



Environmental Problems and Sustainable Development: With Special Reference to India

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Introduction*

Man has been continually changing the forms and modes of his interaction with the environment at an increasing rate. Natural processes and factors that depend on the structure and other characters of the earth and social processes and factors that depend on structure and characteristic of our society, have been closely interwoven. On one hand, population of the earth is growing rapidly while on the other hand, with the technological and scientific revolution developmental activities have been accelerated to such an extent that in certain areas they have become threat to the environment. The utilization of natural resources is growing at an alarming rate, causing great concern for their conservation.

Any country's environmental problems are related to the level of its economic development, the availability of natural resources and the lifestyle of its population. In India, rapid growth of population, poverty, urbanization, industrialization and several related factors are responsible for the rapid degradation of the environment. Environmental problems have become serious in many parts of the country, and hence cannot be ignored. The main environmental problems in India relate to air and water pollution particularly in metropolitan cities and industrial zones, degradation of common property resources which affect the poor adversely as they depends on them

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for their livelihood, threat to biodiversity and inadequate system of solid waste disposal and sanitation with consequent adverse impact on health, infant mortality and birth rate.

The degradation of the environment due to industrial and other wastes discharged into the atmosphere and hydrosphere has caused great concern. All these environmental problems associated with development have raised several questions regarding the type and nature of development and in turn to the concept of 'Sustainable Development'. In this background, the paper examines the various environmental problems of India. It also discusses some policy measures aimed at reducing environmental degradation and achieving sustainable development.

The paper has been divided into five sections. Section I deals with the concept of sustainable development. Section II gives some highlights on present state of the environment in India. Section III refers to environmental issues and sustainable development. Section IV analyses the strategies and policy measures aimed at reducing environmental degradation and achieving sustainable development. And, Section V provides some concluding observations.

I. Concept of Sustainable Development.

The term 'Sustainable Development' was used at the time of the Cocoyoc Declaration on Environment and Development in the early 1970s. Since then it has become the trademark of international organizations dedicated to achieve environmentally benign or beneficial development. The term has served to catalyze debate over the relationship between economic development and the natural resource utilisation. Definitions vary, but the most widely adopted one is contained in Our Common Future – the 1987 report of the proceedings of the World Commission on Environment and Development. It defines, "Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition is far from adequate – it begs the critical question of what constitutes an acceptable 'need' in the context of present global situation – but it does encapsulate the essential point – that we all have to learn to live within our planetary means. Various UN publications, in an effort to define strategy for sustainable living and development, refer to it as "improving the quality of human life while living within the carrying capacity of the supporting ecosystem".

The publication of US Global 2000 Report (1980) and other publications like Resourceful Earth (Simon and Kohn, 1984), The Global Possible

(Repetto, 1985), Our Common Future (World Commission on Environment and Development, 1987) have generated a general debate highlighting the consequences of overexploitation of resources and neglect of global 'common interest'. The various programmes of the UNO, especially the programmes of UNEP, have emphasized the need for sustainable development and also referred it as 'eco-development'.

Sustainable development became the major focus of yet another United Nations Conference held at Johannesburg in 2002 namely "World Summit on Sustainable Development". Thus Sustainable Development is a positive concept in economics and law, both of which aims to seek cordial relationship with nature and explore ways and means for economic development without any adverse impact on the sustainability of natural resources.

II. Present State of the Environment in India

The population explosion in India has placed great strain on the country's environment. This rapidly growing population, along with a move toward urbanization and industrialization, has placed significant pressure on India's infrastructure and its natural resources.

Following the 1984 Bhopal disaster in which a toxic leak from the city's Union Carbide chemical plant resulted in the deaths of more than 3,000 people – environmental awareness and activism in India has increased significantly. The Environment Protection Act was passed in 1986, leading to the set up of Ministry of Environment and Forests (MoEF) and strengthening of India's commitment to the environment, which was enshrined in the 42nd amendment to country's constitution in 1976. Under the 1986 Environmental Protection Act, the MOEF is entrusted with the overall responsibility of administering and enforcing environmental laws and policies. The MOEF has played an important role in integrating environmental strategies into any development plan for the country.

Nevertheless, despite a greater commitment by the Indian Government to protect public health, forests, and wildlife, policies geared towards development of the country's economy have taken precedence in the last 20 years. While industrial development has contributed significantly to economic growth in India, it was done at the cost of environment. Not only industrial pollution increases public health risks, but their abatement efforts also are consuming a significant portion of India's gross domestic product (GDP). As such, one of the main responsibilities of MOEF continues to be the reduction of industrial pollution.

Air Pollution

Industrialization and urbanization have resulted in a profound deterioration of India's air quality. India has more than 20 cities with population of at least 1 million, and some of them – like New Delhi, Mumbai, Chennai, and Kolkata – are among the world's most polluted. Of the 3 million premature deaths in the world that occur each year due to outdoor and indoor air pollution, the highest number are believed to be occur in India. Sources of air pollution, India's most severe environmental problem, come in several forms, including automobile emissions and untreated industrial smoke. More and more people are adversely affected by continued urbanization and rapid industrialization, and cities are unable to implement adequate pollution control mechanisms.

One of the most affected cities New Delhi, where airborne particulate matter (PM) has been registered at levels more than 10 times India's legal limit. Vehicles are the major source of this pollution, with more than three million cars, trucks, buses, taxis, and rickshaws already on the roads. With vehicle ownership rising along with population and income, India's efforts to improve urban air quality have focused on this area. In New Delhi, emission limits for gasoline – and diesel – powered vehicles came into effect in 1991 and 1992, respectively, and the government has prohibited the use of vehicle more than 15 years old in the city. Emission standards for passenger cars and commercial vehicles were tightened in 2000 at levels equivalent to the Euro -1 standards of the European Union, while the even-more-stringent Euro-2 standards have been in action for the metropolitan cities like Delhi, Mumbai, Chennai, and Kolkata since 2001. Furthermore, the *sulphur* content of motor fuels sold in the four cities has been restricted to 500 parts per million (PPM) since 2001 in order to be compatible with tighter vehicle emissions standards. Motor fuel sulfur content in all other regions of India has been limited to 2,500 PPM since January 2000.

Some major Highlights of UNEP Report 2001 for State of Environment in India

In the executive summary the UNEP report refers to the five major areas of concern for environment in India. Firstly, land degradation. The report recommends six steps for improvement. These include an integrated land use policy, a national land use commission, an assessment of existing degraded lands, the use of land according to its capabilities, a balanced use of organic manures, chemical fertilizers, bio-fertilizers and clear property rights for land use. Secondly, regarding biodiversity problems, the report emphasizes on of conservation and suggests protection of biodiversity, legislation for biodiversity through conservation, policies for use of wastelands, grasslands and sacred grooves, a biodiversity act independent of Wildlife

Protection Act, a country wide bio-diversity strategy and action plan, monitoring of bio-diversity use, and documentation of biodiversity resources .

Third, with regard to air pollution, the report says that there is need to control air pollution in major towns and cities by use of public transport and rapid mass transport systems. Industrial air pollution needs to be controlled by new technologies. An overall strategy for urban air quality management is needed. Use of LPG in households is recommended. Epidemiological studies should be made to develop dose-response. Industries should adopt better technologies.

The report highlights following steps regarding fresh water management, namely, emphasis for river pollution control should be on river basin which integrates all aspects of water management. Each State in India should prepare its water policy. The National Water Policy of 1987 needs to be revised. There is a need to develop rain water harvesting with peoples' participation. Tariffs for water use will lead to appropriate economic use of water supply. Cost-effective water appliances should be used. Technology is needed to treat waste waters for re-use. Data for water supply and sanitation for urban and rural use have to be collected. And, analysis has to be done on demand and supply of water resources.

And finally, the hazardous waste management. The report recommends following steps. There is need for scientific management of hazardous waste. Strategy is to have minimum waste to be disposed off after treatment. Industrial waste should be quantified before disposal. Impact of waste on health and eco-system should be analyzed. Proper infrastructure should be developed for disposal of waste. Solid waste at source should be minimized by incentives, and laws. Technologies should be developed for waste management and treatment. Government standards should be made for disposal of waste as also for cleaning up of contaminated land areas and ground water.

III. Environmental Issues and Sustainable Development

With his technological and scientific skills, man has made rapid developments in agriculture, irrigation, mining, industries, transportation, forestry, land management and other areas. Unfortunately, in doing so, there has been much disruption of the functioning of natural environment. Now people have begun to realize the side effects of the developmental activities and have started their efforts in minimizing these effects by adopting methods and technology for sustainable development. Some of the important environmental issues associated with development, and the role of ecology in possible solution of these problems, i.e., sustainable development are as follows:

(i) Food Production and Organic Farming

The increasing demand due to food for growing population has become a serious problem in many parts of the world, specially in developing countries like India, China, Indonesia, Japan, Egypt, Brazil and many other Afro-Asian countries. Agricultural scientists have been successful in increasing the quantity and quality of food and other crops. This has been made possible by the application of chemical fertilizers, high yielding seeds, crop rotation practices, weed control, pesticides as well as due to mechanization in agriculture. This resulted in the Green Revolution, which began in the late 1960s with an attempt to increase food production in developing countries. New varieties of wheat, rice and corn were developed that respond better than the traditional varieties to fertilizers, irrigation and chemicals for pest and weed control.

But, along with the increase in food production, there came an increased dependence on energy-based expensive technology and several ecological problems have emerged due to the excessive use of chemicals fertilizers and pesticides. Now it has been realized throughout the world that use of chemical fertilizers and other chemicals are harmful to soil productivity and also a cause of water and air pollution. The Green Revolution has not only disturbed the ecosystem but is also a cause of many a social revolution. The adoption of organic farming is a way for sustainable development. By adopting proper management practices, one can develop high yielding varieties even in this system. Along with agriculture, aquaculture can be developed. The best way is to develop fish farming, which fulfills the increasing demand of foods, specially that of protein.

(ii) Energy Crisis and the Ecosystems

In the ecosystem energy plays a very vital and controlling role. The sun is the original source of energy on our planet. All forms of energy, i.e., nuclear, wind, coal, electric, water, gasoline, etc., originate from the sun. The total energy received by the earth's surface from the sun is enormous and much more than required by human beings. But, in modern times, the use of fossil fuels, hydro-electricity and to some extent nuclear fission are the sources of energy. India's energy consumption is increasing rapidly, from 4.16 quadrillion Btu (quads) in 1980 to 12.8 quads in 2001. This 208% increase is largely the result of India's increasing population and the rapid urbanization of the country. Higher energy consumption in the industrial, transportation and residential sectors continues to drive India's energy usage upwards

at a faster rate even than China, which experienced a 130% increase in energy consumption from 1980 to 2001.

The rapid exploitation of these energy sources has resulted in an energy crisis. In the coming day fossil fuels such as oil, gas, and coal will become scarce. The impact of big dams and thermal as well as atomic stations is a cause of concern to environmentalists. Therefore, for sustainable development it is necessary to adopt non-conventional sources of energy like solar, wind, tidal and so on. Of these, the best is solar energy, provided that we are able to harness it with cost effective technology. In tropical countries like India, solar energy is the only alternative, which will provide energy without any adverse impact on environment. Steps have already been taken for the development of photovoltaic cells, solar-energized water pumps, air conditioning units, solar water heaters, solar home heating units, solar cookers, etc. Research in this field is also going on. What is needed is the development of cost effective technology to harness the solar and other non-conventional sources of energy.

(iii) Pollution and Environmental Degradation

Pollution is the result of human activities associated with industrial and automobile revolution. Pollution is a man-made problem, mainly of affluent countries, not a serious problem of the developing countries. The developed countries used to exploit the natural resources of developing countries and also export or dump such materials and machines which have become a source of pollution.

For sustainable development pollution should be checked first at source. The location of industries be selected in such a way that their pollutants may not affect the nearby localities, and there must be treatment plants. There is a need for environmental education, monitoring, and environmental management and also to fix accountability and responsibility for damages, if any. The production of eco-friendly products is a new concept in this direction.

(iv). Problem of Waste Disposal and its Management

In developed countries enormous use of unlimited commodities in daily life is causing environmental problems. This problem is now not limited to developed countries alone but growing day by day in developing countries also. Wastes and toxic substances are accumulating at a rapid rate in our surroundings. These substances enter the biogeochemical cycles. In man-made ecosystems, various types of wastes accumulate in the environment which upset the growth of micro-organisms. A variety of synthetic matter like plastic, rubber, glass, etc., are not degradable, thus,

causing environmental problems. Wastes include domestic wastes, industrial and mining wastes and agricultural wastes.

The various types of wastes, if properly managed can be used profitably. Steps have already been taken in this direction. Through gene engineering, new strains of bacteria and other micro-organisms are being bred, which can help to decompose various harmful industrial effluents into non-toxic agents.

Due to lack of proper facilities sewage is allowed to enter in to nearby water bodies without any treatment. The untreated sewage causes serious water pollution and also damages the local ecology. It is, therefore, high time that sewage is recycled in an economically feasible and environmentally safe manner to meet the various needs of mankind. Several techniques have been developed for sewage treatment and to extract water for irrigation, fodder, fuel and fertilizer from it. Efforts are also being made to use sewage on a large scale to improve farm lands, reclaim spoilt areas and create new recreational facilities.

(v) Irrigation and Problem of Salinity and Water Logging

During the last fifty years, vast areas have been provided with irrigation facilities. This has definitely increased the agricultural production throughout the world. But due to the lack of water management and also due to illiteracy of the farmers and the geological structure of a particular region, vast areas are now suffering from the problem of salinity and water logging.

Gradual depletion of organic matter and microbial population involved in decomposition, increase in salinity and water logging have adverse effects on soil fertility. Water logging and increased salinity are mostly the outcome of poor drainage and mismanagement of water in areas covered by large irrigation projects. The recent example is the Ganganagar and Bikaner districts of Rajasthan, where problem of water logging has become serious and several villages have been evacuated and there is no possibility of crop production in these areas. Similar is the problem of salinity, which has damaged the irrigated land. These problems can be checked by proper water management system.

(vi) Deforestation and Desertification

The problem of deforestation has been raised mainly due to destruction of forests for various developmental or commercial activities. The growth of population, rapid expansion of cities and other settlements, land for new agricultural farms, mining, construction of roads, dams, etc., have resulted in large scale cutting of natural vegetation. Apart from this, forests have also been cut down for commercial purposes.

Many useful plants have been already extinct and several thousands are of the verge of extinction. In the absence of reforestation, the forest cover throughout the world is declining at a very fast rate. The dense tropical forests too are suffering from the problem of mass cutting for commercial purposes.

The threat of desertification and expansion of desert area is due to overgrazing, loss of natural vegetation and also due to other human activities. UNESCO studies have shown that approximately 43 percent of total land surface in the world has been affected by desertification. The suggested measures for the check of desertification are improvement in land use patterns, stabilization of sand dunes, development of natural vegetation suitable to arid climate and reduction of population pressure, etc.

Sustainable development should essentially be based on maintaining the fragile balance between productivity functions and ecosystem. For sustainable development, our approach should be holistic linked to every resource sector at all levels of logical, regional and global scale. Unless we adopt an approach of sustainable development, the problem of environmental degradation cannot be solved.

IV) Strategies and Policy Measures for Sustainable Development

The environmental problems that challenge human society are ecological in nature. There is an urgent need to address economic activity, population growth and environmental protection as interrelated issues. This study suggests a threefold strategy for meeting the challenge of sustainable development.

- ***Build on the positive links.*** Policies for growth promote efficient use of resources, technology transfer, and better-working markets – all of which can help in finding solutions to environmental challenges. Rising incomes can pay for investments in environmental improvement. Policies that are effective in reducing poverty will help reduce population growth and will provide the resources and knowledge to enable the poor to take a long term view.
- ***Break the negative links.*** Rising incomes and technological advances' make sustainable development possible, but they do not guarantee it. Usually, additional incentives that capture the true value of the environment will be required to induce less-damaging behavior. Effective environmental policies and institutions are essential.

- ***Clarify and manage the uncertain links.*** Many relationships between human activity and the environment remain poorly understood, and there will always be surprises. The response should be investment in formation and research and the adoption of precautionary measures, such as safe minimum standards, where uncertainties are great and there is a potential for irreversible damage or high costs in the long run.

The measures for sustainable development may be different in developed and developing countries according to their level of technological and economic development. But developing countries, like India, can focus attention on the following measures:

- Ensure clean and safe living and working conditions for the people;
- Sponsor research on environmental issues pertaining to the region.
- Ensure safety against known and proven industrial hazards;
- Find economical methods for salvaging hazardous industrial wastes;
- Encourage afforestation;
- Find out substitutes for proven hazardous materials based on local resources and needs, instead of blindly depending on advanced nations to find solutions.
- Ensuring environmental education as a part of school and college curriculum;
- Encourage use of non-conventional sources of energy, specially solar energy;
- As far as possible production of environmental friendly products be encouraged;
- Use of organic fertilizers and other bio techniques should be popularized;
- Environmental management is a key for sustainable development, it should include monitoring and accountability; and
- Need for socialization and also humanization of all environmental issues.

Conclusion:

Environmental problems are multidimensional and varied in nature in different countries. There are global problems which have had their impact throughout the world. Therefore, sustainable development is the need of the present time not only for the survival of mankind but also for its future protection. Unlike the other great revolutions in human history - the Agricultural and the Industrial Revolutions - the 'Sustainable' revolution will have to take place rapidly, consciously and at many different levels and in many different spheres, simultaneously. The aim of ecologically sustainable development is to maximize human wellbeing or quality of life without jeopardizing the life support system. Unless we adopt an approach of sustainable development, the problem of environmental degradation cannot be solved.

In India, efforts are being made on for the environmental management in a sustainable manner.. At all levels of education provisions have been made for the knowledge of environment and its conservation. In the country many centres are providing special training for environmental management. The programmes of environmental awareness have been launched through media. India is an active member of International Organizations concerning environment. Several programmes are going on under UNEP. The Government has recently started emphasizing the combined use of regulatory and economic instruments for improving environmental quality. There is a need for coordination between government agencies, NGOs and the public for the proper management of environment quality and to achieve sustainable development in the country.

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