
UNIT 4 ENVIRONMENTAL POLLUTION AND HEALTH HAZARDS

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4.1 INTRODUCTION

The concept of environment is as old as the concept of nature itself. It is a composite term referring to conditions in which organisms consisting of air, water, food, sunlight etc., thrive and become living sources of life for- all the living and non-living beings including plant life. The term also includes atmospheric temperature, wind and its velocity. Before understanding what “Environmental Pollution” is it is equally necessary to-know what “pollution” is.

Pollution is an unfavorable alteration in the physical, chemical or biological characteristics of air, water and land that may or will adversely affect human life, industrial life, industrial progress, living conditions and cultural assets.

Environmental Pollution is not a new phenomenon, yet it remains one of the greatest threats to the health and well-being of humanity and one of the major environmental causes of death and morbidity. For example, substances such as plastic materials, heavy metals, etc., once released into the atmosphere. By natural processes, it cannot be degraded and are harmful to living organisms.

After reading the unit, you will be able to-

- Understand what is environmental pollution
- Explain kinds and factors of environmental problems
- Describe the main causes of environmental pollution
- Analyze environmental pollution and health hazards

4.2 KINDS OF POLLUTION AND FACTORS OF ENVIRONMENTAL POLLUTION

4.2.1 Kinds of environmental pollution may broadly be classified into:

- i. Natural pollution

- ii. Man-made pollution
 - i. **Natural Pollution:** Environment is polluted often by natural phenomenon, such as earthquakes, floods, drought, cyclones, etc.
 - ii. **Man-made Pollution:** is pollution which takes place because of human activities.

4.2.2 Factors of environmental problems- The environmental crisis“ is caused due to environment and ecological changes as a result of developmental process of the 'economic and technological man" of the present century. In fact if the present century is marked by socio-economic, scientific and technological development on the one hand, it is plagued by serious problems of environmental problems on the other hand. The environmental crisis arising out of the environmental deterioration caused by several forms of pollution, depletion of natural resources because of rapid rate of their exploitation and increasing dependence on energy consuming and ecologically damaging technologies, the loss of habitats due to industrial, urban and agricultural expansion, reduction and loss of ecological populations due to excessive use of toxic pesticides and herbicides and loss of several species of plants due to practice of monoculture removal of habitats through forest clearance has now become of global concern. The life of common man is being so rapidly adversely affected by environmental degradation caused by man himself that there has been a marked growth of interest within the last decade in the quality of the environment, the disruption of the earth's natural ecosystems and the depletion of resources.

The most striking reason of the environmental degradation and hence global environmental crisis is the fact of deteriorating relationship between man and environment because of rapid rate of exploitation of natural resources, technological development and industrial expansion. The rate of environmental change and resultant environmental degradation caused by human activities has been so fast and widespread.

The impact of man on environment through his economic activities are varied and highly complex as the transformation or modification of the natural condition and process leads to a series of changes in the biotic and a biotic components of the environment. The impacts of man on environment fall into two categories

- (i) direct or intentional impacts and (ii) indirect or unintentional impacts,
 - i. Direct or intentional impact of human activities are preplanned and premeditated because man is aware of the consequences, both positive and negative of any programme which is launched to change or modify the natural environment for economic development of the region concerned. The effects of anthropogenic changes in the environment are noticeable within short period and these effects are reversible. On the other hand
 - ii. Indirect or unintentional impacts of human activities on the environment are not premeditated and preplanned and these impacts arise from those human activities which are directed to accelerate the pace of economic growth, especially industrial development. The

indirect impacts are experienced after long time when they become cumulative. These indirect effects of human economic activities may change the overall natural environmental system and the chain-effects sometimes degrade the environment to such an extent that this becomes suicidal for human beings.

4.3 MAIN CAUSES OF ENVIRONMENTAL POLLUTION

The problem of environmental pollution, we face today, is a complex consequence of forces connected with various interrelating factors. There are clearly a number of divergent and conflicting views of what could be the basic factors underlying the environmental crisis.

Some of the main causes of environmental pollution are:

- i. **Population growth-** Modern thinkers consider that growth of population is the root cause for many human problems. This observation also applies to environmental degradation. Increase in the population will have a multiplier effect requiring proportionate increase in all requirements necessary for the existence of human beings. Population growth requires abnormal exploitation of natural resources to provide day-to-day essential requirements of life. It results in migration of people and growth of urban areas, thereby inviting new problems of health, ecology and human sustenance.
- ii. **Nature of Modern Technology:** The nature of productive technology in recent years is closely related to the environmental crisis. Commoner maintains that sweeping transformations of productive technology since World War II productive technologies with intense impacts on environment have displaced less destructive ones. This factor has been largely responsible for the generation of synthetic and non-biodegradable substances such as plastics, chemical nitrogen fertilizers, synthetic detergents, synthetic fibres, big cars, petrochemical and other environmentally injurious industries and 'disposable culture. Thus, environmental crisis is the inevitable result of a counter ecological pattern of productive growth. Ecologically benign technologies did and do exist but they are not utilized, for they are considered inconsistent with the short-term interests of private profit maximization.
- iii. **Deforestation:** Forests are invaluable property of a nation because they provide raw materials to modern industries, timber for building purposes, habitats for numerous types of animals and micro-organisms. Good fertile and nutrient-rich soils having high content of organic matter, offer protection to soils by binding the soils through the network of their roots and by protecting the soils from direct impact of falling raindrops. They encourage and increase infiltration of rainwater and thus allow maximum recharge of groundwater resources, minimize surface run-off and hence reduce the frequency, intensity and dimension of floods. They help in increasing the precipitation; they are natural sink of carbon dioxide because they use carbon dioxide to prepare their food during the process of

photosynthesis. They provide firewood to millions of people all over the world and food and shelter to innumerable humans and animals. In fact, forests are 'life line' of a nation because prosperity and welfare of the society directly depends on sound and healthy forest cover of a nation concerned. Forests are main component of the biotic components of the natural environmental system and the stability of the environment and ecological balance largely depend on the status of the forests of the region concerned. Deforestation gives birth to several problems encompassing environmental degradation through accelerated rate of soil erosion, increase in the sediment load of the rivers, siltation of reservoirs and river beds, increase in the frequency and dimension of floods and droughts, changes in the pattern of distribution of precipitation, intensification of greenhouse effects increase in the destructive force of the atmospheric storms etc. economic loss through damages of agricultural crops due to increased incidence of floods and droughts, decrease in agricultural production of loss of fertile top soils, decrease in the supply of raw materials to the industries and building matters etc. Thus deforestation cause a chain effects which adversely affect the natural environment.

- iv. **Industrial Development:** Rapid Industrial Development has given economic prosperity to human society. It has also given new dimension to socio-economic structure and has provided material comfort to the people of industrially developed countries but it has also created many fold environmental problems. In fact, the glittering effects of industrialization have affected the mind of the general public that industrialisation is now being considered as the parameter of modernity and as a necessary element of socio-economic development of a nation. Rapid rate of industrialization resulted into rapid rate of exploitation of natural resources and increased industrial output. Both the components of industrial development e.g. exploitation of natural resources and industrial production have created several lethal environmental problems and have caused large scale environmental problems and ecological imbalance at global, regional and local levels in a variety of ways. Exploitation of natural resources in order to meet the industrial demand of raw materials has resulted into
- i. the reduction of forest covers due to reckless falling of trees
 - ii. excavation of land for mining purposes
 - iii. reduction in arable land due to industrial expansion
 - iv. lowering of groundwater level due to excessive withdrawal of groundwater
 - v. collapsing of ground surface due to withdrawal of mineral oil and groundwater, etc.

Besides desired production there are numerous undesired outputs from the factories such as industrial wastes, polluted water, toxic gases, chemical precipitates, aerosol ashes and smokes etc. which pollute air, water, land, soils etc., and thus degrade the environment. The industrialized countries have increased the concentration of pollutants

emitted from the factories in the air, water and land to such an extent that they have degraded the environment to the critical limit and have brought the human society on the brink of its destruction. The adverse effects of industrialization may change the overall character of natural system and the chain effects sometimes become suicidal for human society. Majority of the impacts of industrialization are related to pollution and environmental degradation. The release of toxic elements into the environment through the application of chemical fertilizers, pesticides and insecticides (output of chemical industries) changes the food chains and food webs and physical and chemical properties of soils. Similarly the release of industrial wastes into stagnant waters of ponds, tanks, and lakes into rivers and seas contaminates water and causes several diseases and deaths of organism and thus disturbs ecological balance of aquatic ecosystem.

- v. **Urbanization:** Exodus of population from rural areas to urban centre and origin and expansion of new urban centres due to industrial expansion and development are responsible for rapid rate of exploitation of natural resources and several types of environment degradation and pollution in the developed and developing countries. The level of urbanisation in the developed countries of the world has already reached its peak. The accumulation of wealth and availability of more economic and job opportunity in the urban centres have resulted into the concentration of population in the congested metropolitan areas and thus the formation and growth of big slum areas. In fact, increasing urbanization means increase in the concentration of human population in limited space which results in the increase of buildings, roads and streets, sewage and storm drains, vehicles (motor cars, trucks, buses, motor cycles, etc.) number of factories, urban wastes, aerosols, smokes and dusts, sewage waters etc. which cause several environmental problems. For example, increasing population of the urban centres uses enormous amount of water for various purposes. The used waste water like sewage water, if untreated, pollutes the streams and lakes because the urban effluents are allowed to be drained into them. Urban centres when combined with industrial sectors become more hazardous from the standpoint of environmental problems and pollution. Huge quantity of aerosols and gases is emitted from Chimneys of factories and vehicles which form "Dust Domes" over the cities. These Dust Domes cause 'Pollution Domes' over the cities. The urban and industrial growth has resulted into rapid rate of deterioration of the quality of air because of heavy pollution of air through gases and aerosols emitted from the vehicles, factories and house-hold appliances. About 60 per cent, of the pollution of Indian capital city of Delhi is contributed by vehicles, Calcutta and Bombay metropolitan areas have also reached high level of air pollution.
- vi. **Poverty:** It is true that poor cause damage to environment. Due to poverty the people exploit excessively the natural resources of the country for meeting their basic needs (food, fuel, shelter, employment fodder for their cattle).

vii. Coal burnt Thermal Power: Plants Power Plants either in public or private sector mainly use coal for generation of electricity. About 62% of the coal produced in our country is utilized for generation of electricity which accounts of 65% of power generation. This process results in the accumulation of various by-products such as bottom ash, boiler slag and fly ash. Fly ash alone amounts to more than 70% of the total quantity. Disposal of this huge amount of fly ash is a difficult and sensitive task. Though this material can be used in manufacture of cement, brick and also used as soil conditioner but these activities have not gained much popularity due to economical and social consideration. Even if the fly ash is utilized for the above mentioned activities, it will not be possible to utilize even 30% to 40% of the ash produced. Thus there is a need to store the ash produced in such a way as to have minimum damage to air, water and soil bodies. A super thermal power plant built on about 800 acres of land normally requires 1200 acres for ash disposal. On the basis of the ash production trends the area requirement for dumping of the ash is around 40000 hectares. Power plants are preferably placed away from the human settlements and moreover on waste lands, but with course of time some of the cultivable area is also covered for ash mount site. Presence of ash particularly in the atmosphere is of major concern to the people living close to the plant site. This is particularly severe in summers due to prevailing high wind speeds. The finer fractions of fly ash are potentially harmful as they get deposited in lungs/pulmonary tissues of respiratory track when inhaled.

In this section, you have studied kinds of pollution and factors of environmental pollution and main causes of environmental pollution. Now, answer the question given in check your progress 1.

Check Your Progress 1

Note: a) Answer the following questions in about 50 words.
b) Check your answer with possible answers given at the end of the unit.

1. What are the kinds of environmental pollution? Explain briefly?

2. Briefly explain any two causes of environmental pollution?

4.4 ENVIRONMENTAL POLLUTION AND HEALTH HAZARDS

i. Air pollution

Air pollution is particularly a health problems in rural areas. Millions of

poor people in urban areas - also suffer from its effects, some estimates suggest that worldwide urban indoor air pollution kills about 600,000 people annually. Air pollution is a major health problem because worldwide almost 3 billion people rely on biomass fuels which are mostly wood, charcoal, and animal dung for household cooking and heating. These fuels do not burn cleanly. They emit large amounts of smoke, often directly inside dwelling houses without adequate ventilation. While rural areas may lack access to modern stoves, or clean fuels, the urban poor often cannot afford cleaner fuels such as kerosene, natural gas or electricity. They have no choice but to use biomass fuels. Women and children suffer most from indoor air pollution because they spend many hours each day in their homes, where often the air is polluted. For example, a study in Accra, Ghana, found that women faced particularly high level of exposure to chemical pollutants, especially if they burned wood and charcoal for cooking. In the urban environment infants and young children are often exposed because they are usually carried on their mothers' back or kept close to their mothers throughout the day.

Air pollution is a problem for all of us. However, some groups of people are especially sensitive to common air pollutants such as particulates and ground-level ozone. Sensitive populations include children, older adults, people who are active outdoors, and people with heart or lung diseases, or suffering from asthma.

ii. Water Pollution

Pollution of water refers to an impairment of water quality that interferes with the use of water, sewage, industrial wastes and agricultural. Chemical such as fertilizers and pesticides are the main causes of water pollution in developing nation; more than 95% of urban sewage is discharged untreated into rivers and bays, creating array or human health hazard.

According to (W.H.O. 1997) two thirds of urban population in developing countries does not have adequate sanitation in that they lack flush toilet sanitary latrine, or a pit that can be covered over. In addition, worldwide, about 2.3 billion people suffer from disease that are linked to water problems. Water related diseases kills millions of people each year preventing millions more from leading healthy lives and undermined developmental efforts. Water related diseases include diarrhea, schistosomiasis, trachoma, ascariasis, trichuriasis and hookworm disease. Diarrhea diseases are the major water borne malady, responsible for 90% of the health problems related to water supply and sanitation. An estimated 4 billion cases of diarrhea disease occur every year causing 3 million to 4 million deaths, mostly among children. Other diseases such as cholera can be endemic when there is poor food - hygiene, lack of sanitation or unsafe drinking water. The effects of water pollution are varied. They include poisonous drinking water, poisonous food animals (due to these organisms having bio accumulated toxins from the environment over their life spans), unbalanced river and lake ecosystems that can no longer support full biological diversity, deforestation from acid rain, and many other effects. These effects are, of course, specific to the various contaminants. Waterborne diseases caused by polluted drinking water:

- Typhoid
- Amoebiasis
- Giardiasis
- Ascariasis
- Hookworm Waterborne

Diseases caused by polluted beach water:

- Rashes, ear ache, pink eye
- Respiratory infections
- Hepatitis, encephalitis, gastroenteritis, diarrhea, vomiting, and stomach aches.

Conditions related to water polluted by chemicals (such as pesticides, hydrocarbons, persistent organic pollutants, heavy metals etc):

- Cancer, incl. prostate cancer and non-Hodgkin's lymphoma
- Hormonal problems that can disrupt reproductive and developmental processes
- Damage to the nervous system
- Liver and kidney damage
- Damage to the DNA
- Exposure to mercury (heavy metal)

iii. Noise pollution

Noise is a prominent feature of the environment including noise from transport, industry. Exposure to transport noise disturbs sleep in the laboratory, but not generally in field studies where adaptation occurs. Noise interferes in complex task performance, modifies social behavior and causes annoyance. Studies of occupational and environmental noise exposure suggest an association with hypertension, whereas community studies show only weak relationships between noise and cardiovascular disease. Aircraft and road traffic noise exposure are associated with psychological symptoms but not with clinically defined psychiatric disorder. In both industrial studies and community studies, noise exposure is related to raised catecholamine secretion. In children, chronic aircraft noise exposure impairs reading comprehension and long-term memory and may be associated with raised blood pressure. Further research is needed examining coping strategies and the possible health consequences of adaptation to noise.

There is no doubt that the noise affects human health adversely. The noise may result in loss of hearing, stress, high-blood pressure, loss of sleep, distraction affecting productivity, and a general reduction in the quality of life. The effects of noise are difficult to quantify because tolerance levels among different populace and types of noise vary considerably. There is a large amount of scientific literature assessing the effects of noise on human beings. Indiscriminate use of horn by the vehicles and wide spread use of loudspeakers in social and religious ceremonies caused several health hazards to the urban inhabitants. It may cause deafness, nervous breakdown, mental disorder, heart troubles, high blood pressure, dizziness and insomnia

. Exposure to noise pollution exceeding 75decibels for more than eight hours daily for a long period of time can cause loss of hearing. The hazards increase with the intensity of the noise and the period of exposure. The sound produced by a bursting cracker, exceeding 150dB, can cause a ringing sensation called ‘tinnitus’ and can impair hearing permanently. In general about 1 percent of the population suffers from noise-induced pollution. The noise level produced by household equipment and appliances sometimes reaches up to 97 dB which is more than double the acceptable noise level. This excessive noise could carry several ill-effects viz. annoyance, speech interference, sleep disturbance, mental stress, headache, and lack of concentration. The workers exposed to high noise levels have a higher incidence of circulatory problems, cardiac diseases, hypertension, peptic ulcers, and neuro sensory and motor impairment. The adverse effects of noise have not even spare the birds (Robins, sparrows, wrens and blackbirds). Those living near busy roads could not hear each other and thus unable to contact for propagation . Noise pollution is at its worst in densely populated areas. Unwanted sound, or noise, such as that produced by air planes, traffic or industrial machinery, or radio repairing shops is considered a form of pollution. It can cause hearing loss, stress, high blood pressure, sleep loss, distraction and low productivity.

iv. Soil Pollution

Soil pollution is the reduction in the productivity of soil due to the presence of soil pollutants. Soil pollutants have an adverse effect on the physical chemical and biological properties of the soil and reduce its productivity. Pesticides, fertilizers, organic manure, chemicals, radioactive wastes, discarded food, clothes, leather goods, plastics, paper, bottles, tins-cans and carcasses- all contribute towards causing soil pollution. Chemicals like iron lead mercury, copper, zinc, cadmium, aluminium, cyanides, acids and alkalies etc. are present in industrial wastes and reach the soil either directly with water or indirectly through air. (e.g. through acid rain). The improper and continuous use of herbicides, pesticides and fungicides to protect the crops from pests, fungi etc. alter the basic composition of the soils and make the soil toxic for plant growth. Organic insecticides like DDT, aldrin, benzene hex chloride etc. are used against soil borne pests. They accumulate in the soil as they degrade very slowly by soil and water bacteria. Consequently, they have a very deleterious effect on the plant growth stunting their growth and reducing the yield and size of fruit. Their degradation products may be absorbed by the plants from where they reach the animals and man through the food chains.

4.5 PREVENTION OF ENVIRONMENTAL POLLUTION

Some of the ways by which you can prevent environmental pollution are given below:

Environmental Pollution can be controlled by proper waste management and developing green chemistry. Instead of conventional fuels and energy systems, non-conventional fuels and non-conventional energy systems must be put into practice, this will cause less pollution and also by the following-

1. The growth of the population must be controlled.
2. Forests should be grown. Everybody must plant a tree and must protect it.
3. Every citizen should feel the social responsibility of protecting and keeping the environment clean and green.
4. Using public transports.
5. Turn off the lights when not in use.
6. Recycle and Reuse. .
7. No to plastic bags.
8. Reduction of forest fires and smoking..
9. Use of fans instead of Air Conditioner.
10. Use filters for chimneys.

In this section, you have read about environmental pollution and health hazards and prevention of environmental pollution. Now, answer the question given in check your progress 2.

Check Your Progress 2

Note: a) Answer the following questions in about 50 words.

b) Check your answer with possible answers given at the end of the unit.

1. Briefly explain the health hazards of water pollution?

2. What are the causes of soil pollution ?Explain briefly?

4.6 LET US SUM UP

Environmental Pollution is the effect caused by undesirable changes in our surroundings that have harmful impacts on plants, animals, and human beings.

4.7 REFERENCES AND SELECTED READINGS

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4.8 CHECK YOUR PROGRESS –POSSIBLE ANSWERS

Check Your Progress 1

1. What are the kinds of environmental pollution? Explain briefly?

Ans. Kinds of environmental pollution may broadly be classified into:

i. Natural pollution

ii. Man-made pollution

(i) Natural Pollution: Environment is polluted often by natural phenomenon, such as earthquakes, floods, drought, cyclones, etc.

(ii) Man-made Pollution: is pollution which takes place because of human activities.

2. Briefly explain any two causes of environmental pollution?

Ans. (i) Poverty: is true that poor cause damage to environment. Due to poverty the people exploit excessively the natural resources of the country for meeting their basic needs (food, fuel, shelter, employment fodder for their cattle).

(ii) Industrial Development: Rapid rate of industrialization resulted into rapid rate of exploitation of natural resources and increased industrial output.

Check Your Progress 2

1. Briefly explain the health hazards of water pollution?

Ans. Water related diseases kills millions of people each year preventing millions more from leading healthy lives and undermined developmental efforts . Water related diseases include diarrhea, schistosomiasis, trachoma, ascariasis, trichuriasis and hookworm disease.

2. What are the causes of soil pollution ?Explain briefly?

Ans. Pesticides, fertilizers, organic manure, chemicals, radioactive wastes, discarded food, clothes, leather goods, plastics, paper, bottles, tins-cans and carcasses- all contribute towards causing soil pollution.