

AIR POLLUTION AND ENVIRONMENTAL EDUCATION

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DEFINITION

Air pollution may be defined as "The presence in the outdoor atmosphere of one or more contaminants such as dust, fumes, gas, mist, odor, smoke or vapor in quantities of characteristics and of duration, such as to be injurious to human, plant or animal life or to property of which unreasonably interferes with the comfortable enjoyment of life and property. (*Encyclopedia 1995*)".

What makes air quality particularly vulnerable is that air, unlike water or other wastes, can not be reprocessed practically at some central location and subsequently distributed for use. When emissions and unfavourable climate conditions interact to create undesirable air quality, the atmospheric environment may begin to exert adverse effect on man and his surroundings. Air may be replenished through photosynthetic process and cleansed through precipitation but these natural processes are limited in their effectiveness. Hence, great care must be exercised when assessing and maintaining the quality of air resources.

The effect of air pollutants is overall i.e. aesthetics, economic viability, safety, personal comfort and health. The aesthetic effects includes loss of clear atmosphere

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due to presence of particulates or photo chemical smokes and objectionable odors

primarily associated with gases such as ammonia and sulphur containing mercaptants. Economic losses attributable to air pollution includes the soiling effect of particulates, damage on vegetation and crops resulting from exposure of excessive concentration of gases like sulphur dioxide (SO₂), nitrogen oxides (NO₂, and ozone (O₃), resulting to damage livestock's associated with exposure of fluorine and deterioration of exposed materials by a variety of air pollutants. Materials deterioration includes corrosion of metals by sulphur dioxide, weathering of stone by acidic mists, darkening of lead-based white paint by hydrogen sulphide, accelerated cracking of rubber by ozone and deterioration of fabrics as nylon by sulphur dioxide. carbon monoxide transports oxygen and even may be fatal.

Hydrogen sulphide causes nausea and headache. Sulphur dioxide is responsible for chest and respiratory diseases. Hydrocarbons directly or indirectly damage agricultural crops, animals, and human beings. Personal discomforts are associated with eye irritations from photochemical oxidants and irritations concerned with respiratory discomforts. Actual health hazards may be resulted from air pollution, with the short term effects of carbon monoxide in urban area with heavy traffic mobility. There are some evidences regarding acute illness and even to death. The national costs of pollution damages by source and effects are analysed separately (Table 1 and 2).

Table : National costs (in billion) of pollution damage by pollutants (1994)

Effect (Loss category)	So ₂	Particulate	Oxidant	No ₂	Total
Residential property	2.808	2.392	-	-	5.200
Materials	2.202	0.691	1.127	0.732	4.752
Health	3.272	2.788	-	-	6.060
Vegetation	0.013	0.007	0.060	0.040	0.120
Total	8.295	5.878	1.187	0.772	16.132

Source : *Environment Journal, National Planning comission (N PC) Singhdurbar, 1995.*

Air quality is intimately connected to population growth, expansion of industry and technology and urbanization. The total national costs of pollution damages by pollutants is 16.132 billions in the year 1994.

Table 2 : National costs (in billion) of pollution damage by source and effects in 1994.

<i>Effect</i>	<i>Fuel combustion</i>	<i>Transportation</i>	<i>Industrial processes</i>	<i>Solid waste</i>	<i>Miscellaneous</i>	<i>Total</i>
Residential Property	2.802	0.156	1.248	0.104	0.884	5.200
Material	1.853	1.093	0.808	0.143	0.855	4.752
Health	3.281	0.197	1.458	0.199	1.005	6.060
Vegetation	0.047	0.028	0.020	0.004	0.021	0.120
Total	7.983	1.474	3.534	0.370	2.765	16.132

Source : Environment Journal, NPC, Singhdurbar, 1995.

Various causes of the genesis and oxides of these pollutants have been identified and controlling mechanisms have been outlined. Certain modifications in the engine design and operating variables are suggested.

The three types of automotive vehicles being used in our country are :

- (a) Passenger cars powered by four stroke gasoline engines
- (b) Motor cycles, scooters and auto rickshaws powered mostly by small two stroke gasoline engines and
- (c) Large buses and trucks powered mostly by four stroke diesel engine. Emissions from gasoline powered vehicles are generally classified as :
 - (i) Exhaust emissions
 - (ii) Crank-case emission and
 - (iii) Evaporative emissions.

The amount of pollutants that an automobiles emits depends on the number of factors including design and operation of the hydro carbon emitted by a car no controls, the exhaust gases account for roughly 65% evaporation from the fuel tank and carburetor for roughly 15% and blow by or crankcase emission for about 20% carbon monoxide, nitrogen oxide and lead compounds are emitted almost exclusively in the exhaust gases (Table 3).

Table 3: Emission in millions of metric tons of major air pollutants (1992).

Source	CO	P.M.	Sox	HC	Nox
Motor vehicles (gasoline)	53.5	0.5	0.2	13.8	6.0
Motor vehicles (diesel)	0.2	0.3	0.1	0.4	0.5
Aircraft	2.4	0.0	0.0	0.3	0.0
Rail roads & other	20.0	0.4	0.5	0.6	0.8
Total transportation	51.1	1.1	0.7	15.1	7.3
Coal	0.7	7.4	18.3	0.2	3.6
Fuel oil	0.1	0.3	3.9	0.1	0.9
Natural gas	0.0	0.2	0.0	0.0	4.1
Wood	0.9	0.2	0.0	0.4	0.2
Total fuel combustion	1.7	8.1	22.2	0.6	9.1
Industrial process	8.8	6.8	6.6	4.2	0.2
Solid waste disposal	7.1	1.0	0.1	1.5	0.5
Forest fires	6.5	6.1	0.0	2.0	1.1
Agriculture burning	7.5	2.2	0.0	1.5	0.3
Coal refuse burning	1.1	0.4	0.5	0.2	0.2
Structural fire	0.2	0.1	0.0	0.1	0.0
Total miscellaneous	15.3	8.7	0.5	7.7	18.7
Total	91.0	25.7	30.2	29.1	18.7

Source : *Environment Journal, NPC, Singhdurbar, 1995.*

HEALTH EFFECT

An average man breathes 22,000 times a day and takes in 16 kg of air each day. A man can live weeks without food and five days without water but not possible for five minutes without air. The polluted air causes the health various problems as eye irritation, nose and throat irritation, irritation of the respiratory tract, gases like hydrogen sulphide, ammonia and mercaptants cause odour nuisance even at low concentrations. Increase in mortality rate and morbidity rate. A variety of particulate particularly pollens, initiate asthmatic attacks, chronic pulmonary diseases like bronchitis and asthma are aggravated by a high concentration of SO₂, NO₂, particulate matter and photo chemical smog, carbon monoxide combine with hemoglobin in the blood and consequently increases stress on those suffering from cardiovascular and pulmonary diseases, hydrogen fluoride causes diseases of brown and mottling of teeth, carcinogenic agents causes. Cancer whereas dust particles causes respiratory diseases, certain heavy metals like lead may enter the body through the lungs and cause poisoning.

SOME CONTROLLING MECHANISMS OF AIR POLLUTION

- Keep the balance in the composition of air, more trees should be planted and deforestation should be kept in check.
- Over crowding of parks and houses should be well ventilated
- Factories and industries should be situated away from the populated areas
- The chimneys to release gas should be very high
- Buses and automobiles which produce heavy & excessive smoke should be withdrawn from the roads and legal provisions should be forwarded for effective control.
- Electric bulb and fluorescent tubes should be used as source of light instead of kerosene lamps.

- Use of fossil fuel, firewood and coke should be minimized, smokeless, fuels such as cooking gas should be encouraged.
- The government should frame laws pertaining to control and prevention of air pollution and enforce them strictly.

ENVIRONMENTAL EDUCATION

The definition of environmental education is very comprehensive and deep. the environmental education is a medium and processes of education and covers man's relationship with his natural as well as social and manmade environment and also incorporates the relationship of population, industrialization, pollution, resource allocation, depletion, conservation, transportation, technology, energy, urban and rural planning to the total biosphere thus, environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelated among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behavior about issues concerning environmental quality. The environmental education should:

- Consider the environment in its totality (economic, political, technological, cultural, historical, moral, aesthetic).
- Be a continuous, life long processes, beginning at the pre-school level and continuing through all formal and non-formal stage.
- Help learners discovers the symptoms and real causes of environmental problems
- Emphasize the complexity of environmental problems and thus needs to develop critical thinking and problem solving skills.
- Utilize diverse learning environments and broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.
- Consideration of environmental aspects in different plans.

- Focus on current and potential environmental situation into the account of historical perspectives.
- Promote the value and necessity of local ,national and international co-operation in the prevention and solution of environmental problems.
- Be inter-disciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective.

OBJECTIVE OF ENVIRONMENTAL EDUCATION

Indeed Environmental education is very important for all of us. It helps to maintain life and health in self preservation, preservation of human race. It also helps to understand different food chains and ecological balance in nature and to understand and appreciate how environment is used for making a living and for promoting material culture. Side by side it helps to appreciate different social institutions and regulate relationship in primary groups like family and secondary and tertiary group like place of works. It stimulates concern for changing environment in a systematic manner for the maximum long-run as well as the immediate welfare of mankind. It direct attention towards problems of population explosion. Exhaustion of natural resources and the pollution of environment and sheds light on the methods of solving these problems. May other benefits of teaching environmental education can also be listed as for example, the contentment and happiness one gets by looking at different gifts of nature or some other objects of environment. These objectives of environmental education can be subsumed in three domains discussed by Bloom in his book. "Taxonomy of Educational Objectives" - Cognitive, Affective & Psychomotor. The objectives in the cognitive domain are:

- Help to acquire knowledge of the immediate environment.
- Help to understand the biotic and a biotic environment.
- Help to understand the effect of unchecked population growth or unplanned resource utilization on tomorrow's' world.

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- Examine to trends in the growth of population and interpret them for the socio-economic development of the country.
- Help to diagnose the cause of social tensions and to suggest methods for avoiding them.
- Evaluate to the utilization of physical and human resources and suggest remedial measures
- Help to diagnose the different causes of environmental pollution and to suggest remedial measures.

Besides the forgoing objectives, the following skills and abilities also fall in the cognitive domain.

- Develop observational skills and notice details usually not seen by an untrained eye.
- Develop skills required for making discrimination in form, shape, sound, touch habits and habitats.
- Develop ability to draw unbiased inferences and conclusions.
- Develop ability to make meaningful suggestions.

Following are the listed affective objective of environmental education.

- Acquiring interest in the flora and fauna of the near and also distant environment.
- Evincing interest in the people and problems of community and society.
- Tolerance towards different castes, races, religions and culture.
- To appreciate the gift of nature.
- Love to the neighbors and value mankind as a whole.
- Value equality, liberty, fraternity, truth and justice.
- Respect to the national boundaries of all countries.

- Value of the cleanliness and purity of our environment.

Environmental education also fulfills some objective of the psychomotor domain.

- participating in afforestation programs.
- Participate in programs aimed at minimizing air, water, and noise pollution.
- Participate in programs aimed at preventing soil erosion..
- Participate in programs aimed at eliminating food contamination and adulteration.
- Participate in cleaning neighborhood.
- Participate in urban and rural planning and execution programs, such as installation of *gobar* gas plant, solar heaters etc.

Other goals are to foster a clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas: To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment. To create new patterns of behaviour of individuals, groups and society as a whole towards the environment. The objective of environmental education are categorized as:

- Awareness:** To help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems.
- Knowledge:** To help social groups and individuals gain a variety of experiences and acquire a basic understanding of the environment and its associated problems.
- Attitudes:** To help social groups and individuals acquires to set a value and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection.

- d) **Skills:** To help social group and individuals acquire the skills for identifying and solving environmental problems.
- e) **Participation:** To provide social groups and individuals with and opportunity to be actively involved at all levels in working towards the resolution of environmental problems.

REFERENCES

1. Das, N.G. 1995, International Encyclopedia of Ecology and Environment, vol ,23.
2. National planing comission, 1995, A Journal of Enviroment, NPC, Singhdurbar, kathmandu.