

ENVIRONMENTAL POLLUTION
AND MANAGEMENT

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Preface

There are thirty three articles in the book on environmental disciplines, written by eminent experts of the respective fields. T.N. Khoshoo, a renowned environmentalist of India is the major contributor.

In the First Chapter on Environmental Concerns, Uma Melkania and N.P. Melkania discuss vividly about the sanitation aspects and feel that the management of wastes-gas, liquid and solid need urgently to be tackled at the State and the National level.

In the Chapter on Agriculture and Environment, again Melkantias discuss the ecological imbalance created in our agro systems right from the traditional to the modern farming. Also the other concerned topics like agro chemicals, erosion in a genetic diversity, forestry pesticides, irrigation have been nicely covered up. The authors propose to initiate regional location specific action oriented integrated researches with a priority to the forestry need.

Environmental Pollution by G.S. Bajwa critically examines the water and air pollution, their sources and discusses about the legal frame work for them. It is suggested to set up separate courts and tribunals exclusively to check the pollution. Also is advocated to go for intensive researches.

K.K. Puri on Environmental policies and programmes, discusses major urbanisation aspects in Punjab. In Jalandhar City there is no area which has all basic services and amenities like good roads, water supply, sewerage, street lighting, etc. At other places too like Jalianwala Bagh and Golden temple Amritsar, the conditions are identical. There is pollution due to—industries, crowded vehicles, population and atomic and thermo nuclear explosions. As a result of this all certain Policies and Programmes are earnestly required to be chalked

out for improvement of the environment. Public participation too is essential to make the programmes more successful.

In the Chapter on Water Quality Management in India, T.N. Khoshoo authentically discusses water pollution due to industrial sources and due to human settlements. He studies deeply about different types of water: Surface Water, Ganges Water, Ground Water, Coastal Water and Rural Water. He further discusses the management issues and specific pollution control measures and works out strategy for futurology on this aspect.

Kaveri basin eco-system is discussed particularly with respect to the industrial discharge, afforestation programmes and eco-system developments. Effective water conservation is suggested ultimately.

Highly acidic spent wash thrown by the distilleries and breweries as wastes ranges between 40,000 to 60,000 mg/l of BOD which is a matter of great concern. Khoshoo advocates for generation of non-conventional energy and for treatment of wastes at the source itself.

Air Pollution and Water Pollution have been studied with respect to the Environment Pollution, national strategy and developments. Also it is suggested to take adequate measures like change in land use, safe disposal of wastes, Check of proximity of the project to national park or monument.

A system approach to environmental problems discusses factors that can promote sustainable developments like population stabilisation, integrated land use planning, water pollution control, conservation of biological diversity, slum improvement and environmental education. Also areas where system analysis has been applied in the country are discussed.

The fluorides form a natural part of our environment and in order to strike a balance the fluoride concentration in drinking water, food, soil and atmosphere need to be at an appropriate level. Among major sources of fluorides are—Air borne fluorides, water borne fluorides, Soil borne fluorides and fluoride toxicity in vegetation, animals and human beings. Sufficient researches are required for this.

The health factor depends much on the environment cleanliness. Several diseases and epidemics like Malaria are discussed in the Chapter. Also descriptions about WHO and such other bodies are also taken up.

The pest control, it is felt, is directly related to two pressing problems—escalating demand for food and agricultural commodities for our teeming millions and control of vectors of human diseases for better health. The employed persons are victims of its poisonous effects. The Bhopal Issue is taken up in the chapter for pest resistance. It is advocated to have some legal frame work like Insecticide Act, 1968. Mr. Khoshoo feels that the location of such chemical plants with respect to other areas have to be carefully seen in advance before the operation of the project as such.

In the Chapter on Environment Mutagenesis, it is said that the chemicals pervade all compartments of human environment. It is desired to evolve a strategy to counter the negative effects of development of Chemical Fertilizer, petroleum and other cognate industry so that living organisms including human beings may live without endangering their genetic heritage.

The role of diet, role of enzymes, implications for human health are important with respect to Genetic Toxicology. Proper testing, evaluation and researches are required for this.

Plants could be used as indicators of pollution. Plant Chromosomes indicate genetic hazards of environmental chemicals and pollutants. Lichens, Bryophytes, green belts, plant evolution and breeding and such other terms are discussed in the Chapter on Air Pollution and Plants.

T.N. Khoshoo on Organo Metallic Chemicals and Environment, feels, that methylated organo metallics have greater toxicity than inorganic compounds.

A team consisting of M.R. Garg and N.S. Tiwana discuss the legal frame work of the Air (Prevention and Control of Pollution) Act, 1981. They have also studied sources and emissions of a few air pollutants, effects of pollution, control of pollution and suggest due remedies.

D.R. Veena freely discusses Integrated Rural Energy : Issues, approaches and methodologies. The article suggests an integrated planning for energy and development activities at State and Centre level. The various topics discussed are—domestic lighting, domestic cooking, water heating, cattle feed preparation, agricultural irrigation, threshing, industrial and artisanal activities, transportation, basic amenities and facilities, community centres and primary health centres.

The Chapter on Plant responses to Ozone and Sulphur-dioxide discusses various Chemical effects in nature of various pollutant gases. It is suggested to make studies of seed germination, plant form and function.

The taxonomic composition and variations in the density of soil litter Heteroptera from tropical deciduous forest stand dominated by *Dalbergia Sissoo* Roxb are discussed in details by the experts Shobha Handa and L.K. Vats.

Small animals living in soil and litter play an important role in decomposition of organic matter and help significantly in releasing mineral nutrients trapped in litter and thus in improving soil fertility.

The article on *Alnus Nepalensis* D. Don by N.P Melkania is very informative. The Chapter provides information on distribution, botanical and ecological characteristics of *Alnus Nepalensis*—a non-leguminous actinorrhizal N-fixing tree of Himalayan region. It is suggested that the tree could also be given due priority in research and development programmes with relevance to eco-system development.

Conservation of Wild Life in ethical, aesthetic, scientific and economic way is suggested in one of the articles written by Yogendra N. Srivastava.

Noise Pollution, its sources and its effects on non-living things are studied and suggestions are given to form legal frame work to improve the environment.

A study of Chandigarh Water Pollution, sources like industries, are studied by expert R.K. Sapru. He calls out "The Environment (Protection Act, 1986)" and suggests remedies to control pollution.

Some observation on—High altitude central Himalayan soils are mentioned in one of the articles written by a team of experts, R.K. Pande and D.S. Rawat.

Sukhna Lake of Chandigarh once more revives the lungs of city, by only the peoples efforts, says S.S. Bhatti—Professor and head of the Architecture College, Chandigarh. It was full with silt earlier. Bhatti has himself given music to the song mentioned in his article on Sukhna Lake.

The main sources of Land Pollution in rural areas are the residue of pesticides and fertilizers, crops, dirty water etc. While in urban areas, industrial wastes, garbage, Cans, papers, bottles

and junk are dominant. About 90 per cent of solid waste in India finds its way to dumps and land fills.

A total of 87 taxa of phytoplankton were recorded from a stretch of river Jhelum. The water of Jhelum has considerably deteriorated during recent years as a result of untreated domestic effluents and sewage dumped into it causing changes in the quality as well as quantity of Plankton.

C. Mumtamayee on the carrying capacity of a human Habitat refers to the relationship between a population and the area it occupies which can be expressed mathematically, based on rate of growth of the population. However, based on Pielou's Concept, carrying capacity is defined as the saturation density.

The editor advocates strongly in favour of the public of Trans-Yamuna area of Delhi where people live under sub-human conditions without proper amenities and basic facilities, like—drinking water, electricity, parks, transportation and all. In 1988, Cholera broke out there which tolled away heavy lives. Again menace of floods haunted the area in August-September 1988. A new Master plan is suggested to be brought out earnestly for the area.

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India's Environmental Concern

UMA MELKANIA and N.P. MELKANIA*

Abstract

The burgeoning population of human and bovines, and rapid industrialization have resulted in massive exploitation of natural resources and pollution. In the present article we review the status of environmental pollution in Indian sub-continent. It could be concluded that the management of wastes—gas, liquid and solid need to be pursued at the national and State levels through legislation, adoption of appropriate technology and impact analysis on the environment. The concern for environmental protection from the release of wastes is now being felt at all levels. Suitable compromise through consensus need to be promoted for promoting development with least harmful impact on the environment and biota.

Introduction

Advances in science and technology have also a risk in lowering quality of the environment. Technology has brought about progress in many spheres of development but in the process, also contributed to pollution of water, air land and

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monuments. Further deterioration is the environment and thereby to the health and well-being of the community could be minimised, provided professionals involved in developmental activities recognise the need for safeguarding the environment.

India is in an advantageous position as it is in the beginning stages of industrial development. It should be possible to avoid the pitfalls faced by the developed countries and take preventive measures at the initial stages of development. Efforts should be made to control pollution and prevent environmental damage consistent with economic growth so that the concern for environment and economic growth could go together. In this communication we have tried to examine the state of environmental pollution in our country at national level.

Water Resources and Wastewater Management

India represents diverse climatic, topographical and hydrological features. The total annual precipitation over the entire country is estimated to be 400 million ha-m (4 billion m³) of water. Nag and Kathpalia (1975) estimated that of the total precipitation, about 59 per cent is lost by evaporation and transpiration, 12 per cent percolates into the ground and the remaining 1.15×10^{12} m³ flows in the river systems. Further, it is estimated that only about 1.05 billion m³ of water is utilizable consisting of 0.7 billion m³ of surface water and 0.35 billion m³ of ground water. There are 14 major river basins in India (Rao, 1975) having a total annual discharge of 1.406 billion m³ (85%). The medium rivers account for 0.112 billion m³ (7%) and minor and desert rivers account for 0.127 billion m³ (8%) water discharge. About 0.2×10^{12} m³ of water is estimated to be flowing into India from outside, and, thus, the total surface flow is estimated to be 1.8×10^{12} m³ (180 million ha-m).

Barring a few major rivers like Brahmaputra, Ganga, Yamuna, Indus, Godavari, Mahanadi, Krishna, Narmada and Kavery, the rest of them are seasonal. These rivers during monsoon are in floods inundating vast areas; whereas the flow dwindles during summer months when the demand for water is highest and pollution is acute. Inadequacy of water is being felt in the country with an adequate rainfall. The supply of adequate fresh water to an expanding population, industries

and agriculture has become increasingly difficult. It is essential to safeguard our water bodies from excessive pollution.

Water Consumption in Industry

Water requirements vary widely from the industry to another as well as in the various processes within an industry (Table 1.1). Sundaresan (1983) estimated that at the turn of the 21st century, the water requirements for industry may increase by six-fold and by the year 2025 may be 24 times the demand.

TABLE 1.1 : Water Requirements for Different Industries in India (Sundaresan 1983)

Industry	Volume of water used
Dairy	6-10 l/l of milk
Sugar	1.5-4.0 l/kg cane crushed, or 15-40 l/kg sugar
Distillery	20 l/l alcohol
Cotton textile	20-70 l/m cloth
Viscose rayon	1600 l/kg fiber
Pulp and paper	270-450 l/kg paper
Tannery	40-45 l/kg hide processed
Integrated steel mill	20-50 l/kg steel
Coke oven	
(i) High temperature carbonisation (coke and byproducts)	1.5 l/kg coal carbonised
(ii) Low temperature carbonisation (L.T.C.)	2.0 l/kg coal carbonised
Urea	6-8 l/kg urea

The current practices adopted for disposal of industrial waste-waters in India include discharge into public sewers, rivers or into sea through creeks and estuaries and on land with little or no treatment. This is evident from the fact that most of the regions with industrial activities have become the foci of pollution.

On the Hooghly estuary alone, there are nearly 159 industries of which 78 are jute mills, 12 textile mills, 7 tanneries, 5 formidable pulp and paper factories, 4 large distilleries and

53 miscellaneous industries. The baseline water quality survey studies of Hooghly estuary conducted by NEERI during 1972-74 revealed that of the total quantity of wastewater (6.7×10^5 m³/d) discharged into the estuary, industries contributed 4.4×10^5 m³/d with a BOD load of 52 tonnes per day, while domestic sewage account for 2.3×10^5 m³/d having a BOD load of 38 tonnes per day. A number of bathing ghats and six major water works intake points are located on both banks of the estuary throughout this stretch. The study also revealed that the bacteriological quality of Hooghly estuary in the bathing ghats was alarmingly poor.

The Ganga river at Kanpur received the domestic wastewater from 1.5 million people living in Kanpur (1971 census) along with the wastewaters from 45 tanneries, 10 textile mills, 3 woollen mills, 2 jute mills and a number of chemical and pharmaceutical industries. The large volumes of wastewater discharged contain a variety of objectionable and toxic organic and inorganic substances. If these waste-waters are not given desired degree of treatment or not recycled, the pollutants reach the water course and bring out a number of undesirable changes in the quality of receiving water, which ultimately render the water unsafe for aquatic life and domestic and industrial utility and for agriculture as well. Sugar industry along during 1978-79 discharged about 150 million m³ of waste-water with population load equivalent to the pollution contributed by 3,800 million people. This indicates that the daily discharges by sugar industry is almost equivalent to the BOD present in the sewage generated daily by Greater Bombay and Madras jointly.

An action plan, viz., "Ganga Action Plan" has been launched to clean the river Ganga at least till next Kumbha fair. It covers 27 cities along the river. So far and till date 153 schemes have been sanctioned for this purpose and 30 more are to be cleared shortly. Interception and diversion of sewage now flowing into the river, integrated sewage treatment plants with energy recovery, low cost sanitation and river front development are the major aspects of the programme. In Varanasi, under a multi-sectoral City Development Package, ghats are being renovated, sewers are being intercepted. In Kanpur, the sewer network and treatment plants at Jajmau are part of a