

STRATEGIES FOR THE UPKEEP OF QUALITY OF LIFE IN DETERIORATING  
ENVIRONMENT OF RAPIDLY INDUSTRIALIZING COUNTRIES

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ABSTRACT

The onslaught on the environment due to the rapid industrialization of the developing countries, is intensive and has been significant in recent times. The ecological effects caused by indiscriminate dumping of urban and industrial wastes into the environment has resulted in public fury and proper Governmental action on the polluting industries to correct their waste-treatment policies is forthcoming in many developing countries and especially in India. India with teeming 740 millions threatening to reach Billion of people by the end of the century has progressed industrially in the last decade or two and has come to the top tenth position of Industrialised countries. The strategies for the control of environmental degradation are discussed keeping Indian example as a base for the rapidly industrializing countries. These strategies would help in giving clean air, fresh water and aesthetic surroundings for people to live in and to have a better quality of life.

1. INTRODUCTION

It is an ancient truism that man is but a part of nature and it would be unwise for him to damage the nature world on which he has to depend. When man first began to live in permanent settlements and utilized fire, land and water around him, no perceptible damage occurred to his environment since the wastes produced were taken care of by the self purification and assimilative powers of nature itself.

The legitimate human activity to provide food, shelter, amenities and transport to his fellow beings has resulted in the man to become his own worst enemy. The products of industry and agriculture make a more bearable and pleasant human existence but have resulted in the production of wastes, effluents and emissions which cause pollution of water and air, erode the soils, destroy the forests and ecological systems.

Man has always been careful to remove wastes from his own private building or dwelling, but he usually dumped them immediately outside. Such indiscriminate dumping of domestic and industrial wastes has led to the creation of serious environmental sanitation problems, accumulation of filth and garbage thereby endangering the physical environment.

Industrial revolution resulted in environmental pollution which was to be taken as a growth index of the industrialized country. The modern industrialized countries vexed with the problems of pollution, started to realise the deterioration of the environment and have taken lately costly corrective measures, to purify their polluted rivers and to cleanse the atmosphere with reduced or no inputs of air pollutants. Thus the man's desire for clean air, pure water, good housing in aesthetic surroundings, all constituting in improving the quality of life is to be taken care of by the present day governments.

## 2. RAPID INDUSTRIALIZATION OF DEVELOPING COUNTRIES

The people of the developing countries are anxious to industrialize at a rapid pace to reach the acceptable standards of living. They are also at an advantageous position and can avoid the pit-falls of the developed countries and take preventive measures to control the ecological imbalances created by the indiscriminate dumping of industrial wastes into the environment. Many of the developing countries are in the initial stages of industrialization and some are developing at a very rapid pace. India, for example has now attained the tenth position in the industrialized countries in the past few years and in this process it is faced with a number of pollution problem.

### 3. INDUSTRIALIZED INDIA

India has achieved near self sufficiency in number of industries like textiles and chemicals like caustic soda and sulfuric acid, iron and steel, cement, food etc. The caustic soda industry is going through changes. Mercury cell electrolysis is being replaced by membrane cell process to reduce pollution and energy consumption. The Industry has an annual installed capacity of over one million tonnes distributed among 35 units. Two more units of total capacity of 66,000 tonnes are expected to come on stream during early 1984. Total capacity by March 1985, will be of 1.2 million tonnes caustic soda. Present day consumption of plastics, both new and reprocessed, is around 450,000 tonnes annually, out of which about 218,000 tonnes are produced annually. There are 10,000 small scale plastic manufacturing units, producing a wide range of plastics worth Rs.350 crores. (\$ 35 million).

The Indian Drug Industry is well developed producing Rs.665 crores (\$ 665 million) worth of bulk drugs and Rs.2,450 crores (\$2450 million) of formulations. There are no imports of any formulations and most of the imported bulk drugs are also made in India. Most of the basic drugs are made from the basic stage and required raw materials, chemicals and intermediates and solvents are indigenously available.

A noteworthy record of the Indian economy in the past 30 years, has been the increase in the food grains production from 50 million tonnes to around 140 million tonnes in 1983-84, to come to self-sufficiency which resulted in 'Green revolution' thereby reducing the chronic deficits and imports of food grains. The notable achievement on the food front is due to increased use of chemical fertilizers, high breed seeds, pest control measures and modern agricultural mechanised methods including better water management policies.

India produces 60,000 tonnes of pesticides currently (1983) and has an installed capacity of 98,000 tonnes, whereas the current demand is of the order of 72,000 tonnes. Along with basic manufacture, the formulation industry too has developed and there are over 800 formulations at present. However, the consumption of pesticides per hectare in India is still well below the levels of

the agriculturally developed countries. Fertilizer production (83-84) is around 4.55 million tonnes whereas the sixth plan target is 5.6 million tonnes. By the end of the decade to achieve self sufficiency the production must be around 8 million tonnes, compared to the production of 16,700 tonnes in 1950, 162,200 tonnes in 1960, 1.35 million tonnes in 1970 and 4.35 million tonnes in 1980 and 5.8 million tonnes capacity in 1982. Work on the two giant gas-based projects at Thal Vaishet in Maharashtra and Hazira in Gujarat, with the world's largest urea plant of a capacity of 1.45 million tonnes of urea, is in progress and will come onstream by the end of 1984. Six new gas-based fertilizer plants will be coming up in the next five to six years. The new finds of gas and oil in various river basins and offshore areas will result in the total demand for the gas from 900 million cubic meters to 5,300 million cubic meter by 1990. Though the share of natural gas as feed stock is expected to be highest at 46.6% in 1989-90 it will still be less than the world level of 69.5% in 1990.

Fertilizer consumption in India stands today at the level of 7.2 million tonnes of nutrients a year, recording a seven fold increase during the last 17 years. It is estimated that with the population likely to exceed 900 million and to reach a billion by 2000 AD the minimum additional food grain requirement will be 90 to 100 million tonnes. This will mean minimum increase in fertilizer consumption by 10 million tonnes of nutrients in the 17 years.

The rapid industrialization of India has created pollution of environment, in the form of river water pollution, air pollution and other forms of degradation of eco-systems.

#### 4. ENVIRONMENTAL DEGRADATION

Reports of water pollution episodes are plenty in India. The officially recorded serious case of water pollution is that of Jaundice epidemic of Delhi in 1956, Ganges was set aflame due to oil pollution in 1968. Certain stretches of river basins like Damodar in Durgapur-Asansol region, Hooghly near Calcutta, Ganges at Kanpur, Matu at Baroda, Kalu and Ullahas near Bombay and cauvery near Erode are grossly polluted and show signs of strangling

future Industrial developments as well as drinking water supplies.

On the Hooghly estuary alone near Calcutta 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, A BOD load of 52 tonnes per day from these industries from  $4.4 \times 10^5 \text{ m}^3$  / day of water are being dumped into the river Hooghly near Calcutta.

The Ganges at Kanpur receives the domestic waste waters from 1.5 million people living in Kanpur (1971 census) along with the waste waters from 45 tanneries, 10 textile mills, 3 woolen mills, 2 jute mills and number of Chemical and pharmaceutical industries.

Reports come quite often of the fish kills by discharge of waste waters in various parts of India. In Bombay, the Kalu river near Kalyani once a spawning ground for the favourite Hilsa fish is no more so, Bio-magnification in aquatic organisms form a source of danger to the humans that consume the fish.

Another source of water pollution in the agricultural run off a non-point source of pollution with the increased use of inorganic fertilizers (7.2 million tonnes per annum) and pesticides (0.6 - million tonnes per annum) the run off water from irrigated land has been adding a variety of organic and inorganic non-biodegradable pollutants. At present their levels are not alarming but the situation becomes serious in view of the increased fertilizer use envisaged at 9 million tonnes by 1985 and 18 million tonnes in 2000. It is reported that in some regions the ground water has already reached excessive levels of nitrate and hence it is essential to watch for nitrate levels in ground waters.

Recently Bombay has experienced smog conditions, the level of suspended particle matter rising as high as 300 micrograms per cubic meter well beyond the permissible limits of 100 microgram per  $\text{cm}^3$ . An estimated 13,000 metric tonnes of pollutants are discharged into the air of Bombay.  $\text{SO}_2$  in the air is 70 to 80 microgram per cubic meter and oxides of Nitrogen 50 to 60 microgram per  $\text{cm}^3$ . Studies made recently at Vishakapatnam where a 3.0 million per year capacity steel plant is coming up, revealed acid rain conditions, the rain water having a pH of 3.3. and 3.9 during October

1982 and January, 1983. Which may be due to the existing Zinc smelting plant, where no air pollution control methods are adopted.

#### 5. PEOPLES' FURY OVER ENVIRONMENTAL DEGRADATION

Number of reports on peoples' fury are common over environmental degradation. A case of pollution protesters turning violent and police opening fire in the air to scare away the protesting crowd protesting against the 'Unbearable air pollution' caused by a carbon factory in Gujarat is reported and a case of people's fury on the pollution caused by a Fertilizer factory due to Ammonia discharges into the air at Ramagundam is also recorded.

A case of village adjacent to a poly fiber factory and exposed to pollution of the river waters, being shifted to a safe place recently is also known. The polluted river waters containing effluent matter was the source of drinking water for the village and almost every one in the village bore a scar in the stomach having undergone surgery. These examples of peoples' fury over the pollution perils are understandable for any country and especially so for a developing country like India. India with its 740 million people today, threatening to reach a billion by the end of the century, has more than half of its people below the poverty line. Illiteracy is high compared to other developed countries. However India is endowed with vast natural resources and if harnessed in a planned way, it would develop into one of the well developed countries. It has the third largest scientific man-power with second largest man-power as people in the world. Thus in the last few years India has taken the tenth position in the list of the industrialized countries, since to fight poverty, greater production is only the weapon.

#### 6. TREATMENT OF WASTES

Industrialization and urbanization of a country leads to creation and strengthening of industrial and urban slums, posing problems of accumulation of filth, garbage, industrial harmful pollutants thereby reducing the water and air quality and the quality of life of the people which is in no way near to any of the developed countries. However it is possible to reduce these perils by treatment of wastes, Technology which has produced new and divergent products for the benefit of man to improve his quality of life, can also

solve the problems created by harmful and unwanted wastes.

Several of the waste waters are amenable for treatment whereas some discharge toxic chemicals whose effects cannot be immediately measured (i.e. Chlorinated pesticides, poly chlorinated bi-phenyl's, non Biodegradable detergents etc.) The discharge of untreated or partially treated industrial waste waters into water courses will pose serious health risks to the population that consume the water, since the pollutants are not removed to any appreciable degree during the conventional water treatment practices that are currently adopted in India.

Waste either in liquid or solid form should be considered as a resource to be put back into the ecological cycle. Microbiological pathway is more relevant in a tropical country like India where micro organisms grow and multiply at a much faster rate than in cold climatic regions. Recycling and reuse concepts using solar energy in stabilization ponds followed by aquaculture and agriculture are much more relevant. A Technological innovation limited to the regional needs within the country with energy saving devices and reuse concepts become relevant.

The national objective is to improve the quality of life of our citizens. Technology options in sanitation and in pollution control should be such that an environment with clean air, unpolluted water, aesthetically pleasing landscape and good housing are made available to the citizens at minimum social cost. In addition, the scientific soundness and Technological adaptability, the system should be culturally relevant and socially acceptable, economically viable, easy to operate and maintain, safeguard public health and capable of recycling of wastes.

## 7. STRATEGIES

The following strategies are given to control the pollution and thereby improve the quality of life, as examples based on Indian experience.

1. Evolve Governmental effective action towards the fulfilment of the declared objectives of improving the quality of life, in legislating simple and stringent laws and in implementing them through various Central and State agencies like pollution control

boards, working under newly created departments of environment.

The Government of India has promulgated laws and acts for the prevention and control of water pollution in the year 1974, and of air pollution in 1981, after adopting a national environmental policy, Department of Environment with a role of 'Watch dog' to bring to the notice of the Government and Parliament instances, causes and consequences of environmental degradation in all sectors was established in December, 1980, by the Government of India. The Department will serve as a model agency for environmental protection and eco-development, and will convey environmental appraisal of development projects and will take up direct administrative responsibility for pollution monitoring and conservation of critical eco-systems, designated as 'biosphers reserves' and marine eco-systems. The department is given a role to examine the weak implementation of the acts which has increased the pollution levels of river waters, pesticide residues and heavy metals like mercury dumped by waste waters indiscriminately into the water courses.

Statutory bodies for the enforcement of the pollution acts are made by State Governments, who will make every industry obligatory to obtain consent for the discharge of wastes and the treatment plants before it is established as an obligation to Society. The existing industries are also expected to treat their wastes at a social cost according to the standards fixed by State Boards and report on the progress made in the implementation of the treatment systems as approved by them. The laws have punitive measures of simple imprisonment of the recalcitrant management personnel for not fulfilling the obligations of waste treatment and for continuously sending untreated or partially treated effluents into the surrounding environment. These State Departments work in unison with the Central Board for prevention and control of water and air pollution.

2. Create Governmental divisions to deal with the gigantic problems that loom ahead consequent to large scale industrialization, deforestation and degradation of eco-system, and to concern with pollution control, assessment of environment, conservation of living natural resources, eco-development, environmental research promotion, society-environment inter-actions, co-ordination and liaison with State Governments, environmental information and international co-operation.

These divisions would work under the Department of environment and co-ordinate environmental monitoring activities to lessen the dangers of environmental pollution and also to respond and give corrective action to the developmental activities.

3. Create agencies for the standardization and codification of the industrial effluents, keeping in view of the existing levels of pollution and the availability of effective and appropriate technologies.

Environment Management is based on the principle of 'best practical means' and the standards of effluents are to be specified based on relationship between the intensity, duration and frequency of exposure to the pollution and the ensuing magnitude of the undesirable effect or the risk to life. In developing countries where the exposure levels are comparatively low and long time, it becomes extremely difficult to prescribe standards in the absence of such relationship. Generally the standards for effluents are set by drawing on the experience of other countries and their standards and also on inspired guess work. In India, Indian Standards Institution, created by Government of India to prescribe standards for the maintenance of the quality of the products, sets standards for effluents coming out of different industries and the Pollution Boards are empowered to give different standards broadly in consultations with the industries, based on the existing levels of pollution and air and water quality. The Boards are also expected to take the cognizance of the availability of technology of the processing wastes and its limitation vis-a-vis the cost effective factor and appropriations. The difficulties observed with the development of standards are very well reflected in wide variations of the standards in different countries and in different states of any country like USA etc.

4. Encourage the efforts of the voluntary organizations sponsored by the well-meaning sensitive groups created to educate the people in the perils of pollution and to inculcate the awareness of social responsibilities in the polluting industries towards their surrounding eco-systems.

The concerned authorities and people vested with the interest on the maintenance and the improvement of the quality of life for

their fellow-beings should encourage the voluntary organizations whose efforts are for keeping the eco-systems from further deterioration and for the elimination of the deteriorating factors. In India, people's Organizations like So-clean (Society for clean environment), save Bombay Committee, an Organization of Scientists and intellectuals for environmental care have come up recently to save the deterioration of environment. The latest to come up in Madras (as late as March 26, 1984.) is a society to 'breathe life' into environment and to resensitise and educate the people about the value and the need of environment and pollution control. These societies are expected to bring about attitudinal and behavioural changes in all the concerned.

In addition, an ingeniously created 'Chipko' movement has come up, where in the person would embrace a tree when it is endangered for its removal by cutting it out and thus aid in prevention of denuding the forest area, as far as possible in a non-violent way. Scientific professional organisations like Indian Science congress, Institution of Engineers etc., discussed Environmental protection as their main themes of congresses for possible solutions of environmental control. These efforts though look small would definitely help in focussing the problems of environmental degradation and for their possible solutions. People would like to have progress without pollution and industrialists should create wealth from wastes and reduce the perils of pollution.

5. Develop the research and consulting agencies for the benefit of industrialists and ecologists so that the problems of pollution are identified and strategies are planned to demonstrate that economic development is possible without ecological imbalance and further damage to the degraded eco-system is reduced.

Research and consultancy services in the field of Environmental Engineering and Management are poor in developing countries, since the emphasis has been to develop the industries at a fast rate to catch up with the developed world. In their anxiety to better the lot of people living in the third world, the countries are fighting hard and taking all possible industrial and economic developmental activities without giving the due importance on the impact of these activities on the environment. Environmental impact studies of the

developmental projects are rarely attempted. There should be proper liaison between the industries and law enforcing authorities on one hand and also with the Research organizations to tackle the waste treatment problems which are peculiar to some developing countries for which ready made options are not available. Alternative technologies for waste treatment, alternate receptacles for liquid wastes are to be thought out to prevent and control the water pollution. New ideas on community treatment plants for the benefit of small-scale industries located in industrial areas are to be worked out as treatment strategies. New approaches to waste water disposal are to be thought out by which the industrialists are obliged to treat the wastes. As an example, the industry based on a river bank be asked to take the fresh water from the down stream and send the waste-water upstream, reversing the normal procedure, so that the industry has to control the quality of waste water for its own survival and interest. An industry can also be asked not to dump their waste waters into a river, if the surrounding areas are of forest or agricultural lands, so that the rigours of treatment to surface water or drinking water standards need not be imposed and the waste water is utilized for agricultural and forestry purposes. The industrialists are to be advised to do some 'good house-keeping' so as to reduce the waste and use waste to recycle wherever feasible and possible. They are also to select the technologies based on least possible pollution and change the existing processes with the less polluting products and raw materials.

These strategies would go a long way, in not lowering the quality of life but help in improving it. Thus the preservation of our Environment is not a liberal or conservative challenge - it is common-sense as declared by President Reagan during his State of Union Address for the year 1984.