ENVIRONMENT AND SUSTAINABLE DEVELOPMENT : A SOCIOLOGICAL ANALYSIS

Dissertation submitted to the Jawaharlal Nehru University
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MASTER OF PHILOSOPHY

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FOR

MY SWEET SISTER HEMA

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CERTIFICATE

Certified that the Dissertation entitled "ENVIRONMENT AND SUSTAINABLE DEVELOPMENT : A SOCIOLOGICAL ANALYSIS", submitted by SHIV KUMAR MOHANKA in partial fulfillment of the requirements for the award of the degree of MASTER OF PHILOSOPHY, has not been previously submitted for any other degree of this University or any other University and is a record of the student's own work, carried out by him under my supervision and guidance.

We recommend that this Dissertation may be placed before the examiners for evaluation.

PROF. M.N.PANINI
(CHAIRPERSON)

PROF. YOGENDRA SINGH
(SUPERVISOR)

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Shiv Kr. Mohanka 92

SHIV KUMAR MOHANKA

LIST OF CONTENTS

"THE EARTH HAS ENOUGH FOR EVERYONE'S NEED BUT NOT FOR ANYONE'S GREED"

MAHATMA GANDHI

CHAPTER - 1

INTRODUCTION

The history of humanity may be envisaged as a struggle against its environment, involving a progressive liberation from its local, natural conditions and the gradual enslavement of the living world by man's own inventions. We have convinced ourselves that we are the masters and possessors of nature.

At the earliest stage, man was integrated within this natural system. In fact, he was completely dependent upon his natural environment. The primitive situation changed rapidly when man became more numerous and reached a higher level of technology. It was because of the substantial increase in man's skills over time. Consequently, man "domesticated" natural ecosystems, and later created artificial ones. Positive effects resulted and man harvested the fruits of the earth. But human influences also had numerous negative effects, particularly when industrialization made living conditions more and more artificial. Indeed, some of man's actions are to be considered serious ecological errors, being in complete disagreement with the biological laws.

At the heart of the ecological crisis is the response of a besieged nature of the inquitous, lopsided path of industrial development that some sectoral interests continue to advocate. Clearly, it is too much to expect from the agents of demolition to repair the damage, perhaps even too much to expect them to see it as symptomatic of a failure, in fact, it is a necessary concomitant, of the system they continue to advocate so successfully.

What is emerging is the fact that this technocratic, business elite expects the marginal periphery of our society to pay the cost of their urge for industrial progress - through the destruction of its ecosystems in which they live by mines,

deforestation and industrial effluents, by their displacement from traditional habitats due to dams, development projects and urban agglomerations by a steady process of deliberate deprivation and exclusion from the political process. Among these people are tribals, the land-less poor, and their natural successors, the slum-dwellers who are being forces into our burgeoning, mismanaged cities and metropolis. Together, they number over a hundred million.

It is very well to say that someone must pay the price of development. What is clearly implicit in the formation, however is that the price of the sort of progress we are heading for, will almost certainly be paid by people who are least able to afford it and who, propaganda aside, will benefit the least from its fruits. There are questions of a political and legal nature inherent here. To deny them in the name of development and national interest is to threaten the constitutional foundations on which our nation is laid. It is time we saw clearly that "efficiency","accountability" and "national progress" are not universal themes - in the present context they serve as loaded catch-words to represent the interests of a certain class.

The form of development followed during the past has only helped to expand our upper middle class and ushering in of unprecedented consumerism and commercialism. To a casual observer this would indicate that people in India are prosperous. However, one has hardly to go a kilometer away from a city to see stark poverty, penury, want and hunger among landless, assetless, powerless, dumb majority. In fact, it is at their expense that the country has "developed". The number of ecological refugees going to the cities (slums) is increasing, and unless this hitherto forgotten section comes out of the

present morass. India cannot progress in the real sense of the term. This cannot be done by paying lip service or by giving doles, but by raking our heads and hearts. Science and technology is a powerful instrument of social and economic change and therefore of development as well. Hence, science and technology should be taken to the good grass-roots for the good, the benefit and the welfare of the people at that level. Today, there is far more appreciation of the intimate connection between development and environment. Development in a country has to be considered against its particular social cultural and economic milieu. In this context, India is a country where medieval and modern ages co-exist. We have ballock cart and jet-craft, charkha and computer and we will enter the twenty-first century with all these contradictions. Thus, we face double burden, and have to solve environmental problems emanating from under development and pursume development at the same time.

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Let us now take up some concrete cases of ecological disaster so as to grasp the problem better.

A recent cartoon by R.K.Laxhman in the Times of India shows an industrialist exclaining :-

Why did I give up being an Industrialist ?... Because, whatever I did seem to result in ozone damage or deforestation, effluent poison, air pollution etc.

This, in a nutshell, represents the paradox of our times as any development is accompanied by environmental degradation. A rapid pace of industrialization, coupled with uncontrolled exploitatioin of Nature, has caused continuous

dumping of industrial by-products, hazardous chemicals and nuclear wastes; deforestation in vast areas of the earth and pollution of the river-basins, lakes and seas. In his quest for wealth and comforts, man has ignored Nature's law and thus disturbed a number of natural cycles.

The continuing destruction of the countryside, the unrestrained pollution of water sources and productive lands makes our country less capable of supporting life in the future. Already, it is estimated that 70% of our surface water supply is polluted and unfit for drinking.

Modern industrial cities are encroaching on agricultural land at an unprecedented scale. Some 1.5 million hectares of rural land (arable) have been lost to them and over the last 30 years and another 4.8 million hectares will be lost before 2000 A.D. For instance : the oil refinery at Bad in Mathura district and the industrial estate in Agra district have transformed the area around the Delhi-Agra rail route from farms and follow lands into a continuous stretch of industrial and urban structures. Brick kilns have proliferated in the area. Good agricultural land is destroyed to produce bricks ; the silt loam soil used by brick kilns is ideal for agriculture. The fertile top soil is wasted for the purpose of filing up the low-lying areas. [centre for Science and Environment, The second citizen's Report, 1985, p. 140]

Even around small cities, the loss of agricultural land in alarming. An area of 2,630 hectares was encroached upon by the industries in the Sahranpur district in between 1950-73. According to a study quoted in the report, as much as 94% of the encroached area was earlier cultivated. Here, we can note that one inch of top soil takes thousands of years to develop.

Let us take the case of AIR-POLLUTION. It has long been clear that there is a problem here, and that the major causes are motor exhaust, industrial smokestacks and domestic stoves. Yet, apart from the apologetic gesture of palming off new designs of stoves in the poor, little has been done. Cars and trucks continue to spew their poison on the road.

Industrial complexes, often located near densely populated areas, use political leverage to operate any way they find convenient. There are many potential Union carbides lurking in the midst of our cities and towns. In the long run, there is the additional prospect of acid raid decimating our few surviving forests.

There has been a tremendous increase in FOSSIL FUEL (viz coal, lignite, petroleum). The sulphur in the fuel is released as SO_2 (sulphur dioxide). SO_2 is oxidized by air, to form SO_3 (sulphur trioxide). SO_3 is absorbed by the rain water to form the dangerous H_2SO_4 (sulphuric acid). [Jean Dorst; what man is doing ? key note paper at a seminar in paris]

The minimum theoretical PH of the RAIN WATER is 5.6. Acid Rain results when PH if rain is less then 5.6. Plants and animals are able to withstand PH upto 5.6 but rarely less. The acid corrodes the leaves resulting in the death of plants ACID RAIN is destroying the Black Forests in West Germany and the forests of Scandinavia. The acid increases the availability of heavy metals in the soil and water, rendering them toxic which kills plants and animals. Acid rain is responsible for the destruction of marble monuments like Acropolis in Athens and Taj Mahal in Agra [C.F. Bennett; man and Earth's Ecosystem, New York, Willey, 1975, Introduction].

Let us now examine the ACID MINE DRAINAGE which causes

much harm to the worker, miners and inhabitants of the area in which the coal mines are located. Dr Anjan Ghosh writes, "whether it is open-cast or it is under ground mining the environmental depredations it causes remains a retention reality". [Dr. Anjan Ghosh; Environmental Impact of coal mining in Eastern India-Article presented at JNU seminar]

Often sulphides are present in the waste rocks of coal mines. These rocks are simply dumped out in the open exposed to nature. The sulphides are oxidized to SO_2 and SO_3. These combine with rain water to form H2SO4, so the rain water runs off from the coal mines often have significant levels of acid this is called acid-mine drainage. This renders the land and nearby water bodies inhospitable to plants and animals. Health hazards of the miners' families can hardly be underestimated whose source of drinking water is polluted by H_2SO_4.

Furthermore, COAL MINING has had a profound impact on the natural habitat in the eastern region. It caused or contributed to the process of deforestation in the area, depredation of the soil and hence its fertility, widespread land collapse, and the prevalence of underground fires. Meanwhile, little remedial measures are underway as neither the Eastern coal fields Ltd nor the state governments are willing to take the responsibility of the ecological disaster and help the rehabilitation of the affected people [Dr. Anjan Ghosh, op cit, p.5].

Let us now take up the issue of GREEN HOUSE EFFECT which is a result of excessive emission of carbon dioxide gas in the atmosphere. From geological records, it has been calculated that the concentration of atmospheric CO_2 was 240 parts per million (ppm). In 1900, it was 270 ppm. Now it has risen to 325

ppm. CO_2 absorbs infrared rays of the sun and gets heated. Consequently, the atmospheric temperature rises up. This results in the melting of the polar nice caps and subsequently the sea levels. As a corollary, various low-lying coastal lands are prone to submergence. For instance - Maldives, Calcutta, New York, Rotterdam etc. The rise in temperature will increase evaporation and it will upset the global climate as such.

Ozone is an allotropic form of oxygen which is present in the stratospheric layer of the atmosphere. Ozone absorbs the ultraviolet radiations of the sun and thus prevent them from reaching the earth's surface. If the ultraviolet rays reach the earth's surface, they will cause mutations, most of which are lethal. This may result in the destruction of life. The ozone layer is being destroyed in two ways :-

(a) High flying military aircrafts release oxides of nitrogen with their exhaust fumes. These oxides destroy the Ozone.

(b) Increasing amounts of chlorofluro-carbons are being used as refrigerants. Leaks from junked refrigerators result in release of these into the atmosphere. Being very light they escape to the stratosphere and react with the ozone - resulting in the destruction of the irreparable ozone layer.

While assessing the environmental impact of industry, we can take up the case of energy generation. As against the vast submergence of land and consequent loss of forest areas and the large scale rehabilitation involved in case of hydel power, the land requirements of nuclear power in insignificant. But in case of nuclear power plants one has to encounter radioactive waste and this has drawn considerable public attention. There is danger of radioactive leaks from these plants as it has happened

in the plants of chernobyl (U.S.S.R) and 3 Mile Islands (U.S.A). Alarmingly, there is no reliable technology to deal with radioactive wastes. Some of these wastes are to be stored for hundreds and thousands of years in suspended animation so that the emission level of these radioactive elements falls to safe levels on the other hand, thermal power plants can be simply cut and scrapped. [CSE CITIZEN'S REPORT SECOND, 1985]

Nuclear Radiations from various sources constantly pose an environmental risk. With the number of nuclear reactors all over the world reaching a figure of 420, there is always a lurking fear of the type of mishap which occurred at Chernobyl in Russia on 26th April, 1986 repeating itself. This accident not only devastated a vast area around Chernobyl which is still not safe for habitation, but also gave rise to a nuclear cloud which remained over a large part of Europe for several days. Even though only two to six per cent of the radioactivity contained in the core of the Unit-4 reactor was released during the accident, this was enough to cause nearly half a million cancer cases and besides, several species of animal and plant life critical to the ecological balance have been threatened in large parts of Europe. High levels of radioactivity continue to be detected in vegetation, milk, oil, food, water, air and soil.

From this, one can imagine the major threat to global environment by a nuclear war. The much-talked movie "The Day After" depicts the horror posed by this scenario. It is said that when the story-writer, Ed Hume, saw the movie, it sent a shiver down his spine and his thirteen year old son turned pale!

Whenever a nuclear accident occurs, dangerous radiations are emitted. Similarly, the debris, that are left in the atmosphere, after nuclear explosion consist of dangerous

particles which are harmful. For example, an isotope of Strontium (Strontium-90) causes blood cancer and decays very slowly. Cesium-137 binds itself to soil and causes genetic changes and Idoine-131 has a tendency to cause thyroid cancer. Another cause for concern is that due to security reasons, atomic energy establishments, like in India, do not come under the purview of any environmental legislation.

If the benefits of nuclear power are to be enjoyed today, it should be with the understanding that some of the hidden costs will be passed on to our children and grandchildren. And to their children and grand children. The growing resistance to nuclear power represents one of the first times that a large part of the population has developed an understanding of an issue of fairness to future generations. Many people seem willing to forgo some current consumption in order to avoid placing a burden on their descendants [Denis Hayes; Pollution : The Neglected Dimensions, World Watch Paper 27, Washington; 22].

Danger posed by the falling of fissionable materials in the hands of terrorists organizations during transport or otherwise is also very imminent. In 1986, a quantity of radioactive caesium used for cancer treatment in a hospital in Sao-Paulo, Brazil, found its way to a rubbish dump. From there it was picked up by scrap metal dealers who were attracted by the shining metal. They carried it in their pockets and even made ornaments out of it. By the time the alarm was raised all those coming to contact with the radioactive caesium suffered radiation burns. Four died of radiation sickness and were buried in coffins of concrete three ft. thickness. Quite recently, there was theft of radioactive radium pencil from the All India Institute

of Medical Sciences, Delhi. Similar case was also reported from the Chittaranjan Cancer Hospital Calcutta. Radiation from these instruments affect sex-cells in such a way that the conceived young are often born deformed physically and mentally.

Electric welding is one of the most common activities carried in an industry. When it is undertaken, a lot of ultraviolet radiation is emitted along with intense white light. Ultra Violet rays have profound chemical effect and if they reach the ratina the light sensing cells are irreversibly damaged leading to partial or complete blindness. Ultra violet rays cause skin cancer in caucasian people who lack the ultraviolet absorbing pigment melanin. Fortunately, we Indians don't lack melanin. Proper prevention measures such as use of welding goggles, masks and proper protective clothing by the poor workers of the industry is often not taken.

Similarly, workers exposed to high levels of sound for long periods lose their hearing due to destruction of tissues in the ear which convert sound wave into electric impulses and transmit them to the brain.

Monuments are an asset of a sentimental and architectural value which any country can feel proud of. Pollution has done a lot of harm to them. Oxides of nitrogen and sulphur which are released from different sources react with themselves and other pollutants to form corrosive acids which cause a big harm to stone, current and even iron. Taj Mahal is threatened environmentally in this way by the emissions and waste of industries in and around Agra-Mathura district. Refinery at Mathura in particular has been accused of causing much damage to the shining of Taj Mahal. It is also leading to deforestation and other allied impacts [Destination Disaster, The Tuimes of

India, 16th April 1989].

Deforestation causes a list of harm to the ecological balance. Forests prevent floods and soil erosion. They play vital role in inducing the rain fall. Deforestation in South Bihar area has resulted in the reduced annual rain fall in the area. Forests also increase percolation of rain water to the underground acquifers - so that, ground water reserve is replenished. Deforestation also results in the depletion of resources in timber, wood, honey, fodder, resin, bamboo tenduleafs, salseed etc. The destruction of forests and reduced access to biomass play havoc with the millions of craftspeople. It is resulting in prepetrating the inequality. Today 40,000 baan - making families face starvation in Uttar Pradesh. The most affected by biomass destruction are women. Many households spend up to 10 hours daily fetching fuel, fodder and water. Even pregnant women work 14 to 16 hours a day [CSE SECOND CITIZEN'S REPORT, p 155].

Destruction of gene-pools in another disaster caused by deforestation. The crop plants we use are never found in the wild as they are ill adapted to withstand environmental stresses. To prevent famines, we must breed plants resistant to diseases, pests and droughts. The genes for these are found only in wild plants. The genes are incorporated into the crop-plants by biotechnology. But once the source of the genes is gone, they are gone for ever unless some evolutionary process regenerates those genes and this takes hundreds of years if not more.

WATER POLLUTION

Water is a unique chemical essential for our survival. Its pollution is a major global problem. Our rivers, lakes and seas have limits for absorbing pollutants and with an increasing

world population, there is a consequent increase in the discharge of sewage, industrial and harbour wastes and dumping of garbage. Still worse pollutants are the chemicals, including pesticides, and radioactive materials which are carelessly dumped by industries. There has also been an increase in oil pollution due to refinery effluents, offshore production platforms, pipe-lines and tanker accidents. During the recent Gulf War, huge amounts of oil found its way into the sea due to damage to pipe-lines and installations and the Red Sea had a long and wide OIL SLICK running into several kilometers,damaging ecological system and badly affecting marine and bird life. In February/March this year, there was news of an oil slick drifting from Bangladesh towards India which could have affected marine life in the Sunderbans. This slick was caused by the discharge of effluents and wastes from a large number of oil tankers which are crowding the Bay of Bengal. The slicks are dangerous because these consist of non-biodegradable hydrocarbons which could damage eggs and larvae of fish and curstaceans.

As far as ground water is concerned, the polluted water not only affects food production, but also there is an increase in water-borne disease. In India, about 80 per cent of the diseases are belives to be water-related. The 14 majir river systems of our country accounts for nearly 80 per cent of the population in their river-basins. Thus, the need for making important rivers pollution-free is obvious.

HAZARDOUS CHEMICALS :

Mention may be made of the Bhopal gas tragedy. The danger of hazardous chemicals is increasingly progressively. We are not discussing here the top-secret chemicals of mass destruction which can be used in warfare. In fact, there is a

stockpile of thermo-nuclear, chemical and biological weapons which, if leaked, can destroy everything living. In many industries, the manufacturing processes involve hazardous chemicals and suitable steps are not taken to render the wastes and effluents harmless. In many cases, industrial establishments dump these dangerous discharges into the rivers, lakes and seas.

In his war against pests, man has used toxic chemicals in a spirt of over-kill. The total amount of pesticides applied worldwise is estimated to be around 2.5 million tons. Of this, 50-60 per cent are herbicides, 20-30 per cent are insecticides and 10-20 per cent are fungicides. The longterm effects of some of these particularly D.D.T. banned by most countries are alarming. Rachel Garson's famous book "Silent Spring" gives a vivid scenario of the harm caused by misuse of pesticides. It has been reported that use of pesticides is responsibe for the decline in population of white-tailed eagles in Sweden, poisoning of penguins and sea-gulls in Antarctica, death of several thousand sea birds on the Irish coast and tigers getting killed in India. It is estimated that annually, about 500,000 acidental human poisoning take place due to pesticides and 10,000 deaths occur.

In a country like ours, there is still ignorance about the proper use of pesticides which get into the environment and thereby into our food. A random analysis of different food samples collected from the market reveals a high percentage of pesticide residues which are far in excess of permissible residues. Many banned pesticides like D.D.T. are still in use. One argument given in favour of use of D.D.T. is its cheapness. The pesticides in the beginning mwere used on a massive scale with the expectation that they would eventually break down by

natural processes. However, some of them have a long term residual toxicity. D.D.T. itself, is an extremely stable compound which breaks down very slowly in the soil and can exhibit toxic action several years after its initial application.

In fact, this list is endless. For a location specific problems, we can see the case of Calcutta, a metropolitan town.

The town planners see it as urban tragedy. Environmentalists say it is an urban disaster. Job Charnock's city of Calcutta, in its tercentenary year, has become the nightmare of urban planners and environmentalists: its air, water and noise pollution levels have risen far beyond the tolerance levels. By the year 2000 few in this megapolis can hope to lead a healthy life as already respiratory diseases, gastroenteric ailments and the incidence of malaria are common.

According to Dr. Dipankar Chakraborti of the School of Environmental Studies, Jadavpur University, Calcutta has the highest suspended particulate matter (SPM) of 419 ug/m3 (milligram per cubic meter) compared to 254.7 ug/m3 in Athens, 361.2 ug/m3 in Teheran and 22.8 ug/m3 in London. According to the World Health Organization, SPM beyond 90 ug/m3 can pose seriouis environmental problems.

Noise pollution has reached alarming levels. Against the tolerance levels of 60-65 db (decibels) in Calcutta it varies from 75-84 db in Esplanade area to 80-85 db in Binoy-Badal-Dinesh Bagh (formerly known as Dalhousie square). In industrial areas it can be even higher. The biggest source of noise pollution is the chaotic traffic with loudspeakers adding their mite, especially during festivals. According to an Indian Council of Medical Research study, nearly a tenth of the city's population suffers from loss of hearing due to noise pollution.

Pollution of water by industrial wastes has led to a rise in the incidence of gastroenteric diseases. This accounts for the high rate of infant mortality in the slums, where almost half of the city's population lives. Ironically, more and more people are being pushed below the poverty line in the Calcutta metropolitan area.

Dr Sivabrata Chatterjee, environmental consultant, says it is the population explosion and the consequent aggravation of the poverty level that has turned the city into a nightmare. The city's metropolitan area accounts for almost a fifth of the State's population with the density put at 7228 per sq km. The figure rises to a staggering 1,62,866 per sq.km. At this rate, the human, social, administrative and public health problems assume a colossal dimension.

Quoting a study of the Zoology Departmentr of Calcutta University, Dr. Chatterjee says such overcrowding leads to abnormality in human behaviour, social maladjustment and degradation of human life. Illteracy and poor sanition compounded the problems. Crimes, anti-social activities, drug addiction, etc., cause enormous social and administrative problems.

Lack of funds has crippled the municipal and civic services. The bulk of the Calcutta Municipal Corporation's revenue goes to meet its wage bill. The civic body has to rely on the State Government's doles to keep afloat. It revenue falls far short of the requirements to maintain even a semblance of efficient services.

The influx of two million refugees from the then East Pakistan (now Bangladesh) has strained the city's municipal services to the breaking point. Add to this the continuous

influx from neighbouring States and districts. Most people who use the city's civic facilities do not pay taxes. The city is thus caught in its own trap [Mr. Vinayak; West Bengal : Tragedy of Urbanization in THE HINDU SURVEY OF ENVIRONMENT 1991, p.16].

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Keeping the foregoing points in view, the following are the environmental problems facing the country where priority action is needed and if solved could as well lead to sustainable development :

-- Population stabilisation;
-- Integrated land use planning;
-- Healthy cropland and grassland;
-- Woodland and revegetation of marginal lands;
-- Conservation of biological diversity;
-- Control of pollution in water and of air;
-- Development of non-polluting renewable energy systems;
-- Recycling of waste and residues;
-- Ecologically compatible human settlements including slum improvement;
-- Environmental education and awareness at all levels;
-- Updating environmental law; and
-- New dimensions to national security.

Environmental degradation and poverty in our country in particular and in the South in general are strongly linked to global processes of trade, economic relations and arm-twisting politics of the developed countries. There has been a lot of talk about a global environmental crisis and the need for global environmental solidarity, especially by western governments, but no effort to recognise the global inequities that accompany the irratioinality and irresponsibility behind the global environmental destruction. What is worse is that the tools that are being proposed to enforce environmental discipline in the South are the very same tools that the North controls, that is the economic levers of aid, trade and debt.

This introductory chapter is followed by a review of various approaches adopted by sociologists towards the ecological question. Here we have come to realise the need for sustainable development which forms the major theme of the subsequent chapter. The fourth chapter of this work deals with nature of Green Politics in the west and its manifestations in the Third World Countries. The International dimension of the question of environment has been analysed through the various conventions and treaties that are now underway. This has been done keeping in mind the fact that the environmental problems faced by the countries of South are largely due to the growing global economic integration. Instead of promoting interdependency among the sovereign nations of the world, environment is becoming another tool to make the South dependent and disciplined.

CHAPTER - 2

SOCIOLOGY OF ECOLOGY :

A Survey Of Literature

The term "ecology" is derived from the Greek root "Oikos", meaning "house", combined with the root "logy", meaning "the science of" or "the study of". Thus, literally ecology is the study of the earth's "households" including the plants, animals, microorganisms, and people that live together as interdependent components. Because ecology is concerned not only with the organisms but with energy flows and material cycles on the lands, in the oceans, in the air, and in fresh waters, ecology can be conceived as "the study of the structure and function of nature" - it is understood that mankind is a part of nature. Another useful definition that reflects current emphasis is one of the several listed in the Webster's Unabridged Dictionary that reads as follows : "the totality of pattern of relations between organisms and environment".

It is interesting that the word ecology comes from the same root as the word economics, which deals with "housekeeping", in the sense of management of man's works. As we shall emphasize subsequently, extending economic cost accounting to include the natural environment as well as man made structures and developments is an important step in redressing dangerous imbalances between these two necessary components of man's total environment. The scope of ecology has expanded considerably as man has become increasingly aware of these imbalances, an attitude change currently known as the ."environmental awareness movement". Until very recently, ecology was considered in academic circles to be a branch of biology. Now, however, ecology has grown from a division of biological science to a major interdisciplinary science that links together the biological, physical and social sciences. The shift in emphasis has resulted from an increased interest in, and study of, the

ecosystem and global levels. It has been increasingly realized that decisions must ultimately be made at the level of the ecosystem and biosphere if man is to avoid a major environmental crisis. [Odum, 1970, pp. 1-5]

HUMAN ECOLOGY APPROACH OF THE CLASSICAL CHICAGO SCHOOL

Human ecology took its birth in the first quarter of the present century in the urban studies of the "Chicago school" whose leading representatives were Robert E. Park, Earnest W. Burgers and R.D. McKenzi. They extensively used concepts and principles developed by plant and animal ecologists and focussed their study on spatial aspects of community life. Park, the founder of the Chicago school, regarded human ecology, as the study of "the forces at work within the units of urban community - within the limits of any natural area of human habitation, in fact, - which tend to bring about an orderly and typical grouping of its population and institutions". Thus, human ecology was concerned with the territorial arrangements that social activities assume in order to discover and explain the regularisties which appear in man's adaptation to space.

In the area studies of Chicago school, "Community became the central concern. They regarded human community as sub-social and sub-cultural entity, belonging to the "natural order" like biotic plant and animal communities. Also the emphasis was laid on "competition", as in biological ecology, rather than on "co-operation" among community members. As Park pointed out, "the study of community as the natural resultant of the competitive process constitutes the field of human ecology". Thus, human ecology was a specialised field of sociological analysis which investigates - (a) these impersonal, sub-social

aspects of communal structure - both spatial and functional - which arise and change as the result of interaction between men through the medium of limited supplies of environment, and, (b) the nature and forms of the processes by which this sub-social arises and change.

Thus, upon the foundation of community's ecology, it was assumed, was erected a structure of economic, political and moral life. This new form of human ecology proved to be useful beginning, and an impressive body of field-research was conducted in urban settlements. However, as a result, the subject matter of human ecology was defined in residual terms - they took heavily from the natural sciences, opines Michael Radclift in his evaluation of sociological approach to the ecological studies.

MUKHERJE, R.K'S SOCIAL ECOLOGY

Professor Radhakamal Mukherjee is credited with having published the first constructive, systematic, theoretical book on social ecology. Mukherjee defined human ecology as a synoptic study of the balance of plant, animal and human communities, which are systems of correlated working parts in the organisation of the region. His main ecological thesis is that the human regions form the proper unit for studying human relations, because, only within the regional area can one best understand the complex interrelations between culture bearing human groups and the plant, animal, and non-living environments with which they interact. Mukherjee considered the idea of region as an intricate network of interrelations as his most important contribution to a Social Ecology. The region exhibits a complex pattern of adaptations between the environmental factors and the plant and animal communities including human societies. He tried

to interpret "regional structures" (organisation) and analyze changes in this structure, using concepts such as balance, competition, competitive-cooperation, distribution, organisation, stratification and succession.

Prof. Mukherjee's Social Ecology is a radical departure from that of the Chicago school. First, he did not over - emphasize the spatial aspects of regions. Second, he took account of not only competition, but also co-operation. Third, he did not make the erroneous distinction between social and sub-social aspects of human life. Last, he recognized the important role of culture in man's ecological relation. The Chicago scholars excluded the factor of culture from their conception of ecological relations. For example, Park considered such relations - as entirely denied of the cultural factor, and occurring solely at a sub - cultural level. Prof. Mukherjee, in contrast, recognized clearly that "even though ecological relations among men are similar in several fundamental ways to these among lower organisms, they cannot fruitfully be separated from culture, not even for purposes of scientific abstraction. Cultural norms necessarily affect both, specific ways in which they compete and co-operate with one-another.

HAWLEY'S THEORY OF COMMUNITY STRUCTURE

A. H. Hawley also found the Human Ecology approach of the Chicago school as "incompatible with the fundamental logic of ecological theory". We find in Hawley's approach to ecology, the inclusion of social aspects of human community, the aspects of both competition and co-operation (Commensalistic and symbiotic) and reduced emphasis upon social structure spatial patterns. Another merit of Hawley's theory is his emphasis upon man's

possession of culture. Hawley was concerned with technology and social organisation which he regarded as the aspects of culture. He asserted man's possession of culture and its potentiality to modify the environment, recognizing thereby the essential difference between human ecology and biological ecology which his predecessors failed to make-out.

Hawley defined human Ecology "as the study of the form and the development of the community in human population". By community, he meant the functional system of relationships of a territorially based population. That is, Human Ecology deals, with the problem of social organisation, its genesis and development, considering it as a property of a population. Thus, unlike other theorists, he was not pre-occupied with the spatial configuration. He attempted to present a systematic and comprehensive account of Human Ecology dealing with its basic assumptions and concepts.

ECOLOGICAL COMPLEXES APPROACH OF DUNCAN, O.D.

Duncan's Ecology based primarily on Hawley's theory, is more succint and larger in scope.His frame of reference to Human Ecology constitutes four variable concepts : population, environment, social organisation and technology. The focus of interest is on social organisation studied in the context of other three factors. For Duncan, a spatially delimited human population enters into process of continuous and dynamic interaction into environment, in producing its sustenance. And this interaction of adjustment or adaptation is greatly facilitated and complicated by man's possession of culture.

In Duncan's frame of reference,the two variables social organisation and technology became the focus of interest as

aspects of culture. The concept of technology in Human Ecology refers not merely to a complex of art and artifact whose patterns are invested, diffused and accumulated (the process stressed by culturologists) but to a set of techniques employed by a population to gain sustenance from its environment and to facilitate the organisation of sustenance producing activity. And social organisation is conceived as one which arises from sustenance producing activities. It is a property of the population aggregate, is indispensable to the maintenance of collective life, and must be adapted to the conditions confronting a population, including to character of the environment, the size and composition of the population itself, and the repertory of techniques at its command. Hence, like Hawley, Duncan also took the territorially delimited population aggregate as the unit of his analysis.

ANTHROPOGEOGRAPHY APPROACH

OR

HUNTINGTON'S ENVIRONMENTAL DETERMINISM

The relationship between culture and environment was one of the oldest concerns of anthropology. In fact, many of them (for instance, Morgan and other evolutimary theorists) took environment as explanatory factor for the particular way of life and culture.

The determinist viewpoint was best represented by Elsworth Huntington. According to him, environment factors determined cultural phenomena. He even sought to explain physiological and psychological development of man in terms of climatological factors. Nevertheless, even the staunchest believer of environmentalism would include some non-environmental

factors such as ethnic or social traits in their explanation.

CULTURAL HISTORY APPROACH : DARYLL FORDE, WISSLER, KROEBER & MASON

In reaction to environmental determinism, there developed a cultural historical approach mainly represented by Wissler, Kroeber and Forde. Both Wissler and Kroeber argued that environmental phenomena have a limiting but not a determining role or they act as selective factors in the formation of cultural areas. "The influence of environment appears as a passive limiting urgency rather than as a casual factor".

A.L. Kroeber attributed explanatory value, primarily to the historical or cultural influence and to him, environmental phenomena was merely a limiting factor. He emphasized historical phenomena such as acculturation and diffusion and cultural factors.

Daryll Forde rejected the culture-area approaches of Kroeber and Wissler on the reason that the broad general classifications have operational limitations and thus are inadequate for the analysis of culture and environment interactions. He preferred to take up studies of individual societies.

Criticising the environmental determinists and others for their failure to recognise specific histories of societies in the account of their cultural phenomena, Forde, in his famous comparative study of cultural history, of food gatherers, cultivators, and pastoral nomads of the world, stated that - the difference in character and content between peculiar cultures have often been ascribed to differences of material and physical environment, or to differences in the alleged stage of social or even psychological evolution. No one of these several factors can alone explain anything - unless there is realisation of the

existence of that specific history both of internal change and external contact in one or several specific environments, understanding cannot begin. Thus, Forde emphasized unique cultural patterns that develop during the course of long histories.

In this way, environmental determinists and cultural historians constantly look upon at environmental phenomena as being opposed to cultural phenomena and vice versa. This is one of the most severe limitations of these theories. In continuation of these two, there developed Julian H. Steward's approach of Cultural Ecology.

CULTURAL ECOLOGY

In reaction to environmental determinists and anthropological cultural historians, Steward advocated the method of Cultural Ecology "according to which the two concepts environments and culture are regarded as complementary rather than contradictory to each other.

Cultural Ecology is the study of the processes by which a society adjusts to environment. It seeks to investigate whether the adjustments of human societies to their environment require particular modes of behaviour of whether they permit latitude for a certain range of possible behaviour patterns. A major breakthrough and real landmark was Steward's selection of certain variables from the global concepts of culture and environment. He rejected the holistic view of culture, which regards all aspects as culture of functionally interdependent, and stated that the degree and kind of interdependence of culture "which are most closely related to subsistence activities and economic arrangements", which he called "CULTURAL CORE". His

cultural ecology pays primary attention to this core. To him environment acts not only as a permissive but also as a creative agent.

Steward gave three fundamental procedure of the area strategy of cultural ecology which, be followed in his substantive studies. First, the interrelationship of exploitative or productive technology and environment must be analysed. Second, the behaviour patterns involved in the exploitation of a particular area by means of a "particular technology must be analysed. The third procedure is to ascertain the extent to which the behaviour patterns entitled in exploiting the environment affect other aspects of culture".

UNIFIED SINGLE ECOLOGY

Vayda and Rappaport,criticising cultural ecologists for treating human cultural features as something different from non-human behaviour of other species, stated that cultural ecological studies have suffered by restricting to cultural orientation and from its isolation from general ecology. Asserting that culture is a means by which a human population maintains itself in ecological system and therefore culture is identical with the mechanisms of survival of intra-human species, they advocated a single general ecological perspective, "which assigns biological meaning, and biological meaning only to such terms as adaptation, adequate functioning, homeostatis and survival". This is, they emphasized the principles, concepts and laws that apply to both human and non-human organisms. Human populations rather than cultures became basic units of their analysis.

Vayda and Rappaport assested that their single unified ecology had advantages over cultural ecology in making

generalizations of much broader scope and adaptability, especially in taking up energy studies. And about the study of origin or presence of particular cultural traits, they stated that the determinants of cultural traits are to be sought in an interplay of factors that include environmental or behavioural or cultural ones. The cultural factors are generating influences and the environmental factors represent selecting influences. "The former provides the material for selection, while the latter do the selecting". Similar selecting influences may produce different results depending upon the material provided for selection.

COGNITIVE ECOLOGY

Yet another distinct approach regards ecology as a study of people's perception of environment. It seeks to investigate how people perceive their environment, what meanings they attach to it, what values they see in it and finally how does all this knowledge help people in their behaviour within their ecosystem. According to Frake, the proponent of this approach, "successful strategy for writing productive ethnographies must tap the cognitive world of one's informants..... By discovering what one must know in order to classify plants and other ecological components in Hancinee fashion (a people of Phillipines) and how to behave within their ecosystem. The ethnographer shows that extent to which the ecological considerations in contrast, say to sociological ones or cultural ones, enter into a person's decision of what to do".

Thus, in the early stages, the ecological sociology and ecological anthropology were narrowly formulated. The former confined itself to sub-social aspects of community life and

neglected cultural aspects in its studies. The latter was pre-occupied with the "culture-environment" and "environment-culture" controversies.

In the treatment of Hawley, Duncan and Steward and Harris, the subject developed into a systematic study of the interaction between four key variables, viz. population, technology, environment and social organisation. Of course, the subject was explicitly formulated as centering around these four variables, by Duncan. However, same four variables were considered by other scholars also in their studies. Although, they are stressed the interdependence of the four, they nevertheless treated social organisation as a dependent of the other three. Their main concern was to study how culture and social organisation develop ecologically. Of late, some scholars have proposed a single unified science of ecology for the study of both plants, animals and human beings. They treat culture at the same level as that of techniques that plants and animals possess. Interestingly, here one remembers the formulations of Professor K. Devis in his human societies.

Let us now consider the Marxian approach to the ecological question.

MARXIST APPROACH

However different the present day ecological situation may be from what it was in the days of Marx and Engles, their understanding, methods and approach to the solution of the problem of the interaction of society and nature are extraordinary apt and effective today. It is characteristic of a Marxian analysis of the ecological problem to clarify its links with various aspects of social being and to turn to matters

of great social and humanist importance.

In opposition to "Technocratic optimism" and equally "Ecological pessimism" Marxism - Leninism maintains a position of national realism both theoretically and in practice, and orientates on the scientifically substantiated actions and broad international co-operation of scientists, and international co-operation of countries with different socio-economic systems, to tackle the ecological problem.

The survival urge, the drive for profit, are still prevalent in all capitalist enterprises, from small private firms to gigantic industrial complexes. And the survival urge inevitably comes into conflict with the ecological requirements of society and, in some cases, with government policy and its attempts to satisfy these requirements, if only to a certain degree.

Analysis of the ecological problem from the standpoint of historical materialism leads us to conclude that to remove the ecological danger, we must abolish private property relations and class antagonisms. For only then will it be possible to apply on a global scale positive technological methods to eliminate antagonistic ecological contradictions. To quote the famous Marxist ecologist. Barry commoner :-

"In effect ..... we now know that modern technology which is privately owned cannot long survive if it destroys the social good on which it depends - the ecosphere. Hence an economic system which is fundamentally based on private transactions rather than social ones is no longer appropriate and increasingly ineffective in managing this vital social good. The system is therefore in need of change."

This should not be taken to mean that socialist

countries have solved all their ecological problems, that environmental protection is near-perfect, and there are no difficulties of an objective or subjective nature. We have ample of instances - such as Chernobyl disaster in which there was all round damage and destruction. A dialectical approach, however, calls for a deepening and concretization of the aim of ecological preservation and sustainable development (Komarov, B, 1978: The Destruction of Nature in the Soviet Union, London, Pluto Press).

CHAPTER - 3

DEVELOPMENT VERSUS ECODEVELOPMENT

It was during 1960's and 1970's that an emerging ecological consciousness started to question the basic ethos of modern day developmentalism based on "the great promise of unlimited progress - the promise of domination of nature, of material abundance, of the greatest happiness for the greatest number, and of unimpeded personal freedom". (Eric Fromm, 1981 : xxiii). In the beginning much of the concern was centered on the rapid resources depletion, population growth, loss of natural beauty (i.e, public aesthetics movement) and environmental pollution.

The early expressions of the interests in the conservation of natural environment were largely anti-urban and anti-industrial. This kind of consciousness first emerged in the industrially advanced Western countries, especially North America. Population increase, industrial expansion and urban growth changed. American landscape at a large scale. During 1960's people started raising protests and making political troubles for progress at the cost of natural beauty. Argument on behalf of the limitless possibility and technological progress were turned against the technocrats. Citizens questioned - were environmental disfiguring smokestacks and power lines really technologically necessary, or was technological feasibility being set aside in the interest of economic convenience? It was predicted that a continued population growth and resource depletion would lead to the ecological imbalance and would set LIMITS TO GROWTH.

Environment is not just beautiful birds, animals, trees and eco-systems which are being threatened. It is actually the entity on which our entire agricultural and industrial development depends.

Development which is taking place at the cost of

environment can be termed as anti-environment. The price for such a development can not be assessed, but undoubtedly, it will be high. It can go on only at the cost of enormous human sufferings, increased poverty and oppression. Although the ancient environmental change was influenced by climatic fluctuation, the primary cause was human impact as a long lasting, slowly accelerating and uncontrolled process. The cost of this has had to be paid for by all the subsequent generations. People in developed countries felt that unplanned economic growth and increasing population would not help in improving Growth. Its main concern is to link the depletion of natural resources and environmental pollution with the present growth trends in world population. It concludes that - "if the present growth trends in world population, industrialization, pollution, food production and resource depletion continue unchanged, the limits to growth in this planet will be reached some time within the next one hundred years" (Meadows, D.H.,et al - The Limits to Growth: A report for the club of Rome's project on the predicament of mankind. Pan Books London & Sydney, 1972 :23).

The emergence of general social concern for the state of the environment is a recent development of past three-four decades. There is an upsurge of public interest globally under the general rubric "environmental quality". Public responsibility for the state of the environment is presently the product of a number of separate environment related social movements. Many of such movements are in a process of fusion. Among these are the conservation of natural resources, environmental health, human ecology, the protection of natural beauty and urban and regional planning. Diversity of viewpoints within these movements, compounded by numerous specialised environmental concerns (such

as those involving economic, aesthetic, political, military or scientific considerations), have complicated environmental quality as a social issue. The concern for environment has been uniquely wide spread and impassioned. Efforts have been made both at official and unofficial levels to create environmental consciousness. One such effort was UN conference on the Human Environment held in Stockholm in 1972. It was the first major organized effort.

The Stockholm Conference was the first organized effort at global level to deal with the environmental problems. Developed countries approached Stockholm Conference with two major concerns; one, environment pollution problem, second, need for a world wide conservation programme to safeguard the planet's genetic and natural resources. The Stockholm conference was accordingly expected to lead a global campaign to curb pollution, conserve resources and lay the foundation for more careful management of these resources.

Developing countries approached the conference with a different perspective. In developing countries resources consumption was not high and industrial pollution problem were localized, if present at all. But these countries suffered from poverty, infectious diseases, low life expectancy and poor conditions of life; lack of clean drinking water, in adequate shelter, sanitary and health services. These countries were engaged in stimulating change, though faced with shortage of financial resources and skilled labour. Third world intelligentsia argued that their problem was too little industries rather then too much, and that some smoke in the air would be a small price to pay for lifting the millions from gross deprivation. Indira Gandhi correctly observed at the Stockholm

Conference, that when it comes to the depletion of natural resources and environmental pollution, the increase of one inhabitant in an affluent country, at his level of living, is equivalent to an increase of many Asians, Africans, or Latin Americans at their current material levels of living". The biologists Wayne Davis estimates that an American, in the course of his life, will consume at least twenty-five times more waste than Indian or Chinese (Kelley, et.al., 1976 :9). Thus, developed nations have an impact on both the local and global ecosystems far out of properties to their population sizes. In these countries development took place with the values, commitment and attitudes that were "pre-ecological", which is to say they industrialized and urbanized without the needs and problems related to the preservation of a stable atmosphere(Kelley,et.al., 1976: 1-11).

The environmentalism that has emerged in the developed industrial countries and does not refer to the underlying causes of the contemporary ecological crisis has "characteristic that cannot be extended to the Third World and might be considered ethnocentric". (Michael Radllift Development and Environmental crisis, New York, 1984: 45). Therefore, the Third World environmental crisis should be analyzed from a perspective which deals with the underlying causes and the various interlocking processes which have led to the emergence of the contemporary ecological imbalance.

While dealing with the concept of development and environmentalism one finds that there exists an intricate relationship between the two for "the fate of ecosystem is closely related to the nature of the system of production which in turn is firmly linked to the economic system". (Barry

Commoner ; Economic Growth and Environmental quality : Social Policy summer 1985: 19). Development requires the manipulation of resources both natural and human. Its impact is felt on both. That is why, Eco-development emerged as a central theme from Stockholm conference Eco-development was defined as development at regional and local level consistent with the potential of the area involved, with attention given to the adequate and rational use of the natural resource application of technological styles.

It is possible to identify the critical levels at which action will take place. Following relevant new relationships for eco-development has been indicated by Ignacy Sachs, the Director of the International Research Centre for Environment and Development, Paris (Matthews(ed) OUTER LIMITS AND HUMAN NEEDS, 1976: 41-60) :-

(a) Effect on the environment of methods of utilization of resources and of production techniques employed,

(b) Impact on the environment of the methods of consumption of products,

(c) Impact of human settlements on the environment,

(d) Degradation of natural resources due to pollution,

(e) Conditioning of production through the quality of the environment,

(f) Environment as a component of the quality of life.

Therefore, there is no question of proposing a single development strategy. This concept of eco-development aims at defining a style of development particularly suited to the rural regions of the Third World. However, this does not mean that it cannot be extended to include towns. In case of New Bombay, the "Guidelines for eco-development" (Sachs in Matthews, (ed), 1976: 48-50) had following features :-

(1) In each ecoregion, efforts are made to develop those of its resources which as specially needed for the satisfaction of the basic needs of the population in regard to food, housing, health and education, these needs being defined realistically and independently so as to avoid the undesirable effects of copying the consumption style of the rich countries.

(2) As man himself is the most valuable resources, eco-development must above all contribute to his fulfillment. Employment, security, the quality of human relations, respect for the diversity of cultures-or, if one prefers, the development of a satisfactory social ecosystem-are all part of this concept. A certain symmetry is discernible between the potential contribution of ecology and social anthropology to planning.

(3) The identification, exploitation and management of natural resources is conducted from the standpoint of a forward-looking solidarity with future generations. Depredation is strictly prohibited and the exhaustion of certain non-renewable resources - which is inevitable in the long term-is mitigated by the dual approach of avoiding wastage and making the greatest possible use of renewable resources which, if they are correctly used, should never be exhausted.

(4) The negative impact of human activities on the human environment is reduced by resorting to procedures and forms of organizing production which make it possible to take advantage of complementarities of all kinds and to use waste for productive purposes.

(5) In tropical and subtropical regions in particular, but everywhere else as well, eco-development relies on the natural capacity of the region for photosynthesis in all its forms. Since guideline number 1, as applied to energy, tends to attach

great importance to the use of local energy sources and to give preference to means of transport other than the private automobile, one result should be a reduction in the consumption of energy from commercial sources (and in particular hydrocarbons)

(6) Eco-development implies a particular technical style, since the above guidelines cannot in most cases be applied without the development of appropriate techniques.

There are two comments to be made here.

The development of eco techniques will play a very important role in eco-development strategies for the obvious reason that it is at this level that compatibility can be achieved between various objectives - economic, social and ecological - since the technical change would appear to be the principal multidimensional variable in planning.

It would be wrong, however, to assimilate eco-development merely to a technological style. It calls for certain social-organization procedures and a new education system.

(7) Eco-development calls for the establishment of a horizontal authority which is :-

(a) capable of looking beyond the interests of particular sectors

(b) concerned by all the facets of development

(c) able to constantly control the complimentarily of the different activities undertaken.

Such an authority cannot be effective without the effective participation of the populations concerned in the realization of eco-development strategies. This participation is essential for the definition and harmonization of actual needs, for the identification of the productive potential of the ecosystem and for the organization of collective effort to

develop it.

Lastly, it is essential to ensure that the results of the eco-development are not impaired by any plundering of the population concerned, by the intermediaries acting as contacts between local communities and the national or international market.

(8) It is essential to make people aware of the environmental dimension and the ecological aspects of development. As we have already said, it is essential to internalize this dimension and thus to change the system of values and predominant attitudes to nature. This result may be obtained by either formal or non-formal education. The Chinese experience is very instructive in this context. The eco-techniques developed in China do not differ appreciably from this which other peasant societies have known and practiced ; but what is new is the education which precedes and accompanies their application and determines their scope. A new kind of co-operation based on traditional skills, knowledge and expertise must incorporate newly developed techniques or revitalise the use of forgotten materials to draw a link between tradition and the soaring problems of modern reality (Glaeser, B., Learning from China ? Development and Environment in Third World Countries, London, 1987: 8).

In brief, eco-development is a style of development which, in each eco-region, calls for specific solutions to the particular problems of the region in the light of cultural as well as ecological data and long-term as well as immediate needs. Accordingly it operates with criteria of progress which are related to each particular case, and adaptation to the environment, as postulated by the anthropologists, plays an important part. Without universalist solutions and panacea-type

formulas. Instead of placing too much emphasis on external aid, it relies on the capabilities of human societies to identify their problems and devise their own original solutions to them, though drawing on the experiences of others. It rejects passive transfers and the spirit of imitation, and gives pride of place to self-reliance. At the same time, it also avoids the pitfalls of extreme ecologism.

Since Stockholm conference there have been several important developments at international level to deal with the crisis of development and environment. Even before Stockholm meeting UNESCO had launched its "MAN AND BIOSPHERE" programme in 1971. It was aimed at identifying environmental problem areas and developing interdisciplinary research methods for better environmental management. The research enterprise was to provide the kind of information that could be used to solve the problem at hand.

Immediately following Stockholm conference, the United Nations Environmental Programme (UNEP) was founded as a supra-national world ecological organization. In spite of its subordinate position within the structure of United Nations, UNEP which is not an independent specialised agency but merely a specialized institution of United Nations Economic and Social Council, has been instrumental in achieving new international ecological agreements to stop the general trends of ecological degradation.

World Conservation Strategy (1980) gave a boost to the concept of sustainability. Its programme has three priorities : First, maintenance of ecological processes of life support systems ; Second, sustainable utilization of resources ; and Third, maintenance of genetic diversity, the programme explicitly

linked the first priority to second and third.

In 1983 World Commission on Environment and Development (Brundtland Commission) was established as a result of increasing concern with environmental problems in developing countries and the failure to relate these problems to development issues. It was headed by Noway's Prime Minister, Mrs. Brundtland and had twenty two people from both developed and developing countries. The objective of the commission was to focus on environment problems rather than the effects of environmental degradation. The main objective was to undertake public hearings in various countries, at which members of public could give evidence about the relationship between development and the environment.

The report of the commission draws attention to what it calls a 'standard agenda' of environmental concern which it wants to call into question. This agenda commits a number of errors, which the Commission seeks to correct. First, it is usually the effects of environmental problems that are addressed in public documents. Second, environmental issues are usually separated from developmental issues. Third, critical issues, such as acid rain or pollution usually discussed in isolation as if solutions to these problems can be found in discrete areas of policies. Fourth, usually a narrow view of environmental policy is taken which relegates environment to a secondary status as it is added to other more important development issues.

During the 1980's, as the knowledge of the ecological crisis grew, numerous individuals, Non Governmental Organizations (NGO's), courts and government agencies tried to deal with the emerging problems. There has been a tremendous internationalization of the world Environment Movement since the

beginning of the last decade. No longer do environmentalists, and especially Western environmentalists, speak only of national environmental problems. Environmentalists today routinely address, and make every effort to influence, problems that occur in other countries or world wide. The need of international co-operation arises because of the fact that the over-consumption at one place creates problems elsewhere. Moreover, nations are not isolated. The actions of one country may affect the environment of a neighboring country.

In recent years, numerous efforts have been made to bring governments to negotiating tables to thrash out legally binding international conventions and protocols to deal with transnational environmental problems. Two conventions dealing with trade in toxic wastes and the protection of the Ozone layer have already been prepared, signed and ratified by numerous countries. Another two are currently being negotiated - one on global warming and another on bio-diversity conservation. Besides, a third one on forests has also been proposed.

Simultaneously, international aid and trade are getting increasingly linked to environmental concerns. The World Bank, UNEP, and UNDP have set up a Global Environmental Facility and numerous aid giving countries are putting a high priority on environmental projects - ranging from tree planting activity to pollution control. In the area of international trade, the recent decision of governments under auspices of the Convention on International Trade in Endangered Species (CITES) to ban trade in ivory, is an excellent example of how international trade is increasingly being used to enforce global environmental discipline. Northern environmentalists are quick to point out that if their yen, marks and dollars are being used to destroy

environment, they have every moral right to withhold those yen and dollars. And if indeed they can change their trading patterns to bring about better care and concern for the environment in a third world country, then why not ?

Indeed, seen in this way, this growing global concern for nature and a rising spirit of international environmental solidarity ought to be applauded, almost as if a "new morality" has at last sprung upon us. But there are several dangers in this approach.

If the world were seriously to address the problems of global environmental management together with the equally urgent problems of economic and political inequalities - the co-existence of wealth and poverty, power and powerlessness, and knowledge and ignorance - together with the problems thrown up by environmental destruction, all of which are indeed quite related to each other, the world would no doubt become a better place to live in. But if the global inequalities were to continue - that is, abysmal poverty was forced to co exist with extraordinary wealth and over consumption - then the emerging global environmental management system, which can also be called a new international ecological order, can itself become a source of continuing inequality and poverty, and erosion of poor countries sovereignty. To quote Mrs. Indira Gandhi, "Poverty is the greatest polluter". In such a "new order", the interests of the future generations of the rich, regardless of where they are in the North or the South, will get protected while the present generations of the poor will not even be assured of bare survival. Such a world can only be more violent, inhumane and inhospitable. It is doubtful if the global environment, too, would get protected in this way. Human's inhumanity to nature

cannot be controlled unless the world is able to reduce human's inhumanity to other humans.

CHAPTER - 4

GREEN POLITICS

An important question to ask is why is the environment becoming such an important and powerful issue in the West? Why did leaders like Margaret Thatcher, who have held diametrically opposite views, suddenly become "green impregnated ?" The reason is simple. In the Western world, environment is today hard politics. In most countries of the West, green issues now poll anywhere between five to 15 per cent of the total vote. And leaders in electoral democracies cannot afford to ignore these numbers.

Green politics grew out of deeply felt principles long before there was any thought of forming a party. Among the broad spectrum of citizens who rallied to stop the spread of nuclear reactors, the pollution of rivers, and the death of the forests during the mid 1970s arose and understanding that we are part of nature, not above it, and that all our massive structures of commerce - and life itself - ultimately depend on wise, respectful interaction with our biosphere. Any government or economic system that ignores that principle is ultimately leading humankind in to suicide. The more that people perceived the interactions among principles of ecological wisdom, a truly secure peace, an economy with a future, the grassroots level, the more they noticed the absence of such ideals among the existing political parties.

The Greens begin their program by explaining why a new politics is necessary :-

"The Establishment parties in Bonn behave as if an infinite increase in industrial production were possible on the finite planet Earth. According to their own statements, they are leading us to a hopeless choice between the nuclear state or nuclear war, between Harrisburg or Hiroshima. The

Worldwide ecological crisis worsens from day to day : natural resources become more scarce ; chemical waste dumps are subjects of scandal after scandal; whole species of animals are exterminated; entire varieties of plants become extinct; rivers and Oceans change slowly into Sewers; and humans verge on spiritual and intellectual decay in the midst of a nature, industrial, consumer society. It is a dismal intransience we are imposing on future generations ..... We represent a total concept opposed to the one dimensional, still - more - production band of politics. Our policies are guided by long term visions for the future and are founded on four basic principles : Ecology, Social Responsibility, Grassroots Democracy, and Non-violence. [Spret nak, & Capra Fritjof ; Green Politics : The Global Promise, Paladin, London, 1985, p. 28]

The electoral potential of the Greens in Europe was demonstrated in the elections to the European Parliament in June 1989. Across Europe, green parties increased their votes, in some cases substantially. In Britain, the Green Party received 14.9 per cent of the vote, the highest ever recorded for a green party in an election at a national level. In France, the Greens received a similarly sensational 10.9 per cent. Thus, there is enough evidence to suggest that green parties are not a transient phenomenon.

As Sara Parkin, an influential spokesperson for the British Green Party, put it in her February 1989 book, entitled, "Green Parties : An International Guide","By any standards the speeds the speed with which green Parties have established themselves on the political scene has been phenomenal. We can now say that in less than nine years

Greens have been elected to 11 national parliaments across the world. At first very few people noticed when Daniel Brelaz took his seat in the Swiss parliament in October 1979, and not many more were paying attention in 1981 when nine members of Agalev and Ecolo entered the Belgian parliament. But by 1983, when 28 members of Die Grunen were elected to the German Bundestag and two Finnish Greens to the Eduskunta, quite a lot of people began to wonder about the green wave that seemed to be breaking over European politics.

Since then those pioneering green parties have seen colleagues elected to national parliaments in Australia, Italy, Luxembourg, Portugal, and Sweden.

"Apart from the attention-grabbing breakthrough of Greens entering national parliaments, there has also been a groundswell of Greens moving into local politics. Greens now sit at some level of local government in almost every West European country around the world; local Green groups are not only multiplying in number but their activities are also becoming more influential". [Quoted in Agrawal, Anil & Sunita Narain ; Towards Green World : Should Global Environmental Management be built on Legal conventions or Human Rights? [Centre for Science and Environment, 1992, p. 106]

The idea of forming political parties rather than pressure groups to defend the environment is almost 20 years old. In 1972, New Zealand formed the first national ecological party, called Values. Britain followed suit one year later with a very small party called People, formed by citizens in the industrial town of Conventry. Both parties shared an identical motivation. The founders of these two parties sought to make a radical political shift towards a

Zero-growth, conservationist society. The two parties found few imitators, however, and remained alone in their quest for some time.

Later in the 1970s, Europe - wide protests against nuclear energy led to the second wave of green party formations. In West Germany, rapid progress towards the establishment of a new national party was made in the late 1970s. The early formation of the German green party, Die Grunen (the Greens), was a 'particularly delicate political balancing act, uniting a broad spectrum of antinuclear and ecological activists.

The rewards of the arrangement were considerable. Under West German law, any party polling more than 0.5 per cent of the votes in national elections is eligible to receive significant public funds. In 1979, the Green's tally of 3.2 per cent of the vote in European elections entitled it to a payment of 4.8 million Marks. German law also provides that any party polling more than 5 per cent in either national or state elections must be represented in parliament. So, the incentives for ideologically diverse groups to join togather to form a green party were good, and, by 1983, the Greens had entered both state and federal parliaments.

Four groups of green parties exist in Western Europe and can be distinguished according to their current standing and political achievement. The first group consists of parties that are already well established at the national level. Despite recent setbacks, Die Grunen remains the most potent force in the group. Die Grunen's defeat in the federal elections of 1990 was largely due to the special circumstances that prevailed that year. The issue that had dominated German

politics since early 1989 was unification and green issues were sidelined. Nevertheless, the Greens are still represented in the federal parliament by the East German candidates who, in their coalition with the citizens' movements, received more than five per cent of the votes in East Germany.

A number of other countries in Western Europe have well established green parties. In Finland, the greens have been represented in the national parliament since 1983, and, in national election in March 1991, they managed to increase their proportion of the vote from 4.0 per cent to 6.3 per cent. In Austria, the greens entered parliament in 1986 have retained their seats by polling 4.8 per cent of the vote in October 1990. In the Netherlands, green politics has had a trublent history. Although a green party was formed in 1983, it has remained marginal. In Luxembourg, a green party won its first parliamentary seats in 1984, and in the 1989 national elections, three green lists attracted 8.5 per cent of the voters and won four seats in parliament. In Belgium the two green parties, AGALEV and ECOLO, represent the two main regions in Belgium and thus, are not competitors but work closely together. The parties' European election results reveal a growing national green electorate of 13.9 per cent.

Other Western European green parties have entered their national parliaments only recently and appear to be on a slightly less secure footing. In Italy, a national green party has still not emerged, but a federation of autonomous groups has been successfully established. It first entered parliament in 1987 with 2.5 per cent of the vote. Sweden elected its first green members of parliament in 1988.

However, they have been kept out of government because they have had to compete for seats against both a reformed communist party and a central party with strong environment records. In Greece, the green party was formed only shortly before the European elections. Ireland's, green party celebrated its biggest successes in 1989. In national elections that took place on the day of the European elections, the party managed to send its first member to the national parliament by polling 1.5 per cent of the vote. The green party in Portugal has been aligned with the Communist party since 1981 and in this way has managed to obtain parliamentary representation since 1983.

There is a third group of green parties - ones that have so far failed to gain any representation at a national level. In some Western European countries, green politics has been underdeveloped, in others such as France and the United Kingdom, green politics holds appeal, but the electoral conditions for minority parties are very hostile.

Since their 1989 success, the British Greens have been unable to maintain the same level of support. Their position in the opinions polls has dropped, and their membership after rising to almost 20,000 in 1990, has fallen back by about one - third. The Greens chances of winning a single seat in the next general elections are remote.

A fourth group includes those that have had little success despite electoral system with proportional representation. Norway's greens party participated only in the 1989 parliamentary elections, polling just 0.4 per cent of the votes. In Denmark a variety of small left and liberal parties have been competing for the same ground.

Greens in Eastern Europe

Eastern Europe is facing one of the most challenging environmental crises. When the communist government started to crumble, greens begin to emerge. But the scale of the economic crises and the return of old political divisions based on ethnic and national identities have hampered immediate green successes.

In Eastern Europe first green party appeared in Poland in 1989 but now only a ragtag organisation seems to be left. Green politics in hungary has been dominated by the debate about building hydroelectric dams on the Danube river. Although the green party was officially formed in November 1989, it did very badly in the May 1990 elections and failed to win any seats.

In Czechoslovakia, the greens are more strongly established. In Czechoslovakia, the green party won seats in the original assembly and 3.5 per cent of the vote. The Czechs, on the other hand, have been plagued by problems such as the unsuccessful attempt by former member of the secret services to set up a Prague branch of the Greens. In Bulgaria, a coalition of opposition parties, including the Greens, polled 35 per cent of the vote in June 1990 elections and the Greens took 18 out of 400 seats in the national parliament.

Green parties are particularly strong in the Baltic states, where they regularly poll between 6 and 10 per cent, and are represented in all three Baltic parliaments. There are also green parties in Georgia and the Ukraine. The situation in Russia is highly confusing, however. Because a variety of Green parties and groups have been springing up and are often in competition with each other, all attempts to

coordinate a Russian green party appear to have failed.

Greens Worldwide

Green parties have now spread beyond Europe to all five continents, but the cradle of green parties is in Oceania. The Values party of New Zealand, formed in 1972, has had a very chequerd history. After the party polled 5.6 per cent in 1975 elections, Values popularity declined sharply and almost ceased to exist by the late 1980s. Recently, the party, which changed its name to the green party of New Zealand, polled 6.8 per cent of the vote. In neighboring Australia, green politics has made its biggest mark on the island of Tasmania, where green independents made a break through in 1989.

Japan has seen the formation of various green lists, but all have operated at a local level only, and attempts to set up a national green party have so far failed. One of the most recent party to emerge is in Mangolia. In Africa, only Egypt has acquired a green party, which the government allowed to be legally constituted in 1990. The Canadian Greens, who are strongest in British Columbia, were organised in 1983 but have yet to make their mark at the national level. No national green party has ever been organised in the United States despite the prominence of the environment lobby.

The future of the Greens

Green parties are facing a number of important problems. One obstacle is the lack of unity among different green groups and lists, which often splits green vote in many countries. The first and probably most important conflict exists between green and red-green groups. In Greece, Italy,

Luxembourg, and Spain, representatives of both types of green parties ran against each other in the European election. In the Netherlands, the conflict between the two types of green parties has been particularly bitter. The role of Rifht wing ecological parties, such as those in Germany, Spain, Austria and Switzerland, has also been source of conflict.

Green parties still depend heavily on the salience of environmental problems. But this dependence is an important weakness. For example, the wave of "greenness" that has swept Britain since 1988 has largely saturated the public. To survive, green parties have to build a stable electorate that identifies with the party and votes for it on a regular basis.

Ultimately, the future of the greens will depend on their ability to deliver environmental improvements. Green parties are indirectly influencing governments simply by attracting votes away from the established parties, even if the Greens are not strong enough to have a bargaining position. Once the opportunity to share governmental responsibility arises, however, the temptation to grasp it is likely to be very strong. Where there is a real prospect of sharing governmental responsibility, the Greens face a clear dilemma. Refusing to join coalitions with established parties could make them rather unpopular with their electorate, which is eager to see the fruits of green activity. On the other hand, sharing governmental responsibility requires the Greens to make compromises that may be rather unpalatable. Green realpolitik could come as a shock to many green voters (Wolfgang Rudig, "Green Party Politics Around The World" in the

Environment, Oct 1991; quoted in Agarwal & Narain, 1992: 104-105).

The green vote

The character of the green vote, however, is still little understood or analysed. Traditionally, environmentlists have been regarded the radical fringe of consumerist Western societies who reject unfettered capatilism and fight for better and safer living conditions. The environmental movement grew in the West in response to the increasing technocratisation of the society and the failure of "electoral" or "representative" democracy to meet the true aspirations of the people. Obviously, the generation which grew up with a sense of outrage against environmental pollution and threats to public health, born out of unbridled green and lack of public accountability of the political industrial system, has now entered the decision-making and analysis centres and is bringing its concerns to bear. But that would be an inadequate explanation of the rapid politicisation of environmental issues, concerns that now get converted into sizeable bank of votes.

Environmentalists are usually professionals : journalists, academic, voluntary activists, lawyers and young bankers. And not surprisingly, the Western environmental movement has limited links with local farming lobbies, trade unions, industrial workers, miners, loggers or even local aboriginals and natives. Indeed, Western green movements have often faced hostility from trade unions and farmers organisations.

The service sector, by its very nature, is divorced from the dirt and grime of agricultural and industrial production activities in the economy. With this kind of detachment, Western environmentalists can afford to be

altruistic, because environmental issues do not threaten their own immediate consumption and jobs. Environmentally conscious professional are quite happy to espouse environmental causes, especially those of the nature conservation and animal welfare kind or those which, in some woolly way, talk about saving the planet.

The environmental politics is in a real sense the first sign of what politics is going to be like in a post-industrial Western society or Technograpic society. The occupational structure in the industrialised countries has been changing rapidly towards the service sector. Even more remarkable is the occupational shift towards what are called "Information - related occupations" or the "Knowledge Sector" (Bell, Daniiel, The Coming of Post Industrial Society; 3-47).

This occupational shift has significant implications for the politics of environment. With occupations in the primary and even secondary sectors declining, and with those in the service sector especially those in the knowledge sector, increasing, there are today large number of people who are extremely important as economic and political actors, both in terms of skills and numbers, but who are not directly linked with systems of production in the traditional primary and secondary sectors, that is to say, the environmentally destructive sectors.

Moreover, member of the new occupational complex do not seem to have deep rooted links with the mainstream political parties. In Britain for instance, all coaiminers and steelworkers usually voted labour while all lawyers and civil servants voted for the conservatives. Now people are more mobile and they see voting green as an expression of that mobility.

ROLE OF VOLUNTARY AGENCIES

Well known Western environmental groups like Greenpeace, Friends of the Earth and others have become mass membership organisations and the large public support ensures them a very sizable financial base. Some US NGOs now have an annual budget of ever $100 million a year. And, if anyone wants to work on Third World environmental problems, Western aid agencies and the United Nations, of course, have reasonably large sums to provide financial support. So environment is now an "in" thing and it also brings money, jobs and political clout.

Some nationwide environmental NGOs in Europe can now claim one to two per cent of the country's adult population as their members. A leading Swedish NGO, for instance, counts about two per cent of the total Swedish population as its members. (equivalent to about four to five per cent of the all households). The Danish Society for Conservation of Nature has 25 per cent of the nations households as its members - more than the combined membership of all political parties put together. Greenpeace in Holland has nearly 10 per cent of the country's population as its members.

This has greatly increased the ability of the Western groups to reach out into the media, to campaign and fight for environment causes, and, at times, even garner votes against political leaders. US president George Bush was recently greatly hurt when American NGOs gave him a bad rating in a score card that gave higher marks to European leaders. The Economist reported that no politician can now afford to ignore the burgeoning environmental lobby and called it "the 500 pound gorilla". Cambridge Reports, a firm of opinion

pollsters based in Massachusetts, claims that 14 per cent of the US population now plays an active part in green organisations. America's National Wildlife Federation (NWF), the worlds biggest environmental group, had about four million supporters in 1980; it now has six million members and money to match. There are now around 30 mainstream green groups worldwide. Best known are Greenpeace, the Woirdwide Fund for Nature and Friends of the Earth. In Britain, Greenpeace has 300,000 members and Friends of the Earth 200,000.

The Economist described the 15 per cent vote for the British Green party as the greatest increase in any party's share of the vote in British electoral history. Every day leading up to the European parliamentary election. British newspapers had reported one environmental disaster after another - listteria or samonella in the country's polluted water systems, the deaths of thousands of seals off the British coast etc - making the British acutely conscious of environmental issues. [Anon 1990, Seeing the Green light; Business and Environment in The Economist, October 20,1990 London and Anon 1990, Green with fear in The Economist April 21, 1990, London].

Membership of Environmental Organisations

	Membership		Budget 1989
	1970	1990	($ m)
National Wildlife Federation	2.6 m	5.8 m	85.3
Sierra Club	114,000	566,000	32.0
National Audubon Society	105,000	515,000	35.0
Wilderness Society	66,000	363,000	20.0
Environmental Defense Fund	10,000	150,000	15.0
Greenpeace*	-	2 m	NA
Natural Resources Defense Council**	-	140,000	16.0

*founded 1971
** founded 1970
Source : THE ECONOMIST, LONDON

THIRD WORLD ENVIRONMENTALISM

All this raises enormous issues for Third World environmetalists. There are, of course, numerous parallels between Third World and Western environmentalists - many of them are professionals, journalists, writers, voluntary activists, researchers and analysts. In democratic Third World countries, they have access to the courts and the media and to some levers in the government. Their base is also largely within the educated, urban middle class. But this is where the parallel ends. Third World environmentalism cannot go further, given the occupational structure in developing countries, unless it can work with issues that concern the

poor in both urban and rural areas. in democratic developing countries this becomes even more important, otherwise a schism will grow between Third World environmentalists and democratically elected Third World politicians, amongst whom concern of poverty and development must, of necessity, predominate. Both Third World and Western environmentalists have tried to gain credibility for their cause by projecting grassroots "environmentalists" like the Chipko leaders in India or rubber tappers' leader Chico Mendes in Brazil. These ploys may work well with the media but will never help to build up a strong political base within developing countries. For that, Third World environmentalists will have to build up crediable and practical concepts of "alternative developments" based on a equitable and sustainable use of natural resources and develop links with appropriate interest groups in society.

In all this, Southern enviromentalists face a major challenge on home ground. They face governments which, just like the Western governments , can be extremely hyprocritical about their own contradictions. Faced with the dominance-dependence structure of the international system and finding itself in a dependent position, the Third World elite will cry itself hoarse in a dependent UN and other fora a more egalitarian global structure. But, within its own national dominance dependence structure, it does noting to alter its own dominant position. Thus, Third World environmentalists must push their national governments to relinquish some of their powers and wealth to strengthen local communities and reverse the unequal distribution of environmental assets.

In India both government agencies and NGO's have been instrumental in creating consciousness about environment. Role played by voluntary agencies has been significant on two counts : first, these agencies have perceived and analysed the environmental problem for a perspective different from that adopted by government agencies. The government agencies, allegedly, end up blaming the poor for environmental degradation. While voluntary agencies hold overconsumption by the elite and government policies responsible for deterioration of environment. Voluntary agencies exhort the people to appreciate alternative government. Second, voluntary agencies have been operating at grass root level and as a result have been successful to a large extent in spreading environmental awareness among the people.

The number of voluntary groups actively engaged in environment today in India is larger than in any other third world country. The 1989 Directory of Environmental NGO's in India lists 908 (The Hindu Survey of the Environment, 1991; p.43).

The national policies on education stated that there was a paramount need to create a consciousness about the environment and it must permeate all ages and sections. Consequently, NCERT developed a national curricular framework with flexibility of content and approach keeping in view the local requirements. Centre for Environment Education (CEE), Ahmedabad is involved in the task of preparing flexible material that can be easily adopted to local conditions. This material through teacher training workshops can be supplemented with local examples.

The national museum, Calcutta and the Madras museum

house have large collections of natural and historical specimen. National Museum of Natural History, Delhi, provides visitors an exposure through exhibition galleries, discovery activities and competitions. Mobile exhibition help to extend these facilities to remote villages, cities and towns where such facilities do not exist.

Different agencies have been using diverse approaches and methods to create environmental consciousness. Street plays, folk dances on environmental issues, rallies, marches, walks, runs and satyaghras have been adopted by several organisation as a means to creating awareness and interest among the public. Use of animals to attract the peoples attention to environment related issues have been effectively taken advantage of by the Madras snake park and by Sunderban at Ahmedabad. Regular Snake shows exhibitions, slide shows and demonstrations are used by these centres. Some Science popularization organizations are also working for the cause of environment. One such organization which has been quite active more recently is Kerala Shastra Sahitya Parishad (KSSP).

Centre for Science and Environment, Delhi has made a valuable contribution in creating environmental awareness. CSE has brought out three reports on the state of Indian environment. First citizens report (1982) brought home the fact that it is poor who suffer most when the environment degrades, in other words, if we did not strive to make development harmonious with environment, development would lead not only to environmental destruction but also to injustice. Second report dated 1985 - built on the first highlighted the plight of politically marginal groups like

women, nomads, fisherfolk and tribals as a result of environmental degradation and loss of control over their natural resource base. The second report went on to elaborate how the poor depend on a biomass based economy for their survival. Third citizens report - titled "Floods, Flood Plains and Environmental Myths" deals with the relationship between deforestation of Himalayas and flood problem in the plains. It was very recently published.

CHAPTER - 5

THE INTERNATIONAL DIMENSION OF THE ENVIRONMENT QUESTION

As it stands today, our common future is sharply divided between two antagonistic parts. We live in an extremely divided and disparate world. Abysmal poverty and hunger coexist with extraordinary wealth and over consumption; unprecedented knowledge with widespread illiteracy; and, incredible technological and military might with abject powerlessness. At the same time, the growing environmental crisis is forcing the citizens of the world to realise that the world is one.

Humanity never needed a global social contract more than it does today. The forthcoming United Nations Conference on Environment and Development to be held in Brazil, with probably over a hundred world leaders and over a thousand non-governmental groups in attendance, provides us with a historic opportunity to formulate precisely such a global contract. With the nations of the world jointly facing a global ecological crisis but sharply divided in economic terms and with possibilities for conflict immense, there never was a greater need for humanity to live as one.

Every citizens on earth wants his or her environment used and managed in a sustainable manner. But the divided economic conditions force different environmental management objectives on different nations and communities. While the rich and well fed are more interested in the environment because they want to secure their future, the poor and dispossessed, caught in a daily struggle to survive, are more interested in the environment because they want to secure their present.

There is an enormous difference in the economies of developing and industrialized countries in environmental terms. The former continue to depend heavily on the exploitation of their natural capital to meet their current consumption needs

and generate the investments needed t build up a stock of human-made capital and a knowledge and skills resource base. The industrialized countries on the other hands, have already gone through a prolonged phase of natural resource exploitation, both within their own countries and outside, to built up a massive base of human-made capital, knowledge and skills. The differential situation today leads to several differences in their economic and ecological conditions and approaches :

(1) Environmental problems in developing countries largely result from a greater stress on the natural resource base (for example, over-exploitation of ground-water and surface water, land degradation, deforestation etc.) whereas environmental problems in industrialized countries largely result from problems of pollution and disposal of waste.

(2) Whereas environmental management in industrialized countries can afford to take a conservationist approach with respect to land, water and forests. In developing countries, given the extreme pressures on the natural resource base for daily survival, on one hand, and economic growth, on the other, only an extremely well thought out, holistic strategy of rational and sustainable resource exploitation will be able to reconcile environmental constraints with development requirements. But tradeoffs can be carefully considered in poor economies and a long-term view adequately incorporated if they can generate more than what the need for current consumption. In other words, they need adequate financial space for sustainable development. (CSE, 1992, THE CSE STATEMENT ON THE GLOBAL ENVIRONMENTAL DEMOCRACY, p.1)

Unfortunately, the global environmental governance

system or the new ecological order that is emerging is unmindful and uncaring of these different priorities. Recent years have seen strenuous efforts by the governments and people of the North to bring about better global management of the world's resources; starting with the Montreal protocol to protect the ozone layer to the proposed conventions on climate change, bio- diversity and tropical forests. Simultaneously, international trade, aid and debt are becoming green linked, with the rich in the world demanding that their dollars and yen should be spent in the South only in a way that secures our "common future". Environmental management is, thus, being thrust upon the developing world using the existing levers of power available with industrialized countries. There is no effort to create new levers of power that would allow all citizens of the world to participate in global environmental management. Today, the reality is that Northern governments and institutions can, using their economic and political power, intervene, say, in Bangladesh's development. But no Bangladeshi can intervene in the development processes of Northern economies even if global warming caused largely by Northern emissions may submerge half the country.

Even worse, the new green twists and turns in international decision making are being made with claims to a new morality of global environmental solidarity. This must be the biggest irony in human history : those who have been the most immoral in environmental terms are now preaching to those who have been largely frugal and sparing. It is obvious that this moralizing must stop and be replaced by honest actions.

The agenda before the Brazil Conference, as yet, is largely Northern and intensily political. It makes no more than a token attempt to deal with the issues of survival and the

financial and economic space that the struggling millions of the developing world desperately need. The Northern agenda, firstly, sectoralises environmental issues to separate them from the global economic and cultural processes that lie at their heart - addressing only the symptoms and not the causes. It refuses any serious discussion on the restructuring of international economic relations even to the extent they relate to environmental issues. It further puts the control of environmental resources in the hands of the rich, the very same people and institutions who have been most responsible for global environmental havoc. So the Montreal protocol as well as the proposed climate treaty discuss the sharing of the burden of technological change to repair the global environmental but shy away from talking about an equal sharing of the resource, our common atmosphere, amongst all citizens of the world.

There is also an undisguised attempt to divert attention by trying to define what are global environmental issues, and therefore require global negotiations and commitments, and what are local issues and therefore best left to national action. So desertification and soil erosion have become local problems regardless of the fact that they affect millions today while ozone depiction, which is the result of the over consumption of a few, has become a global issue. The Global Environmental Facility of the World Bank, UNEP and UNDP, set up as a major global initiative to transfer funds to the developing countries in the area of environment, lends only for so-called global issues. This division of issues is intensely political. It denies the local dimensions of the global and the global dimensions of the local. And it distorts the economic and environmental priorities of the developing world.

This partisan system of global governance may well secure the interests of the future generations or the rich across the world, but it will care little whether the present generations of the poor can even be assured a bare survival. Such a world can only be more immoral, inhumane and inhospitable.

If all citizens of the world have to manage the planet Earth as equal partners, then the global environmental agenda itself must be changed. It will have to recognise, firstly, that for developing countries the environmental challenge is now to use the resources of the environment, often at far higher rates of productivity than at the moment, but in a sustainable manner. In the South, for instance, forests are not wilderness areas but habitats for the poorest of its poor.

Secondly, that in the South, environmental degradation is strongly related to the global processes of trade and economic relations. Environmental degradation, for instance, is intrinsically linked to the world market system which is rapidly growing and integrating the use of the world's natural resources. The world market system fixes product prices in a way that increasingly allows the North to capture the ecological costs of production and built it into its pricing structure. Enormous investments have been made by Northern countries in pollution control and all consumers of Northern products across the world now pay the cost of those investments. But the developing world is not being allowed to capture the ecological costs of production. The terms of trade of its various minerals and biomass products -- tea, coffee, cocoa, bananas, pineapples, peanuts and prawns -- have been steadily declining even though they are produced at enormous environmental costs. How can developing countries make an investment in their future if even

the prospects for today are uncertain ? (CSE, 1992, CSE STATEMENT ON GLOBAL ENVIRONMENTAL DEMOCRACY, p.2)

Before discussing the agenda before the Brazil Conference (Earth Summit), it is worthwhile to see in detail the following attempts to Global Environmental governance :-

- THE OZONE TREATY
- THE BASEL CONVENTION
- THE CLIMATE CONVENTION
- THE BIODIVERSITY CONVENTION

All these environmental negotiations are essentially about the use of natural resources - some of which are truly global commons (like the atmosphere and the Ozone layer) while others are largely national resources, over which nations have sovereign rights (like forests, biodiversity, and the folk knowledge about the biodiversity). These are issues of global equity in the use of global resources and the basic, inalienable and equal rights of all human being to survival and development. At a time when natural resources in developing countries are being consistently "devalued" within the world market system - through rising debt on the one hand, and declining terms of trade of land and water - based products, on the other - it sounds callous to preach long term environmental care and concern while neglecting short term concerns (that is, immediate economic and ecological needs) of the developing countries. Developing countries have both a keen interest and a serious economic stake in these negotiations.

THE OZONE TREATY

The first of recent spate of conventions aiming to govern global industrial activity is the convention to protect the ozone layer. The convention, known as the Vienna Convention for the Protection of the Ozone Layer, 1985, which has since been followed by the Montreal Protocol on Substances that Deplete the Ozone Layer, was signed in 1987 by the United States, the European Community and 22 other countries. But this attempt to police the world's atmosphere soon turned into an acerbic North-South issue as two of the leading developing countries, India and China, have till recently not signed the treaty calling its provisions unfair and discriminatory.

The ozone issue was first noticed worldwide in 1985 when a British scientist reported that a hole in the ozone layer had been occurring over Antarctica every spring since 1979. Teams of scientists sprang into action and what was earlier alleged was now confirmed: that the ozone layer was being depleted far more rapidly than had been forecast and that the cause of this was the presence of human made chemicals, chlorofluorocarbons (CFCs), in the upper reaches of the atmosphere.

The ozone layer provides a fragile shield for the earth against harmful ultraviolet radiation (UV-B) from outer space. This "shield", if compressed to sea level atmospheric pressure, would be only a few millimeters thick but it is vital to life on earth, as we know. Scientists have warned that if this hole in the sky is not healed, it could lead to enormously increased skin cancers, cataracts and depress the human immune system.

According to scientific reports, the tiny amounts of radiation which today manage to escape the shield already cause

considerable harm - a grim forewarning of the dangers to come. Some 6,00,000 new cases of non-melanoma skin cancers, the commonest and less dangerous variety, are reported each year in the United States alone. Worldwide the figures are much higher. But more alarming is the increase of malignant melanoma, a more deadly form of skin cancer.

The ultraviolet ray does not just cause cancer: it also impairs the body's ability to fight it off. It supresses the efficiency of the immune system, making it easier for tumours to take hold and spread and makes people more vulnerable to infections and parasitical diseases.

Damage to the ozone layer will also affect crops and fisheries, scientists warns. Research on particular plants has shown that UV-B radiation affects their ability to capture light and retards photosynthesis. Screening of more than 300 different plants and crops found that over two thirds were sensitive to UV-B radiation. Soyabean yields, for instance, have decreased, 20 to 25 per cent with ozone depletion of 25 per cent in laboratory conditions.

All this is the result of the chloroflurocarbons (CFCs) and halons, once known as miracle substances when Thomas Midgley developed a series of chloroflurocarbons (CFCs) - compounds containing carbon, chlorine and fluorine - for DuPont in U.S.A. In the early 1930's, it was hailed as a remarkable discovery for the refrigeration industry which was till then depending upon obnoxious ammonia gas and sulphur dioxide. These compounds are odorless, non-toxic, non-flammable, non-corrosive and have a low boiling points. Commercial production of dichlorodifluromethane (Freon-12) and trichlorofluromethane (Freon-11) started during 1931-32. These and other related compounds proved to be ideal

refrigerants. Soon, another important application of these compounds was discovered as aerosol propellants (Krishan, C.Joshi, The Ozone Hole Controversy, Employment News, 6-12 April 1991, p.3).

When CFCs and halons, totally unchanged in composition, drift up to the stratosphere, where intense UV-B radiation serves their chemical bonds, chlorine and bromine are released which strip an atom from ozone molecule, turning it into ordinary oxygen. The chain reaction destroys thousands of ozone molecules. In the extreme weather conditions of the Antartic atmosphere, this ozone eating process is speeded up by ice crystals in the stratospheric clouds.

In the lower reaches of the atmosphere, CFCs cause yet another problem - green house warming.

World Watch Institute figures show that worldwide CFC consumption was and remains lopsided. India and China with 38 per cent of the world's population use only two per cent; industrialized countries, excluding Soviet Union and Eastern Europe, 70 per cent.

The wonder chemicals have found ready use in many industries and are used in a variety of products, from solvents for the electronics industry, refrigeration and air conditioning to aerosols. In 1986, the production of CFCs was estimated to be 1.1 million tonnes.

Roughly 27 per cent of world CFC production was consumed in aerosol products used in, among other things, packaging of paints, and cosmetics like hair sprays and deodorants. Another 25 per cent was used in refrigeration and car air conditioning. In this case, the chemicals are released into the atmosphere through leaks and during repair of equipment.

Foams used for insulation of padding in products like house furniture, among other things, comprise another quarter of the CFC use industry. The remaining portion of solvents is used for cleaning in the electronics industry and for dry cleaning of clothes and furs. Halons are used mainly in firefighting equipment.

The action called for is clear - curtail the use of the identified substances - and the need for it is urgent. But surprisingly, the Western world dragged its feet for many years before arriving at any consensus. UNEP, the United Nations agency responsible for environment, started discussions on the ozone layer as early as 1973. In those days, the threat from CFCs was not even suspected. There was concern instead about the possible damage to the ozone layer by the hundreds of supersonic aircrafts expected to be in operation by the late 1980s. In 1975, UNEP's governing council backed a programme proposed by the executive director on risks to the ozone layer. By this time, scientists had identified CFCs as the major problem. In 1976, UNEP even adopted a "World Plan of Action on the Ozone Layer". But in spite of clear commitments from developed countries to curtail use of CFCs, production rose in the 1980s.

UNEP persisted and in 1981 the governing council set up a working group to prepare a global framework convention for the production of the ozone layer which, four long years later, was adopted in Vienna. But this convention did not even mention any substance that might harm the ozone layer and CFCs were only mentioned as substances which needed monitoring.

The 1985 news about the hole in the ozone layer shocked the world but not enough to spur it into action. Trade and development interest of many countries were involved. The

Americans were keen for fast action, arguing for complete elimination of the substances, but the Europeans hesitated, arguing scientific uncertainty. One reason for this could be that the substitutes for CFCs had by then been developed by the US firm, DuPont. The Executive Director of UNEP addressing a group of environmentalists in Stockholm in early 1987 expressed his extreme frustration at government indecision. According to him, since the substitutes were being developed by American firms, the Europeans and the Japanese were afraid this would affect their electronics industries and the Soviets feared for their growing refrigeration industry.

THE MONTREAL PROTOCOL

Finally, the world battered out of solution. In September 1987, the Montreal Protocol was signed by 24 countries. The agreement came into force only in January 1989, by which time countries representing about 90 per cent of the world's CFC consumption had satisfied it.

Provisions of the agreement, which is a legally binding treaty with trade sanctions against non-parties, include a freeze on CFC production at 1986 levels by 1989; a 20 per cent decrease in production by 1993; and another 30 per cent cut by 1986 levels by February 1992. Developing countries have been given an extra 10 years to delay the phase down schedule to meet "basic domestic needs".

The Montreal Protocol was evidently weak. By the end of the decade the world would still be producing over half a million tonnes of CFCs and halons and the future for the ozone layer was still bleak. Scientific reports estimate that this production would lead to doubling of the chlorine and bromine

content in the atmosphere by 2060 and not help the Antartic hole.

It was in 1989 that the situation changed - this time because of Margaret Thatcher, the former British Prime Minister, who had by then become a "green convert". In March 1989, she called an international conference to discuss the ozone problem. After this things just could not move fast enough. Spurred on by her, two weeks later, ministers and heads of states from over 24 nations met in the Hague at the invitation of the prime ministers of France, Holland and Norway. This gathering called for a new international institution called THE GLOBE which would protect the planet's environment and impose trade sanctions against countries infringing standards. A month later, in May 1989, environmental leaders met once again, this time in Helsinki, to discuss ozone. The meeting made environmental history as 80 nations agreed to ban CFCs totally by the end of the century - a consensus far beyond world expectations.

Attention now shifted to the two rotten apples in this basket of global goodwill - India and China, who had not agreed to sign the protocol. An article in the respected Christian Science Monitor published from the US even called these countries refusal a form of "internationally blackmail". According to the article, "subsidise us more or we will dirty up your environment is the implied threat" by these two countries. As these countries could not conceivably be blamed for what had happened in the past - using just 2 per cent of the world's CFCs - they were being blamed for what could happen in the future. It was increasingly pointed out that their huge populations and their eagerness to modernise was creating a growing demand for appliances and consumer products which could undermine the Montreal Protocol. According to one commentator, "If they

(developing countries) realise only the modest increases allowed by the Montreal Protocol during the initial 10 year grace period, global CFC use would skyrocket. If India and China achieve their modernisation and electrification goals for the next decade, all CFC abatement efforts by the industrialized nations would be nullified. The British journal, New scientist reported growing Western fears about China's plan to put a refrigerator in every house by the end of the century (Agrawal Anil & Sunita Narain; Towords A Green World, CSE, 1992, p.7).

A detailed look at the protocol makes it clear that its provisions were indeed discriminatory and extremely unfair to developing countries. As a forerunner of the many international conventions which are on the cards, the anti-Third World provisions of the Montreal Protocol will but naturally lead to distrust and deep suspicion among developing countries of international environmental action.

The first problem was that of quotas for further consumption. The Montreal Protocol categorised developing countries as those with an annual per capita consumption of CFCs less than 0.3 kg. In contrast, the US per capita consumption in 1986 was 1.7 kg. The developing countries were allowed to increase their production to bring it up to 0.3 kg per capita or an average of each country's estimated annual consumption between 1995 and 1997, whichever is lower, before reducing them to half by 2010. This "biggest concession", is clearly not so fair as it freezes current global inequality. The US, for instance, with its stipulated 50 per cent reduction over the 1986 level would be consuming 0.85 kg per capita in 2000. Even if developing countries took full advantage and expanded their production to the limit of 0.3 kg in 2010, their consumption would be halved to

0.15 kg per capita-five times less than the permitted consumption to the US.

The ozone protocol sets an extremely dangerous precedent, especially for the poor nations. Instead of the treaty setting out a system in which a global common resource is shared and managed equitably, with equal rights for every citizen, the treaty operates within the context of existing inequalities, creating a legal framework to institutionalise and perpetuate the gap between rich and poor. Clearly, this is not a protocol that can be used as a fair model for the global warming convention.

Secondly, a large part of the CFCs - by some rough estimates, almost 50 per cent - were used for packaging of what cannot under any circumstances, be called survival items. For instance, hairsprays, paints, deodorants as well as styrofoam cartons for hamburgers. On the other hand, the projected use in developing countries in for food refrigeration and air conditioning - are crucial in hot temperate climates. If there are limits to growth, then these factors ought to be taken into account and fair quotas assigned

Thirdly, Various trade clauses in the treaty seek to safeguard the interests of industries in the West while openly discriminating against Southern interests. The protocol stipulated :

1. Within one year, there ought to be a ban on import of controlled substances from nations not members of the protocol;
2. By 1993, there will be a ban on developing countries to export any controlled substances;
3. Within three years, a ban on imports of products which

contain controlled substances from nations not members of the protocol;

4. Within five years, a ban on imports products produced with, but not containing, controlled substances from nations not members of the protocol; and

5. Parties signatory to the protocol are expected to discourage the export of technologies used for controlled substances to nations not members of the protocol.

The provisions leave a lot unsaid. They explicitly disallow the developing nations as well nations not members of the protocol to export products or substances. This justification being that this would, on one hand, serve as an incentive for non-parties to become members and, on the other, dissuade developing nations from taking advantage of the concessions given to them and delay their count down by trading. But what the provisions leave out is the total freedom to developed countries to export high products and substances to both developing countries as well as to those countries not party to the protocol.

The implications are clear. With total protection and monopoly, Western nations can, on one hand, switch to so-called alternative technologies while using their quotas to export and increase trade. Unfair trade practice is a polite way to describe these provisions. "Friends of the Earth" from Australia reports that in 1988, taking advantage of these clauses, Australia passed the Ozone Protection Bill which allows for an export quota of 3,800 tonnes in 1989, an increase of 80 per cent over 1986 exports.

Fourthly, under the treaty, developed countries could withdraw from the protocol but developing countries were

explicitly forbidden to do so, making them very unequal "partners".

Fifth, key powers for decision making under the protocol were handed over to the largest polluters. It stated that in case parties were unable to arrive at a consensus regarding crucial issues like further reductions in CFC use, then the decisions could be adopted by a two thirds majority vote of the parties present and "representing at least 50 per cent of total consumption of the controlled substances". US alone consumes roughly 30 per cent.

Sixth, the protocol made no real provisions to assist developing countries to find alternatives to a problem which was not their creation or responsibility. The main fear of countries like India and China, expressed by the former Indian minister for environment, Z.R. Ansari, at the 1989 London conference was, "the technology of substitutes, conservation, recycling and equipment modification will be the monopoly of a few countries in the developed world." Without funds to buy the technology, the developing countries faced the prospect of becoming captive markets for the new chemical products.

The protocol only called upon parties to "facilitate" access to such alternative technology and make bilateral and multilateral provisions for subsidies. Ansari aptly called these provisions "delightfully vague", while provisions for restrictions were clear and specific (Usha Rai, 1989, India's Terms For Signing Montreal Protocol, in Times of India, March 17, 1989, N.Delhi).

POST MONTREAL - INCORPORATING GLOBAL AND THIRD WORLD CONCERNS

LONDON PROTOCOL

Obviously a lot needed to be done to change the protocol. Indian diplomats recall the enormous hostility they faced from the existing members when they first raised the issue of modifications. The discussions which started in mid 1988 took over two years to reach some consensus. In June 1990, at the meeting hosted by the British government, it was decided to propose amendments to the Montreal Protocol. It was at the same meeting that the Indian delegation, lad by Maneka Gandhdi, the then minister of state for environment, agreed in principle to sign the protocol, but only once the ratification of the amendments was completed by the existing members.

The amendments incorporated several of the objections raised by developing countries. For instance, the discriminatory clauses for withdrawal and veto were removed; and, not just imports but exports were also banned to nations not party to the protocol. This trade barrier was apparently retained to enforce nations to comply with the protocol. The Western nations also pledged to double their commitment to the problem by greatly advancing the time table for phasing out CFCs and other substances. This meant a changed pace for developing countries also.

The post-London time table states that CFCs are to be totally phased out by 2000 by the developed countries and by 2010 by developing countries. The clock has already started ticking and India, for instance, once it joins the protocol would have to phase out 10 per cent of its production by 1993 and, in eight years, another 75 per cent. Halons have also been included now

and have the same time table as CFCs. Two near chemicals, carbon tetrachloride and , methyl chloroform, used primarily as solvents in metal cleaning industry, have been included with a phaseout scheduled by 2000. Both these synthetic compounds were found responsible for releasing ozone depleting chlorine in the atmosphere.

It is clear that the extraordinary consumption of the developed world has damaged the common ozone layer for many tens of years to come. And it calls for far more drastic and bold steps than the chest thumping Western leaders are willing to take.

TECHNOLOGY AND MONEY

For the developing countries the main issues remain technology and money. These discussions were the most heated and difficult. Developing countries like India and China wanted clear assurances for transfer of technology as well as additional finances to cover the costs of the switchover. The most intransigent were the Americans who, according to various sources, consistently blocked efforts on such aid. In May 1990 when the US suggested a contribution of US $ 20 million for three years to a fund to pay for ozone friendly technology, it made the UNEP's executive director, Mostafa Tolba, remark that the "contribution was very little compared with revenues of more than US $ one billion it has made from taxes on chemicals which deplete the ozone layer."

The major reservation of the US was that any commitment on the issue of ozone would create a precedent for the proposed climate convention. As late as March 1991, the US almost jeoparadised the entire negotiations when it withdrew from

its earlier commitment to provide funds. Pressure from other Western allies like the Scandinavian countries forced it to agree. At the London meeting USA again reiterated its concern that the funding criteria adopted for ozone should not apply to global warming.

The modifications include directives on financial mechanisms. It is now proposed to establish an interim fund for the three year period from 1991 to 1993 to provide financial and technical cooperation, including the transfer of technologies. This, it was proposed, would be followed by a long term financial mechanisms. More importantly, it was provided that all incremental costs needed to comply with the protocol would also be met. These costs would have to be agreed upon with the parties to the protocol with representation of both developed and developing countries.

The contribution to the fund, called the multilateral fund, would be additional, putting at rest fears of developing countries that existing aid would be diverted under a new name. The fund would be largely multilateral with 20 per cent bilateral and regional aid included - against the 10 per cent preferred by developing countries - and would be financed by developed countries. The basis of assessment of each country's contribution would be the UN scale of assessments.

The European Community which consumes less than the US complained, unsuccessfully, that this was not equitable burden sharing. The meeting did not accept the "polluter pays" principle as a basis for assessment. FOE also reports that the meeting refused to consider the proposal made by various environmental groups for a consumption tax which would make the funding flows move visible and enable alternatives to compete

more effectively.

The fund was established with commitments of US $ 160 million which could be raised to US $ 240 million when India and China become parties to the protocol with each getting US $ 40 million. This amount to be spread over three years is clearly inadequate. There is no mention in the amendments of how the remaining amount of money needed for the switchover will be collected.

Disbursement of the money will involve a tremendous amount of bargaining the haggling. To make matters worse, there is no definite state of the art technology for alternatives to estimate the costs. Already, in the case of India, the haggling and mud slinging has started. According to Western reports, India had allegedly overestimated its switchover costs as US $ 5 billion. The Indian government then, funded by the British Overseas Development Administration, hired a Brotish consultant, Touche Ross, to assess switchover costs - the figure arrived at was US $ 1.2 billion. But the Indian government, strangely enough, is also quoting figures in a recent newspaper report, totalling 800 million as its total costs of switch-over The range of estimates is large and it will take a far better knowledge of needs and options to arrive at definite estimations (Usha Rai, 1991, India To Sign Montreal Pact in Times of India, June 4. New Delhi).

Doubts about actual transfer of alternative technology and not just of manufactured chemicals and products also persist. The chemical giant which makes a quarter of the world's CFCs, DuPont, which has developed the substitutes, has consistently argued that developing countries are incapable of handling these technologies and are best off buying the products from the west.

As late as the 1990 London conference, in the heady atmosphere of the "success" of the agreement, DuPont had produced countries should be funded to use new chemicals, not to produce them. It is thus up to the leaders of the developed world to persuade or purchase the technology for the developing world. Thus the means of implementing the obligations of poorer countries under the protocol of the leaders of the developed world creating an unhealthy dependency and perpetuating the role of "aid" and patronage, instead of rights and responsibilities.

Indian negotiators, however, believe that the financial provisions will work. They point to the clause in the modified protocol which relates developing countries ability to fulfill obligations to the effective implementation of financial and technological transfer. It also calls for a review not later than 1995 to assess the situation. The question now is, will the developed world put its money where its mouth is ?

Is the Montreal Protocol then a good precedent for further global treaties on healing the planet ? As an instrument of governance, it is clearly weak and remains extremely one-sided. It does not assign any entitlements to people nor any penalties for the overuse or abuse of the common resources of the earth. Any discussions for corrective action, thus, remain a mere charity from "penalized".

The charity, in fact, comes from the poorer countries who are prepared to take on the financial and administrative burden of the technological shift.

THE BASEL CONVENTION

In the late 1980s, when concern was building up about global warming, ozone and other environmental issues, the world was shocked with news about a lethal underworld trade - the export of hazardous wastes from the environmentally conscious West to unsuspecting developing countries. The cases reported were horrifying: 15,000 tonnes of toxic flyash from the US dumped in Guinea and Sierra Leone; a proposal to export hazardous waste from West Germany to Liberia; five million tonnes of industrial waste from North America and Europe sent to Benin; 4,000 tonnes of Italian waste dumped in Koki, Nigeria; radioactive waste from uranium mining in Colorado sent to Gabon; 120 drums of mercury laced sludge from New Jersey dumped in South Africa; and, the most infamous of all, the worldwide journeys of waste carrying barges looking for ports willing to accept their deadly cargo.

The worst affected continent was Africa. According to Greenpeace, which has done the most detailed work to monitor toxic wastes trade and alert governments of the danger, "if European industrial powers could have built a pipeline across the Mediterranean Sea towards Africa for the discharge of their hazardous effluents, they would have most probably done so". Instead, an invisible pipeline, sweetened with much needed foreign cash, was built to Africa through a barrage of unsavory schemes.

The African governments reacted with anger and alarm to this growing threat of "GARBAGE IMPERIALISM", in the words of President Daniel Arap Moi of Kenya. Nigeria which found over 3,000 tonnes of Italian wastes, including radioactive material, on the port of Koko, when workers unloading the shipment started vomiting blood, entered into a bitter diplomatic row with Italy.

The Nigerian government impounded the ships, arrested the involved businessmen, and threatened to execute all those found guilty in the toxic wastes deal. The Italians took the waste home only to encounter angry crowds who tried to keep the waste from being unloaded. Grinea Bissau, which was offered money four times its GNP income to dispose over 15 million tonnes of toxic waste, said no under public pressure.

In mid 1988, the organisation if African Unity (OAU) an intergovernmental political organisation of all African countries, except South Africa and Morocco, declares that dumping was a crime against Africa and the African people, and adopted a resolution to refrain from entering into any such agreements. In a separate move, the 16 member states of the Economic Community of West Africa (ECOWAS) agreed to make trade in toxic wastes a criminal offense by enacting national legislation against dumping of foreign wastes. It said, "we cannot accept that at a time when industrialized nations refuse to buy our commodities at reasonable prices, these same countries are selling us death for ourselves and our children".

UNEP began work on a treaty to set global rules for the control of this trade in the basis of a request from the heads of African governments. The treaty, called the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, also called the Basel Convention, was signed in March 1989 by 33 countries. But the very African countries which pushed for the treaty and in fact, participated actively in the negotiations, were so disappointed with the final outcome that they refuse to sign. To date, except for Nigetia, not one african country has sign the convention. Greenpeace comments that the treaty ignores the demands if various developing countries for

protection against the international waste trade and says that it has "legalized toxic terrorism".

The trade has boomed primarily to cut the cost of disposal by evading stringent and expensive environmental regulations at home. As richer nations have become alarmed by the hazards if toxic wastes, they have passed stricter rules about what can and cannot be done with garbage. The cost od burying a tonne of hazardius waste in the US rose from US $ 1,500 per tonne. In Europe, disposal costs have quadrupled in the past ten years. Industries are increasingly getting caught between a pincer environmental attack -- stricter government rules and widespread environmental concern which calls for expensive incineration; but incineration capacity has remained limited because of public reluctance to permit new plants. Developing countries have, therefore, been most convenient dustbins.

In 1989 Basel convention was the culmination of international efforts to regulate this vicious trade, A UNEP working group of legal and technical experts which met in May 1984 had prepared an initial document which required countries exporting harmful chemicals to notify authorities in the importing country and to assist them with timely information. Under the London Guidelines for the Exchange of Information on Chemicals in International Trade, formulation by UNEP, countries were again required to provide information about their toxic exports. The Basel convention made the guidelines and other procedures legally binding on the signatory countries.

The convention does not call for an outright ban of the trade. It seeks to regulate the trade by insisting that companies wishing to export wastes have to notify the government of the country importing the waste or locates en route. Only when the

importing country gives the company its "prior unformed consent", can the government of the exporter, rubber stamp the deal. In the event that the shipment is found to be illegal, the exporter is required to reimport the wastes within 30 days. However the convention also provides that if this reimportation is found inpracticable, it could be avoided and the waste is disposed off in an "environmentally sound manner".

The convention provides for bilateral agreements outside its terms, but only if the agreements stipulate provisions that are not less environmentally sound than those included in the convention. However, the convention fails to clarify what is "environmentally sound".

The main criticism of the Basel convention has come from African countries and Greenpeace. According to Greenpeace, throughout the final week of negotiations in Basel, developing countries pointed out to numerous flaws and loopholes in the draft. But these were ignored or expanded because of the insistence of the industrialized countries. The convention, in fact, merely borrowed and slightly revised existing laws on waste trade in North America and European Community. "It became clear that the industrialized countries would no sign the Basel convention unless it was a weak, loophole ridden vehicle through which they could justify and expand their involvement in the international waste trade. These nations ultimately succeeded in limiting the scope of the convention to a simple waste trade notification system ..... the convention was tailored to the demands of the industrialized countries", reports Greenpeace (Debora Mackenzie, 1989, IF YOU CAN'T TREAT IT, SHIP IT, in "New Scientist", April 1, 1989, London).

The existing convention has several problems. Firstly,

by providing a legal framework within which to trade waste. it legitimizes what should be considered a criminal activity. "The Basel convention's greatest danger is that it creates the illusion that the international waste trade is now under control", says Greenpeace.

There is no provision to ban any sort of waste-trade, except to Antarctica. According to the New Scientists, existing controls only ask for prior consent and they are so weak that many countries will feel under pressure to earn foreign currency by allowing their territory to become a dumping ground for other nations' garbage. During the negotiations for the conventions' the minister of natural resources from Guinea Bissau explained why his country was reluctant to postpone a deal which would have brought 15 million tonnes of waste and US$ 600 million to his cash hungry country. "We need the money", he said.

But it must be said to the credit of the convention that it recognizes the right of any nation or group of nation to ban the important to hazards waste into their country. It further stipulates that once this decision has been made, and the secretariat of the convention informed accordingly no country can thereafter allow the export of hazardous waste to that nation.

The second major problem with the convention is that it does not specify what is hazardous. It merely lists some 40-odd classes of materials-from inorganic cyanides to waste from the production and use of photographic chemicals- that need to be controlled. It also lists hazardous characteristics of waste like flammability, corrosion, poison and toxic etc. Here the wrangling starts. For instance, a load of wastes containing five parts per million of mercury could be called hazardous in some

countries, but not in others. It has also been pointed out by Greenpeace that, as the treaty now reads, radioactive wastes are excluded from the scope of the convention.

The third major loophole relates to wastes intended for "recycling". The treaty permits the export of hazardous wastes in conditions where the "wastes in question are required as a raw material for recycling or recovery industry in the state of import".

This has left the treaty open to abuse. In the waste business, such dispensations could easily lead to sham recycling, where waste is exported ostensibly for reuse. This was the precise case of the Philadelphia ash which was exported to Guinea. It was to be reuses in building bricks, only it turned out to be toxic garbage. According to Greenpeace, this leaves waste traders to disguise highly dangerous substances as "fertilizer, road oil, building material etc." For instance, as several Caribbean countries suffer from shortages of roads and electricity, traders have tried to build toxic waste incinerators which would presumably produce electricity, along with toxic air emissions and ash. The toxic ash would be used to build roads. In early 1980s, an American was arrested for exporting hazardous wastes to Mexico to a 'mercury recovery plant' where it was simply dumped and burned.

There are various other provisions, or the lack of them, which reduce the treaty to near impotence. But the fundamental issue raised strongly by Greenpeace is that, without a global ban, there is no incentive for industrialized countries to minimise wastes or to implement clean production technologies. The ultimate solution to waste disposal is the prevention of waste generation. But investments in such technologies or

reduction in consumption will only be possible when such measures become cheaper than a quick trip to Haiti.

Given these flaws, it is not surprising that the convention has found few takers. Signed in March 1989, over two years later it seems only a little closer to entering into force than when it was created. The convention will become legally binding only after 20 countries have ratified it, that is, they have turned the provisions of the convention into national law. By March 1991, only six countries France, Hungary, Jordan, Norway, Saudi Arabia and Switzerland, has ratified it. No African country had even signed it.

With this obvious failure of global cooperation, many developing countries have sought ways to bring the trade under control through regional cooperation. In late 1989, just nine months after the Basel convention, 66 less industrialized countries from Africa, the Caribbean and the Pacific, collectively known as the ACP countries, joined with the European Community (EC) to totally prohibit the international trade in waste between their countries. The agreement, under the Lome Convention, bans all radioactive and hazardous waste shipments from the EC countries to ACP countries. In addition, ACP countries have agreed to ban imports of wastes from any other country. The agreement has been approved by the European Parliament and is now awaiting ratification. Earlier the joint declaration of the EC and ACP countries had stated that the draft Based convention "in its present from was unacceptable as its primary aim was to legalise and facilitate the international trade in waste"- an interesting comment from one of the main actors- Europe, responsible for the final formulation of the convention (Jim Vallette & Heather Spadling edited 1990, THE

INTERNATIONAL TRADE IN WASTES; A GREENPEACE INVENTORY, GREANPEACE, WASHINGTON).

In 1991, the Africans took the initiative to end the dirty trade in their back-yards. The Bamako convention totally bans the import of hazardous wastes, including radioactive wastes, to the African subcontinent. The convention, in contrast to the Basel convention, requires hazardous waste generation audits and imposes strict, unlimited liability on hazardous waste generators. The convention, which Greenpeace has called probably the most progressive hazardous waste legislation in the world is the direct consequence of the failure of the Basel convention to address issues of immediate environmental concern to African nations and their people.

Obviously, safeguarding the global environment calls for much bolder action than the Basel convention and its negotiators were able or willing to take. The Basel convention also shows how narrow is the concern for the global environment. Even the commercial interests of waste traders are dearer to governments of industrialized nations than the poor people of the world, their health and their environment.

GLOBAL WARMING AND GREENHOUSE EFFECT :

There have been numerous warnings in recent decades that the Earth's climatic patterns - which followed an almost steady course for centuries - are undergoing visible changes. This is being caused by changes in the composition of global's atmosphere which consists of a number of natural and synthetic gases. Any increase in the amount of certain gases - particularly synthetic gases - results in the absorption of infrared radiations reflected from the surface of the earth. This leads to an enhanced heat - trapping capacity of the earth. This leads to an enhanced heat-trapping capacity of the atmosphere - a phenomenon called "green-house effect" - with a consequent increase in global temperature. One of the major consequences of this is the melting of snows in the polar regions and increase in global sea-level. During the last century, this increase in the level was less than 15 centimeters but at the present rate of global warming, an increase between 30 to210 centimeters is expected by 2075 A.D. Consider a scenario where vast parts of land areas in low-lying countries like Bangladesh and Maldives completely disappear, 30 to 80 per cent of the coastal wet lands of the U.S.A. disappear and the Nile Delta in Egypt just vanishes !

GASES INVOLVED : CARBON DIOXIDE

Although the composition of the atmosphere varies slightly from place to place, a major constituent is carbon dioxide which is a key factor in causing greenhouse effect. As early as 1861, the English philosopher John Tyandall proposed that increased concentrations of atmospheric carbon dioxide could

conceivably raise surface air temperature and produce a change of the climate similar to that created by a green-house. Since then, in the course of a century, the concentration of this gas has increased from 280 parts per million 350 parts per million - an increase of about 25 per cent. This increase has been caused by various factors. An indiscriminate burning of the fossil fuels like coal, oil and natural gases releases huge quantities of the gas into the atmosphere. Each Boeing 747 burns an enormous amount of aviation fuel in an hour. There are more than half a billion vehicles on the road. The burning of a large number of oil-wells continuously for almost an year during the recent Gulf War is too recent an event to be forgotten. It was reported that dark clouds covered a number of Gulf countries for weeks together. As far as industrial emissions are concerned, the main culprits are the developed countries. For example, in 1985, out of a global total of 20,500 million tonnes of industrial carbon dioxide emitted, 23 per cent came from U.S.A. Other major countries responsible were the former Soviet Union, Western Europe, Japan and China. The remaining developing countries accounted for only 20 per cent of the industrial carbon dioxide emissions. The industrialized nations are thus responsible for forcing the pace of global warming (Krishna C. Joshi, ENVIRONMENTAL POLLUTION; Employment News, New Delhi, 4-10 April, 1992).

Nature has its own mechanisms for "storing" carbon in plants by photosynthesis. Man has increasingly interfered with this mechanism by destroying forests over vast areas of the world. There has been extensive deforestation in many countries of the Third World like India, Nepal, Indonesia and Brazil. It is believed that ten million hectares of the forest lands have

been alarmingly low at hardly 14 per cent when it should be around 33 per cent in the plains and 60 per cent in the hills. Wood is being used - or 'misused' - for various purposes like firewood, timber and industrial raw material for paper, board, newsprint etc. Unfortunately, this has not been accompanied by requisite Social Forestry. This deforestation has resulted in an increase of 2000 million to 10,000 million tons of carbon dioxide annually to the global atmosphere. This carbon dioxide absorbs infrared radiations from the earth and re-radiates these back to the earth and thus contributes significantly to the greenhouse effect.

Besides carbon dioxide, a number of other gases are present in the atmosphere. These include nitrogen oxides, hydrogen, ammonia, sulphur dioxide, hydrogen sulphides, halogens etc. An increase in the concentration of these gases is known to be harmful to living organisms i.e. plants, animals and human beings. Besides, these gases can also damage other articles like paper, leather, metals and even building materials. There has been considerable debate and controversy in recent years about the location of the Mathura Refinery near the Taj Mahal is a matter of national concern and a number of studies have been made, viz. the Government's Varadharajan Committee Report (1977) and other reports by the National Environmental Engineering Research Institute (NEERI), the Process and Product Development Centre (PPDC) and U.N.D.P. The reports recommend shifting of the iron foundries to another site. There are mainly two kinds of pollutants from the foundries - one of the oldest industries of Agra - sulphur dioxide and Suspended Particulate Matter. It is also recommended that the power plants in the vicinity of the Taj should be closed and the dieselising of the adjoining railway

marshalling yards done.

Many industrial establishments may cause environmental pollution if the poisonous gases are not properly trapped and prevented from being released into the atmosphere. The Bhopal gas tragedy some years back has been one of the biggest industrial environmental disasters causing death and disability to thousands of people.

There are many uncertainties in the prediction of climate change, particularly with regard to the timing, magnitude and regional patterns of climate change and changes in precipitation. These uncertainties are due to our incomplete understanding of sources and sinks of greenhouse gases and the response of clouds, oceans and polar ice sheets to the change in the radioactive forcing caused by the increasing greenhouse gas concentrations in the atmosphere.

Any effort to control global warming has to be preceded by an assessment of the various sources of greenhouse gases and different nations' contributions to these gases. This seemingly scientific exercise has, unfortunately, become intensely political.

Various methods of estimating national contributions of global warming have been proposed and discussed in anticipation of an international agreement aimed at slowing climate change. An understandable, comprehensive, and technically sound method to delineate national contributions to global warming is fundamental to a climate agreement. This method should not only reflect the relative warming ability of different greenhouse gases- from carbon dioxide to methane and CFCs - but should also assign national responsibility in a way which correctly accounts for the past, present and future warming impact of national emissions.

It is necessary to be cautious in accepting the concept of carbon dioxide equivalence given our present state of knowledge, in particular relating to sinks for various greenhouse gases, which influence their average residence times in the atmosphere. This problem arises because different greenhouse gases stay in the atmosphere for different lengths of time. Carbon dioxide stays in the atmosphere much longer than, say, methane, which makes it difficult to compare the present and future heating effects of these two gases. This problem can be understood by visualizing two factories, one producing a radioactive substance which has a small half-life, say, iodine-131 (eight days), and another producing a radioactive substance with a very long half-life , say, plutonium-238 (24,000 years). On any particular day, both factories may have such quantities of these substances that their radiation to the environment is the same, in other words, each factory's responsibility is 50 percent. But ten days later, the second factory will be responsible for most of the radiation as the substance owned by the first would have considerably decayed. And 100 days later the second factory will be responsible for almost all the radiation. Similarly when comparing the heating effect of two greenhouse gases, which have different residence times in the atmosphere before they get removed by the natural sinks, the choice of time horizon is important. Depending on the time horizon chosen, the responsibility of a particular nation's contribution to global warming with respect to that of another nation's will greatly vary.

Nonetheless, considerable public opinion, influenced by the highly vocal environmental movement, has been building up in favour of efforts to ward off global warming. In June 1988, the

World Conference on the Changing Atmosphere held in Toronto, Canada, coincided with a severe drought that scorched the US midwestern corn belt. Extreme, often record, weather events occurred worldwide during the 1980s - heat waves hit New York and central European capitals; floods in Africa interrupted nearly two decades of drought; and, in Britain, the 1988 summer brought almost continuous rain and cold.

Thus, the Toronto conference opened with the public mind and media attention fixed firmly on climate and the greenhouse gas issue. Initially conceived of as just the first in a series of international scientific examinations of atmospheric pollution issues, the conference gained considerable stature when it was announced that the prime ministers of Canada, Brian Mulroney, and of Norway, Gro Harlem Brundtland, would participate. The conference came up with a startling recommendation calling for reducing carbon dioxide emissions by approximately 20 per cent of 1988 levels by the year 2005.

Political Positions On Climate Change Problem

Let us now turn to the political positions of various countries on the climate change problem. With the ozone treaty now under wraps, several developed countries have shown a keenness for a similar convention to control global warming. There are, however, enormous differences even between the industrialized countries, particularly between the US and the European countries on how to approach the problem.

Western countries believe that a frame work convention is needed to get all countries of the world to agree to steps to reduce greenhouse gas emissions. While European countries, under pressure from their own, more environmentally conscious public, seem to be more eager to reduce greenhouse gas emissions, the US

has taken the position that there is, as yet, no need to invest in the reduction of greenhouse gas emissions.

Despite the grim prospects of a warmer future, world leaders have not been able to move beyond petty national agendas. As a result, the ongoing negotiations for a climate convention have literally inched forward to reach nowhere. The main reason is the intransigence of the United States which has blocked, and successfully, any efforts for a "binding legal agreement" to limit greenhouse gas emissions. The talks, which started in early 1991, have been convened by the United Nations General assembly under the International Negotiating Committee for a Framework Convention on Climate Change (INC). There have been four meetings, each lasting a fortnight to bash out a convention. By the third meeting, in Nairobi, the tensions were high, the conflict strident and obvious, as the US was increasingly isolated in its fight to the right to pollute.

There are clearly two sets of issues to be resolved in the negotiations: One, what limits, if at all, will be set to control greenhouse gas emissions; will these be adequate and will they be applied to developing countries as well? Two, what will be the mechanism for and amount of financial and technological transfer to enable developing countries to make the shift.

By the second meeting of the INCs in June, it had become clear that the US was totally opposed to the idea of any legal obligations to curtail its emissions. In July when the G-7 leaders met in London, they failed to make any reference to the need to limit carbon dioxide emissions, allegedly at the insistence of the US. The "post mortem" report given to the US senate by Robert Reinstein, the deputy assistant secretary of state and the chief US negotiator on global warming, proudly

announces that "G-7 countries had been brought into line, while some developing countries had even tempered their rhetoric to suit US aims".

In June, the British and the Japanese, in a bid allegedly to bring about some compromise, floated discussions on an innovative scheme called "pledge and review" which would allow governments to pledge their commitment to the climate cause, but would make cuts discretionary rather than mandatory The scheme was quickly dubbed "hedge and retreat" by NGOs monitoring the climate process.

The third meeting started in the gloom of this proposal which would delay any legally binding timetable to limit emissions. But the European Community raised the stakes by tabling its own proposal. The proposal called for the industrialized countries - jointly or individually - to stabilise their carbon dioxide emissions by the year 2000, at the 1990 levels of emissions. The developing countries should in view of their "common and differentiated responsibility" adopt energy efficiency and land use practices. The EC also provided for technical cooperation and for financial resources to equip developing countries in their transition.

According to the EC, emissions in the community are expected to grow by 11 per cent over the 1990 level by 2000. Each country would reduce its emissions to the average per capita carbon dioxide emissions of the community. Netherlands and Belgium, for instance have decided to reduce their emissions by 5 per cent bu 2000 and Germany and Denmark by 20 and 25 per cent by the year 2005. At the same time, Portugal would be allowed to increase its emissions by 25 per cent by the year 2000. The EC has also proposed a specific energy and carbon tax to "bring

about a change in the economic behaviour of 340 million energy consumers". The tax has been proposed to be pegged at US$ 10 per barrel in 2000. But, most importantly, according to EC estimates, all measures would lead to a negligible reduction in the annual economic growth rate of the community - between 0.05 to 0.1 percentage points, making it truly a "no regrets" option for green Europe.

The proposal, as expected, has met with hostility from the US. At the INC, a member of the US delegation declared on the side, that the "shoot out" was now coming. And, not surprisingly, the US delegation responded by restating their country's opposition to specific targets and timetables to reduce emissions. The delegation then went on to emphasise that the convention should "commit to long term goals and objectives for combatting human induced climate change."

And, in rejecting the proposal, it made two specific points; firstly, that the costs of stabilizing carbon dioxide in 2000 "may be quite high for the US". Secondly, that "if only industrialized countries take these short term action, the effect is likely to be small and transitory". This sleight of hand is an obvious attempt to globalise responsibility of global warming to include developing countries. Interesting also is the US insistence that the energy sector must not be singled out but the negotiations must include agriculture as well and it must cover "all sinks and actions on forests should be climate related". The need is to regulate forests in developing countries as measures to control global warming.

The EC proposal, has been received with glee by NGOs, calling it remarkable and the most welcome step forward. At the INC, the US based Environment Defense Fund said that it

introduced concepts of ecological limits, while the Australian Conservation Foundation urged that the proposal should command widespread support. Only Greenpeace voiced caution saying that the proposal was some salvation "but deep reduction not stabilisation" is what is needed at the moment.

Seen from the point of equity between developed and developing countries, this "best" of the industrialized countries is clearly far from adequate. The scheme freezes the current inequity in the use of a common resource. By not taking into account the drastic cuts needed in the industrialized world, it totally fails to provide the ecological space needed by the developing world to meet its growing energy demands. It would be foolish to assume that the world could withstand the continued consumption levels of an European - even at the stabilise 1990 levels with per capita levels of roughly 2.2 tonnes of carbon emissions. Will developing countries also be "allowed" to reach these levels, or is their quota of the atmosphere finished ? Obviously developed countries need to reduce their use of the atmosphere not only to a point that the world ecology begins to recover, but also to a level that makes "environmental space" for developing countries to expand their emissions.

Who is planning what for their carbon dioxide

Country	Contribution to the world CO_2 emissions(%)	Policy plans
USA	22.0	Not in favour of emission controls
USSR	18.4	Not in favour of emission controls at present
Ireland	0.14	Supports stabilisation at current level by 2000
Finland	0.26	Stabilise at 1990 levels by 2000, "at least"
Sweden	0.22	Stabilise at 1988 levels by 2000
Norway	0.22	Stabilise at 1990 levels by 2000
Japan	4.4	Stability at 1990 levels by 2000
Britain	2.8	Stability at 1990 levels by 2005
Canada	2.0	Stability at 1990 levels by 2000
Belgium	0.5	Stability at 1988 levels by 2000
Germany	3.2	30% reduction on 1987 levels by 2000
France	1.9	Recommends 20% cuts by 2005 to 50% cuts by 2030
Italy	1.8	stabilise at 1990 levels by 2000. Parliamentary resolution for 20% cuts by 2005
Australia	1.6	20% reduction by 2005
Netherlands	0.65	stabilise by 1995, 3% to 5% reduction by 2000, followed by substancial cuts
Denmark	0.3	Calls for 20% reduction by 2000
Switzerland	0.2	Supports stabilisation at 1990 levels by 2000, 20% cuts proposed
New Zealand	0.1	20% reduction by 2000

Source: New Scientist, 27 October 1990.

Most important, if per capita emissions have been accepted within the EC, then why not at the global level. Obviously, this "last regret" policy is most regrettable from a global point of view. It can, at best, be seen as a compromise in favour of the stubbornness of the US. But it is an unfortunate compromise, clearly in favour of the rich and against the interests of the poorer nations of the world.

The second issue confronting the negotiators is the financial and technological transfers to developing countries. Again the positions are sharply divided with the developing countries broadly demanding the following clear commitments on both issues to enable developing countries "shoulder the burden of reducing greenhouse gas emission", that all financial transfers should be additional and not tied to existing aid; and, the transfer should be administered by a democratic, new "dedicated" organization. The Europeans and the Nordic countries have broadly agreed to the developing country demands, with Norway calling upon the OECD countries to support a new, billion dollar fund, separate from aid and administered by a clearing house mechanism under the authority of the contracting parties.

The US and Japan however stand in opposition to these moves. While Japan wants the fund to be discussed first, the US is more categorical in its reply. It insists on maximum use of existing multilateral and bilateral sources. It also proposes that resource flows to developing countries must be based on rigorous technical studies and cost estimate. This would imply not a compensatory transfer of funds but one based on a country by country review leaving the developing countries with their "begging bowl" intact. On technology transfer, the US delegation noted the need to protect intellectual property and has emphasized

the role of the private sector.

On the mechanisms for transfer of funds, however, the industrialized West, is in near unanimity, with the EC and the US both supporting the use of the Global Environment Facility (GEF), jointly controlled by the World Bank, UNDP and UNEP as the lead agency to monitor and control the switch to a cooler future.

But what is clear is that, in-spite of the pleasing rhetoric about a common future, when it comes to a crunch, petty national interests prevail. And action for global oneness is either too little or too late.

THE BIODIVERSITY CONVENTION

The fourth major item on the global agenda is the preservation of biodiversity. A global convention to protect the world's genetic resources of plant and animals is currently being negotiated.

According to the World wide Fund for Nature, scientists have identified about 1.4 million living species. Of these around 1.03 million are animals and 248,000 are higher plants. But human knowledge of the world's biodiversity is still limited. Humans have probably discovered 80 per cent more of all the species of birds, mammals, reptiles, amphibians and fishes. Higher plants have also been fairly well studied but it is possible that 15 per cent more may still be discovered.

However, numerous insects, invertebrates, lower plants and micro organisms have yet to be found. Twenty-five years ago, the total number of insect species was estimated to be about three million, including those not yet identified. But one recent estimate to be about three million, Biologists now believe that fewer than five per cent of the world's species estimated to

be living keeps increasing with research.

For much of the time man lived in a hunter-gatherer society and thus depended entirely on biodiversity for sustenance. But with increased dependence on agriculture and then industrialisation, the emphasis on the biodiversity has decreased. However, the realisation that the spectrum of biodiversity (plants, animals and micro-organisms) affects the environment on which the very existence of life depends has awakened man to take steps to conserve it. Biodiversity is crucial especially to the assetless sections whose well-being depends on biomass.

Biological diversity is the sum total of species richness, i.e. the number of species of plants, animals and micro-organisms living in a community or an ecosystem. Genetic diversity among domesticated plants and animals led to the expansion of agriculture and animal husbandry. But in course of time, in actual practice, it came to greater dependence on high-yielding varieties and the consequent shrinkage of the genetic base leading to increased crop vulnerability. The Green Revolution is based on high productivity and low diversity. There is now need to combine high productivity and high genetic diversity not only to enhance food production but also for use as insulation against threats from global climatic changes and air, water and land pollutants.

Biodiversity conservation has become a holistic concept and encompasses the whole spectrum of biota and of activities ranging from ecosystems at the macro-level (in situ) to DNA libraries at the molecular level (ex situ). Conservation is however, not an end by itself, but only a starting point for a chain of actions.

Further, biodiversity in general and genetic diversity in particular have become highly politicised issues much to the disappointment of scientists who care more for the underlying science and service to society. Accordingly, there is now talk of "gene drain" from the south to the north. Such politicisation has been the direct result of the reset interest taken multinational corporations, businessmen, diplomats, bureaucrats, politicians and the press. However, traditional caretakers have been the subsistence farmers and tribals and the individual breeders in universities, government departments and industry. Both have kept biodiversity alive for different reasons. The breeders used to exchange material without any reservations. In fact, Green Revolution is the result of such scientific exchanges of the very advanced breeding material of Mexican dwarf wheat varieties which were subjected to selection under local environmental conditions.

India has geographic area of 329 million hectares. It is around on the north by the youngest, the most fragile and the highest mountain systems (the Himalayas) in the world. Climate in the country ranges from, perpetual snow cover to near-equatorial conditions, from mangroves to humid tropics and to hot and cold deserts. The 45,000 species of plants constitute roughly 12 per cent of the global plant wealth. There are about 15,000 species of flowering plants and 33 per cent of them are endemic located in 26 endemic centres.

The crop plant genetic resources can more or less be assigned to specific centres of diversity, identified by a Russian agrobotanist, Vavilov, in the Thirties on the basis of varietal diversity, homologous variation, endemism, dominant allele frequencies and disease resistance. The centres, in

different continents, are referred to as germplasm treasuries. It is ironical that these areas where the ancestors of the crops were first domesticated, are regions of low agricultural productivity and constitute the "hunger belt".

Of the 2503 cultivated plant species, 320 (12.8 per cent) have come from the Indo-Chinese-Indonesian region; 297 (11.9 per cent); from the Chinese-Japan region; 292 species (11.9 per cent) each from the African and South American regions. The Indian region is placed seventh with 167 species (6.7 per cent). The contribution includes important crops such as rice, sugarcane, coir, minor millets, brassicas, Asiatic vignas, cucumber, eggplant, banana, citrus, mango, jackfruit, cardamom, tree cotton, jute, edible dioscorea, vegetable amaranths, alocasia, amaorpho-phalus, colocasia, black pepper, turmeric, ginger, several cucubits and umbellifers, rauvolfia and several herbal drugs, rhododendorons, jasmines, some bamboos, some ornamental orchids, betal-vine and betelnut. This regiion is also a secondary lkcentre of diversity for grain amaranths, maize, red pepper, soyabean, potatoes and rubber plant.

There are several examples of plant germplasm for India making significant contributions to plant improvement. Two cases are distinctive. Nearly 20 cultivar of rice contain useful genes from wild rices of Kerala. The genes are responsible for resistance in cultivated rices. Equally important is the contribution to the cantaloup (musk melon) industry (14,000 ha) of California by powdery mildew-resistant genes from the wild musk melon of India. In economic terms the turnover of these crops would run to billions of dollars. Similarly the hardy livestock breeds are in constant demand abroad. (T.N. Khoshoo; Biological Diversity : A case For Conservation, Hindu Survey of

Environment, 1991, p. 125 - 127)

BIODIVERSITY NEGOTIATIONS : IS THE SOUTH MORTAGAGING ITS FUTURE ?

The proposed convention on biodiversity does not deal only with the subject for biodiversity conservation. In return for its support for biodiversity conservation the North is demanding access to the world's biological resources, which are largely concentrated in the South. Since the convention is attempting to deal with both these issues, it raises numerous complex issues which must be resolved before any convention is signed.

There can be no doubt that biological diversity needs to be conserved both for its own sake - all living species have a right to exist - and for the benefit of all humankind. In an ideal world, given the fact that people all over already use biological resources from far flung corners of the globe, these resources should be commonly available to all use and conserve. But the principle of "common heritage" has been misused by commercial interests in the North to monopolise and plunder the biological resources of the South while restricting access to genetic materials and associated technologies based on these resources. This Northern approach is both unfair and ecologically unsound. While the measures taken under the proposed convention would make access to biological resources, easier, the new life forms and technologies emerging from these resources would strongly privatised through powerful patents under the proposals being pursued in the Uruguay Round. Any effort therefore to improve access to the biological wealth of the South would lead to an extremely inequitous situation. It is obvious that we cannot have one set of negotiations that aim to privatise knowledge and bio-technologies while another set seeks to

globalise the biological resources on which this knowledge and biotechnology is based. (The Imperative of Equity : The Missing Dimension of UNCED : Statement of The South Asia NGO Summit New Delhi CSE, p.11).

The Malayasian delegation to the second preparatory committee of the UNCED told the conference, in no uncertain terms, "It is easy enough to highlight that developing countries in the tropics, being custodians of world's biological diversity, do have the obligations to lock up vast stretches of land for such purposes. In doing so, developed countries who have in recent years utilised extensive areas of their natural forests for industrial development and economic growth must now recognise that they too have obligations to those developing countries to compensate the opportunity cost of land set aside in perpetuity to conserve biological diversity. In this connection, may I add that the opportunity cost forgone in not utilising 3.8 mha of conservation areas which are totally protected for sustainable timber production in Malaysia is currently being valued at well over US$ 17 billion and to effectively protect and conserve these biological reserves an additional annual budget of US$ 5.6 million would be required".

Many countries of the South are opposing the concept of biological resources as a common heritage of humankind and are no longer willing to allow unconditional free access to the genetic resources under their national jurisdiction. While they concede that the international community has a common concern in conserving these resources, these countries maintain that they have the right to exploit and benefit from them.

Efforts to formulate a legally binding convention to protect the world's biodiversity are on. The conservation text,

after four meetings, is full of square brackets and alternate sentence formulations, with negotiating countries divided on the what and how of the convention. For the developing countries the negotiations are crucial, as they will determine what control will they lose over their biodiversity resources which may well turn into global resources, in the name of environment. And, what compensation, or what benefits do they get from this deal.

The future of the convention is not clear. While some observers fear that given the stalemate that exists between the North and the South on many critical issues, the convention will not be ready for signing by the Brazil conference. Others however point to the asymmetry between the climate and biodiversity negotiations. As a result of which, under the proposed biodiversity convention, the developing countries could agree to conserve their forests, which are also major carbon reservoirs, that the climate convention also aims to protect. But industrialized countries are still hedging any firm commitments on reducing their carbon emissions under the climate negotiations would evade taking the needed action. The UNCED process is also discussing biodiversity to include in Agenda 21 - the so called action plan which will be endorsed by the Brazil conference. There is added fear that this dual forum will help the industrialized countries to bulldoze their way through many of the critical issues.

The most contentious issues are, firstly, if the nation states will merely be "stewards" of a common heritage of humankind or its owners ? This question of sovereignty has been hotly debated within the convention forum, and by the end of the third meeting of the negotiators, the point of view of the developing countries seemed to have prevailed. The convention

draft notes that while conservation of biodiversity is a common concern of all humankind, the states have sovereign rights to exploit their biodiversity and sustainable use. However, the draft also includes a listing of obligations to conserve biodiversity, many items, of which mention the need for the development of "agreed measures and practices" for the implementation of the convention.

Given the levers of power that exist with the North, will these provisions, howsoever loosely worded, be used to monitor and push management strategies in the developing world ? For instance. according to the convention draft, each country would be obliged to foster favourable economic and legal conditions for the sustainable use of biodiversity. Similarly, the UNCED discussion paper for Agenda 21 even goes to the extent of proposing that protected areas for the conservation of biodiversity should be expanded to cover at least 10 per cent of the earth's surface area. Already an area twice the size of India - almost 5 per cent - is under such nationally protected areas. Will the convention then be used by the donor community to push for more barricaded national parks in the biodiversity rich South, with predetermined management plants ?

The second issue relates to the access to the biodiversity of the South as well as to the genes stored in the national as well as corporate gene banks of the West. The convention draft is fairly explicit about the undertaking of countries to provide access to in situ as well as ex situ genetic material for the "collective benefit of humankind, including economic benefit". But it is not clear if this includes access to resources stored in private gene banks.

The third issue is payment for the biodiversity

resources and the products developed as a result of the biodiversity. The consensus on this issue is weak and reluctant. There is no talk of royalty or other systems to compensate the use of biodiversity in the past or in the present. There is no mention also of the need to protect the resource, through appropriate patenting measures. The draft only says that this access should be based on mutually agreed terms and should not impose restrictions that run counter to the principles of this convention. Which means that if any country was to deny access to its genetic material, it could twisted and turned to mean that it went against the ethic of providing material for the "collective benefit" of humankind. Furthermore, mutually agreed terms could be used to disguise the most rapacious of agreements.

On the question of providing the results of research, or the products or profits to the country or origin of biodiversity, the draft remains sharply divided. With some countries fighting for a clear undertaking, while others wanting non committal phrases like, taking appropriate measures, all this could mean anything or most likely nothing.

The fourth issue, concerns payments for traditional and folk knowledge which has transformed the economies of the industrialized countries. This knowledge has never been paid for, and nor will it be, if the draft convention is any indication. In the draft convention, there is an enormous emphasis on the need to document and share the traditional knowledge of biodiversity across the world. The UNCED paper also underscroes this need emphatically. But there is absolutely no mention of the need to compensate countries, farmers or tribals for this extraordinary resource they provide. The knowledge of the poor is,m thus, free.

Instead, ironically, Northern delegations have been using the same point about abused rights of indigenous people to argue for more control over biodiversity in the South. The argument is that global control over biodiversity and protected areas would safeguarding the rights and knowledge of indigenous communities.

This leads to the question of the knowledge of the rich. The most acerbic discussions centre around the access the South will have on the biotechnologies and other products in compensation for the basic genes it provides. The industrialized countries are strongly opposing any move to include biotechnology within the framework of the convention. Any mention of access to technology is tempered with a clause that, in this context, decisions on intellectual property rights within the framework of WIPO and GATT would be taken into considerations.

But this raises a serious dichotomy in the Northern proposal on intellectual property rights. The efforts of the developed countries in GATT are geared to formulating a binding and strigent global system for the protection of intellectual property rights or patents.

Even worse is the question of the transfer of the knowledge held privately by the rich in the world - a critical issue as most such technologies are developed by large corporations of the West. The draft simply says the parties will endeavour to stimulate the private sector to facilitate access to environmentally sound technologies on a preferential basis to developing countries. "Due regard shall be given to the interests of the private sector to receive fair and equitable returns on its investment in the developing countries."

The duplicity is thus enormous. One hand, the

governments of developing countries without the permission or concurrence of the real owners of genetic diversity and its knowledge - the farmers and indigenous people - are expected to make a deal to protect and provide the resources. On the other hand, the developed countries are not prepared to make any concessions for nationally or privately held knowledge or technology.

After four divisive meetings to negotiate a convention, there is still a lot to be done. The South will insist as it must, that if the international community its anxious to avoid genetic erosion, then the rights and the knowledge of the owners must be recognised. And that obligations must include not just protection of biodiversity but access to the technology developed from the knowledge and resources of these biodiversity on resources. In other words, the world needs discussion on just Trade Related Intellectual Property Rights (TRIPS), but also on Diversity Related Intellectual Property Rights (DRIPS).

But if the present deliberations are any indication, the South could easily mortgage its entire future without the North giving anything away. Let us hope the green spirit of the Brazil conference does not let this happen.

CHAPTER - 6

ENVIRONMENT AND DEVELOPMENT : India's Approach

For us, the people of India, environmental conservation is not a new concept. The Indian tradition of love, respect, and reverence for Nature goes back to time immemorial. Historically, the protection of nature and wildlife formed an ardent article of faith, reflected in the daily lives of people and also enshrined in myths, folklore, religion, art and culture. Twenty two centuries ago Emperor Ashoka made it a king's duty to protect wildlife and forest trees. He got edicts inscribed on rock and iron pillars all over his kingdom prohibiting the destruction of forests and the killing of various speeies of animals. This historical evidence, surviving till today, is the first recorded measure on conservation anywhere in the world.

Some of the fundamental principles of ecology - interrelationship and interdependence of all life - were conceptualised in the Indian ethos and reflected in our ancient scripture, Ishopanishad, over 2000 years ago, which says, "This universe is the creation of the Supreme Power meant for the brnefet of all his creation. Each individual lifeform, must, therefore, learn to enjoy its benifits by forming a part of the system in close relation with other species. Let not anyone species encroach upon the other's rights".

The theme of conservation of wildlife and reverence for life is also reflected in some of the exquisite images in Indian Art, painting, sculpture, architecture and the decorative arts.

The tradition has been handed down the ages, becoming an integral part of the Indian psyche. Maintenance of sacred groves, divinity assigned to mountains, rivers, sacred trees and animals, religious customs and beliefs - all have contributed to the ethos of nature conservation in the ancient civilization of our country.This long tradition and abiding faith in conservation

of nature has been vividly alive till recent times, although often overshadowed by the impact of technological advancements and urbanization leading to the incerasing exploitation of natural resources.

ENVIRONMENT : The Challanges in India

With a land mass of 329 million hactares, bounded on the south-west by the Arabaian sea, south-east by the Bay of Bengal, south by the Indian ocean and the north by the mighty Himalayan ranges, India is a country of physical, natural, climatic, cultural and linguistic diversity. Its population of 844 million (1991),following various religious faiths, speaking one or more of the 15 major languages and 1652 dialects, providing a varied spectrum of cultural and socio-economic strata constitute the colourful mosaic of the country's diversity .

Today India is no exception to the global phenomenon of environmental degradation. It shares, with the poorer seventy per cent of the world,the painful results of the deterioration of its natural resourses and the dilemmas in trying to halt this deterioration.

India has often been describrd as a rich land with poor people. Its average annual perspitation, the second highest in the world, next only to South America, its perpetual sunshine and its other resources - natural and human, place it among the potentially rich nations. History, however, decreed otherwise and it found itself in 1947, at the time of independence, among the poorest with a majority of its people suffering from hunger, ignorance and disease and with little infrastructure of irrigation, power, transport, communication or industry. Only 25% of its men and 7% of its women knew how to read and write. The founding fathers of the nation led by Mahatma Gandhi and

Jawaharlal Nehru realised that political independence will not have any meaning to its citizens unless it helps them to get quickly out of the morass of poverty. Thus as stated, in the words of Indira Gandhi "an enterprise unparalleled in human history - the provision of basic needs to one-sixth of mankind within the span of one or two generations".

POST-INDEPENDENCE DEVELOPMENT

Development, based in utilisation of the natural resources of the country with the aid of science and technology was essentially carried out with internal resources of the country. Over the past forty years despite being a poor country, India mustered nearly 3000 billion rupees for investment, with about 7% coming from foreign investment and assistance, in improving its infrastructure of irrigation, power, transport, communication, etc. as well as in education and welfare programmes for the disadvantaged sections of society. The results, in making the infrastructure of the country stronger and in reversing the trend of poverty and its consequences, have been commensurate with the efforts. The literacy rate has increased to 36%. The death rate has come down from 27 to 12 per thousand. The food production has jumped up by 300% from 50 million tonnes at the time of Independence. Every indicator of quality of life has shown betterment. The nation, it was thought, has to do more and more of the same and get better and better (India, 1991, A Refrence Manual, Introduction).

IMPACT ON ENVIRONMENT

It was in the early seventies that, along with the rest of the countries of the world, India realised another disquietening trend.The same efforts which helped to bring people above the poverty line also put greater pressure on the natural

resources of the country. The irrigation facilities provided the much needed water to the parched fields, but some times, produced salinity in the land. The industrial technology, based on the old models of the developed countries, provided products but also polluteed water and air. The roads provided better communication facilities but also gave access to forests which were cut to meet the demands of the people. The medical facilities improved the health of the people but increased the popolation dramatically raising the demand for the products of nature.

POVERTY AND THE ENVIRONMENT

The nexus between poverty and environmental degradation can hardly be over-emphasised. This is a major issue and the biggest challenge.

The vast majority of our people are directly dependent on the natural resources of the country for their basic needs of food, fuel, shelter and of fodder for their cattle.

While the annual per capita income in India has been rising over the years, about 40% of the people are still below the poverty line. Environmental degradation has adversely affected the poor who depend upon the resources of their immediate surroundings. Thus the challenge of poverty and the challenge of environmental degradation are not two different challenges, but two facets of the same challenge.

To quote Indira Gandhi from the address to the United Nations Conference fn Human Environment, Stockholm, June 14, 1972, "We do not wish to impoverish the environment any further and yet we cannot for a moment forget the grim poverty of large numbers of people. Are not poverty and need the greatest polluters?".

POPULATION AND ENVIRONMENT

The relationship between poverty and population growth

is better understood now. The Government of India is one of the first few governments in the world which has an officially sponsored programme of family planning. Because of this programme, the birth rate has come down from 41 in 1961 to 32.4 in 1986 per thousand. However, this is not enough to control population growth as the death rate has fallen steeply from 22.8 in 1951 to 10.9 per thousand in 1988. The present projection is that we will have a population of 972 million by the year 2000 A.D. It is widely recognised that population growth is essentially a function of poverty. To the very poor, every child is an earner and helper and global concerns have little relevance for him. He will curtail his family voluntarily only if the primary causes are tackled and on amount of publicity or coercion will succeed otherwise. India has therefore to expect a certain population growth despite its efforts for population control and make provision for providing the basic minimum needs.

LAND DEGRADATION

Of the total 329 million hectares (mha) of land, it is estimated that only 266 mha possess any potential for production. Of this, 143 mha is agricultural land. It is estimated that 85 mha suffers from varying degrees of soil degradation. Of the remaining 123 mha, 40 are completly unproductive. The balance 82 mha is classified as forest lands, of which over half is denuded to various degrees. India has the world's largest cattle population. These 406 million heads of livestock have to be suppoted on 13 mha, or less than 4 pre cent of the land which is classified as pasture lands, most of which is overgrazed. Thus, out of 266 mha, about 175 mha or 66 per cent is degraded to varying degrees. Water and wind erosion account for the degradation of almost 150 mha out of this. The challenge of

prevention of erosion, and indeed of restoration of India's land resources is intimately related to strategies for the management of land, water and vegetative cover.

A masive programme of Wastelands Development through afforestation and tree planting with peoples' participation was initiated in 1985. The programme attempts to restore, through natural regeneration or appropriate intervention, the forest and tree cover in the country both for ecological security and to meet the fuelwood and fodder needs for rural communities. It also seeks to raise a green cover in non-forest and private wastelands in order to reduce the pressure on the forest areas. The programme is closely linked with peoples' movements and relies largely in the assistance of volintary groups and non-governmental organisation.

FORESTS

The Forests of India, occupy an area of about 75 million hectares, i.e. 22% of the land area with a great variety of species. During the colonial era, these forests were treated as a source of revenue and to oupply the demands of people for timber, fuelwood and minor forest products such as cane, resins and lac. Nearly a 100 million poor people including tribals live in and around forests. The forests supply, almost free of cost, their food requirements, water, fodder for livestock, firewood, timber for agricultural implements and house construction as well as medicinal plants. In addition, these people make their living by collecting and selling minor forest products. They have a symbiotic relationship with the forests since ages. Their demands on the forests did not affect the ecological role of the forests when the total population of the country was small. However, with the increase in human and cattle population already

mentioned above, these biotic pressures have become intense. In addition, industrialization has brought about an increased demand for wood, particularly, for the paper and newsprint industry. Fruit packing and housing have alse put tremendous pressure on forests.

Forests in India have been shrinking for several centuries owing to pressures of agriculture and other uses. The process continued after Indepedence. Vast areas that were once green stand today as a wastelands. Bringing these back under vegetative cover is a major challenge. Like indigenous people all over the world, the tribal communities that live in forests respect the trees, and the birds and animals that give ghem sustenance. Strategies are being developed for a greater degree of people's participation in forest management. The role of forest communities in restoring and conserving forests is now being increasingly recognised. The chalange is to integrate modern knowledge and skills in the area of forestry with the traditional knowledge and experience of the local communities, and to evolve more effective strategies for the joint management of forests.

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Forest legislation in India is over a century old. Concern with the state of India's forests and the protection of the ecological wealth is widespread. We are substituting other products for forest produced. We do not believe that the management of forest is a subject that can or should be administered internationally. India's forests are an intimate part of her land and people. That was the point we made at the RIO SUMMIT.

Water Resources And Water Pollution

India has 14 major river systems such as the Ganga,

Brahamputra, Mahanadi, Godavari, Krishna, Cauvery and nearly a hundred medium and minor river systems. The total storage available in reservoirs and tanks is about 15 mhm. The accelerated run-off during floods carries the soil with it leading to silting of rivers and reservoirs. This alternating cycle of floods and droughts has become more frequent now.

Industrialization has posed a threat to water quality through effluents discharged from industries. The technology for most old industries is essentially borrowed from outdated polluting models of the developed world. Municipal eastes from the towns and cities reach the water sources mostly untreated. These discharges affect the quality of surface water, ground water and of the costal areas. Almost all the rivers to dry during summer months with no flow available for dilution of waste water discharged in them. The dams on the rivers constructed for irrigation purposes have made down stream stretches over dried.

With the consttant inflow of municipal wastes and industrial effluents, most of the rivers and water bodies have become polluted. Treating the water quality of these rivers and other water bodies such as lakes is one of the biggest environmental challenges facing India. Besides the massive cleaning Ganga project, a National River Action Plan is also being formulated to cover other major rivers of the country.

Environmental Impact Assessment

Environmental management is now accepted in India as a major guiding factor for national development. It is realised that environmental issues arise in virtually every sector of the economy and that each sector should evolve its owm solutions. This process of integrating environmental considerations into development activities is promoted through a system of

environment impact assessment before projects are cleared. The proponents of all the major projects in the sectors of irrigation, hydroelectric power, thermal and nuclear power industries, ports and harbours, now townships, etc. have to assess their impact on environment and prepare environmental management plans befort the government approves these projects. Before approval, it is ensured that the adverse effects of these projects on environment are minimal.

Education And Public Awareness

In the area of formal education, the National Policy on Education (1986), emphasises that there is a paramount need to creeate consciousness about the environment.

It must permeate all ages and sections of the society, beginning with the child. The policy gives unqualified priority to universalization of elementary education and substantial improvement in the quality of education. Detailed school mapping exercises have been planned under a master plan for universal provision of facilities for enviromental education. The National Council of Educational Research and Training (NCERT) has been assigned the responsibility of bringing out model syllabi and instructional packages in ten core curricular areas, of which Environmrnt is one.

The Ministry of Environment and Forests supports two Centers of Excellence in the area of environmental education. These are the Center for Environment Education, Ahmedabad and the CPR Environmental Education Center, Madras.

The National Museum of Natural History, New Delhi, provides people an opportunity to acquire a direct understanding of the world of nature, the inter-relationships among plants,animals and the environment, and the need to develop a new

approach and ethics towards our natural environment.

The Nation Environment Awareness Campaign which began as an annual exercise in 1986 is a major programme of the Ministry of Environmental and Forests. The programme seeks to increase environment awareness through the involvement of governmental and non-governmental organizations. Activities include seminars, workshops, rallies, teacher's training, eco-clubs, environmental camps etc, carried out by non-governmental organisations and educational institutions.

Information Network

The Ministry of Environment and forests set up an Environmental Information System (ENVIS) in 1982, as a decentralised system using a network of database to ensure integration of national efforts in collecting information related to environment. ENVIS has ten centres working in diverse areas such as pollution control, coastal ecology, environmentally sound and appropriate technology etc. It has a documentation service and processes queries from national and international users. A quarterly journal Paryavaran Abstracts is published after scanning nearly five hundered scientific journals.

ENVIS maintains a close liaison with other national information system on Science and Technology (NISSAT) and Biotechnology Information System (BTIS).

THE INSTITUTIONS ENGAGED IN IMPROVING THE ENVIRONMENT

The Ministry of Environment and Forests and the Department of Science and Technology, Government of India are involved in research and development related to several environmental issues through their institutions.

The Indian Institute of Tropical Meteorology, Pune, is involved in studies of atmospheric ozone, effect of aerosols

on climatic change, carbon dioxide studies etc.

The Birbal Sahni Institute of Paleobotony, Lucknow, is engaged in paleobotonical research which aims to build up an evolutionary sequence charting the history of modern vegetation. It is also involved in investigating past climates.

The Wadia Institute of Himalayan Geology, Dehradun, has been studying various aspects of the chemistry of Himalayan glaciers. It has also conducted studies on the impact of growing human population on the Himalayan ecology.

The Indian Institute of Astrophysics,Bangalore, studies solar activity while the Indian Institute of Geomagnetism,Bombay, has a programme for the study of atmospheric and solar terrestrial weather relatioships.

The Survey of India, Dehra Dun, is responsible among other things, for tide gauge observation along the Indian coastline and for the study of anticipated problems of sea-level rise and impact on coastal environment.

The Center for Atmospheric Studies at the Indian Institute of Technology, New Delhi,studies the effect of aerosols on climate change, air pollution over India, and other related issues.

The National Environmental Engineering Research Instiute. Nagpur, is concerned with issues of quality control in respect of air and water, and disposal of waste water amd solids. Its activities include development of analytical capabilities to improve monitoring of pollutants, waste recycling urban and industrial solid waste management, environment impact analysis, development of appropriate processes for water treatment and environmental support programmes for integrated rural development to minimize health hazards.

The Industrial Toxicological Research Centre, Lucknow is a pioneering institute dealing with effects of industrial and environmental pollutants on environment and human health. Studies on the role of various factors like age, sex, physilolgical status, nutritional status and genetic make-up in morbidity, hitherto largely unexplored in the Indian Context, are being taken up. It also takes up occupational health related studies and environmental monitoring of pollutants.

WILDLIFE INSTITUTE OF INDIA

The Wildlife Institute of india (WII) is an autonomous institute devoted to the development of wildife science and to suggesting wildlife management in the field. It trains wildlife biologists through a Master's programme and also in-service foresters at the post-graduate diploma level. Its short courses provide conservation orientation to others concerned with land use and management.

Wildlife Institute of India has major research programmes which cover biological management and human aspects of wildlife and biodiversity conservation. The topics and sites conform to national priorities so that findings are helpful in improving management. A notable contribution is by way of a detailed biogeographic classification and examination of the existing network of protected areas, with suggestion for additional sites in order to fill in the gaps in representative biogeographic coverage. It has a rapidly growing wildlife database which includes information on protected areas status of major habitat types and main species.

New initiatives include development of landscape level integrated management strategies in areas harbouring protected area clusters and training in planning of ecodevelopment measures

around protected areas. Its training programmes show an upward trend in utilization by contries of the region.

Eco-Task Forces

Eco-Task Forces of ex-servicemen is a joint venture of the Ministry of Environment and Forests, Ministry of Defence and the concerned state government to undertake ecological restoration work in selected enironmentally degraded areas, particularly in unapproachable and hostile terrains. The activities include afforestation, pasture development, and soil and water conservation.

Participatory Forest Management

Van Panchayat is a democratically elected village level institution set up in Utter Pradesh for the management of forests. It is responsible for the the management of grazing, collection of fuelwood, fodder and timber, and protection of community forests. A Van Panchayat can be formed if one-third of the inhabitants of a village resolve to form one sole arbitrator for the management of the Van Panchayat forest. It has linkages with the Forest Department for technical assistance and for the preparation developmental plans.

Pollution Control

The Central Pollution Control Board was constituted under the Water (Prevention and Control of Pollution) Act. 1974. All states have their own Pollution Control Boards. The main function of the Boards is to promote cleanliness of diffenent water bodies, to imporve the quality of air and to control air pollution in the country. The Environment Protection Act of 1986 has further widened the scope of these Boards. They have also been entrusted with the additional responsibility of air pollution control under the Air (Prevention and Control of

Pollution) Act, 1981.

Wasteland Development

Unprotected land or land degraded due to extensive soil erosion, salinity, desertification etc, is termed as wasteland. The Government of India set up the National Wastelands in the country thorugh a massive programme of afforestation and other appropriate measures. While doing so it is expected to restore the disturbed ecological balance and provide employmnent opportunities in rural areas. The thrust in the board's methodology is to secure people's active involvement in afforesting government as well as private wastelands.

Forest Conservation and Policy

The Forest Conservation Act of 1980 is a unique piece of legislation to ensure the examination in depth of the diversion of forest land for non-forest uses. It has been instrumental in slowing down such diversion while ensuring that developmental needs are married with enviornmental considerations.

The Forest Policy of 1988 is another landmark, wide-ranging in its coverage and focusing on conservation efforts in Indian forestry coupled with sustainable utilizaton and people's participation.

The Protected Area Network

Although the first protected areas in this century were set up in the mid thirties, their numbers went up substantially in the fifties. The onslaught on natural areas in the fifties and sixties led to gazetting of a large number of new areas in the seventies and eighties. The number reached 75 national parks and 419 sanctuaries covering 138,000sq km in 1992.

The need for systematic coverage of the full spectrum of the country's biological diversity in the protected area

network was,however,strongly felt. In 1988 the Wildlife Institute of India came up with Biogeographic classification system recognizing 10 zones divided in to 25 provinces in which over three hundred landfroms were identified. The existing network was then tested for its representativeness vis - a - vis the classification system. Sites were identified to fill the gaps and the suggested network now recommends 148 national parks and 503 sanctuaries, equivalent to about 4 percent of India's land area.

Fiscal Incentives

To generate public involvement in environmental protection the Government has decided that the amount paid by a taxpayer to any association or institution for programmers of conservation of natural resources will be exempt from income tax. A depreciation allowance at 50 per cent of devices and systems installed for minimizing pollution or for conservation of natural resources was introduced in 1982. An investment allowance at the rate of 35 per cent, as against the general rate of 25 per cent, of the actual cost of new machinery or plant which assists in the control of pollution or proterction of enviornment is also allowed.To encourage industries to shift from urban areas,capital gains arising from transfer of buildings or lands used for the purpose of business are exempt from tax on capital gains if these are used for capital investments for the purpose of business at the new place. The Water Cess Act 1977, provides for the levy of a cess on water consumed by certain industries and by local authorities. If any of these bodies install plants for the treatment of sewage or effluent, they are entitled to rebate on the cess.

Enivironment Friendly Products

A recent scheme of the Government of India provides for

the award of a label known as ECO MARK to environment friendly household and other consumer products. These products will have to meet specified environmental criteria along with the quality requirements laid down by the Bureau of indian Standards. Criteria have so far been notified in case of' soaps and detergents. Criteria for paints,paper, plastics, aerosols, paking materials and wood substitutes are under consideration. It is hoped that the ECO MARK scheme will motivate the manufacture, use and disposal of commonly used consumer products in a way that would cause less harm to the environment than at present.

Fellowships and Awards

The Minstry of Environment and Forests has instituted a number of awards to recognize outstanding contributions of individuals and organisations in various environment-related endeavours.

National Awards for prevention and control of pollution have been instituted to recognize the achievements of industries for their contribution in the prevention and control of pollution.

Indira Priyadarshini Vrikshamitra Awards are given to individuals and organization for outstanding work in the field of environment.

Pitamber Pant National Fellowship recognizes excellence in research in any branch of environmental science.

Voluntary agencies

India has a very active movement by Non Governmental Organizations (N.G.O's) in the area of Environment with an impressively large number of them involved in rural development, afforestation programmes, creation of public awareness, tribal welfare and action against polluting industries. More than 850 environment NGOs are now active throughout the country. These

NGOs are broad-based and consist of organisations of scientists, lawyers, fatrers, fishermen etc.

NGOs in India have played a vital role in raising awareness about the issues related to environment and development, and in mobilizing people to take action . They have employed a variety of techniques and media. The Kerala Sastra Sahitya Parishad, which was the catalytic agency involved in mobilizing public opinion against the Silent Valley hydroelectic project, uses traditional and folk media to communicate its messages. The Center for Sciencce and Environment (CSE),New Delhi, has brought out three widely criculated volumes on the state of India's environment, in addition to several other publications. CSE has also played a key role in bringing in the South perspective in international discussions of environment and development issues. Eklavya, Bhopal, develops innovative and relevant school programmes and material. The Assam Science Society which has a membership of professionals and students, attempts to enhance science education.

The Narmada Bachao Andolan has brought together scattered voices of protest against the damming of the river Narmada and has raised awareness not only in the affected area and in the rest of India, but also among the international community. The Vivekanand Kendra, Tamil Nadu, trains hundreds of workers in the fields of health, education amd development. A major focus of its activities is in Arunachal Pradesh where it runs 14 residential schools for tribal children. The people's Commission on Environment and Development, New Delhi, is a forum created to bring together and articulate citizens' concerns to put before the UNCED. Kalpavriksa, New Delhi organizes awareness programmes and carries out campaigns on specific issues by

lobbying holding demonstrations and fighting legal cases.

The Center for Application of Science and Technbology to Rural Areas (ASTRA), Bangalore, was set up in 1974. It has undertaken reseach projects leading to the development of many technologies and products including fuel-efficient wood stoves, stabilized mud blocks for construction, rural energy systems based on biomass and forestry programmes (MEF, 1992, Environment And Development: India's Aproach; 6-19).

Besides, several organizations are involved in research and education in various aspects of natural resource management, including technology development.

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