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## ENVIRONMENTAL POLLUTION CAUSES AND CONSEQUENCES: A STUDY

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### *ABSTRACT*

*Man is causing all round damage to atmosphere, water, land, to the various elements of environment and to the ecosystem itself. There is so much man-made pollution and environmental degradation that the nightmare ahead is enough jittery to shake us all. Taking a synoptic view of the general scenario a few trends are underway. Our atmosphere on global as well as regional scale is heavily polluted. The protective ozone shield in the heavily populated latitudes of the northern hemisphere is thinning twice fast as scientists thought a few years ago. The buildup of green house gases will lead to significant changes in the weather patterns in the near future leading to global warming. The destruction of ozone layer and the further warming of the earth surface threaten catastrophic consequences such as eruption of cancerous and tropical diseases, disruption of oceans food chain, rising of sea levels, submersion of many islands, melting of small land-based glaciers, flooding in many low lying coastal areas and harvest loss etc.*

### INTRODUCTION

The concept of environment is as old as the concept of the 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.

### ENVIRONMENTAL POLLUTION

Before understanding what “Environmental Pollution” is it is equally necessary to-know what “pollution” is.

## DEFINITION OF POLLUTION

The Royal Commission on Environmental Pollution in U.K. in its third report gave the following definition to the term "Pollution", namely:

The introduction by man into the environment of substances or energy liable to cause hazards to human health, harm to living resources and ecological systems, damage to structure or amenity or interference with legitimate uses of the environment".

According to Section 1(3) of the U.K. Environment Protection Act, 1990, the term 'Pollution' means:

The release (into any environmental medium) from any process of substances which are capable of causing harm to man or any other living organisms supported by the environment.

Pollution occurs when there is the potential for harm. Harm of man is not confined to physical injury but encompasses offence caused to any of his senses or harm to his property, therefore smells and noise which I may not cause injury can constitute pollution. Harm to living organisms can include harm to their health or interference with the ecological systems of which they form a part".

## KINDS OF POLLUTION

Environmental pollution may broadly be classified into: (1) Natural pollution; (2) Man-made pollution.

**1. Natural Pollution:** Environment is polluted often by natural phenomenon, such as earthquakes, floods, drought, cyclones, etc.

**2. Man-made Pollution:** Human activities.

The environmental pollution can also be classified further as, Air pollution, water pollution, land pollution, food pollution, noise pollution and radio-active pollution, etc.

## 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 abiotic 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, 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 the indirect 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.

## **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. No single cause can be considered as the root cause of

environmental impairment. However, the following causes could be pointed out as the generally underlying factors though each of these too could be operating simultaneously and their balance may vary from place to place and through time.

### **1. 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.

### **2. Increased General Affluence and Economic Growth**

The affluence (i.e. material aspects of per capita consumption of goods and resources) is an important factor in man-resource- environment relationship. It is the increasing per capita demand of rich which is absorbing the growth in output of goods and services in the developed and developing countries and cause misuse or overuse and pollution of resources, for the affluence unmatched to the necessary resource consumption and not motivated by human requirements produce tendency to waste matter and energy. Surprisingly, affluence factor though, having a great impact on environment, is seldom talked about. On the other hand, poor and the poverty often get blamed for the destruction of environment. The notion that poverty or the poor destroy the environment most is but partially true.

### **3. 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.

#### 4. 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.

It is a matter of serious concern that the present economic man has forgotten the environment and ecological significance of natural vegetations mainly forests and grasslands and has destroyed the forests so rapidly and alarmingly that the forest areas at global, regional and local levels have so markedly decreased that several serious environmental problems such as accelerated rate of soil loss through rain splash, sheet wash, rill and gully erosion, increase in the frequency and dimension of floods, greater, incidence of drought due to decrease in precipitation etc. have plagued the modern human society. The major causes of deforestation at global and regional levels are conversion of forest land into agricultural land, shifting cultivation, transformation of forests into pastures, overgrazing, forest fires, lumbering, multipurpose river projects etc.

Deforestation gives birth to several problems encompassing environmental degradation through accelerated rate of soil erosion, increase in the sediment load of the rivers, siltation or 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 draughts, 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.

## 5. Agricultural Development

Agricultural development means expansion of agricultural land increase in agricultural productivity and net agricultural production. It is due to development of modern scientific techniques, advanced technologies, increased production and use of chemical fertilizers, expansion in irrigational facilities, development of high-yielding varieties of seeds, etc. This has solved the problem of growing demand of food due to ever increasing world population on the one hand; it has also created or is creating hazardous environmental problems of serious concern on the other hand. Thus modern economic and technological man is at the cross road of dangers in all directions.

The agricultural development degrades the environment in a variety of ways, *e.g.* (i) through the application of chemical fertilizers and pesticides and insecticides, (ii) through the increase in irrigational facilities and amount of irrigation, (iii) by making changes in biological communities etc.

Conversion of forests land into agricultural farms on sloppy ground accelerates rate of soil erosion. Increased in agricultural land at the cost of destruction of forest and consequent soil erosion, substantial increase in the productivity of land through the practice of intensive cultivation, increased use of machines and modern scientific techniques, application of chemical fertilities, pesticides, insecticides and herbicides, increase in the frequency and area of watering of agricultural fields, etc. All these processes and measures of increased agricultural development cause several serious environmental problems. It appears that the root cause of all these environmental problems arising out of agricultural development is the increase of human population at alarming rate. So the foremost step to be taken is to stop population growth because if population continues to grow agricultural development has to be maintained.

## 6. 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.

Increasing industrial expansion is responsible for the release of enormous quantities of pollutants (e.g.) ions of chlorine, sulphate, bicarbonate, nitrate, sodium, magnesium, phosphate, through sewage effluents into the rivers and the lakes and thus for contaminating the water. Release of several gases, smokes, ashes and other aerosols from the chimneys of the factories adversely affects the environment in a number of ways. The burning of hydrocarbon fuels (coal and petroleum) has increased the concentration of  $\text{CO}_2$  in the atmosphere and thus has changed the natural gaseous composition of the atmosphere. The increase in the construction of  $\text{CO}_2$  content of the atmosphere may change global radiation and heat balance by increasing the level of sensible heat in the atmosphere because  $\text{CO}_2$  intensifies the greenhouse effects of the atmosphere as  $\text{CO}_2$  allows the solar radiation to pass through the atmosphere and reach the earth's surface but stops the outgoing long wave terrestrial radiation from escaping to the space release of chlorofluoro carbon in the atmosphere causes depletion of ozone layer. Depletion in ozone layer means less absorption of ultraviolet solar rays and thus substantial increase in the



temperature at the earth surface. Thus changed in the global radiation and heat balance caused due to increase in the concentration of carbon dioxide in the atmosphere and depletion of ozone layer may cause changes in weather and climatic conditions at global and regional levels may cause severe damages to plant and animal lives and thus may cause ecological imbalance. It may cause dangerous diseases like skin cancer etc.

Release of toxic gases through advertent and inadvertent actions of man causes environmental hazards which destroy all types of life forms in the affected areas. The Bhopal Gas Tragedy (December 3-4, 1984, India) is an example of disastrous effects of modern industrialization. Acid rains, urban smogs, nuclear holocaust, etc., are the other forms of environment hazards emanating from industrialization.

## 7. 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, sewages 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. According to the survey report of the National Environmental Research Institute, Nagpur (India) the level of air pollution in Delhi, Calcutta,

Bombay, Madras, Ahmedabad, Cochin, Hyderabad, Kanpur, Nagpur etc. has gone up. Besides industrial wastes from industrial cities, huge quantity of urban solid wastes also creates environmental problems. The quantity of urban solid wastes is rapidly increasing with urban expansion and growth in urban population.

## 8. Unplanned Urbanization

The skewed urban development has deteriorated the environment visibly and considerably in both the urban and rural areas. The urban areas suffer from their own plight, squatter settlements, lack of sanitation and water supply, overcrowding, congestion and pollution. The cities in India are facing environmental problems like lack of sanitation, chronic shortage of traffic congestion etc. Moreover, the domestic and industrial waste disposal in the urban areas is very serious. Most of the cities are lacking sewer systems. For example studies by the Central Board for the prevention and control of water pollution have shown that the discharge of community wastage and industrial effluents is the major cause of water pollution. At present 56% of Class-I cities and 87% of Class II towns do not possess sewerage facilities. We therefore need a well controlled and well managed process of urbanisation in order to curb rural urban migration and other related problems.

## 9. 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.<sup>14</sup>

## 10. 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). Poverty and need are indeed the greatest polluters as told by late Mrs. Indira Gandhi in her address to the Stockholm Conference. Hence necessary steps should be taken to bring the poor people above the poverty line.

## CONCLUSION

The causes for environmental problems are many. The multiplicity of causes makes it difficult to clearly delineate the causes and consequences of environmental degradation in terms of simple one to one relationship. The causes and effects are often interwoven in complex webs of social, technological, environmental and political factors. However, some of the very common causes of environmental degradation which can be clearly pointed out are the population growth, the economic growth associated with the affluence factor and change of technology. Population is an important resource for development, yet it is a major cause of environmental degradation when it exceeds the threshold limits of the support systems. The overriding impact of adverse demographic pressure ultimately falls on our resources and ecosystems. Combined with it the conditions of poverty and underdevelopment themselves create a situation where the people are forced to live in squalor and further degrade their environment. The process of development itself also leads to damage of the environment, if not properly managed. Associated with the rapid economic growth, the extravagant affluence consume far more resources and put far greater pressure on natural resources. The change of technology causes planned obsolescence causing the generation of more and more wastes which in turn prove ecologically harmful. Short-term interests of private profit maximization, further, hamper the process of replacement of obsolete technologies by the ecologically benign technologies.

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