint solvents and organic cleaning solutions which evaporate and enter the air in a vapour state. VOCs are prime agents of ozone formation.

#### **c) Carbon Monoxide (CO)**

This is an invisible, odorless gas that is highly poisonous to air breathing animals because of its ability to block the delivery of oxygen to the organs and tissues.

#### **d) Nitrogen Oxides (NO)**

These include several nitrogen - oxygen compounds, all gases. They are converted to nitric acid in the atmosphere and are the major sources of acid deposition. Nitrogen dioxide is a lung irritant that can lead to acute respiratory disease in children.

#### **e) Sulphur Oxides (SO)**

The most common species, sulphur dioxide, is a gas that is poisonous to both plants and animals. Children and elderly people are especially sensitive to SO<sub>2</sub>.

#### **f) Lead and Other Heavy Metals**

Lead is very dangerous even at low concentrations and can lead to brain damage and death. It accumulates in the body and impairs many tissues and organs.

#### **g) Ozone and Other Photochemical Oxidants**

Ozone in the upper atmosphere shields us from ultra violet rays. However ozone is also highly toxic to both plants and animals. It damages lung tissue and is implicated in many lung disorders. Therefore ground level ozone is a serious pollutant.

### **Sources of Air Pollution**

#### **a) Urbanisation**

Urbanisation has unveiled before us an alarming situation. It leads to development of industrial centres without a corresponding development in civic amenities and pollution control machinery. The vehicular pollution alone accounts for nearly 70 per cent of the total air pollution. Urbanisation has spelt out greater comforts in luxurious living with dramatic improvements in technology used. However, this development in technology accentuates the problem of indoor air pollution.

Scientific evidence has indicted that air within homes and other buildings can be more seriously polluted than the outdoor air. Environmental tobacco smoke is a major source of indoor air pollution because it contains carbon monoxide, formaldehyde and many other harmful gases. Other sources include smoking, use of unvented stoves or space heater, solvents for cleaning products and house keeping also release pollutants intermittently.

#### **b) Industrialisation and other developmental activities**

The rapid rate of industrialization has resulted in more and more air pollution. Various industrial processes release almost all types of pollutants into the air. Due to the presence of hydrocarbons in the materials like spray, paints and polish air pollution is caused which is dangerous for

health. Similarly spray of pesticides in agriculture is also responsible for air pollution in rural areas. Chemical industries release a host of harmful gases and compounds into the atmosphere.

### **c) Deforestation**

The burning of fuel wood is one of the major sources of air pollution. Intense use of fuel wood mainly for domestic chores contributes to high level of air particulate matter. Thus large scale utilization of forest resources causes serious environmental hazard. It is now a serious national problem and has invited attention of national planners and environmental advisers. The destruction of forest resources is resulting in acid rain, global warming and other such dreaded phenomena.

### **d) Vehicular Exhaust**

The automobile with its internal combustion engine, emits poisonous gases that are harmful to human health and is the most serious pollution of the technological age. The diesel engines emit carbon monoxide and nitrogen dioxide, both of which are extremely poisonous gases. The combustion engines emit lead in the atmosphere which is a threat to the environment as well as for all living organisms.

It becomes clear from the above analysis that the problem of air pollution is increasing with the growth and expansion of industries and automobiles. It is high time that all of us knew the harmful effects of air pollution and evolve a suitable technology to control it.

## **Effects of Air Pollution**

### **a) Effects on Human Health**

Some environmental poisons can cause acute illness and even death. Others may be harmful but the disease may take years or even decades to appear. Air pollution may affect respiratory system. It is feared that lung cancer is caused mainly due to air pollution. Sulphur dioxide in the air is considered to cause cough, shortness of breath, spasm of the larynx and acute irritation in the eyes.

### **b) Effects on Animals**

The impact of air pollution on animals is more or less similar to that of on man. Chronic poisoning results from the ingestion of forage contaminated with atmospheric pollutants. Fluoride is another pollutant which causes fluorosis among

animals. A number of livestock have been poisoned by fluorides. Lesions in animals occur due to excessive fluorides.

### **c) Effects on Agriculture**

Air pollution has caused widespread damage to trees, fruits, vegetables, flowers and in general vegetation as a whole. Experiments show that plants are considerably more sensitive to gaseous air pollutants than humans. Fluorides are responsible for various types of injuries to plants. Fluorides seem to interfere with the photosynthesis and respiration of plants. The dying off of vegetation in large urban areas and the damage to crops, orchards, and down wind of urban centres are caused mainly by exposure to ozone and other photo chemical oxidants. The negative impact of air pollution on wild plants and forest trees may be even greater than on agricultural crops.

#### **d) Effects on Materials**

Walls, windows and other exposed surfaces turn grey and dingy and particles settle on them. Paints and fabrics deteriorate more rapidly. The side walls of tires and other rubber products become hard and checkered. Metal corrosion is dramatically increased by sulphur dioxide. These and other effects of air pollutants on materials increase the costs for cleaning or replacing them by crores of rupees a year. Many of the damaged materials are irreplaceable.

#### **Controlling Air Pollution**

Worldwide efforts are going on to control air pollution. The following are some of the steps to be taken for controlling air pollution. a) The forest area should be protected by restricting

deforestation. Afforestation programmes should also be adopted, because trees are the best controllers of air pollution. There must be a green belt around every township and village. Similarly industrial areas should be surrounded by green belts. The main cause of air pollution is the automobiles. Therefore their engines should be redesigned in such a way that their emissions cause minimum pollution.

In developing countries traditional use of fuel wood should be controlled. In industries arrangements for pollution control should be done. For this proper laws should be enacted.

#### **WATER POLLUTION**

Water may be regarded as a global public good. Water is needed for maintenance of life of human beings, plants and animals. The greatest use of water is for irrigation and agricultural purposes, while only a small amount is consumed by the people. Like clean air, now fresh water is also becoming scarce. The limited availability of fresh water and its unequal distribution makes water pollution a matter of great concern. It is a serious national problem. While water pollution is easier to study and manage, its control is highly complex.

#### **Definition of Water Pollution**

a) Water pollution simply means contamination of water due to any external material. It may be defined as the introduction of something to natural water which makes it unsuitable for human consumption.

b) WHO has defined water pollution as any foreign material that may contaminate the water supply and make it harmful to life.

c) Water pollution may be defined as the presence in water impurities in such quantities and of such nature as to impair the use of water for a stated purposes.

d) Water pollution is the addition of oxides of undesirable substances to water and making it turbid, foul smelling and harmful to man, animals and aquatic organisms.

#### **Sources of Water Pollution**

Water pollution is caused by several sources, which are not independent in nature but interact with one another.

##### **a) Natural Sources**

There are certain natural elements which cause water pollution. These are gases, soil, mineral, humus material, waste created by animals and other living organisms present in the water. When the quantity

of minerals like sodium, potassium, magnesium and iron is present in water more than the permissible limit these are harmful. The poisonous minerals like nickel, beryllium, mercury and cadmium are responsible for pollution.

#### **b) Domestic Effluents and Sewage**

The discharge of huge amounts of municipal and household wastes into rivers and canals is one of the major sources of water pollution. Most sewage systems mainly contain human and animal wastes. This is the inevitable and unfortunate fallout of urbanization. Most of the sewage receives no treatment before discharge. Even well treated sewage contains pathogenic bacteria. Sewage is a major contributor to water borne diseases such as cholera, dysentery and jaundice.

#### **c) Industrial Effluents**

Industrial activities generate a wide variety of waste products, which are generally discharged into water courses. The waste water from industries contains floating matter, settleable solids, colloidal particulates, dissolved solids and toxic chemicals.

#### **d) Agricultural Effluent**

The use of various types of pesticides and insecticides in agriculture is also one of the causes for water pollution. Their presence in water is highly toxic to man and animals. The farm animal wastes also contain pathogenic organism which get transmitted to humans.

#### **e) Thermal Pollution**

Now-a-days with the increased utilization of nuclear energy as a major source of power, the problem of thermal pollution is assuming dangerous proportions. The production of electricity by nuclear power requires billions of litres of cold water to remove waste heat. The warm water emptied into the water ways has resulted in the thermal pollution of our water courses.

### **Measurement of Water Pollution**

Water pollution is measured by the following methods.

#### **a) Bacteriological Quality**

The coliform index is a measure of the concentration of coliform organism or E-coli in a water sample. It is defined as the reciprocal of the smallest quantity of sample (in ml) which would give a positive E-coli test. This index is now obsolete and now Most Probable Number (MPN) is the one commonly used. MPN is defined as that bacterial density which if it had been actually present in the sample under examination, would more frequently than any other, have given the observed analytical result.

#### **b) Dissolved Oxygen of Water (DO)**

Indirect proof for the presence of microorganism and biodegradable organic matter can be found out from the knowledge of dissolved oxygen. All living organisms are dependent on one another, in order to maintain the metabolic process that produces energy for growth and reproduction. N<sub>2</sub> and O<sub>2</sub> dissolve poorly in water, but their solubility increases with temperature. At saturation, dissolved gases in water have 38 per cent oxygen. The solubility is 14.6 mg/litre and it raises to 17 mg/litre at 35° C at one atmosphere pressure. Further the rate of dissolution of O<sub>2</sub> in polluted water is much less than

pure water. Thus DO. determines whether biological changes are brought out by aerobic or anaerobic organisms.

### **c) Bio Chemical Oxygen Demand (BOD)**

BOD is defined as the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic conditions. In other words BOD represents the quantity of dissolved oxygen in mg/litre required during oxidation of decomposable or biodegradable organic matter by aerobic biochemical action. The decomposable organic matter at a time serves as the food for bacteria and energy is obtained due to such oxidation. Thus BOD gives an idea about the water pollution.

### **Effects of Water Pollution**

Water pollution is responsible for the diseases like cholera, typhoid and diarrhea. Sewage enriches the water with nutrients. This causes rapid growth of plankton and algae. This leads to oxygen depletion in water. The oxygen depletion causes death of algae. Chromium from industries is toxic and especially from tanneries is carcinogenic. Mercury from pesticides is toxic and causes foetal brain damage. Selenium from pesticides causes cancer.

### **Prevention of Water Control**

All domestic and municipal effluents should be discharged into water bodies only after proper treatment. The sewage treatment includes sedimentation, dilution and storage. As far as possible domestic waste water should be used for irrigation, it is very useful for horticulture. There must be strict regulations for industrial effluents, that they must not discharge highly toxic water into water bodies. Every industry should develop its own effluent treatment plant. Only standard quality pesticides should be used. There should be a complete ban on the disposal of dead bodies in rivers. Algae and other water borne vegetation should be cleaned regularly. Chemicals such as potassium permanganate should be spread regularly in order to protect water from micro organisms. Pollution can be prevented to a certain extent by reutilizing the wastes. This is called recycling. The already existing law for the prevention and control of water pollution need to be implemented forcefully.

## **SOIL POLLUTION**

The progress or development since independence has been phenomenal, but rapid industrialization brought with it the danger of soil pollution. Today almost everything around us ie the air we breathe, the water we drink and even the soil we cultivate for food is severely polluted. Some of the dangers of soil pollution are due to the fact that while the number of the earth's inhabitants are increasing, the earth's natural resources are by and large fixed as well as limited, and thus soil gets heavily polluted. Now soil pollution has turned from being a local irritant to a global worry.

### **Importance of Soil**

Soil is one of the most significant ecological factors, which is derived from the transformation of surface rocks. It is nothing but soil on which plants depend for their nutrients, water and mineral supply and anchorage. It constitutes an important medium wherein numerous animals live. In fact, soil of a nation is its most valuable material heritage. The soil provides homes and ideal environmental conditions for living beings.

### **Definition of Soil**

The word soil is derived from the Latin word solum, which means earthy material in which plants grow. Soil study is commonly referred to as soil science or pedology. Soil can be defined as the weathered

layer of the earth's crust with living organisms and their products of decay intermingled. Soil is a natural body of animal, mineral and organic constituents. Any part of the earth's surface that supports vegetation also bears a covering of soil. Muddy bottom's of ponds, porous rock, surfaces, bottoms of lakes, beats or glacial deposits are all soils.

Life on earth depends directly on living soil and the aquatic eco-system of rivers. Without fertile soil and microbial fauna that inhabit it, food would not grow, dead things would not decay and nutrients would not be recycled. Yet earth's soils are being stripped away, rendered sterile and contaminated with toxic chemicals at a rate that cannot be sustained.

### **Sources of Soil Pollution**

The problem of soil pollution differs from air and water pollution in the respect that the pollutants remain in direct contact with the soil for relatively longer periods. The widespread industrialization and increasing consumption have changed the very complexion of soil. Thus soil is getting

heavily polluted day by day by toxic materials and dangerous micro organisms. The following are the sources of soil pollution.

#### **a) Industrial Wastes**

Disposal of industrial waste is the major factor responsible for soil pollution. The industrial pollutants are mainly discharged from pulp and paper mills, chemical industries, oil refineries, sugar factories, tanneries, fertilizer and pesticide industries, coal and mineral mining industries etc. Thermal, atomic and electric power plants are also the villain to add pollutants to soil. These pollutants affect and alter the chemical and biological properties of the soil. As a result, hazardous chemicals can enter into human food chain from the soil or water, disturb the biochemical process and finally lead to serious effects on living organisms.

#### **b) Soil Pollution by Urban Wastes**

Urban wastes comprise of both commercial and domestic wastes consisting of dried sludge of sewage. All the urban solid wastes are commonly referred to 'refuse'. Solid wastes and refuse, particularly in urban areas contribute to soil pollution. This refuse contains garbage and rubbish materials like plastics, glasses, fibers, metallic cans, containers etc. These solid wastes are causing chronic soil pollution.

#### **c) Radioactive Pollutants**

Radioactive substances resulting from explosions of nuclear devices, atmospheric fallout from nuclear dust and radioactive wastes penetrate the soil and accumulate there creating soil pollution. Radioactive wastes contain several radio nuclides such as strontium, iodine, caesium and isotopes of iron which are most injurious.

#### **d) Agricultural Practices**

Modern agricultural practices pollute the soil to a large extent. Today with the advancing agrotechnology, huge quantities of fertilizers, pesticides, herbicides, weedicides, and soil conditioning agents are employed to increase the crop yield. Artificial fertilizers contain nitrogen, phosphorous and potassium. Critical pollution problems arise mainly from their

excessive application rates. Although the fertilizers are used to fortify the soil, yet they contaminate soil with their impurities. : Different kinds of pesticides used to control pests are causing a stress in the natural environment. Among the pesticides the most important are the chlorinated hydrocarbons



such as D.D.T., aldrin, endrin, chlordane and endosulphan. Cergano-phosphates include malathion, parathion and fenthion. The remnants of these pesticides may get absorbed by soil particles which may contaminate root crops grown in soils.

#### **e) Chemical and Metallic Pollutants**

A number of industries including textiles, paints, synthetic detergents, drugs, cement, petroleum and metal industries pour their hazardous effluents in soil and water creating disastrous effects on living organisms. Synthetic chemicals and fertilizers are a source of trace metals which are added to the soil either deliberately or as an impurity. Metallic contaminants in soil are considered to be the indestructible poisons and may be highly dangerous since they affect the production of atmospheric oxygen as well as living beings

#### **. f) Biological Agents**

Soil gets large quantities of human, animals and birds excreta which constitute the major source of land pollution by biological agents. In addition to these excreta, faulty sanitation, municipal garbage, waste water and wrong methods of agricultural practices also induce heavy soil pollution.

#### **Effects of Soil Pollutants**

Soil pollution is the result of urban – technological revolution and speedy exploitation of every bit of natural resources. The soil on which we grow our food is highly polluted by several pathogenic organisms and hazardous industrial effluents. a) Industrial wastes consist of a variety of chemicals which are extremely toxic and dangerous to living beings. Industrial effluents when discharged through sewage system will poison the biological mechanism. Metallic contaminants destroy bacteria and beneficial micro organisms in the soil. Several agricultural crop

The use of highly toxic and resistant synthetic chemical pesticides should be banned. The use of bio-pesticides should be encouraged. Domestic sewage should be effectively treated by suitable biological and chemical methods. Municipal wastes have to be properly collected by segregation, treated and disposed scientifically in land fills. Recycling and reuse of materials should be done wherever possible. Industrial wastes have to be properly treated at source by segregation of wastes. Proper care should be taken in treating heavy metals, wastes and other obnoxious waste materials. Environmental audit for industries and promoting eco labelled products should be enforced. Informal and public awareness programmes should be imparted to educate people at large regarding the health hazards and undesirable effects due to environmental pollution. Mass media, educational institutions and voluntary agencies should be involved to achieve these objectives.

#### **MARINE POLLUTION**

Marine pollution is a world wide phenomenon. Most marine pollutants originate on the continent and reach the oceans via atmosphere and rivers. Marine pollution cannot be separated from global pollution generally. Spectacular oil spills and conspicuous acts of dumping hazardous wastes (e.g. radioactive materials) at sea have attracted greater attention in recent years to the dangers of marine pollution. Marine pollution is defined as the discharge of waste materials into the sea resulting in harm to living resources, hazards to human health, hindrance to fishery and impairment of quality of sea water.

#### **• Factors Responsible for Marine Pollution**

In the total volume of water on the earth's surface the share of sea water is 71% and it contains about 3.5% of salt contents. Man's activities are largely responsible for the detrimental effects on the marine environment. There are a number of factors responsible for marine pollution.

The rapid pace of industrialisation and population explosion have resulted in the release of large amount of waste water. The sewage discharge from cities, industrial wastes, dumping of garbage and agricultural wastes are responsible for marine pollution.

The major source of marine pollution are the oil pollutants and so we can call marine pollution as oil pollution. The magnitude of oil pollution is increasing rapidly. Approximately two thirds of world's oil production is transported by sea. About 0.1 per cent of this spills into the sea. Oil pollution arises from tanker accidents, deballasting operations and tank washing, refinery effluents, losses from pipe lines and offshore protection platform. These oil spills mixed with urban sewage, silt, plastics, pesticides and other toxic compounds complicate the pollution problem at sea.

#### **a) Effects of Marine Pollution**

Crude oil is one of the most complex mixtures of natural product with different degrees of toxicity. The short term effects of an intact cohesive film of crude oil over the water surface are detrimental for the following reasons.

Marine fowl are particularly vulnerable to oil spills. The spilled oil breaks down birds natural insulations which shield them from water. Ultimately they lose insulation, start shivering and may freeze to death in winter. Oil spilling in sea water causes abnormally low body temperature in birds resulting in hypothermia.

Shore properties and beaches can be extensively damaged. Slow moving crustaceans and inter tidal marine life can be physically damaged by heavy spills of oil. The oil film forms a barrier to the transfer of oxygen into the water to support marine life, particularly planktonic species that reside less than a half to one meter below the surface.

The long term effects of oil pollution are two fold. Once incorporated into a particular marine organism, hydrocarbons are stable and pass through many members of the marine food chain without alteration eventually reaching organisms that are harvested for human consumption. One consequence of this may be the incorporation into food of materials which produce an undesirable flavour. - Far more serious is the potential accumulation in human food of long term poisons derived from crude oil, for instance carcinogenic compounds. ' Another effect is the low level interference of oil pollution with marine ecology. Oil pollution interferes with nature by plugging taste receptors and distorting natural stimuli which may threaten some marine species.

#### **Control of Marine Pollution**

Several methods are being following to control oil pollution. In the early instances of oil spills in water bodies, detergents were used to remove them from water surface. But these proved to be even more toxic to aquatic life. Recently a product Bregoil resembling saw dust from paper industry waste has been employed. It rapidly absorbs oil. The residue can be conveniently handled and even burnt as a fuel. Bregoil may make the cleaning of world's growing number of oil spills much easier.

Monitoring and research in the marine pollution control are fast developing activities in India. Surveys for the collection of baseline data on all potential pollutants in the marine environment are in progress and a good data base has been built for this purpose.

The Department of ocean development has been entrusted with the responsibility to look into various aspects of marine pollution. It has established a network of stations along the coastal line for monitoring pollution. The Central Govt. has also decided to create a separate anti-pollution cell to control oil and other pollutants.

As per Geneva Convention of 1958 every state must draw its regulation to prevent pollution of seas through discharge of oil from ships or pipelines or resulting from exploitation and exploration of the sea-bed and its sub soil. It must take measures to prevent pollution of the seas from dumping radioactive wastes and other harmful agents.

The oceans are in a certain sense mankind's last frontier. We know so little about them yet we feel that if we could but exploit the variegated resources of the sea for food, for energy, for raw materials, the development of the world could be accelerated.

### **NOISE POLLUTION**

Modern life has given rise to a new form of pollution, called noise pollution. Crowded cities and towns, mechanized means of transport, new devices of recreation and entertainment are polluting the atmosphere with their continuous noise. No doubt, noise is a normal phenomenon of life and is deemed to be one of the most effective alarm systems in man's physical environment.

· Noise has now become an important environmental pollutant and is a serious threat to the quality of our atmosphere. It has penetrated almost every aspect of modern life. It is potentially a serious signal and a grave threat to the environmental health. The quantum of noise has made many people apprehensive about its possible adverse effects on health.

#### **Noise Pollution Control**

In the electronic age it is almost impossible to completely get rid of the malady of noise pollution. However there can be ways and means to reduce noise intensity so that its influence can be minimised. The means of noise control are to manipulate the source so as to reduce the noise at its origin, to interrupt the path of transmission and to protect the recipient.

Legislation and public policy are essential. Noise could not be completely diminished but it can be minimised to a great extent. To minimize noise following measures should be taken. a) Nobody should be permitted to create noise in silent zones. b) Noise reducing vehicles should use silencers, and if

their silencers are not working they should not be allowed to ply on the roads. Standard for noise control measures should be set up for industry and community. Building codes should enforce sound proofing in the construction of buildings. Plants are efficient absorbers of noise, especially high frequency. In metropolitan cities green belt vegetation may have a great value in minimizing sound. Personal protection can be achieved by holding our hand over ears under noisy situations, or by running away from the source, or by simply stuffing in the ears bit of cotton though it does very little good

The safe limit of noise is 90 dB. The existing ordinances, Acts against noise pollution should be revised from time to time depending upon the changing nature of the sources.

### **THERMAL POLLUTION**

The term thermal pollution refers to the release of warm water into the water body. It has been used to denote the detrimental effects of heated effluents discharged by various power plants. The WHO has defined thermal pollution as heated effluents, either from natural or man made sources

contaminating water bodies. It may be harmful to life because of their toxicity, reduction in normal oxygen level of water, and aesthetically unsuitable and spreading diseases.

The discharge of unutilized heat from certain industries causes severe damage to the surrounding environment. If such materials are released into rivers, lakes, streams and ponds, the temperature of the water will be raised to abnormal level and the biotic life will be damaged.

### **Sources of Thermal Pollution**

The accelerated pace of development, rapid industrialization and extensive population density have increased the demand for thermal energy. Man made activities are constantly adding pollutants to air and water at a very alarming rate. The following are the sources which contribute to thermal pollution.

a) The nuclear power plants discharge a lot of unutilized heat and traces of toxic radionuclide into nearby water -steams. b) The coal-fire based power plants constitute the major sources of thermal pollution. Because their condenser coils are cooled with water from nearby lakes or river and discharge the hot water back to the stream. Industries generating electricity and other industries like textile, paper, sugar etc. release heat in water. The domestic sewage which is released into rivers and canals raises stream temperature. The hydro electric power is also a source of thermal pollution.

### **Effects of Thermal Pollution**

The following are the effects of thermal pollution.

As a result of thermal pollution the oxygen content decreases in warm water. It will kill the aquatic life. The effluent discharged adversely affects the life forms. The planktons (producers) are killed, thereby altering the components of the ecosystem.

Toxic pollutants like copper, cadmium discharged with thermal effluents kill fishes. Sharp changes in water temperature affect the microorganisms and the food chain of other animals. Young fishes are killed by warm water. Fish migration is caused by warm water. Fishes move away from areas polluted by warm water. Warm water not only disturbs spawning but also destroys the laid eggs and it affects the reproductive rate. Sponges, mollusks and, crustaceans are eliminated at temperatures above 37° C. This results in a change in Biodiversity.

### **Control of Thermal Pollution**

Today control of thermal pollution assumes importance because it would severely affect the aquatic ecosystem in future. So the following methods can be adopted to control the thermal pollution. Cooling Ponds: The hot water, emerging from industries is stored in ponds. Here natural evaporation cools the water. After cooling, the water is drained into natural water bodies. Cooling Towers: The hot water is passed through a system of coiled pipes kept in a tower. The hot water is allowed to flow downwards from the top of the tower. Cool air is allowed to flow over the pipes upwards from the bottom of the tower. Spray Ponds: The hot water from the industries are sprayed through sprayers into fine water droplets. Heat is dissipated from these droplets and the water is collected in spray ponds.

### **RADIOACTIVE POLLUTION**

(NUCLEAR HAZARDS)

Radioactivity is a physical type of pollution caused by radioactive substances. It is an offshoot of industrialisation. The nature of radioactive pollution and the consequences are notably contrary from

different types of pollution. According to H.P. Jammet, "Radioactive pollution of the environment is the increase in natural background radiation emerging from the activities of man involving the use of naturally occurring or artificially produced radioactive materials".

### **Sources of Radioactive Pollution**

The chances of radioactive materials spreading into the air have increased as a result of the discovery of the artificial radioactivity. More over the development of atomic bomb and of techniques of harnessing the nuclear energy increased the radioactive pollution. The following are the sources of radioactive pollution

#### **. a) Natural Radiations,**

Naturally occurring radioactive elements are present in the rocks, water and air and in all living organisms. The composite of all forms of natural radiation that we are exposed to, is called background radiation Cosmic-ray bombardment of the atmosphere continuously produces a few radioactive materials of short half life. Among them the important nuclides are carbon-14 and Hydrogen-3. The primary sources of natural radiations are the ores of uranium and thorium which contain a wide variety of radioactive nuclides. The other radio nuclides found in nature are potassium-40 and supidium-87. .. There are numerous possibilities for water to get contaminated with the above mentioned radioactive nuclides when the water runs through soils and rocks.

#### **b) Man made Radiations**

Man made radiations originate from the activities of man involving the use of radioactive materials. They are used for the production of nuclear weapons, nuclear fuel and for the production of electric power. The disposal of radioactive or nuclear wastes is a great problem and a cause of environmental pollution. Nuclear wastes from atomic power plants come in the form of spent fuel rods of uranium and the by-products such as plutonium. These can remain toxic to human over two lakh years.

### **SOLID WASTE MANAGEMENT**

Solid waste is composed of a broad array of materials discarded by households, businesses, industries and agriculture. It includes all the heterogeneous mass of throw-aways from residential and commercial activities as well as more homogeneous accumulations of a single industrial activity. Recently pollution due to solid wastes has created a great fear. It has become a great worry to the world nations. So solid waste management assumes importance. The disposal of solid wastes from the environment is called solid waste management.

#### **Sources of Solid Wastes**

Solid waste causes pollution on land, water and air. Solid waste is a health hazard. The solid wastes may be biogradable and non-biogradable. The biogradable wastes are readily decomposed by the activity of micro-organisms. The non-biogradable wastes are not decomposed by micro organisms. The following are the sources of solid wastes.

Domestic wastes include all residential wastes resulting from handling, preparation, cooking, and serving of food. Commercial wastes are produced as a result of consumerism. These include garbage, rubbish, ashes demolition and construction waste. Industrial wastes are discarded from industries. These include iron scraps, broken tiles, rubbish and chemical wastes. Municipal solid waste comprises small moderately sized solid waste items from residential areas, commercial buildings and institutions. Clinical wastes are discarded materials of hospitals and clinical laboratories. These wastes are directly

produced from patient rooms, treatment rooms and nursing rooms. Wastes are the used and old electronic goods such as T.V., computers and cell phones.

The following are the common solid wastes. They are paper, cardboard, plastics, textiles, rubber, wood, glass, dust, stone, concrete wastes, bricks, ashes, food waste, garden trimmings, carry bags, packing materials, bottles, tin cans, ferrous metal and food wastes.

### **Solid Waste Management**

The disposal of solid wastes from the environment is called solid waste management.

#### **1) Solid Waste Collection**

Collection is the first fundamental function of solid waste management. Solid waste collection refers to the gathering of solid waste from places such as residential, commercial, institutional and industrial areas as well as public parks. The three basic methods of collection are as follows.

##### **a) Curbside Collection**

The quickest and most economical point of collection is from curbs using standard containers. In curbside collection, dwellers should keep the container on curbside at the time of collection. The crew simply empty the containers into the collection vehicles and redeposit the container in the original location. Whenever possible, the crew must collect from both sides of the street at the same time.

##### **b) Set-out and Set-back Collection**

The set-out and set-back collection method consists of the following operations. The set-out crew carries the full containers from the residential storage location to curb before the collection vehicle arrives. The collector crew loads the refuse. The set-back crew returns the empty cans.

##### **c) Backyard Collection**

Backyard collection is usually accomplished by the use of tote barrels. In this method, the collector enters the resident's property, dumps the container into the tote barrel, carries it to the truck and dumps it. The collector may collect refuse from more than one house before returning to the truck to dump. The primary advantage of this method is the convenience to the house owner. The major disadvantage is the higher cost.

the use of recycled products to make the same or similar products. Secondary recycling is the use of recycled materials to make products with less stringent specifications than the original.

Waste paper boxes, cardboard boxes, office papers and newspapers are recovered from solid wastes. These recovered waste papers can very well be used in paper industry for manufacturing paper and paper board products.

Steel industries, the de-tinning industries and the copper precipitation industries are the potential markets for old steel cans and scrap iron. ,

Glass pieces are melt and remade into bottles. It can also be used as a road paving material or a component of building material.

The most difficult operation in recycling is the identification and separation of plastics. Because mixed plastics have a few economical uses. Plastic recycling is economical only if the different types of

plastics are separated from each other. PET bottles and high density polyethylene plastic can be recycled into trash cans and flower pots. "Polystyrene foam is crushed into pellets and turned to plastic lumber for benches and walkways.

Today waste management is extremely necessary to prevent pollution of the environment, to prevent complete exhaustion of the resources, to make optimum use of waste generated and for a better and sustainable future.

## **ROLE OF AN INDIVIDUAL IN**

### **PREVENTION OF POLLUTION**

Environmental concern is comparatively a recent phenomenon which regained momentum throughout the entire globe. With the accumulation of various pollutants, more threats to earth's fragile ecosystem became apparent which threatened the survival of men, animals and plants on the planet. Now the pollution and its agents have gone beyond the geographical boundaries of every nation. The present air, water and soil pollution can be attributed to the irresponsibility of both industrialized and developing nations. People consume most of the precious wealth, use most of the natural resources, generate wastes and pollute the land.

In this context every individual should have responsibility to see that the environment in which he is living is unpolluted. Here are some things an individual can do to keep the environment clean and at the same time make a small but significant contribution to check pollution. Every individual has the duty to prevent pollution. The following are some of the duties of an individual to reduce pollution.

Nowadays we use and throw plastics recklessly. This leads to ecological degradation and ill effects. So we should avoid usage of plastic bags and, covers etc. which are less than 20 microns, to avoid environmental pollution. Plastic waste should not be burnt in residential areas. The combustion of petrol and diesel in automobiles releases harmful gases into air. So we should not use car unless we have to. Wherever and whenever possible, common and public vehicles may be used to reduce the quantity of emission of harmful gases. Use of bicycles may be encouraged. Less use of automobiles will certainly prevent air pollution. The domestic sewage from the houses can be used to water the gardens. The solid waste can be segregated into organic and inorganic matter. The youth in the villages can identify the ways in which all the domestic sewage can be collected in a particular area, which can be used for irrigation or for fish culture. Trees and economically important plants can be grown around every house. This can reduce the pollution problem to some extent. To maintain the fertility of the soil and to avoid the contamination of food crops and ground water by chemical fertilizers the farmers should avoid the use of chemical fertilizers and pesticides.

Judicious use of water in houses for domestic activities can help the country's water management scheme. Rain water harvesting can be used to collect rain water and to maintain the ground water levels. The youth can see that the water quality of the particular area is good. For this they can collect water samples from the pond, wells and streams in their locality and get them analyzed to know their pollution status. To avoid noise pollution individuals should keep their vehicles fit on the road. Noisy automobiles should be condemned. Loud speakers, T.V. sets, audio systems should be set at low sound. High decibel fire crackers should be avoided.. Excessive use of radiation emitting substances like radium watches, cell phones, televisions should be avoided. Every individual should educate the people who are not aware of environmental problems and begin a campaign to stop pollution.

No doubt man is now awakened towards environmental pollution. The public interest concerning the quality of environment has reached the emotional peaks. Without much scientific knowledge every individual can practically play a vital role in the prevention of pollution.

## **. POLLUTION CASE STUDIES**

### **1) London Smog - 1952**

London smog is an example for air pollution tragedy. Smog is a combination of smoke and fog. Smoke is a suspension of carbon particles in air. Fog is suspension of vapour in air. The notorious pea-soup fogs become especially offensive when mixed with coal smoke. In 1661 John Evelyn published a pamphlet "The inconvenience of the air and smoke of London dissipated".

His major recommendation had been the removal of all smoke producing plants from London. But London did little about it until the famous London Smog of December 1952, truly a major air pollution disaster.

The London Smog lasted five days from 5th to 9th December. It killed five thousand people mostly old with respiratory diseases. The onset of fog was followed by acute respiratory symptoms. Almost exactly ten years later in 1962 London experienced black smog with 340 deaths. So the British Government enacted clean air Act to reduce the emission and to create awareness among the people. This significantly prevented the occurrence of smog afterwards.

### **2) Bhopal Gas Tragedy - 1984**

The Methyl Isocyanate (MIC) gas leak in Bhopal during 1984 has been regarded as the worst industrial accident in India, which is related to air pollution. Bhopal episode is a toxic gas tragedy where more than five thousand people were killed. It is a man made hazard. The tragedy happened in the midnight of December 4, 1984, in Bhopal.

The Union Carbide of India set up a chemical industry in Bhopal to manufacture methyl isocyanate. It is a toxic gas used for manufacturing pesticide. This gas was stored in a tank. Due to the break down of the essential safety provisions within the plant, the gas emitted from the tank and spread to the distance of eight km area. More than ten thousand people died in a week and one lakh people were affected by various disorders in the eyes, lungs, stomach, intestine, heart and kidney.

### **3) Minamata Disease - 1953**

Minamata episode is a typical example for the effects of water pollution. Minamata is a small coastal town in Japan. In 1905 a chemical industry was started which used mercury chloride for the production of poly vinyl chloride. From the factory a by-product called mercury was disposed into the sea.

This polluted the sea water. As a result of this mercury pollution, mercury accumulated in marine animals.

When men ate the fishes, they were affected by dysphasia, ataxia, mental deterioration and convulsions. Finally it affected and destroyed the brain. As a result, in 1953 forty five people died. Due to this mercury pollution 1144 people died up to 1989. Thus Minamata episode is a living example for ill effects of water pollution.

### **4) Bombay High Oil Slick - 1993**

Bombay high oil slick is an example for marine pollution as well as air pollution. It is a man made pollution. Oil slick is referred to a mass of petroleum oil floating on a large surface of water. Oil slicks



occur due to accident in oil fields and oil loaded ships. An accident occurred in Bombay offshore oil fields in May 17th, 1993. As a result, a huge oil spill spread over four kilometer length and four hundred metre wide.

This oil slick caused severe marine pollution. Fishes and marine animals died. The dissolved oxygen level in water was reduced. The marine bio-diversity was disturbed. Marine plankton and seaweeds were destroyed. More than four hundred species of algae were killed in the Bombay marine habitat.

## **5) Marine Pollution Due to Gulf War - 1991**

The gulf war is an example for ecoterrorism. The gulf war broke out due to the enmity between Kuwait and Iraq. Saddam Hussein, the military ruler of Iraq invaded Kuwait on 2nd August 1990. The world nations were shocked and asked Iraq to withdraw from Kuwait. This was turned down by Saddam Hussein. So a multinational force was created under the leadership of USA. This multinational force attacked Iraq on 16th January 1991. The war lasted for 42 days. On 26th February Kuwait was liberated from Iraq.

## **DISASTER MANAGEMENT**

Hazards are sudden or slow-onset events which disrupts lives of people and communities. The hazards may be natural like floods, earth quakes, land slides and cyclones, or it may be based in man made factors and technological degradation. The hazard having adverse effect on communities becomes disaster.

Disasters are a combined result of hazards and vulnerabilities. Disaster only happens when it exceeds the adjustment capacity of the affected communities and individuals and their ability to cope with the crisis. Therefore a disaster is fundamentally a socio economic phenomenon. It is an extreme state of every day life in which the continuity of community structures and processes temporarily fails.

Disasters will usually have direct and indirect, as well as short and long-term impact on individuals, communities, systems and services. Disasters kill thousands of people and destroy billions of dollars of habitat and property each year. Though it is almost impossible to fully recoup the damage caused by the disasters it is possible to minimize the potential risks by developing early warning strategies, prepare and implement developmental plans to provide resilience to such disasters iii) to mobilize resources including communication and telemedical services, and to help in rehabilitation and post disaster reconstruction.

The following are the natural disasters.

### **1) Floods**

Floods are one of the most disastrous phenomena which cause extensive damage to the properties in addition to the toll of human lives. Flood directly means submerging of extensive land area with water for several days in continuation. It may be pointed out that flood is a natural phenomenon and is a response to rainfall. Floods happen as a result of an increase in rainfall

Earth quakes are common occurrences under the earth, but they are not felt if they are small and insignificant. But major earth quakes can cause extensive damage to buildings, roads, railway tracks, gas and water pipelines. Loss of life accompanies such destructions. In Bhuj in Gujarat nearly 50,000 people were killed, in Iran nearly 25,000 people were killed and in Lathur, Maharashtra 2,000 people lost their lives. The rehabilitation of the quake affected people is a huge task for the governments.

Sometimes quakes start huge forest fires and land slides which cause extensive dislocation and vast environmental damage. We must soon find out means and ways to minimize the damages caused by earth quakes and to find out methods to get a forewarning

### **. Earthquake Management**

If earthquake strikes at night, the loss of life will be great, because all the people will be indoors at that time, sleeping. 50% the people caught under the debris do not survive, and relief to the injured becomes difficult because of possible damage to roads and railines. Damage to property and life can be prevented by constructing quake resistant buildings in the earthquake prone zones or seismic areas. Pads or floats can be strategically placed to absorb vibrations. Wooden houses are preferred in earthquake prone areas like Japan and California in USA. Anthropogenic activities, which will enhance the quake frequency can be avoided or minimized. Building of huge dams with massive reservoirs of water, underground nuclear testing and deepwell disposal of liquid waste are some of the activities that might trigger off the tremors.

### **Tsunamis**

Huge tidal waves caused by earthquakes under the oceans are called Tsunamis. The giant sea waves can travel at a speed of 1000 km/hr, generating waves up to 15 - 20 metres in height. These waves lash at the sea shore with such a force, that the waters will rush into the land with enormous force destroying houses, buildings and killing people instantaneously. Tsunamis are common in Japan and China. By a Tsunami in

## **SOCIAL ISSUES AND ENVIRONMENT**

### **SUSTAINABLE DEVELOPEMENT**

The earth in which man lives is a unique planet and man occupies a unique place among the species because he is more intelligent than the other animals and is in a position to control and manage the other species. Man's knowledge and use of science and technology especially after the Second World War has brought vast development in life style and environment. By development it cannot be construed as development only for a privileged few, both individuals and nations, who would corner all the benefits.

Development has to be visualized in a holistic manner where it brings benefits to all, not only for the present generation, but for posterity as well. When a country develops, the development is not only increase in the available resources, but also increase in the population. The living conditions and the environment are greatly affected by the increase in population. We have to face many problems like degradation in the environment, scarcity of food and safe drinking water, deterioration in public hygiene, etc.

These are social issues and they affect not only the life style of man, but also his environment, energy resources, and life of other species around him. There is an urgent need to solve these social problems so that we get a sustainable development and stable and safe environment.

### **From Unsustainable to Sustainable Development**

Sustainable development is meeting the needs of the present generation without compromising the ability of future generation to meet their own needs, according to Brundtland, Director of WHO. To-day hundreds of programmes have been initiated to achieve sustainable development.

After the industrial revolution, there was a boom in industries and they emitted millions of tons of carbon dioxide and this caused the green house effect. This heated up the atmosphere and caused a devastating damage to the mankind, animals and other species. The question arose whether such a development which damaged the environmental condition was necessary at all. Any development detrimental to the society, to the environment, to the numerous species, to biodiversity and to the ecosystem can not be real development. This is only unsustainable development.

A new awareness was created among the environmentalists and the attitude of man had to change. So far development had been man-oriented and all the scientific and technological developments served the selfish ends and objectives of man. But now the stress is shifting towards creating safe surroundings not only for man, but for other species, plants, animals and other organisms also. The tragedy is that man is unaware that the so called industrial development has damaged the atmosphere and the air he breathes, the water he drinks and the food he eats have all been contaminated because of pollution. The natural resources are dwindling due to exploitation. This industrial development which is only temporary is unsustainable development.

Though the fears about the dangers of such unsustainable development started in 1970, a clear understanding of the need to change this unsustainable development to sustainable development came only in 1992. The Rio Earth Summit proposed a global programme, for a successful action plan for the development in social, economic and political fields during the 21<sup>st</sup> century, which was named Agenda 21. ;

The degradation of the environment was caused by over population and over exploitation of resources. Steps should be taken to reduce the over exploitation of resources damaging the environment, control water usage, and emissions from industries, and thus maintain the ecological balance. This can maintain an intergenerational equity. An intra-generational equity also must be maintained by minimizing wealth gaps within and between nations. The benefits of technology should not stop with developing rich nations, but reach and address the problems of developing and poor countries. Benefits such as

hybrid seeds which can stand uncertain climates, vaccines for tropical diseases, clean fuel and supply of pure and safe drinking water, will induce development in the economy and social life of poor countries and this will narrow down the inequalities among nations and lead to sustainability.

Measures to be taken to attain Sustainable Development Using appropriate technology: The technology used should be locally adaptable, culturally suitable, eco-friendly and should be able to utilize the local resources, and labour. The technology should be economically viable and produce minimum wastage. To minimize the use of resources, we must adopt the 3 R method - Reduce, Reuse and Recycle-Reducing the waste and regenerating the sources by recycling will help us to achieve sustainability. Creating awareness among the people will bring about attitudinal changes in the people. Such subjects should be introduced even at the school stage so that the young minds are educated on the right lines. This will, in the long run help in achieving a sustainable development. The programme of achieving sustainable development should be adapted by various governments, which should draw out their own action plans. This should involve not only the governments, but non-governmental and social organizations and the general public also. Such extensive participation by all sectors is the gist of Agenda-21.

In the next Summit Meet held at Seato – Japan, an agreement was signed by 178 countries to control and reduce the emission of green house gases. But the USA, which emits the highest amount of such gases declined to sign this agreement. Developed countries have pledged to reduce the activities that

will disturb and degenerate the ecosystem and environment. These rich nations must also help the poor countries with financial and technical assistance to achieve this sustainable development, using the resources to the maximum co-operation no plan can succeed. People should be instructed to reduce power consumption, to accept new technologies which can save energy and to cooperate with the government in saving power.

### **WATER CONSERVATION**

Water is one of the most precious and indispensable materials, next only to air. All species need water for their survival. Man needs water for drinking, cooking, cultivation and the industries. Water is available to us from rivers, ponds, lakes and from the ground water, but all sources are replenished only by rainfall. There is a scarcity of water on a global level because the rainfall is not sufficient to reinforce the water resources. With the increase in population and decrease in the amount of rainfall, water scarcity is a threatening factor to the people globally. The World Health organization (WHO) has estimated that an individual needs 150 litres of water per day. But practically even in developed countries only half of this amount is distributed especially to urbanites. It is worse in developing and poor countries, where a man finds it difficult to get 10 litres of water per day.

To solve this problem of water scarcity we have to adopt certain strategies to conserve water. Water loss due to run off on the soil can be prevented by

allowing the water to infiltrate into the soil. allowing the water to stand on small furrows or ridges and to infiltrate. using chemicals like gypsum to the soil to increase water absorption. constructing farm ponds, and dug-outs. reducing the loss of water by evaporation. reducing irrigation losses by the use of lined or covered canals. reusing water after treatment. economizing in domestic or commercial use.

animals form an integral part of a watershed, because they depend upon this watershed for their livelihood. Watershed affects the life of people as it helps sustained food production, water supply for domestic and irrigational purposes, power generation, vegetation and even running of industries. Very often the water sheds are found to be degraded due to unplanned and unscientific land use activities like deforestation, mining, overgrazing, construction of roads and buildings, soil erosion etc. People should be educated properly how to manage the watersheds effectively.

### **Objectives**

Controlled and judicious utilization of land and water resources to get the optimum production is the main objective of water shed management. The other objectives are adopting conservation strategies to minimize soil erosion, using the watershed for beneficial developmental activities, reducing the risks of floods and droughts and developing rural areas and improving their economy.

Watershed management approach with a number of programmes was included in the 5 Five Year Plan, and a national policy for this was developed. Various measures were taken for the benefit of the people. Proper storage of water is done so that there is no water scarcity during dry season Afforestation plays an important role in water conservation, by preventing soil erosion and preventing run off loss. Woody trees, under agro forestry are grown to achieve the objectives. Several mechanical measures like terracing, bunding, contour cropping etc. are taken. Mining and quarrying should be scientifically undertaken with a minimum damage to the environment. Above all an awareness of these principles and practices and the benefits, should be created in the people and their cooperation should be enlisted.

### **RESETTLEMENT AND REHABILITATION ISSUES**

In the history of mankind, migration of people from one place to another has been a common and continual activity. In olden days people lived as nomads constantly shifting settlement for various reasons like food availability, fresh hunting ground and climatic conditions. Whenever and wherever there was a natural disaster like floods and earthquakes they had to shift to safer places. So such migrations have been very common in the history of mankind.

Besides this, implementation of government and private projects causes displacement of native people, who are directly affected. These native people are poor and underprivileged tribals. Various types of projects result in displacement of people who suffer immense economic and psychological stress as the ecological and social base of these natives is disturbed.

#### **a) Construction of Mega Dams**

The mega river valley projects and storing massive quantity of water in the reservoirs have caused great impacts on the socio-economic status of the people. Some of the major projects are the Hirakurd dam, Bagranangal dam, Tehri dam, the Damodhar valley project and the controversial Sardar Sarovar projects. These projects have caused displacement of the native people from their ancestral house and driven them from their traditional occupation.

In India so far 20 million people have been affected by such hydro projects. The government promises rehabilitation of these displaced people, but not much has been done even after 50 years. Half of the displaced people because of the construction of Bagranangal dam, are yet to be rehabilitated. The Sardar Sarovar project is an interesting case study. It is a multi crore project on the Narmada river which will submerge nearly 600 villages, affecting 3 lakh people. Environmentalists and social organizations are fighting against the project. It is the duty of the government to give adequate compensation in the form of land, job and cash.

#### **b) Mining**

Mining is another type of multi crore project which involves displacement of the native people. It is a developmental project involving thousands of hectares of land. The government takes over the land and the local people had to

are given new settlements, the tribals get alienated in the modern cultural and economic situation. Psychologically they had to suffer a loss of identity and the intimate link with the familiar environment is irrevocably lost. There is a need to formulate a Rehabilitation policy taking into consideration all the above problems.

#### **. ENVIRONMENTAL ETHICS**

The principles and guidelines regarding the relation between human activities and his environment are called Environmental Ethics. Man must recognize the sacredness of nature and the environment and must respect her and nurture her. Nature has provided man with all the resources and nourished him like a mother, and so man must reciprocate this attitude and protect her from danger and destruction by his activities.

Man was living under the powers of nature for a long long time, but later with his scientific knowledge and technological development has begun to conquer and master nature. In the process man seems to have forgotten the sacredness and supremacy of nature and does not bother about the damages to nature. This has resulted in extensive deterioration of the surrounding and the environment. It is time for man to think over this situation and change his attitude to nature and maintain a cordial relationship with nature. Otherwise the earth we live in may become useless for the present

generation and dangerous for the future generation, with the degradation of the ecosystem, and pollution of the surroundings - air, water and the soil. Environmental ethics is the study of the right attitude man must have towards nature and its natural systems.

Man is in the centre of activities on the earth, and he is the most intelligent of all the species and most capable of managing the earth and all the other species. He has the capacity to know and use the supply of resources for developmental purposes. Economic growth is of vital

importance but at the same time economic growth should not be attained at the cost of environmental degradation. Man must have earth-wisdom also. He must realise that nature exists not only for human beings, but also for other species -- the plants, the animals and other organisms. He must also realise that the earth's resources are not unlimited and so must be judiciously used so that the resources are not exhausted leaving the earth empty for the future generation. To this end the following guidelines known as Earth ethics or environmental ethics should be followed.

The earth and nature must be considered sacred and man should do nothing to degrade earth and its contents. Each species has a right to exist and man has no power to drive them to extinction by his eco endangering activities. The population should be controlled so that the resources are not consumed by too many people on earth. Resources must be consumed in moderate and necessary amount, so that the future generation is not denied their right to the resources.

An awareness must be created among the people that they must develop environmental considerations and healthy life style without harming the surrounding and nature. Our Vedas and cultural rituals have taught us to worship the sacred nature, and one should not defile this earth and the natural resources. They must develop and live an eco centre and eco friendly way of life.

## **WASTELAND RECLAMATION**

Land is an important resource, which helps man in the production of food. But man by his unscientific and unimaginative practices, has spoilt the fertile lands into useless wasteland. Wastelands are unproductive and environmentally

degraded lands. Such wasteland includes sandy area, salt affected lands, barren hill ridges and hard slopes in the hilly regions. In India the wasteland extends up to the area of nearly 6 lakhs of sq.km., which is about 20% of the total land area. Maximum wasteland areas are found in Rajasthan, Madhya Pradesh, Andhra Pradesh and Haryana, and these lands are saline, sodic and sandy areas. Generally wastelands are marshy lands, water logged areas, salt affected land, forests destroyed, places where industrial effluents are dumped, desert and rocky regions, useless lands on the sea shore etc.,

### **Objectives of Wasteland Reclamation**

These wastelands were formed either by natural processes or by man engineered activities. The wastelands must be reclaimed and converted into useful fertile lands. The quality of the soil must be improved with the help of natural or chemical fertilizers. The quality of the water used also must be improved. Steps must be taken to reduce floods, landslides and soil erosion and the fertility and biostructure of the soil should be conserved. Man needs more and more food for the ever growing population, and one way to increase food production is to reclaim wastelands and convert them into fertile and cultivable lands.

### **a) Reclamation Practices**

#### **Land Development**

To reclaim salt affected soil, the salt from the top soil can be removed by flushing the soil with excess amount of water. This process is called leaching. After leveling and ploughing the field is divided into small plots and 1 cm water is allowed to stand and then flushed out. This will remove 90% of the soluble salt, reducing the salination of the topsoil.

### **Drainage**

This is done for water logged soil reclamation. When water stands in the fields after heavy rains, it is removed by ditches. To remove the sub-surface water log, sub-surface drainage is arranged with perforated PVC pipes placed below the land surface.

population explosion, especially in India. The world population has crossed the 6 billion mark and in India the population has touched 100 crores. Two problems have arisen because of this. One is consumption of more natural resources and generation of more waste and these two have tremendous impact on the environment. Ironically in the poor developing countries the rate of increase in population is high and there is no corresponding increase in the resources. The result is poverty, undernourishment, malnutrition, disease and death. But in the developed countries, the rate of increase in population is low but there is abundance of resources and people adapt a luxurious life style and the consumption of resources is also high. In both the cases the generation of waste is high and this causes a tremendous impact on the environmental conditions, because of increased pollution.

Production of goods has increased because of increase in the level of consumption. But production is on the increase without minding the safety of the environment. For example the production of sub-standard polythene carry bags has increased vastly. But the bags which are discarded after use have polluted the environment. The polythene bags do not get decomposed and spoil the soil. After the cautions given by environmentalists many states have now banned the use and waste of polythene bags. Nuclear energy is used in industries to increase production and nuclear waste is a great hazard to the environment. Because of unethical trade practices poor quality goods are produced and marketed and this paves the way for generation of more waste and this is a danger to the environment. Above all an awareness must be created among the people not only about their rights as consumers, but also their duty to maintain a healthy and safe environment.

### **GREEN HOUSE EFFECT**

Among the planets, only the earth has millions of living organisms, apart from animal and plant species. The optimum temperature that is suitable for living organisms exists only on the earth. The average temperature of the earth has been 15°C. But for the past few years the average surface temperature of the earth is increasing. This phenomenon is referred to as Green house effect, and this has been a cause for worry for the environmental scientists. Green houses are constructed in big parks with glass tops and sides, and the inside of the green houses will be warmer than outside. When the plants are watered, the growth of the plants will be more because of the water supply and the hot atmosphere inside the green house. Similar situation has arisen in the atmosphere above the earth and the temperature of the atmosphere above the earth's surface has increased because of so many reasons. This is called green house effect. This is because of the high concentration of green house gases in the atmosphere.

The green house gases are dumped into the atmosphere in large quantities. CO<sub>2</sub> and water vapour absorb the infra red without reradiating into the space, resulting increase in the temperature in the

atmosphere. The immediate result of this is global warming, which may cause very serious consequences. The green house gases are the following.

### **Carbon-di-oxide CO<sub>2</sub>**

Carbon-di-oxide plays a major part in the emission of green house gases. The normal amount in the atmosphere around the earth was .032%. But after the Industrial Revolution the amount of CO<sub>2</sub> in the atmosphere began to increase steadily. The main reason is burning of fossil fuels like coal, petroleum and natural gas, which are used in the industries. Every day millions of tons of CO<sub>2</sub> reach the atmosphere. Besides the industries, the exhaust from the automobiles and locomotives also reaches the atmosphere. Because of deforestation, land clearing and burning and forest fire, a large amount of CO<sub>2</sub> is thrust into the atmosphere. The CO<sub>2</sub> which reaches the atmosphere remains in tact there, causing the green house effect.

### **Methane**

Next to CO<sub>2</sub>. methane reaches the atmosphere in large quantities. Methane is produced by the bacterial action on dead organic matter in moist places like swamps, wetlands and wet paddy fields. Methane is also produced in the digestive tracts of cattle, sheep. Methane strays in the atmosphere for about 10 years.

### **Nitrous Oxide**

Nitrous oxide is produced by burning of biomass and nitrogen rich fuels, by the bacterial action on the soil and on the dead plant species, and by using nitrogen rich fertilizers. It is also produced from livestock waste and nitrate contaminated water. The life span of N<sub>2</sub>O is about 150 years in the troposphere. The amount of nitrous oxide has increased by 15% after the industrial revolution.

### **Chlorofluoro Carbons (CFCS)**

This chlorofluoro carbon is another important ingredient of the green house gases. This gas also reduces the ozone in the stratosphere. The main source of this gas is leaking air conditioners and refrigerators, evaporation of liquids used in industries, plastic foams, etc. It absorbs heat about 5000 time more than CO<sub>2</sub>. It stays in the troposphere for about 100 years. Every year the chlorofluoro carbon increases by 5 per cent.

Apart from the above gases ozone and water vapour also serve as green house gases, and this adds to the green house effect, which is responsible for the increase in temperature. The increase in the amount of CO<sub>2</sub> is 80%, that of nitrous oxide is 15% and this has caused global warming.

### **GLOBAL WARMING**

The foremost effect of enhanced green house effect is global warming. Global warming refers to increase in the temperature of the earth, raising of sea level, melting of ice in the mountains, storms and floods. Scientists have formulated that when the amount of CO<sub>2</sub> in the atmosphere gets doubled, the temperature of the earth will increase by 3° C. The meteorological stations in St. Louis, Columbus etc. have confirmed the warming up of the earth's surroundings. In the last century the increase in the global warmth has been .6%.

The Chandley conference in France, The Earth Summit of 1992, The Berlin conference on climatic changes (1995), The meeting of the UN General Council in 1997, The Seato Summit of 1997, were some of the efforts taken to involve suitable methods to reduce the green house gas effect and thereby reduce the global warming.



## **ACID RAIN**

Acid rain is one of the results of atmospheric pollution. It refers to an increase in the acidic property of rain water. Oxides of sulphur and nitrogen, emanating from the various industries react with the water particles in the atmosphere and change into sulphuric and nitric acids. During rainfall these acids are added to the rain water and make the rain water acidic in nature. This contaminates the rain water and causes dangerous impacts on human beings and properties. Acidic deposition is the sum total of wet deposition and dry deposition.

Acidic rain affects water bodies, animal and plant species and historic monuments like the Taj Mahal and the British Parliament building. Acid rain is an environmental hazard in the industrial areas.

Acid rains are the direct offshoot of industrial revolution in the 19th century. Robert Angus Smith, a famous chemical scientist, came out with the theory of acid rain. As early as 1852, he proposed the relation between the sulphur dioxide and the acidity of the rain water. He published this principle in 1872, describing his research for 20 years. It was he who named this phenomenon as acid rain. In 1965 the first acid rain was detected and Swanthi Eden, the chemical scientist proposed the theory that the water species die because of an increase in the acidic nature of the waters of lakes, ponds and rivers.

The acidity of water is measured by its pH value. Water is said to be acidic if its pH value falls below 5.6, clean and natural rain water has a pH value of 5.6 at 20° C, because of dissolved CO<sub>2</sub>, forming carbonic acid. But if SO<sub>2</sub> or NO<sub>2</sub> is present, the conference on Human environment was held in Stockholm and an action plan was drafted to reduce the atmospheric pollution and the consequent acid rain. In 1975 an International Conference on Acid Rain was convened in Columbus in the USA, and it spread the awareness on the dangers caused by acid rains. In 1979, due to the efforts taken by the then Soviet President Brezhnev, an international conference on Acid rain was held in Geneva. It was emphasized that human activities were the main reasons for the emission of SO<sub>2</sub> and NO<sub>2</sub> and that must be checked. In 1982, an international conference was held at the UN, in which 22 members of the UN Economic Committee members participated. An action plan to reduce the human-generated pollution was adopted. In 1984, a conference of ministers of environment from various countries was held in Ottawa in Canada. In the same year an agreement was signed to reduce the amount of SO<sub>2</sub> emission on a global level, in a conference held in Munich. Thus international awareness was created and action plans were drafted to protect the historic monuments and traditional artistic structures from destruction by acid rain.

## **OZONE DEPLETION**

The earth is surrounded by atmosphere that is filled with various gases and water vapour. The air around us enables millions of organisms to survive and grow. Ozone is one of the gases, that remains as a layer 60 km above the earth. This layer filters out the harmful ultra violet radiation from the sunlight and protects various life forms on the earth. This ozone layer has been acting as a natural sunscreen for the last 400 million years. Because of various reasons, particularly the increase in the surface temperature and because of global warming, the ozone layer is slowly being reduced. Ozone is a form of oxygen (an isotope). It contains three atoms of oxygen (O<sub>3</sub>). This ozone is constantly being created by the absorption of ultra violet radiation of the sunlight by the oxygen in the atmosphere. Ozone thus formed. Because of the various steps taken by world bodies and the world governments, there is a hope that ozone depletion can be stopped and the ozone layers could be restored. Awareness campaigns are held all over the world and not only the governments but individuals also must realize the gravity of the situation and steps should be taken to save the world and other living organisms from the onslaught of sun's UV radiation.

## **NUCLEAR ACCIDENTS AND HOLOCAUST**

The world will not forget the greatest tragedy that occurred at the close of the Second World War. The dropping of atom bombs on the two Japanese cities, Hiroshima and Nagasaki and the nuclear holocaust which killed about 10000 people shook the world. The radiation caused by the explosion produced large scale deformities to the people and even after 60 years the impacts of the nuclear explosion are still visible.

Many developed countries have gone nuclear and they are trying to use nuclear power for productive purposes. Nuclear reactors are set up in many parts of the world and nuclear tests are conducted in deserts and deep oceans by many countries. But there is always the danger of nuclear accidents in the reactors, and this is viewed very seriously because the effects of reactor accidents are very dangerous and drastic. Even without accidents, the radioactive debris and the nuclear waste from the reactors can affect the health of human population who live in and around the reactor areas.

The Chernobyl accident, 1986, has resulted in wide spread contamination by radioactive substances. The accident occurred due to the non functioning of safety systems and the reactor was blown up by excessive heat. It threw up a shower of radioactive particles over thousands of square miles. The accident affected nearly 1.5 lakhs of people who had to be evacuated and resettled. So people all over the world who live near the reactor sites are in constant fear of accidents or leakages.

### **Effects of Nuclear Bomb Explosion**

Nuclear bomb blasts will cause burning away of wood, plastics, forests and fuels, and this will cause large quantities of smoke and soot to be carried into the atmosphere. The black soot will absorb solar heat and radiation and cooling of the earth will result. Therefore the infra red radiation absorbing water vapours will be reduced. This will increase the cooling of the earth. So due to nuclear explosion a phenomenon opposite to global warming will occur. This is called nuclear winter. Even - the summer time will experience freezing temperature. It will drastically affect plants and other organisms and destroy the ecosystem. Food production will be reduced causing famine and human suffering.

Man is in possession of many lethal weapons but the most dangerous weapon is the nuclear bomb. Many governments are proclaiming that they are using nuclear energy for peaceful and productive purposes. No doubt it is true, but the common people are in constant fear and doubt that nuclear energy poses a great threat to their life and property. Something needs to be done with the legacy of nuclear energy and we should not pass on the problem of safety of humanity to the next generation.

## **ENVIRONMENTAL LAWS**

An awareness of the importance of environment has been created in the people for quite sometime, and many governments came forward to introduce many legislations with a view to protect the environment. India has been respecting and living with the environment since long time ago. Man was living respecting and even worshipping natural forces like land, air, water, plants and animals. The history of India and the religious books, have revealed that other living species have an important part to play in the history and life of mankind. The tradition continued and India was the first country to make provisions for the protection of the environment in its constitution.

At the international level, as early as 1972, in the U.N. conference on Human Environment held at Stockholm on 5<sup>th</sup> June, environment was discussed as an important agenda. That day 5<sup>th</sup> June every year is celebrated as World Environment Day. Following the Stockholm conference India initiated a number of legislative steps for the protection of environment.

The Wildlife (Protection) Act, Water (Prevention and Control of Pollution) Act, The Forest (Conservation) Act, Air (Prevention and Control of Pollution) Act, and Environment (Protection) Act, were passed at different times to ensure legal protection to environment. These provisions for environmental protection were made in 1976 within four years of Stockholm conference. Article 48-A of the constitution of India provides "The State shall endeavour to protect and improve the environment .....". Article 51-A (g) provides "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, .....". Let us consider each legislation and its provisions.

#### **a) Wildlife (Protection) Act 1972**

It was a historic landmark in wildlife legislation which came into effect in 1972. Wildlife was transferred from the state list to the concurrent list. The Indian Board of Wildlife took up the task of setting up Wildlife National Parks and Sanctuaries. The major provisions in the Act are i) creation of wildlife advisory board, ii) prohibition of hunting of the endangered species, iii) constitution of central zoo authority, iv) a ban on trade or commerce in scheduled animals, v) legal powers to officers to punish the offenders. Several conservation projects for individual species like lion, tiger, crocodile and brown deer were started under this Act.

An amendment to this Act was passed in the Parliament in 2002, enhancing the punishment for the offenders, and controlling the export of endangered species. The Ministry for Environment has made 'Animal Welfare Division' as its constituent. Every year the 4th of October is observed as World Wildlife Day.

#### **b) Forest (Conservation) Act**

This Act deals with the conservation of forest and related aspects. Forests play an important role in the economy and wealth of a nation. Forests in India cover approximately 6.5 lakh hectares. But the area is shrinking because of deforestation and man engineered activities like converting forests into cultivable lands to feed the ever increasing population of the country. As early as 1894, the first Indian Forest Policy was drafted and it was amended in 1952.

Adding more provisions to the policy, an Act was passed in the Parliament in 1980. The Act covers all types of forests, including reserved forests, or any forested land though belonging to private owners. The Act helps to curb illegal felling of trees, over grazing and forest fires. The important provisions in the Act are:

Forest lands should not be used for other purposes without the prior approval of the central government. Any illegal entry into the forest area without the permission of the Forest officials or cutting trees is a punishable offence. It makes provision to conserve, protect and develop the forest land. Offenders against the Act can be punished with an imprisonment for 15 days.

In 1992 an amendment to this Act was brought and passed in the Parliament, which allowed some non forest activities like surveys, research projects, exploration, hydro electric projects on the condition that the forest lands should be least affected. Under the amendment cultivation of cash crops like tea, coffee, rubber, fruit bearing trees and herbal plants was included in the non forestry activity. Mining was banned and any proposal for a project must have "Environmental Impact Statement with reference to ecological and socio-economic aspects.

Thus the Forests (Conservation) Act has made ample provisions for the protection and development of forests: But above all this conservation of forests depends more on the co operation and awareness on the part of the public, without whose active involvement, no law could be effective. The government must take effective steps to educate the public.

### **c) Water (Prevention and Control of Pollution) Act 1974**

The Act makes provision for maintaining and restoring the wholesomeness of water by preventing pollution. Pollution of water can be defined as contamination of water or altering its natural condition with harmful matter, which may be injurious to public health or harmful to plants, animals or other organisms. The Act makes the following provisions:

The quality and purity of all types of surface and ground water should be maintained. Central and state Boards of Pollution Control should be established, and enough powers should be conferred on them to control water pollution. The Boards should have enough funds for their budgets, and their accounts are to be audited. The defaulters and offenders will be punished as per the penal code.

The Central Pollution Control Board (CPCB) will advise the central government in matters related to prevention and control of water pollution. It will also co-ordinate, supervise and regulate the activities of State Boards. It will organize training programmes and awareness programmes for the benefit of the people. It will establish and run laboratories for the analysis of water.

The State Pollution Control Boards (SPCB) have similar functions and activities to be executed at the state level advising the state governments, watching over the discharge of industrial effluents. The State Board has the powers to exercise control over the industries regarding the contents of the effluents and the method of discharge.

The Water Act has to some extent proved effective, and the public are evincing keen interest in the preservation of quality of water. Some of the Public Interest Litigations (PIL) are pointer to this trend and recently the dye factories in Tirupur were ordered to be closed by the Madras High Court, since they have not constructed effluent water treatment centres. Though there are some loopholes in the Act, by and large the Water Act has been effective and beneficial..

### **d) The Air (Prevention and Control of Pollution) Act 1981**

The Act provides for the maintenance of air and the atmosphere free from pollution. The salient features of the Act are:

Air pollution has been defined as the presence of any solid, liquid or gaseous substance in the atmosphere in such concentration as to be harmful to human beings or any other living creatures or plants or property or environment. Noise pollution has been inserted as pollution by an amendment to the Act in 1987.

Pollution Control Boards at the Central or State level have the authority to implement, supervise and monitor the Air Act. The boards have the powers to check and evaluate the industrial emission of any air pollutant. The norms and standards to be followed by the industries have been laid down under Section 17 of the Act. Section 20 of the Act has provision for ensuring emission standards from automobiles.

The State Governments have to issue instruction to the Motor Vehicle Authorities to comply with the implementation of emission rules (MV Act 1939). Recently the Delhi High Court ordered that public transport in Delhi (DTC) should use gas instead of diesel, to control air pollution Section 19 empowers

the State Governments to declare an area as 'air pollution control area', prohibiting the use of fuels declared pollution causing.

An amendment to the Act was passed in the Parliament in 1994, making Environmental Impact Assessment (EIA) mandatory for any proposal for developmental projects. Another rule was added to the Act, i.e., Hazardous wastes (Management and Handling) making, safe handling and disposal of dangerous wastes the responsibility of the occupier or producer.

Thus the Environmental (Protection) Act has extensive provisions to ensure maintaining, protecting and improving the environment. Still it has a number of loopholes, which are exploited by unscrupulous industrialists and individuals and this can be checked only by mass movement and this requires public awareness of the legal sanction to protect the environment.

#### **f) Public Environmental Awareness**

Public awareness about environment is only at an initial stage. But some awareness is being created about environmental degradation and pollution by the mass media. Still incomplete knowledge has often led to misconception. Development in various fields has caused a rise in the standard of living. This coupled with increase in the population has led to serious environmental disasters. The best thing is to maintain a balance between the development on the one side and needs and supplies on the other, so that the delicate ecological balance is not disturbed. Environmental ignorance among the people is due to the failure of the educational system which has not included environment as a subject of study. The decision makers, politicians and planners have no clear idea about the environment and its importance. With greater considerations of economic gains and eagerness to complete ambitious projects, environmental conditions have become secondary, and that is why environmental aspects have not gained enough currency.

#### **g) Methods to Propagate Environmental Awareness**

Environmental awareness should be propagated through formal and informal education. Environmental education must form part of the curriculum right from the childhood stage. Environmental Studies must be made mandatory at all levels of education. An awareness must be created among the public

### **HUMAN POPULATION AND ENVIRONMENT**

#### **POPULATION GROWTH**

Population growth is an important factor in the social life on earth. People are an integral part of the environment, and any change in the environmental conditions will necessarily affect life, security and well being of the people. Excessive increase in the population tells up on the consumption of natural resources and the earth faces the danger of becoming impoverished.

In the last century population increase has been phenomenal. 200 years ago the global population was about 1 billion. The rate of increase in the population was on the increase. The world population reached 1 billion in thirty-nine, thousand years. The doubling of the population took 130 years and next doubling came alarmingly fast only in 45 years. As per the World Bank estimates the next doubling to reach 8 billion is round the corner and it will be 11 billion by 2045. Scientists call this population explosion.

#### **a) Reasons for the Population Explosion**

In the beginning of human civilization population was small. Man had to face a hostile environmental condition. Droughts, diseases and natural disasters resulted in mass deaths. With scientific and technological advancement life expectancy of man improved. Man began to live in settled colonies, with better food and medical facilities. Increased sanitary conditions and reduced women – infant death rate caused a surge in the population. People lived healthier and longer. Increase in the birth rate and the simultaneous decrease in the death rate caused the population explosion. In agriculture based societies children were considered assets, because it meant more hands to work in the field. Now the global population stands at an alarmingly high of 6 billion (600 crores).

### **ENVIRONMENT AND HUMAN HEALTH**

'Health is Wealth' – is a very popular maxim. Man's health determines his activities. A physically fit person not suffering from any disease is a healthy person. Man's health is influenced by many factors like food, water he drinks, the air he breathes and the environment he lives in. Pollutions or impurities in any of the above factors will affect his health adversely. It is ironical that man's activities affect and degrade the environment and in return a degraded and damaged environment affects the health of human beings. Man must realise that protecting and safeguarding the environment means protecting his own health.

Diseases in man are caused by various organisms like germs, bacteria and virus. The situation is more dangerous in developing countries because a degraded environment, high temperature and moisture help the disease causing organisms to thrive and multiply. Insects like mosquitoes and flies add their share of infections. These organisms enter the human body through the food, water or the air, and cause a number of diseases. Some of the common, infectious and dangerous diseases are listed below. Cholera Cholera is a dreadful disease caused by bacterial infection by contaminated food and water. The affected persons will have diarrhea and vomiting and will suffer from dehydration, which may lead to death. Typhoid It is a disease that affects the intestines and is caused by bacterial infection. Malaria It is a disease caused by mosquito bite. Mosquitoes breed in unhealthy and unhygienic environment and cause this disease. Jaundice It is a disease caused by contaminated water, infested by Proper environment, availability of basic needs like protected water and food, clean air, good sanitary conditions etc. are essential for healthy living. Improper settlements and poor housing conditions may cause not only physical stress, but also psychological stress which may result in diseases.

### **HUMAN RIGHTS**

Human rights are the rights and privileges, man must enjoy on this earth since he is a human being. Human rights are basic to human beings and are granted to him by the society and law. The rights ensure individual freedom, dignity, respect, essential for a peaceful living on the earth. The foundation for human rights was laid as early as 13th century when some liberal thinkers revolted against religious intolerance, social constraints and scientific dogmas. But with the Universal Declaration of Human Rights (UNDHR) by the UNO on December 10, 1948, true hopes for real Human rights were realised.

This declaration provided comprehensive protection to individuals against all forms of injustice, exploitation and violation of rights. The declaration provided civil, political, economic, social rights to individuals which guaranteed freedom of thought, speech, association and movement, apart from the right to work, right to wages, right to form trade unions, right to health care, education, rest etc. The UN charter and the preamble, sections 1, 13(1), 55, 56, 62(2), 68 & 76(e) clearly guarantee, fundamental freedom and fundamental rights to man.

Although human rights are considered to be universal, there is wide disparity between the developed and developing countries. The main causes of violation of human rights are over population and poverty. Where there is poverty and absence of human dignity, human rights have no meaning. According to WHO report, one in every six persons in this world is poor, lacking in food, clean water, housing employment and other basic facilities.

values, aesthetic values, ethical values and environmental values and train the people to arrive at value based judgements. Value education must increase the awareness about our national history with the backdrop of world history, our cultural heritage and also the rights and privileges guaranteed under the constitution. The learners should be taught a right perspective of national Integration, Community Development and the importance of environment.

The value education and environmental education in combination will help create in or youth a sense of earth citizenship and a sense of duty towards Mother earth who has provided man with so much natural sources and natural wealth, to prosper.

The learner must be made to realize that a value-based management of the earth resources and the ecological biodiversity will create a sustainable development, which will make the earth safe and useful for the present generation as well as the future generation. Development and progress which will bring about destruction of nature's beauty, environmental disasters and health hazards are not real and sustainable. The environmental literacy combined with value education can provide answers and solution to the many problems humanity is facing.

#### 49. HIV / AIDS

To-day millions of people are affected by Sexually Transmitted Diseases (STD). Any disease transmitted from one person to another person through sex is an STD. There are more than twenty varieties of STD attacking men and women, and among them the most dreaded disease is AIDS. .

AIDS is the dreaded disease of the 20th century and it is threatening to take a heavy toll of human life in the 21st century, because no medicine has been found to cure it.

AIDS the Acquired Immuno Deficiency Syndrome is caused by Human Immunodeficiency Virus (HIV). HIV from an infected person can pass to a normal person through blood contact, through unprotected sex, or through sharing needles .

#### **Effects of HIV / AIDS on Environment**

With the increase in the number of AIDS patients, the environment will be affected. If there is an AIDS epidemic, the deaths will adversely affect the environment and natural resources. There will be loss of labour, manpower and loss of production. There is always the danger of infection of AIDS to normal persons, if necessary treatment and precaution are not taken. The HIV carriers will be psychologically affected and will carry a stigma. This will affect the family system as well as the society at large. So HIV / AIDS should be handled carefully and the HIV positive people should not be denied their right to live.

#### **WOMEN AND CHILD WELFARE**

Women and children are helpless, weak and economically dependent and so very often they are easy targets in the society. Women usually suffer gender discrimination and devaluation at home. Violence against women, sexual exploitation and harassment of women are in the increase nowadays. The crimes against women are abduction, rape, dowry deaths, mental torture and domestic violence. In the male dominated patriarchal society, the rights of women are violated. This must change, and

women must have equal rights. There is a need for complete reorientation of social ethos and sensibility, for restoring the dignity, status and respect for women.

There are many "Women Groups", 'Women Cells' and Women Associations' who fight for the welfare of women. At the governmental level there is a Ministry for Women and Child development, which will look after the welfare, and upliftment of women in the social structure. Developmental projects and displacements caused by such projects do not give any protection to women which increases their dependence on men. The role of NGOs, like Mahila Mandals, is essential to create an awareness among women of their rights. Education among women should increase so that they come to know about

factors. Female infanticide is another social evil that has to be effectively eradicated. Children must enjoy their rights and privileges. But ironically about 20 million children are working as child labourers, that too in hazardous industries like match factories, fireworks factories, textile and knitting factories, and brass work industries.

Poverty is the main reason which drives children to work. The U.N. General assembly in 1959, adopted the Declaration of the Rights of a child. It has become International Law in 1990. The children have the right of survival, and development, which includes access to education, child care and support, social security, right to leisure and recreation. The World Summit on children held on Sept. 1990 focused on an agenda for the well being of children. Children are the most affected due to environmental pollution. Their sensitive bodies are more susceptible to diseases caused by environmental contamination. It is the duty of the present generation of adults to conserve the environment, so that to-day's children will inherit a safe and secure environment to live, work and prosper.

## **ROLE OF INFORMATION TECHNOLOGY IN**

### **ENVIRONMENT AND HUMAN HEALTH**

In this century we have witnessed a revolution in Information Technology and communication has reached a new height with modern technology. Consequently almost all the fields like science, medicine, agriculture, environment etc. have vast developments. The role of Information Technology is very significant in the study and protection of environment, Development of internet facilities, world wide web, and information through satellites has revolutionized communication system and up-to-date information in various fields including environment and health studies is available. It won't be an exaggeration to say that the whole world is at our fingertips. Database is a unique computerized system, wherein all the information is arranged in a systematic manner, and we can access any field any time. Internet has brought in a help of computers. This technology is used in a number of ongoing research programmes on various potential drugs to be used in medical treatment

#### **. a) Bioinformatics**

It is a multi-disciplinary subject integrating Biology and Information Technology. The world now faces a new problem of eradicated diseases - systemic diseases and infectious diseases - cropping up again because of various reasons including environmental degradation. Bioinformatics has become popular after genetic studies and human genome projects, and it is going to be an effective tool in the diagnosis and treatment of many dreaded diseases.

#### **b) Medical Transcription**



It is a process of converting voice into a written form using a particular software and word processing unit. When patients are examined by multiple physicians like pathologists, radiologists, surgeons, and others, we have a host of findings by different doctors, and all the information is coordinated in the form of medical transcription. This helps in the quick diagnosis and treatment of the diseases, thus helping in the patient care. Thus Information Technology plays a very significant role in the fields of environmental study and health.

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