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OBJECTIVES

Swasth Hind (Healthy India) is a monthly journal published by the Central Health Education Bureau, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi. Some of its important objectives and aims are to:

REPORT and interpret the policies, plans, programmes and achievements of the Union Ministry of Health and Family Welfare.

ACT as a medium of exchange of information on health activities of the Central and State Health Organisations.

FOCUS attention on the major public health problems in India and to report on the latest trends in public health.

KEEP in touch with health and welfare workers and agencies in India and abroad.

REPORT on important seminars, conferences, discussions, etc. on health topics.

The 5th June is observed as the World Environment Day since 1972 as designated by the United Nations Organization. Each year, since then, the World Environment Day focusses people's attention towards protection of our environment.

Swasth Hind devotes this Issue to the World Environment Day with a focus on Health and Environment: The Growing Challenge.

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State Health Directorates are requested to send in reports of their activities for publication.

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UNCONTROLLED URBANISATION :

A matter of global concern

DR (COL) A. C. URMIL

DR P. A. SOMAIYA

DR A. K. URMIL

URBANISATION has been rightly described as one of the most characteristic features of the 20th century. The unimaginable fast pace of unplanned and uncontrolled urbanisation has already become a matter of global concern. A direct consequence of Population Explosion, it is already being referred to as "Urban Crisis" and "Urban Explosion". Like "Population Explosion", the "Urban Explosion" is therefore a self-inflicted malady which the mankind has brought upon itself. Consequently, numerous problems are becoming more and more difficult to tackle with the existing resources. An unpredictable influx of migrant population from rural to urban areas in search of means of livelihood, is also responsible for this crisis. The urban authorities and local bodies are finding it extremely difficult to solve this problem due to several constraints. As a result, slums and shanty towns have been cropping up at an unbelievable, unprecedented rate. Besides this, the migrant population have also

The fast pace of uncontrolled urbanisation or "urban crisis" portrays a gloomy picture at present. It is already being regarded as a problem of growing international concern since there is no single/simple solution in sight.

been using roadsides, pavements and footpaths for their temporary shelter. The fast pace of urbanisation, in its wake, has given rise to problems of housing, transport, health and medical care, water supply and sanitation, education and other public services, environmental pollution and also psychosocial problems leading to deteriorating law and order situation.

A study carried out by the Population Crisis Committee (PCC), a USA based voluntary organization, devoted to promote family planning, reveals that in respect of more than 50 per cent of the cities studied all over the world, the problem of urban population explosion has surpassed their capacity to tackle it effectively since their population is getting doubled in every 12 to 20 years. A recent study by Habitat shows that even the local

bodies like municipalities are now finding it increasingly difficult to ensure proper disposal of garbage (75% of total solid wastes) collected from households with the result that most of it is being dumped openly leading to insanitary conditions favouring breeding of many disease vectors. It creates nuisance by attracting birds and animals including stray dogs and by producing foul odour while undergoing decomposition. Besides garbage, the proper disposal of other community wastes—sullage, sewage, human and animal excreta etc—is also becoming more and more difficult. Cities in the developing world are the worst affected. According to WHO, it has already become a major challenge for "Health for All" by 2000 AD since according to current projections, 50 per cent of the

world's population will be living in urban areas by the turn of the century. There will be 60 megacities of over 5 million population each, of which no fewer than 45 will be in the developing world, compared with just one in 1950. Population projections (based on population size in 1985) for the year 2000 in respect of world's 49 largest cities indicate that 24 of them will cross 10 million mark. This includes 3 Indian cities also, namely Calcutta (15.94 million), Greater Bombay (15.43 million) and Delhi (12.77 million). At the beginning of the 19th century, only 3 per cent of the world's population lived in towns. By the beginning of the next century, more than half will be living in cities. More than 1000 million men, women and children are now living in shanty towns where living conditions and hygiene are appalling. Urban poverty is consistently on increase and likely to outstrip rural poverty in next 10 years time. The mean salary has already gone down by at least 25 per cent in many developing countries. Although the demand for health care has never been so high in the past and is consistently on increase, the health costs are getting covered less and less. More than 50 per cent population of the Third World cities is living in conditions of obvious poverty. The proportion in Africa is 70 per cent and likely to get worse in future. The improvement in health and nutritional status in respect of these populations has either slowed down or totally stopped in many African and Latin American countries. UNICEF has already

warned that millions of children among these populations who are growing up today under such horrible conditions, are not going to realize their full mental and physical potential. Among these children, diarrhoeal diseases account for 25 per cent deaths in the least developed countries. Respiratory infections and malnutrition, the 2 major causes of morbidity and mortality in young children, have become part and parcel of life in urban fringe areas. With increasing urban poverty, the situation is not likely to improve—may become worse.

The population of aged people is also registering an increase in urban areas. There are 300 million people aged 65 and above in the world today. In the next 10 years time, their number is going to surpass 400 million mark. It has been projected that by 2025 AD, 70 per cent of them will be living in the developing countries, a majority of them in the urban areas, where they will be facing deplorable living conditions, struggling for survival, looking for employment in the absence of any guarantee of their social security and family support.

New area of Concern

A new area of concern is also emerging due to poor residential environment in the urban areas. New or previously unknown diseases such as Legionnaire's disease, are now coming to light. Room humidifiers, air ventilation systems, cooling towers as well as hot and cold water supply ducts have

been found to nurture Legionella bacteria and transmit them throughout the indoor environment or discharge them into the immediate vicinity of buildings.

Disheartening Urban Scenario

As regards India, the fast changing urban scenario is also disheartening. Slum areas and shanty towns are cropping up at unprecedented rate with no prospects of control or proper planning in future. Although a Supreme Court judgment of 10 July 1985, empowered the civic administration from 01 Nov 1985 to remove encroachments on public places, it has not helped much since people displaced from one area have no option than to settle down in some other new area where this problem again comes up. As a result, half of the population of Bombay continues to live in slums. During 1985, nearly 78 per cent of the families were found to be living in single room tenements and sharing a lavatory. Bombay still has the dubious distinction of housing more than 40,000 people in Asia's largest slum-Dharavi. However, the problem is not peculiar to Bombay alone. It has already afflicted all major/mega cities and even towns of our country. Madras was supposed to be having 21.08 lakh slum dwellers, Ahmedabad 11.33 lakh, Hyderabad 11.12 lakh, Bangalore 10.37 lakh, Kanpur 8 lakh, Pune 5.15 lakh and even a relatively small city of Bhubaneswar about 30,000 slum dwellers during 1990 according to one official estimate. Provision of housing to solve this problem is a

formidable task due to increasing financial constraints. Even construction of 16.2 million targetted housing units during the 7th Five Year Plan, at a minimum cost of Rs. 30,000 per unit required an investment of Rs. 486 billion for this purpose alone!

Environmental health problems

Several environmental health problems are intimately associated with urban growth. Air pollution has assumed an alarming increase in several cities around the world. According to the World Watch Institute of Washington DC, engaged in environmental research, mere breathing of air in Bombay now equals to smoking of 10 cigarettes per day. Every day in Bombay, over 1200 metric tonnes of pollutants are released by vehicles which is 60 per cent of the total load of pollutants. The annual cost of treatment of pollution related ailments in Bombay has been worked out at Rs. 400 crores, according to Dr. S. R. Kamat, the vice-President of the National Society for Air Pollution Control. The growing number of automobiles, in all urban areas, has now become a matter of major concern all over the world. Their number, which is 400 million today is going to cross 700 million mark over the next 20 years. Much of that increase will occur in the

developing countries which currently own only 12 per cent of the global car fleet. In Delhi city, the number of motor vehicles increased to more than double and air pollution registered a ten-fold increase during the period 1970-1989. Besides automobiles, industrial and domestic sources are also responsible for increasing air pollution in urban areas where respiratory infections and chronic lung irritation are predisposing more people to lung cancer. The first 2 factors are also responsible for increasing noise pollution in urban areas. Although WHO has fixed 45 dB as the "safe noise level", cities like Bombay, Calcutta and Delhi register over 90 dB. Bombay infact holds the dubious distinction of being the third noisiest city in the World. The noise levels have also been found doubling every 6 years or so therefore by 2000 AD (target year for Health for All), it is possible that no one above the age of 10 will hear normally. Depletion of greenery is causing increase in level of carbon-dioxide and adding to Greenhouse effect and global warming. It has been found that the dust content of the air drops by 40 per cent in green spaces which also absorb and dissipate sound energy and are a good means of protection against noise pollution.

The fast pace of uncontrolled urbanization or "urban crisis" thus portrays a gloomy picture at present. It is already being regarded as a problem of growing international concern since there is no single/simple solution in sight. "A global human development pact is desired to safeguard the planet and to ensure the survival of humanity, reverse the current trends responsible for present sufferings and promote harmonious development that can restore dignity and hope to everyone"—according to Dr Fredj Stambouli, Professor of Urban Sociology, University of Tunis, Tunisia.

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(Contd. from Page No. 144)

and smaller cells dealing with colour and detail. Research has shown that in glaucoma patients most damage occurs in the large cells. After considerable investigation, the group has designed software that measures sensitivity to small movements. As it can be used on a personal computer, people would be able to undertake the tests at an optician's premises as part of a routine examination.

In a way, carrying out the test is a bit like playing a gentle version of many computer games. Sitting in front of the screen, a patient fixes his sight on a cross in the centre of the screen. All around the cross are fine short bars which move slightly from side to side, one at a time, and at random. Every time a patient perceives a bar moving, he presses a button. These responses—and any bar shifts that have been missed—are recorded by the computer. It is able to dis-

tinguish between real reactions and false ones by assessing the time between bar movements and button-pressing. Based on the patient's reactions, the computer can then evaluate how much sensitivity has been lost. Full trials are now underway involving more than 500 people, some of whom may be at risk from the disease for hereditary reasons.

—Spectrum, March-April 1993

Message

Health & Environment : The Growing Challenge

The close links between health and the environment are universally acknowledged. It is, for example, well accepted that a degraded environment, devastated largely by man-made endeavours leads to ecological imbalance and very adverse effects on human health. The Earth Summit held last year in Rio de Janeiro spelt out these concerns most eloquently and forcefully, calling urgently for measures to curb the mindless destruction of the ecological system in the name of development.

As in other developing regions of the world, the countries in WHO's South-East Asia Region are now realizing the importance of paying attention to maintaining the ecological balance. Already, rapid urbanization in some developing regions has brought in its wake untold misery in the form of overcrowding and the rapid spread of water-and-vector borne diseases, not to mention the diseases related to lifestyle, which seem to proliferate in urban settings.

Fortunately, however, enough is known about what needs to be done to ensure clean air, water and land resources. What we must ensure is timely action to make the environment clean so that coming generations inherit a healthy planet where blue skies, clear, bubbling freshwater streams and clean air are a reality and not just wishful dreams.

—Dr U. Ko Ko
Regional Director WHO, South-East Asia Region

(Contd. from Page No. 157)

forth by India and like minded developing countries. The Declaration is expected to provide basic framework for the position to be taken by the developing countries in future negotiations.

Kuala Lumpur Conference

Another ministerial level conference of 55 developing countries took place in Malaysian capital Kuala Lumpur in May 1992. The Declaration adopted at the conference is far reaching in several directions. One of them is the demand for new and additional funding for serious environmental problems faced by developing countries, including desertification and drought. The conference called for additional financial resources and transfer of technology to developing countries on

preferential and economical terms. It called for evolving a partnership leading towards the goal of sustainable development in both developing and developed countries. The Declaration called for new funding arrangements which should be in addition to and separate from the official development assistance (ODA) target commitments by developed countries.

SAARC Conference

Environment Ministers from the seven SAARC Member countries also met in New Delhi in April 1992 to deliberate upon the issues related to UNCED. The Ministers from Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka hoped that the Earth Summit could lead to a

genuine meeting of minds. In their joint communique, they said the Summit should give true recognition to the needs of environment and development, without resulting in additional burden on the developing countries. It said the right of developing countries for an equitable global partnership and prosperity must be fulfilled at the deliberation.

Earth Charter

The Rio Summit held in June 1992 adopted the Rio Declaration on Environment and Development, a voluminous programme of action entitled "Agenda 21"; and a "Statement of principles on the Management, Conservation and Sustainable Development of All Types of Forests". (Also see *Swasth Hind*, July 1992).

—Courtesy : PIB

HEALTH AND ENVIRONMENT : The Growing Challenge

STATE OF THE ENVIRONMENT IN SOUTH-EAST ASIA

The WHO South-East Asia Region has eleven developing countries of which five (i.e., Bangladesh, Bhutan, Maldives, Myanmar and Nepal) are least developed countries (LDCs). The present population of the Region is about 1300 million which is expected to double in less than 50 years. More alarming is the trend of urban population growth (which is at present more than three times the average national growth rate) and the rapid growth of squatter settlements—at twice the rate of growth of the urban population. The increase in the level of consumption of renewable and nonrenewable resources is causing a faster degradation of the environment due to an increase in demand for water and arable land for food and energy. As a greater number of people are moving to urban areas, services such as water supply and sanitation, drainage of storm and waste waters, management and disposal of solid and hazardous wastes, supply of adequate and safe food, and housing, etc., are unable to keep pace with the rapid and massive urban growth. Many countries in the Region are faced with an accelerating decline of the quality of life as a result of environmental degradation due to surface, ground water and marine pollution, deforestation, desertification and destruction of wild life and flora. These factors in turn lead to various types of physical degradation, spread of diseases and poor health.

URBAN ENVIRONMENT

Urbanization and Land Use

The total urban population of the Region in 1980 was about 340 million and constituted nearly 22% of the total population. Between 1980-1990, the urban population in the Region increased by about 110 million which was almost 50% more compared with the figure in 1980. Demographic trends indicate that by 2020 almost half of the population in the Region will be

living in urban centres and the urban population will double in the next 10-20 years. There is a pronounced trend of population concentration in metropolitan cities like Bombay, Calcutta, Bangkok, Jakarta, etc., and it is likely that the number of smaller cities with populations of one million and above will increase rapidly. Large areas of prime agricultural and forest lands in the vicinity of these urban centres are therefore being lost every year due to urban encroachment.

Housing

Due to the population influx from rural to urban areas the shortage of housing has been increasing and in most cities squatter settlements are growing rapidly. Presently, slum dwellers constitute 30-50% of the urban population with very poor housing structures.

The deterioration of shelter and basic infrastructural services affect

mostly the urban poor. A significant number of these urban residents have no shelter at all and many sleep on pavements or in public parks in many metropolitan cities in the Region.

Water Supply and Sanitation

The evaluation of the International Drinking Water Supply and Sanitation Decade (1981-1990), indicates that urban water supply and sanitation services in most cities in the Region could not keep pace with rapid urbanization. In spite of significant investments during the Decade, only about 75% of the urban population had adequate water supply, while over 50% of them did not have adequate sanitation facilities by 1990. The water supply and sanitation services in slums and squatter settlements are virtually non-existent. People therefore have to use unsafe sources of water and open land and water bodies for defecation, thereby polluting surface and ground water.

Solid Wastes

Cities in countries of the Region are unable to cope with the collection, transport, treatment and disposal of solid wastes resulting in unsanitary conditions with vector proliferation and related diseases. With rapid urban population growth, solid waste from domestic, commercial and industrial sources has been increasing, placing a major burden on municipalities.

Drainage

The provision of drainage in human settlements has assumed

considerable significance in the Region due to the enormous population growth and the rapid and haphazard urbanization in most countries. The absence or inadequacy of drainage is directly linked to the resurgence of malaria, filaria and diarrhoeal diseases and also causes damage to housing and property.

Air Quality

Most cities in the Region are experiencing mild to severe air pollution caused mainly by motor vehicles, burning of fossil or biomass fuel, increased industrial activities and power generation either within or on the fringes of the cities. In most countries the per capita increase in energy consumption and the number of vehicles have been quite dramatic. While the transport sector contributes most of the carbon monoxide and lead emissions, the power generation sector the particulates and sulfur dioxide emissions, the industrial sector is mainly responsible for hydrocarbon and carbon monoxide emissions. The WHO assessment of air quality in the megacities of the Region in 1991 indicates that air quality has deteriorated over the past decade. Unless legislation and enforcement are strictly followed for the control of industrial/power and motor vehicle emissions, air quality in these cities will worsen significantly in the next decade.

Water Quality

Increased solid and liquid wastes and particularly the discharge of

domestic sewage and industrial wastes has resulted in the deterioration of river and surface water as well as ground water in most cities. Typical examples are the Klongs in Bangkok, the Brantas River in East Java, and the Ganges and Yamuna rivers in India.

Industrial, Toxic and Hazardous Wastes

As most industries are located in and around urban areas, the adverse effects of emissions and effluents from factories are often more acutely felt by urban and peri-urban populations. Chemical accidents have also become more frequent, leading to extensive toxic impact.

Vehicular Traffic, Noise and Vibration

In most cities noise and vibration levels have increased considerably due to motor vehicles (commercial and private), railway traffic, aircraft, industrial machinery, construction, air conditioners and loudspeakers, etc. In parts of Delhi city, for example, the noise level is well above the threshold limit of 85 decibels (db).

RURAL ENVIRONMENT

Population Pressure on Land

The rural population in the South-East Asia Region in 1990 was 926 million and was growing by nearly 2% per year. Rapid rural population growth in many countries of the Region has

resulted in severe pressures on agricultural land and the destruction of tropical forests to meet the growing food, fuel and fibre needs. Overgrazing and undesirable farming practices have caused land degradation as well.

There is a phenomenal decrease in agricultural land per capita in densely populated areas of the Region and the number of landless rural households is increasing in countries such as Bangladesh and India. Population growth moreover results in subdivision of land holdings into smaller units. When land holdings are smaller than 0.4 hectares, they are usually unable to support a family. It is estimated that about 40% of all rural households in many countries of the Region now barely subsist.

The quality and quantity of rural shelters is also declining. A large part of the rural population live in extremely bad conditions under leaking, makeshift shelters with poor ventilation.

Rural Water Supply and Sanitation

While much progress was achieved in the provision of water supply in rural areas in the 1980s during the International Drinking Water supply and Sanitation Decade, nearly 30% of the rural population remained unserved in 1990. Sanitation facilities in rural areas are hardly available to 11% of the population. It was estimated that in 1990 over 800 million rural people did not have adequate sanitation facilities.

Energy Consumption

The problem of energy requirements in rural areas is of the same magnitude and urgency as food needs. Two-thirds of the energy demand in rural areas is met from wood for cooking purposes. Wood is therefore being used faster than it is being replaced. In addition to wood, people use coal, cowdung cakes, crop residues etc., resulting in diversion of soil nutrients.

Indoor Air Pollution

Poor ventilation coupled with the use of poorly designed cooking stoves, cause severe indoor air pollution and health problems in women and infants who are particularly exposed to high concentrations of suspended particulates and carcinogens in smoke.

Agro-chemicals

The occupational health hazards of agricultural practices affect more than half of the economically active population in the Region. Exposure to agro-chemicals and the health risks they pose to both farmers and consumers of the produce is a major health concern. The problem of pesticide poisoning among agricultural workers is also quite common.

LAND ENVIRONMENT

Deforestation

This is one of the most serious environmental problems in the

Region. In many countries, while the tropical forests have been a major basis of development, they have been disappearing at an alarming rate. In Sri Lanka and Thailand the loss is 5% annually. Commercial logging, fuelwood collection by rural people, slash-and-burn cultivation, human settlements and pasture farming are destroying the forest environment. At this rate the tropical forests can disappear in a relatively short time and the environment can be deprived of an important agent which converts atmospheric carbon dioxide to oxygen. The newly opened forest canopies also disrupt the biology of the forest floor and interrupt the life cycles of organisms in this habitat.

Desertification and Degradation of Soil

Man's intervention in land use for developmental activities, like constructing highways, railways, canals, etc. have brought about drastic changes affecting hydrology and wildlife. Massive landslides have been precipitated by cutting into hills for construction. In addition mining operations resulted in adverse topographical changes. The consequences of these interventions are loss of good agricultural land, destruction of forests, wildlife and even man's habitat and his health.

Soil erosion precipitated by the above-mentioned factors, particularly rain, is considered to be the second important land-related environmental problem in the

Region. A major contributor to soil erosion is livestock herding which is a traditional use of land in dry areas. Nepal is estimated to lose 240 million cubic metres of soil annually as a result of grazing, etc.

Salination caused by mismanagement of irrigation systems also leads to soil degradation. Irrigated land which is not properly drained acquires salinity nearer its surface because of salt built-up during the dry season. In Bangladesh, Indonesia and India roughly 3, 10 and 20 million hectares are lost annually respectively due to salinity. Chemical degradation of soil caused by natural leaching of nutrients is another problem frequently faced in the Region.

Destruction of Wildlife and Plant Habitat

South-East Asia's tropical zones which contain some of the most diverse forms of wildlife in the world, are under significant pressure as a result of hunting and habitat destruction, threatening the extinction of many animal and plant species. In India alone

between 3000-4000 plant species are presently endangered.

Water Resources

With the expanding demand for water for industrial and agricultural development, increasing attention is given to surface water and groundwater development projects such as dams, reservoirs and irrigation systems. These projects invariably have an environmental impact.

Already scarce water resources are being polluted by agricultural and industrial development activities. The discharge of domestic and municipal waste water is making these water resources unsuitable for drinking water supplies and some times even for agricultural and industrial use. Pollution from human excreta due to open air defecation is probably the Region's most serious surface water pollutant, resulting in a high incidence of diarrhoeal diseases.

In many countries of the Region where rapid population and economic growth have taken place, surface water no longer satisfies the demand and thus groundwater is being increasingly exploited. With excessive groundwater with-

drawals, salt water intrusions affect large parts of the Region's coastal population as, for example, in Bangladesh, India, Indonesia, Thailand and Maldives. At places the groundwater which constitutes the largest source of drinking water supply is also getting contaminated by pesticides and fertilizers used in agriculture and from insanitary landfills, garbage dumps, etc.

Marine Environment

Eight countries of the Region have a marine environment of coastal waters, estuaries, wetlands and high seas. Though the marine environment meets a large part of the food and energy needs in the Region, it is often being degraded by oil pollution from tankers and wastewater effluents from refineries, land-based pollution from municipal sewage and other wastes, sediments and chemicals from agricultural practices, logging, mining and construction. These activities as well as industrial discharges, have led to the destruction of mangroves, sea grasses, coral and fish life and threatens the life of many marine mammals.

NATIONAL CAPABILITIES FOR THE PROTECTION OF HEALTH AGAINST ENVIRONMENTAL POLLUTION HAZARDS

The awareness of the need for environmental protection in the Region has continued to increase during the last decade. In most countries of the Region, institutions for environmental policy formulation, implementation, and evaluation are now in place. Many countries have developed comprehensive national control programmes based on preventive approaches involving land-use planning, environmental impact assessment, waste management, pollution control, and production processes in agriculture, industry and energy development to minimise waste and reduce pollution.

While some progress has been made in strengthening institutional capability to address environmental issues, policies and programmes in many countries are still too weak to protect human health from environmental hazards. Technical, organizational, financial and human resource constraints are major problems faced by countries in responding effectively to pollution hazards. Due to the multidisciplinary nature of environmental management, effective implementation requires integration and horizontal coordination of all government institutions/departments. This, however, is often missing.

Although all development activities tend to increase pollution hazards, countries undergoing rapid industrialization tend to have the greatest problems. According to the 1989 assessment, four countries in the Region—India, Indonesia, Sri Lanka and Thailand—had the basic infrastructure to monitor and control environmental hazards. The assessment, however, indicated that there is substantial scope for strengthening institutions in these four countries, and in developing institutions and their capabilities in monitoring, assessment, enforcement and laboratory support in the remaining countries of the Region. —WHO

ENVIRONMENT AND HEALTH: CREATING COMMUNITY AWARENESS

THE lives of people are inextricably related and dependent upon the environment in which they live. The quality of what is available to them to breathe, eat and drink are largely influenced by environmental factors. And it is not that people are unaware of this link. Most people do believe that 'air' is responsible for a number of illnesses and that 'water' and 'food' can make people sick.

But a certain helplessness prevails, helplessness born out of a sense of dependency, even despondency. What is worse, some individuals and communities regardless of the consequences continue to manipulate the environment in search of so-called comfortable living.

The concern for building a healthy environment is not new. It has been felt and expressed for several years on both national and international platforms. Its political, social and economic implications have been meticulously analysed, the health hazards have been documented and the study of environmental sciences has emerged as an academic subject in many schools and universities the world over.

But this academic and research-oriented approach has had a marginal impact on action programmes at the country level. This is largely because there is little involvement from individuals and communities. Today we know that to achieve their objectives, policies and programmes must

involve the people for whom they are meant.

This indicates the need for massive community awareness campaigns and programmes. It is not enough to tell people what illnesses are caused by adverse environmental factors. It is also important to tell them what price is paid in terms of human ill-health when the environment is manipulated, when resources are exploited by the not-so-needy and when programmes are planned without regard to their sustainability or are poorly monitored. Awareness building in communities involves drawing attention of the people to the problems that exist, their seriousness and, above all, their social and economic costs. Facts and figures must be provided as a basis for action, a potential for solution must be pointed out and people must be involved in problem-diagnosis and in finding solutions.

A carefully designed communications strategy that involves people at every stage is the beginning of creating community awareness. A communications strategy must include a dialogue with communities on action that can be taken at the individual, family and community levels. This cannot be left to the environment activists alone. The government sectors concerned with environmental issues must become more communication-oriented and must include communication strategies in their programmes. Simul-

taneously, nongovernmental organizations, youth and women's groups and consumer bodies must form alliances between themselves and with government sectors to promote a common cause.

At a global consultation on Water Supply and Sanitation held in New Delhi, India, in 1990, the New Delhi statement issued at the concluding session asked for "intensive efforts to raise awareness through communication and mobilization of all sections of society". Participants of this consultation requested that communities be involved "by intensive mobilization through sharply focussed communication and education efforts at all levels of operation".

It is now generally recognized that most water and sanitation related problems can be tackled by people both in urban and rural areas provided they are empowered to take action themselves. There are also examples of community action to prevent deforestation and monitor air quality. Several groups and agencies can be involved in such efforts.

The schools, the media, nongovernmental organisations and several other groups and agencies can be and are involved in creating community awareness. Religious leaders have an important role to play in some countries. Employers and business leaders can also be mobilized for creating community awareness through their employees. Finally, enlisting health workers in creating community awareness must not be ignored in helping to create a healthy environment. □

POPULATION, ENVIRONMENT AND SUSTAINABLE SOCIETY

DR S.C. GUPTA AND DR DEOKI NANDAN

It is clear that demographically divided world is divided economically also and this dividing line may become deeper and deeper if present trend is continued. It is also noted that if the relationship between rapidly multiplying population and their life support systems is not stabilized, all our development policies are likely to fail.

TODAY, we are facing the problem of population explosion. The increase in population of the world is reaching a stage beyond the Earth's limited capacity to sustain it. Around 1830, the world population was one billion and it took approximately 2 million years to reach this stage. The population was doubled in the next 100 years (1930) and redoubled in the next 45 years. Another billion was added in only 11 years and it is expected to become six billion by the year 1995 (Table-1).

Demographically and Economically divided World

In one group of countries in this world, the fertility is at or below the replacement level and they have either established a balance between births and deaths or they are in the process of doing so. In the other half of the world, where birth rates remain high, rapid population growth is beginning to overwhelm local life support system leading to ecological deterioration

Table 1—Increase in World Population

Population	Years required to add one billion	Year
First billion	2,000,000	1830
Second billion	100	1930
Third billion	30	1960
Fourth billion	15	1975
Fifth billion	11	1986
Sixth billion	9	1995
		(Estimated)

and declining living standard. On this basis, the world can be divided into two groups viz. slow growth regions and rapid growth regions. The slow growth regions are Western Europe, North America, East Europe, Australia and Newzealand and East Asia, whereas rapid growth regions include South East Asia, Latin America, Indian Subcontinent, Middle-east and Africa.

In slow growth category the Western Europe is on the verge of reaching zero population growth

and East Asia grows on the rate of one per cent annually. This group has collective growth rate of 0.8 per cent per year. In these countries, rising living standard and low fertility rate reinforce each other. The rapid growth group contains about 2.6 billion people, over half the world's total. This group is growing at the rate of 2.5 per cent per year, three times as fast as the slowly expanding half. Thus rapid growth regions add 64 million people every year while slow growth regions add 19 million only. Because of this

rapid growth, some countries in the second category are showing a fall in their *per capita* income. However, some countries like India are still showing increase in the *per capita* income, but with the risk of reversal in this trend, if the population growth is not slowed down.

It is clear that demographically divided world is divided economically also and this dividing line may become deeper and deeper if present trend is continued. It is also noted that if the relationship between rapidly multiplying population and their life support systems is not stabilized, all our development policies are likely to fail.

Population : Carrying capacity and sustainable development

The objective of population ecology is to study the environmental factors and biotic characteristics intrinsic to the population which interact to determine the number of individuals of different species at a given place. And a population structure is reflected in such dynamic aspects like birth-rate, death-rate, immigration and emigration. These factors are in turn influenced by age structure, sex ratio and distribution pattern. Since our wellbeing rests on the balance with other populations, we must learn to consider the impact that our activities have on our fellow inhabitants of this planet.

The 'carrying capacity' for a particular region is defined as the maximum population of a given species that can be supported there without degradation of the natural resource base. In other way, it is the measurement of a region's ability to support its human population. Through technological advances and trade, we can certainly increase the carrying capacity of that region,

but not for continued unlimited growth. We can increase it temporarily through environmental mismanagement to increase the *per capita* supply of goods but it is not sustainable in the long term and may ultimately cause irreparable damage to the natural resource base in the form of deforestation, desertification, loss of biological diversity and pollution.

There are many views regarding the carrying capacity of earth. In 1983, the Food and Agricultural Organisation (F.A.O.), in collaboration with the International Institute for Applied Systems, conducted a study analysing the population sustaining capacity of land in 117 countries. The study concluded that 65 countries with a population of 1.1 billion would not be able to provide even the minimum level of nutrition to its people. Hence, there is a great need for a vigorous drive for population control, specially in developing countries, which are already having problems of environmental and natural resource degradation.

THE SITUATION IN INDIA

(i) Population

India is the second largest populous country of the world with a population of about 860 million and it is projected that by 2000 A. D. the population will be close to one billion (between 945 and 1053 million, according to the Registrar-General of India) while by 2010 A.D., India is likely to become the world's most populous country, surpassing China. In India, there was sharp increase in population after 1951. During 1901-1921 there was an increase of only 30 million population while during 1971-81, 13 million people were added every year. The population growth per decade was not more than 14% up to 1951, while during

1971-81, a sharp rise of 25% was noted. Thus by 2010 A. D., with 1.2 billion population, India will have double the population compared to the year 1975.

(ii) Availability of Land

India accounts for 15% of the world's population while land area constitutes only to 2.4%.

(iii) Availability of Food

The average *per capita* calorie intake in India is 2189, well below the standard from nutritional point of view. The situation is not fair in the neighbouring countries also, viz.,—Pakistan—2199, Kenya—2151, Nepal—2034 and Bangladesh—1899. In the beginning of our plan era, it was proposed to increase the *per capita* food intake by 2% per annum but we could achieve an increase of 0.5% only. Availability of pulses has been sharply decreasing which are the principal sources of protein for our people. Despite the significant achievements in the field of agriculture, India faces serious challenges due to increasing population, depleting land fertility, building up of pollutants in soil due to industrial discharges, increasing use of agro-chemicals and shrinking of non-renewable energy sources.

(iv) Water Supply, Sanitation, housing and uncontrolled urbanization

More than half of our population is still to be provided with the basic need of potable water. The situation is still worse in our neighbouring countries like Pakistan, Nepal, Bangladesh, Srilanka and Kenya. Regarding adequate sanitation facilities in our towns and cities, it is estimated that up to 1985, only one-third of the Indian urban population could be provided with these facilities. Even in Metropolitan cities like Bombay, Calcutta, Madras, and Delhi all

people do not have access to adequate drinking water supply and sanitation facilities. On housing situation, it was estimated that housing shortage in the country was 24.7 million during 1985 and it may be around 29 million in 1995. With the increasing population we also have the problem of rapid urbanization. India has the third largest urban population in the world with 156 million people living in urban areas, about 24% of the total population. It is expected to reach 350 million by 2000 A. D., doubling the present figures. The important impacts of the urbanization are creation of slums, over-crowding, squatter settlements and unauthorised colonies. The characteristic feature of slums is the very poor availability of amenities and public services. During 1961 and 1981, the urban population was doubled. However in Bombay, the squatter population grew from 4 lakh to 40 lakh, a tenfold increase. The proportion of urban population living in slums is: Bangalore—10%, Kanpur—37%, Bombay—38% and Calcutta—42%. Today the squatter population of urban India is 30 million and is expected to increase to 80 million by the end of this Century.

(v) Others

With the growing population, consumption will also increase. This will in turn lead to atmospheric pollution, acid rains, water pollution, radiation pollution, deforestation and denudation of vegetal covers.

There is no definite answer to the actual sustainable limit of the population on the Earth, still it is clear that our present exponential growth is associated with serious risks. This is also clear that irrevocable depletion of resource base for technological development has already begun. Keeping the above in view it can be concluded that a sustainable society can be built if the threat to our environment is recognised and appropriate action is taken immediately. In this regard the 'World Watch Institute' in 1982 published a short pamphlet entitled 'six steps to sustainable society'. According to this pamphlet, the following six steps are necessary for smooth transition into the twenty-first century—

1. Stabilizing world population
2. Protecting cropland through—
 - (i) The use of cropland in the most efficient manner, and
 - (ii) reducing soil erosion.

3. Reforesting the earth
4. Conserving energy
5. Developing renewable energy, and
6. Moving beyond the throw-away society.

'Throwaway society' means whose members use the goods and throw them away frequently, thereby increasing the pollution. Such type of waste can be reduced, if manufactured goods are durable in the first place and if the discarded goods are recycled.

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DR NAKAJIMA APPOINTED FOR SECOND TERM AS DIRECTOR-GENERAL OF WHO

Dr Hiroshi Nakajima was appointed on 5 May 1993 by the Forty-sixth World Health Assembly to a second five-year term as Director-General of the World Health Organization. His current five-year term of office ends on 21 July 1993.

Dr Nakajima was nominated for the position by the WHO Executive Board at its Ninety-first session in January 1993. (See S.H., Feb. 1993 for details).

Protecting Environment —Everyone's Duty

Environmental management in India is a major guiding factor for national development. It is realised that environmental issues arise in every sector of the economy and that each sector should evolve its own solutions. This process of integrating environmental considerations into development activities is promoted through a system of environment impact assessment of the project before it gets a clearance.

EARTH, is the only planet, so far known, with an environment, necessary for sustainable life. Land, water, air, plant and animals are the main components of the global environment. Sustainable development is a process of social and economic well-being. But, to meet this end we should ensure that the demand on the environment, does not exceed its carrying capacity for the present as well as future generations.

Indian Tradition

India, with its geographic, climatic and biological diversity, has an unique environmental heritage. For the people of India, environmental conservation is not a new concept. Historically, the protection of nature and wildlife formed an ardent article of faith, reflected in the daily lives of the people and also enshrined in myths, folklore, religion, art and culture. According to the

Upanishads "this universe is the creation of supreme power meant for the benefit of all his creation. Each individual life-form must, therefore, learn to enjoy its benefits by forming a part of the system in close relation with other species. Let not any-one species encroach upon the other's rights."

Even in modern times, as is evident in the constitutional provisions, environmental legislations and planning objectives, conscious efforts have been made for maintaining environmental security alongwith developmental advances. The national conservation strategy and the policy statement on environment and development are in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of our national life and development process.

The Challenge

The vast majority of Indians is directly dependent on the natural resources of the country for their basic needs of food, fuel, shelter, and fodder for their cattle. The challenge of prevention of erosion and, indeed, of restoration of India's land resources is intimately related to the strategies for the management of land, water and vegetative cover.

A massive programme of Wastelands Development through afforestation and tree planting with people's 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 of rural communities. It also seeks to raise green cover on non-forest and private wastelands in order to reduce the pressure on the forest areas.

The role of forest communities in restoring and conserving forests is now being increasingly recognised. The need 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.

With the constant inflow of municipal wastes and industrial effluents, most of the rivers and water bodies have become polluted. Restoring the water quality of the rivers and other water bodies such as lakes is another important environmental challenge facing India.

A major programme to improve the water quality of the river Ganga has been undertaken and it includes a total of 261 schemes covering interception and diversion of industrial waste and sewage, sewage treatment plants, low-cost sanitation and development of river front facilities including tree plantation on river banks. A National River Action Plan is also being formulated to cover other major rivers of the country.

The threat to the biological diversity of India due to over exploitation and habitat destruction, is a major challenge. Realising the fact that many species of animals and plants have become endange-

red, several initiatives have been taken in India for their conservation.

Today, India has a wide network of 69 National Parks, 392 Sanctuaries and 7 Biosphere Reserves located in different parts of the country. Among the special projects taken up for the protection of threatened species, Project Tiger has been a phenomenal success. Separate projects have also been established for the protection of the Gir Lion, Crocodiles, Kashmir Stag, Himalayan Musk Deer, Indian Swamp Deer, the Brown-tinted Deer and Snow Leopard. Some zoos are also engaged in captive breeding programmes successfully.

Guiding Factor

Environmental management is now accepted in India as a major guiding factor for national development. It is realised that environmental issues arise in every sector of the economy and that each

sector should evolve its own solutions. This process of integrating environmental considerations into development activities is promoted through a system of environment impact assessment of the project before it gets a clearance.

In the area of formal education, the National Policy on Education (1986), emphasises that there is a paramount need to create consciousness about the environment. It must permeate all ages and sections of the society, beginning with the child. The policy gives unqualified priority to universalisation 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 environment education. The National Council of Educational Research and Training (NCERT) has been assigned priority to environment as a subject in the model syllabi and instructional packages. —PIB

Preparations for Conference on Population

Twenty-year goals should be set for all states in such areas as maternal mortality, infant mortality and family planning. Nafis Sadik (Pakistan), Secretary-General of the 1994 International Conference on Population and Development, told the Conference's preparatory committee on 10 May. The recommendations made by the Conference should be comprehensive,

operational and visionary, she said.

Jean-Claude Milleron (France), Under-Secretary-General for Economic and Social Information and Policy Analysis, said socio-economic development thinking at the United Nations should be at the forefront of new global trends. Citing the increasing gap between

the world's developed and developing regions, he said peace could only be guaranteed by development.

During its two-week session, the preparatory committee is expected to agree on the final document to be adopted by the conference, which will take place in Cairo from 5 to 13 September.

—U.N. Newsletter

“First of all our young men must be strong. Religion will come afterwards. Be strong my young friends, that is my advice to you. You will be nearer to heaven through football than through the study of Gita. You will understand the Gita better with your biceps, your muscles a little stronger”.

—Swami Vivekanand

AIR POLLUTION—A SERIOUS HEALTH RISK IN SOME OF THE WORLD'S BIGGEST CITIES

Air pollution is posing increasingly serious health problems in some of the world's biggest cities, and is now an almost inescapable part of urban life everywhere, according to a new report published jointly on 1 December 1992 by the World Health Organization (WHO) and the United Nations Environment Programme (UNEP).

The report, "Urban Air Pollution in Megacities Of The World", is the result of a scientific study of pollution levels in 20 such cities—those that already have populations of ten million or more, or are expected to reach that total by the year 2000. The United Nations estimates that by then, 47 per cent of the global population will be living in urban areas.

The cities are: **Bangkok**, Beijing, **Bombay**, Buenos Aires, Cairo, **Calcutta**, **Delhi**, **Jakarta**, Karachi, London, Los Angeles, Manila, Mexico City, Moscow, New York, Rio de Janeiro, Sao Paulo, Seoul, Shanghai and Tokyo. In some of them, air pollution contributes to premature death and serious disability, the report says, adding that these cities are not necessarily the world's most polluted.

Urgent Action Recommended

The report's recommendations include the urgent implementation, where necessary, of measures such as:

- air quality management programmes;
- energy conservation;
- motor vehicle examination and maintenance programmes;
- phasing out lead in petrol;
- promotion of mass transit systems;
- alternatives to open burning of refuse;
- the introduction of "clean" technologies

In an example of how history can repeat itself, the report shows that some of the megacities have approached the same massive air pollution levels of the notorious London smogs of 40 years ago. But while London and other cities in developed countries have cut their air pollution dramatically since then, expanding cities in the developing world face slow suffocation as their air quality deteriorates.

Dr Hiroshi Nakajima, Director-General of WHO and Dr Mostafa K. Tolba, Executive Director of UNEP, say in their foreword of the report: "By studying past and present air pollution problems and air quality management strategies, UNEP and WHO believe that many of the problems currently faced by megacities can be avoided by the megacities of the future".

Hazards Will Increase

The report says that because many of the world's major cities are growing rapidly, with few if any pollution control measures, the hazards will increase and the quality of life for millions of urban residents will continue to fall. "It is clear that air pollution in many of the world's megacities, as well as in other cities, is a major health and environmental concern. This concern is increasing and should command high priority for action," it says.

The study investigated levels of six major pollutants in 20 megacities. The pollutants are sulphur dioxide (SO₂), mainly from power generation and industrial emissions, suspended particulate matter (SPM), largely from domestic fires, power generation

and industries; lead (Pb), chiefly from petrol engine exhaust; carbon monoxide (CO) also from motor vehicles; and nitrogen dioxide (NO₂) and ozone (O₃), due to a combination of heavy traffic and high levels of sunshine.

Of the 20 megacities examined, Mexico City emerges as among the worst-affected. Levels of SPM also rates a serious problem in eleven other cities—Bangkok, Beijing, Bombay, Cairo, Calcutta, Delhi, Jakarta, Karachi, Manila, Seoul and Shanghai. Cairo and Karachi have a similar rating for lead, Beijing and Seoul have serious problems with SO₂, Karachi has the highest lead level among the 20, and Los Angeles, Sao Paulo and Tokyo have serious ozone problems.

London, New York and Tokyo come out as the least-polluted

megacities, normally meeting WHO guidelines on four or five of the six pollutants.

Impact on Health

The report says that the direct human health effects of air pollution vary according to both the intensity and duration of exposure and also with the health status of the population exposed. Those who may be at greater risk include the young and the elderly, those already suffering from respiratory and cardiopulmonary disease, and those taking exercise.

Most of the air pollutants directly affect the respiratory and cardiovascular systems. Increased deaths, disease and disability have been associated with elevated levels of SO₂ and SPM. Nitrogen dioxide and ozone also affect the respiratory system, irritate the eyes,

nose and throat, and in addition, ozone can cause headaches. Carbon monoxide is able to displace oxygen in the blood which in turn can result in cardiovascular and neurological effects. Lead affects bone marrow, impairs liver and kidney function, causes neurological damage, and limits mental development in children.

The report continues: "For the megacities, motor vehicle traffic is a major source of air pollution; in nearly half of them it is the single most important source." The present total number of vehicles in the world—about 630 million—is expected to double within the next 20 to 30 years, with much of the growth occurring in developing countries and in eastern Europe.—

Courtesy: HFA 2000

HOW TO PREVENT CHOLERA

—DO'S AND DONT'S

The incidence of cholera and other diarrhoeal diseases takes place during the monsoon period. They occur basically due to polluted contaminated water. They are preventable, if we follow these Do's and Dont's:

Do's

- Use only potable water.
- Add chlorine tablets in case drinking water is unsafe.
- Always wash your hands before taking meals.
- Keep the surroundings clean.
- During an episode of diarrhoea, use Oral Rehydration Therapy (ORT) at domiciliary level.
- Garbage should be properly disposed.
- Drain out water from Air-Coolers periodically at regular intervals to avoid breeding of mosquitos.

Dont's

- Do not take exposed and cut fruit and food articles.
- Do not allow water to collect and stagnate in the surroundings.
- Do not use shallow water for drinking and cooking.

Cholera and other diarrhoeal diseases are basically due to polluted/contaminated drinking water. A large incidence of such diseases takes place almost all over the country during the monsoon period. Water-borne diseases are generally transmitted through oral route due to contamination of drinking water sources and food with faecal matter and poor personal hygiene.

The steps taken to prevent such outbreaks include surveillance and monitoring of these diseases, supply of safe drinking water and chlorination of unsafe drinking

water sources, safe disposal of human excreta, garbage and refuse, improvement of food and personal hygiene, promotion of ORT in case of dehydration due to diarrhoeal diseases and providing health care facilities by strengthening health infrastructure in rural and urban areas. Other measures include strengthening of health education measures, giving detailed information about various water-borne diseases and their prevention to the people giving guidelines to the health personnel for prevention, improvement of environmental sanitation and training of medical staff engaged in the activities to impart knowledge and skill for house management of diarrhoea.

—PIB

HEALTH PROBLEMS WITH FLUORIDE IN WATER : A REALITY

DINESH CHAND

Limited fluoride in water may not be a cause for worry and it may play havoc in human life if taken in excess for long periods continuously. To provide fluoride-free water to save the population of endemic areas, a combination of hardware and software have to be opted to achieve the desired results.

EXCESS fluoride in water causes fluorosis (dental and skeletal) and is considered a disease which has no cure. Thus, the preventive measures are the only solution. Apart from the above, it may also cause gastro-intestinal complaints, viz., loss of appetite, nausea, vomiting, pain in the stomach, constipation and intermittent diarrhoea and flatulence due to fluoride toxicity. The expectant and lactating mothers and children are most vulnerable groups. Fluoride free water may be provided by chemical treatment processes like Nalgonda, Prasanthi, A ion exchange etc. Providing fluoride free water alone in the endemic areas is not adequate. Together with it, information, education, communication should also be an essential part of the control of fluoride programme.

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3-5/DGHS/93

In India, about 85% of rural as well as urban population are solely dependent on ground water as the drinking water source. This is desirable as ground water sources are economical and can be depended upon.

The earth's crust being extremely rich in fluoride bearing minerals, the ground water contains high fluoride content in some parts of the country. The maximum fluoride content so far detected is 38.5 ppm (mg/litre) in ground water used for drinking purpose.

This has caused severe health problems since the last 50 years. Initially, the health problems were known to exist in only 4 States of India. But today, an estimated 25 million people are leading a painful, crippled and vegetative life in

about 150 districts spread over 15 states of the country who have been associated with health problems as a result of drinking fluoride contaminated water. It has become an urban as well as a rural health problem; affecting the young and the old alike.

Since early 1930s, the major focus had been to promote basic research, epidemiological studies and clinical research to understand fluoride action on body tissues and the health problems in its totality. Researches in this field are still being promoted by various national and international agencies. In the recent past, Canada has supported fluorosis research in India.

In the year 1986, the Government of India had set up a Technology Mission in the Ministry of Rural

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Development as the nodal agency to tackle the drinking water problem on a war footing. The strategy adopted for visible results is to focus on Sub-Missions, countrywide. Water quality assessment and defluoridation installations, both at the domestic and community levels as one of the major activities are dealt with.

India is possibly the first country to launch a National programme on Control of fluorosis.

Sources of Fluoride

The origin of fluoride, like most other minerals, is associated with volcanic and plutonic activities in the crust of the earth. Fluoride occurs as calcium fluoride. In the acid plutonic rocks like granites, it occurs in the form of fluorapatite. It also occurs in micas and calcium phosphate deposits. Basalts contain 100 ppm (parts per million), whereas granites contain as high as 500 to 850 ppm of fluoride. Shales and deep sea clay deposits contain 740 and 1300 ppm of fluoride respectively. Alkaline rocks contain the highest percentage of fluoride (1200 to 8500 ppm). Alkaline water also shows high enrichment of fluoride.

Fluoride concentration in ground waters may range up to 50 ppm or more but more than 10 ppm is rare and surface waters seldom contain more than 1.0 ppm.

Health problems

In fact, in major parts of the globe excess fluoride is a problem.

China has reported to have nearly 32 million people affected with dental fluorosis and 1.75 million people affected with skeletal fluorosis. In the developing countries to prevent dental caries, the need of the hour is not fluoride but adequate awareness on the importance of oral health and hygiene besides improving adequate calcium and vitamin-C in the diet.

Fluorosis is considered as a disease which has no treatment or cure and its preventive aspects are often neglected. It is also true that the disease was very often misdiagnosed as arthritis, spondylitis or joint pain. We are not surprised to note the statement in Chemical Engineering News (Page 37, August, 1988) that most doctors in U.S. have not studied the disease and do not know how to diagnose it.

In India, the data are available to suggest that 0.4 ppm of fluoride in drinking water is causing mild, moderate and severe forms of dental fluorosis.

It is also a fact that due to atrophy of fibre and connective tissue of the body including the oral cavity caused by the use of fluoride, people living in endemic areas for fluorosis, become edentulous (loose teeth) at an early age; look much older and many (who can afford) resort to the use of dentures.

People may also have health problems with excess ingestion of fluoride associated with kidney function which has been confirmed by leading Nephrologists in the country.

Muscular weakness, loss of muscle power and neurological manifestation leading to excessive thirst, tendency to urinate more frequently, although the volume of urine is not too large, are common among the afflicted individuals.

Severe and widespread gastrointestinal problems, viz. anorexia, pain in the stomach, intermittent diarrhoea, chronic constipation, gas formation and bloated feeling in the stomach (Non-Ulcer Dyspepsia) caused due to drinking fluoridated water have been confirmed. Changing the source of water with low levels of fluoride (below 1 ppm) provides relief from the gastrointestinal problems within a period of 2-3 weeks.

Some developing nations are now reporting on the unsuitability of WHO guidelines for fluoride concentration in drinking water. A recent report from The Netherlands, based on a study in Senegal has shown dental fluorosis in children where fluoride in water ranged from 1.0 to 7.4 ppm, prevalence of mild dental fluorosis is 68.5% at 1 ppm of fluoride in drinking water. When fluoride exceeded to 4 ppm, the prevalence of dental fluorosis reached 100%. It has been suggested that the WHO guidelines for fluoride concentration in drinking water in Senegal is unsuitable and the upper limit should be reduced to 0.6 ppm (Lancet: 11,223-225, 1988).

It is unfortunate that the use of fluoride for prevention of caries although formulated and brought out 50 years ago by U.S.-based dentists, is still being promoted the

SWASTH HIND

world over without questioning, the health hazards which have been emerging due to fluoride poisoning. It has been shown by the Indian dentists that by use of fluoridated toothpaste for brushing the teeth, in young and old, the serum fluoride levels are enhanced within minutes (Rajan *et al*, Fluoride in toothpaste: Cause for Concern, Fluoride 21:4 1988; Rajan *et al*, Serum and Urine Fluoride in Toothpaste Users, Jr., Ind. Dent. Assoc. 59, 137-142 1987). The oral mucosa rich in blood vessels do absorb fluoride ions rapidly. The sublingual blood vessels (the one below the tongue) drains the stuff directly to the superior vena cava and then to the heart. It is not true that toothpaste never enters the body unless it is swallowed/ingested. Fluoride does enter the circulation directly from the oral cavity through the fine blood vessels of the mouth. Fluoride being a persistent bioaccumulator, even small amounts that enter through fluoridated toothpaste is a guaranteed entry not only in children but even among the adults and the cumulative or additive effects of fluoride is causing serious concern.

Not free from fluoride

It has been discovered in India recently that there is no toothpaste marketed which is free from fluoride whether labelled or otherwise. The amount of fluoride arising as a contaminant from the raw materials used *viz.* chalk, talc and calcium carbonate, may be as high as 80 ppm. Over and above the contamination, different manufacturers add fluoride to the extent of 2000-2500 ppm. It has also been observed in India as a result of extensive laboratory investigations that the fluoride is not mixed homogeneously in the paste.

In none of the so called fluoridated brands of the toothpaste, the quantity of fluoride in the paste is revealed on the tube. It is also a fact that, when sodium monofluorophosphate (SMFP) is added to the paste, it is known to decompose and the expiry date of the toothpaste is never revealed either.

It has been shown that excess ingestion of fluoride leads to the accumulation of a particular chemical substance *viz.* dermatan

sulphate, both in the bones and teeth. The substance on accumulation tends to demineralize the area around, both in human teeth as well as in the bones. Such demineralized zones in the teeth get pitted and perforated in dental fluorosis besides being discoloured (Susheela *et al*, Arch. Oral Biol., 33, 10, 765, 1987). The belief that cavity formation occurs only in dental caries is an outdated information. In fact, cavity formation may be aggravated in some cases due to excess ingestion or use of fluoride, leading to dermatan sulphate formation and ensuing demineralization of the tooth matrix.

In reality the statement that using fluoride for caries prevention only makes the enamels strong, no longer holds good, because fluoride also causes demineralization of the teeth and they get pitted, perforated and chipped off.

In addition to the above, it has also been reported that fluoride may induce cholesterol production in males and can also lead to blocking/calcification of blood vessels, specially in the region of the main vessel leading from the heart, *viz.*, the aorta, causing cardiac problems. This certainly means that the toxic effects of fluoride far outweigh its benefits in the Indian situation.

There are reports on high incidence of cancer due to fluoride in U.S. (Cancer Mortality in Relation to Fluoridation and Population Changes, Data from 140 largest U.S. cities from 1940-1980, Burgstahler, Int. Conference of the Fluoride Society, Utah, 1986). Animal experiments from Japan and other parts of the world, also suggest that fluoride is cancer-causing (Mutation Research, 139, 193-198, 1984; Cancer Research, 44, 938-941; Science of Total Environment 68, 79-96, 1988).

Excessive fluoride in drinking water causes dental fluorosis (Mottled enamel) which increases in the intensity of its effect with increasing fluoride concentrations. Following observation of this condition, Dean suggested that the mineral composition of drinking water might have an important bearing on the incidence of dental

caries. His examination of nine-year old children with continuous exposure showed a higher percentage of children to be caries-free in those communities where the domestic water supplies contained a higher concentration of fluorides in comparison with communities using water having a lower concentration.

Hodge has reported that 13 of 114 residents of Bartlett, Texas (U.S.) where the drinking water contained 8.0 ppm of fluoride showed osteosclerosis, and that 21 of 178 of those living in a specific South American area and who were drinking water having in it 16 ppm, gave evidence of bone changes by X-ray examination. A single dose intake of fluoride in the range of 2,250-4,500 mg can be lethal.

Preventing dental caries

The effectiveness of fluoride in preventing dental caries was confirmed by the 10-year observation of participants in a study in Michigan-201. Here the adjustment of the fluoride content of the communal water supply to 1.0 ppm produced a reduction of the caries rate for the deciduous teeth in 6-year-old by 54 per cent and, in children born subsequent to the start of the fluoridation programme, the caries rate in permanent teeth was reduced by 60 per cent.

With the initiation and extension of the practice of supplementing fluoride intake to the optimum level, using drinking water as the vehicle, Galagan-200 pointed out that water intake—and hence the fluoride intake increased directly with increase in air temperature under normal living conditions in the United States.

The U.S. Public Health Service Drinking Water Standards specify that when fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper limit as indicated in table-1 and if average concentrations are greater than twice the optimum values in that table, water should be rejected straightaway. When controlled amount of fluoride compounds are artificially added for fluoridation, the average concentration should be kept within the upper and lower limits of table 1:

Table 1 — Fluoride Concentrations

Annual Average of Maximum Daily Air Temperatures in Degrees F*	Limits of Fluoride Conc. ppm.		
	Lower	Optimum	Upper
50.0—53.7	0.9	1.2	1.7
53.8—58.3	0.8	1.1	1.5
58.4—63.8	0.8	1.0	1.3
63.9—70.6	0.7	0.9	1.2
70.7—79.2	0.7	0.8	1.0
79.3—90.5	0.6	0.7	0.8

*Based on temperature data obtained for a minimum of five years.

Technology options

In an endemic area for fluorosis, if all the sources of water are contaminated with excess fluoride the good source is identified, labelled safe in local language and the people are informed to consume water from the good sources only and use the fluoride contaminated sources for washing and cleaning purposes. If the yield of water from good source is less than 20 litres *per capita* per day (LPCD) for human consumption (i.e. for use of cooking and drinking), possibilities are also explored by providing water from an alternate source or mixing both water to bring down the concentration of fluoride to the permissible levels on economic basis.

The excess fluoride is removed from water by addition of lime, alum (bleaching powder for disinfection). It is popularly known as "Nalgonda Technique". The method is simple and can be used at domestic or community (Fill and draw type) levels depending upon the quantity of water required. The only precaution needed is not to add excess alum, otherwise a residual metallic taste becomes perceptible.

Using this process, units attached with handpumps have also been

designed and put for field operation in the rural areas.

Recently excess fluoride is also removed from water by using activated alumina by adsorption process. In this process activated alumina is periodically regenerated by sodium hydroxide, neutralised and recycled. In India, the technique is tried as handpump attachment unit and properly known as Prasanthi Technique. It is reported that relatively large defluoridation plants using this unit process have been in operation for a number of years in desert centre (Californiya, vail, Arizona, Gila Bend, Arizona (Rubel and Woosely 1978). In India it is yet to be tried and perfected. The certain quaternary type Anion Exchange resins have also been proposed for defluoridation alike sorption of undesirable materials from water. The resins can also be reused after desorption. It is reported to be faster, economical as well as simple and at par of water softening units. The design of the plants on this technique is to be perfected.

These processes are having their own merits, demerits and limitations in actual practice.

Communication

Although fluoride-free water through alternate safe source or by chemical treatment is provided even then the community should not be ignorant about the facts of the health problems associated with excess fluoride. The Information Education Communication (IEC) plays an important role, particularly in the developing countries like India as making the provision of fluoride free water in sufficient quantity for all purposes may not be possible due to differential priorities and economic affordability. Thus, fluoride water has to be used for washing and other purposes until it have comes to our reach.

In fact, limited fluoride in water may not be a cause for worry and it may play havoc in human life if taken in excess for a long periods continuously. If we want to provide fluoride free water to save the population of endemic areas, a combination of hardware (appropriate water supply systems), software (IEC) have to be opted and implemented to achieve the desired results within the resources whatever available with us. □

NEW TESTS FOR EYE DISEASE

GLAUCOMA—a disease of the eye that affects many millions of people around the world, and is a common cause of blindness—may eventually be able to be detected at a very early stage. Researchers at the Institute of Ophthalmology in London have been looking at the type of nerve damage that occurs in glaucoma, and have devised a test that can detect changes in the eye up to two years earlier than conventional tests.

Sufferers from the disease gradually lose their peripheral vision. If the condition is not diagnosed early enough, or is left untreated, raised pressure behind the eyeball compresses and eventually kills the nerve fibres. However, if the disease is detected early enough, there are treatments that can slow down or even halt it. Tests now in use look for early loss of peripheral vision—but these are unable to spot the

damage until more than half the nerve cells are already dead. In the new tests devised by the London-based group, a computer is used to measure the eyes' sensitivity to motion, which can indicate the onset of a problem at an early stage.

The visual system involves different types of optical nerve cells; large ones which concern motion

(Contd. on Page No. 127)

COMMUNITY AND ENVIRONMENT

DR MANJIT SINGH
AND
HARBIR KAUR

Air, water and soil pollution has resulted in global warming. Community can play a major role in preventing a catastrophe taking place as a result of this global warming. To live in clean surroundings is the right of every individual and to make it clean is the duty of everyone. Community can do it with strong will, legislation and through resources made available to it, say the authors.

HUMAN demands are many but resources are limited.

Developing countries face many problems; pollution is becoming a threat to them. Millions of people die every year from illness caused by environmental pollution and millions more suffer chronic disabilities in the form of diminished physical strength, lower intelligence and lack of alertness.

Environment pollution is in the form of pollution of AIR, WATER and SOIL.

Air Pollution is as a result of over-use of energy, more demand of food leading to deforestation, vegetation and grassland being burnt to clear land for more food. Fuel pollutants add to air pollution. Whereas industrial plants, power generating stations, refineries, tanneries and hospital wastes all contribute towards air pollution. Air pollution can increase risk of cancer, respiratory diseases, heart and lung defects, genetic defects and mental retardation.

Water Pollution is as a result of increased congestion in the cities, industrial expansion, lack of population control measures.

Increased human demands exceed the rate of renewal of land, forests and fresh water. Out of the available fresh water, approximately 70% is used for irrigation purposes which can be better utilized with the help of modern techniques, 20% to 25% of this water is utilized by industries. The industries add all its pollutants to the water sources. Only 8 to 10% of the water is used for household purposes which can be better used by plugging leakage, better sanitation means and storage facilities.

Faecal wastes are added to water sources. Nitrogen and phosphorus wastes deplete oxygen supply in the water, thereby killing fish, animals and plants in water. Most of the urban sewage is discharged untreated in waterways. Heavy metals, toxic chemicals and solid wastes are added to water wastes.

Cleaning of water is most cost effective in improving the nutrition

of the people. We know "Clean Gut" leads to increased digestibility and assimilation of food, thereby increasing and improving nutrition of people and preventing them from getting diarrhoea, typhoid, infective hepatitis, amoebiasis, giardiasis, intestinal infection, trachoma, scabies and yaws.

Seventythree million work-days are lost every year because of water related diseases all over the world. India has taken a step towards conservation of water supplies and to prevent pollution through control waste facilities.

The Ganga cleaning Project is a step towards cleaning of water. This river travels through 1500 miles and supplies water to million hectares of land and serves as a drinking source of water to millions of people, in India.

Soil Pollution:— Soil erosion is due to pressure of population to grow more food for increased population. The Metropolitan Cities face problems due to increased congestion, industrial expansion, lack of pollution control measures;

all contributing towards unhealthy air and water pollution. Rapid population growth burns nature's candle at both ends generating more consumers while reducing natural productivity. Population has direct relationship with poverty. This is due to more demand for food and water. The demand for land and more food is met by destroying vegetation and burning the grassland to clear more land to grow more food to meet more demand. As a result, top soil is lost.

Loss of trees, native plants and animals contribute towards soil pollution and air pollution.

Grassland takes a year to grow back after over-grazing. Fish stalk may take five years to return to previous level after moderate over fishing.

Ever increasing human demands exceed the rate of renewal of land, forest and fresh water.

Depletion of coal and oil from the crust of earth, carbon dioxide emission from the energy used and reduction in Ozone layer from the stratosphere, all are becoming evident and alarming.

Wastes are dumped in the wasteland which are limited and control measures cannot cope up with the fast growing wastes. Earth Summit at Rio focussed mainly on preservation and protection of environment. This has resulted in

generating awareness amongst the countries to limit the pollution, thereby making life of their people comfortable and for the overall well-being of human beings.

There has been a stress on not to blame each other and to make joint effort in limiting population growth, a step towards pollution control—because growing population demands rising standards of living, increased demand of water and land together multiply environmental problems.

Soil depletion and erosion, acid rain, air and water pollution, loss of wet land and other natural habitat all are as a result of overpopulation.

Role of Community:—Air, water and soil pollution has resulted in global warming. Community can play a major role in preventing a catastrophe taking place as a result of global warming by taking steps towards:

1. Afforestation, i.e., restoration of forests. *Chipko Andolan* is an example towards such step.
2. Retaining and protection of top soil by restoring grassland, protecting native plants and habitats.
3. Prevention of polluting air and water by limiting automobile emissions and industrial wastes.

4. Use of natural resources (sun, air and water energy).
5. Renewable energy sources and developing more energy efficient devices.
6. Conserve water supplies by preventing pollution through controlled waste facilities and water treatment plants.
7. Recycling and conservation of energy.

Women can play an important role. They are the users of resources. They can help in limiting the use of these resources and in controlling population growth by planning and implementing the Govt. programmes on Family Welfare. Their involvement and desire in preventing unwanted pregnancies shall help in limiting population.

People give environmental protection high priority. The need for achieving this is through strong political will and acceptable solution to problem.

To live in clean surroundings is the right of every individual and to make it clean is the duty of everyone. Community can do it with strong will, legislation and through resources made available to it.

Resource conservation and pollution control can help in protecting the natural system and life thus safeguarding the rights of the future generation. Δ

Treatment is more than just technology

No treatment is simply a technology. In practice, the effectiveness of treatment depends upon the skills and attitudes of the person applying it, the diagnostic and other characteristics of the patient, and the sociocultural context.

—Evaluation of methods for the treatment of mental disorders. Report of a WHO Scientific Group. Geneva, World Health Organization, 1991 (Technical Report Series, No. 812), p. 2.

A Universal Environmental Ethic

The Ultimate Goal of Environmental Education

An ethic may be thought of as an *ideal* of human behaviour, an environmental ethic as ideal human behaviour with respect to the environment, natural *and built*. One senses a newly emergent environmental ethic in the growing concern about the environment, in swelling movements to save the Earth, indeed in current and encouraging national and international environmental laws and regulations. Yet, we know that, as in the more familiar context of social interaction, strict obedience to the letter of the law must be complemented and supplemented by individual moral sensibility and conscience, by environmentally-ideal human behaviour, an ultimate goal of environmental education.

The examples are simple and homely. Many countries, a vast number of towns and communities, have enacted laws and established rules to prevent the littering of public roads, lands and gardens. Such laws and regulations reflect an often newly acquired collective moral sensitivity to the environment. However, we know, even guiltily, that one may *legally* litter one's own home and one's back yard, if one owns one. An environmental ethic, created or reinforced, would discourage one from doing so, even if one were alone. We may never perfectly achieve harmony with nature, but the existence of an environmental ethic, partly encoded in laws, but largely a matter of sensibility and conscience, can draw individuals in the direction of that ultimate goal of environmental education, namely, environmentally-ideal personal behaviour.

Think globally, act locally has become the universal slogan of the environmentally concerned. It implies a *universal environmental ethic* towards which, one feels, we are massively moving. What are the principles in common in that movement and its varieties, how can they be educationally strengthened, developed, *universalized*? The beginning may lie in a comparative study of environmental cultures and ethics across the borders of time and space.

Chronologically one might commence with *Hinduism*, whose origins reach into the dim historical past and resist facile doctrinal definition. Roughly contemporary with the Greek epics of Homer and Hesiod are the Vedas, composed by Aryans who brought them to India and in which we find a pagan polytheism with clear affinities to the pagan polytheism of the Greeks, who were from the same Indo-European linguistic, cultural, and racial stock. The

gods, identified with and manifested by features, forces and processes of nature (Sky, Earth, Thunder, and so on) were propitiated with animal sacrifice, entreated with prayer, and commanded by magical incantation.

Hindu thought gravitated toward belief in an inner, unseen, abstract reality, underlying the manifest world disclosed to the senses. For man (and other living things) it was *Atman*, the spirit or

inner self, in contrast to the body. More expansively and abstractly still, all things in the divided, articulate world disclosed to the senses are manifestations of inner Being, *Brahman*. Atman and Brahman, in turn, came to be conceptually united so that the inner Being or essence of all things is soul, spiritual being, or consciousness. Objective knowledge and subjective knowledge thus coalesce. To know one's self, not one's personality or empirical self, but one's transcendental self, is to know the nature of all things.

The empirical world is both unimportant, because ultimately unreal, and contemptible, since it seduces the soul into illusion and bad karma. It distracts the soul from finding itself, attaining liberation, and merging with the one essential, transcendental self, *i.e.*, from achieving nirvana. On the other hand, since the essential or transcendental self of each person is the same, "same" in the strongest sense, literally identical with the Self or Being *per se* in everything else, one is led to empathy and compassion. Other forms of being, particularly other forms of life, are victims of the same deceit, frustration, and suffering as oneself and should be pitied. Indeed, there is no real distinction between self and other. One cannot, thus, profit at the expense of others, either other human beings or other natural, environmental beings since, ultimately, there are no "others"—all are ephemeral manifestations of one indivisible Being.

Lastly, there is a correspondence between the ecological world view and the world view of Hindu thought. Ecology also represents the world as a unity, that is, holistically—the unity of oneself and one's surroundings. Thus,

there are two major elements in Hinduism which contribute to the development of a universal environmental ethic: empathy and compassion regarding all living things and a sense of harmony with the environment, therefore its protection and enhancement.

In *Jainism*, more than in Hinduism, or Buddhism, one finds an explicit environmental ethic. Jainism, in contrast to the core philosophy of Hinduism as discussed, is dualistic rather than monistic. There is a fundamental dichotomy between souls and body, mind and matter. Each soul, moreover, maintains its own integrity. It is not a manifestation of the universal soul. Every living thing is endowed with such a soul. And, although in each living thing the soul is, as it were, crusted over with flesh and its consciousness dimmed and confused with sensory perceptions of various modes and degrees of clarity, all souls are equally pure and perfect in and of themselves.

At the moral core of Jainism is the doctrine of *ahimsa*, the determination not to kill or harm any living thing which contains a soul as perfect or complete as one's own and which is as liable to suffering as oneself. The Jains are famous for the extreme lengths to which they go to honour this doctrine. Of course, the eating of meat especially is prohibited since animal empirical consciousness is more acute than plant consciousness. Mahavira, the founder of Jainism, himself, only ate leftover food, prepared for someone else, so as not to have personally caused injury even to the plants, or their seed, from which it was made. Moreover, food must be inspected before eating to assure that insect eggs or mites are not consumed inadvertently. Similarly, water must be strained, not to protect

one's health, but to avoid consuming any organisms in the water. One ought even to sweep one's path before walking so that one's footfall does not injure or kill any living thing. Ahimsa is a doctrine of extreme concern for other living things. It is in this respect a kind of environmental ethic contributing to the universal environmental ethic aimed at.

Buddhism stems from the teachings of Siddharta Gautama, who lived in India during the sixth century B.C. Buddhism, however, today flourishes less in India than in countries to the south and east of India, namely, Sri Lanka, Myanmar, Thailand, Kampuchea, Laos, Vietnam, China, Korea, Japan, Tibet, and Mongolia.

Core moral values in Buddhism are to be found in the five precepts: abstention from killing living creatures, abstention from stealing, abstention from lying and abstention from taking intoxicants. While these precepts embody the basic requirements for the living of a good life and the establishment of a good community, some of these are relevant to a conservationist ethic. The respect for life and property, the rejection of hedonistic life styles and the notion of truthfulness emphasizing consistency in thought and action are all ethical premises relevant for the development of environmental ethics.

The Buddhist precept concerning abstention from killing living creatures focuses attention on the ethical premise concerning the value of life. The Buddha asked people to abstain from destroying the life of human beings and animals and also condemned the infliction of suffering and pain on living creatures. He was also critical of the pleasures of hunting. The kings were expected to

provide protected territory not only for human beings but also for the beasts of the forests and birds of the air. The principle of ahimsa, non-harming and non-injury to life, was a concept found in the Jains and other Indian sects and the Buddha (though he did not go to the extremes of the Jains) was alive to the concept and preached against taking life. All this shows great feeling of sympathy for living creatures.

What can be inferred from the philosophy of Buddhism is a pro-conservationist (sound management) conception towards nature, which is critical of an aggressive attempt to exploit the environment for short-term benefits and generate gigantism, and a life style based on limitless consumerism. In short, a non-violent and gentle attitude towards nature, animals and fellow people provides the essence of the environmental stance—the environmental ethic—of Buddhism.

Zen Buddhism provides an especially fitting philosophical and experimental basis for an environmental ethic: the phenomenal world is affirmed as the delightful expression, the artifice and play, of the benign and loving common essence in all things. There is, moreover, a very strong tradition, evident in Zen poetry and art, of nature esthetic. The contemplation of the fleeting yet eternal moment of satori are all elements of an esthetic attitude towards the environment. And the esthetic value of nature has long served as a powerful human motive for its conservation.

Zen Buddhism has certain affinities with **Taoism**, since Zen is a version of Buddhism which evolved in China, where Taoism is native. The word << tao >> literally means a way, or a road. It

is the way of the universe, the orderly and harmonious unfolding of phenomena, the developmental tendency of things. If allowed to take its course, it results in natural fulfilment and perfection.

Taoism stresses the perfection of harmony between humanity and nature. It also provides the basis for a philosophy of technological development. The traditional Western forms of << high >> and << hard >> technology should be abandoned, from the Taoist point of view, for forms of << low >> and << soft >> technology or what is sometimes called an << appropriate >> technology. An appropriate technology is essentially adaptive and cooperative. It does not attempt to command or control nature, rather, its approach is to bend natural processes to human advantage and adapt human ways of life to the environment.

Like Zen Buddhism, Taoism conceives the environment as an articulate unity, a unity among natural things and these things with humanity. This picture of nature as an autonomous and dynamic whole, in which humanity has its fitting and appropriate place, fits well the world view of ecology which has been described.

Confucius also accepted the Tao, but focused on the order of human society. Just as nature is an orderly and harmonious realm so ought human society to be equally orderly and harmonious. Confucianism supports an anthropocentric environmental ethic. Environmental destruction, degradation and defilement would in most cases impose deleterious effects on other people and thus violate the first two Confucian virtues, regard for others and justice. A third virtue being wisdom, it would also be

plainly unwise, because imprudent or profligate, and violate a fourth virtue, namely, faithfulness to one's children or one's children's children or to one's more remote posterity. The contribution to a universal environmental ethic is clear.

During the past fifteen years of heightened environmental consciousness there has been intense controversy about the environmental attitudes of the **Judeo-Christian** tradition. Most of this controversy has centered on the relationship between God, Man, and Nature in the book of Genesis in the Bible.

Environmentalist critics of Genesis have claimed that since, according to Genesis, Man is created in the image of God and given dominion over nature and commanded to subdue the Earth, Genesis clearly awards Man a God-given right to exploit the Earth without moral restraint (except insofar as environmental exploitation may adversely affect Man himself). Man's unique essence among creatures, constituted in the image of God, confers upon Man unique rights and privileges among creatures. Further, God seems to have intended Man to be his viceroy upon the Earth. Man is to the rest of creation as God is to Man. Thus, if God is the lord and master of Man, so Man is the lord and master of Nature. This may be called the mastery interpretation of Genesis.

Judeo-Christian apologists have contested both this interpretation of Genesis and the untoward environmental ethical implications drawn from it. Man's unique essence, to have been created in the image of God, confers, it is argued, not only special rights and privileges upon Man, but also special duties and responsibilities.

Paramount among Man's responsibilities is his responsibility to wisely and benignly rule his dominion, the Earth. To abuse, degrade, or destroy the Earth is to violate the trust the regent (God) placed upon His viceroy (man). This interpretation may be called the stewardship interpretation of Genesis.

There are two separate creation myths in Genesis: (1) The account which begins (rather than ends) with the creation of Man and the Garden of Eden in a single day and is centuries older than (2) the account which begins with the creation of light and the division of waters on the first day and ends with the creation of man on the sixth. The older, even more ambiguous, myth also is subject to two conflicting interpretations about the proper role of Man in relation to nature. It is in this myth that one finds that the role assigned to man by God is to dress the garden of Eden (which might be interpreted to mean Nature as a whole) and keep it. This injunction together with Man's naming the animals and thus establishing a kind of power over them and prerogative respecting them suggests the kind of responsible, benign vice-regency of the stewardship interpretation.

There are, as well three possible environmental ethics consistent with the Judeo-Christian worldview, depending upon its interpretation: (1) an indirect anthropocentric, utilitarian environmental ethic associated with mastery; (2) a more direct biocentric environmental ethic associated with stewardship; and (3) a direct biocentric environmental ethic associated with citizenship. While both the environmental ethics associated with stewardship and citizenship are direct and biocentric, they differ in their practical

implications. The former would permit benign management of Nature and wise use while the latter would imply a *laissez faire*, live-and-let-live approach, incompatible with the present more positive attitude toward environmental protection and improvement. The environmental ethic associated with stewardship is thus both the most practical and the most acceptable interpretation consistent with the Judeo-Christian tradition. Further, since it is a possible interpretation of the role intended for Man by God in both the creation myths of Genesis, it seems the most plausible interpretation of the overall gist of the text as it has come down to us, and its most effective contribution to a universal environmental ethic.

Indeed, current teaching on the environment—as exemplified by Pope John Paul II's Encyclical on the Environment (1990)—stresses humanity's stewardship of nature. People are the guardians, the protectors, of the environment, not its owners. A way of loving one's fellow human beings as oneself, the Encyclical states, is to protect the environment and natural resources on which they depend.

The other primary source of Western culture and civilization is Greek mythology and, later, philosophy, which was disseminated throughout the Mediterranean basin by the Macedonian and Roman empires. A fairly rational account of the world, initiated early in the sixth century B.C., is the living legacy, due to its revival during the European Renaissance, which was followed directly by the rapid development of Western science, and is thus essentially Greek in both origin and fundamental character.

The dominant strains were Pythagorean, Platonic and Democ-

ritean. Some see a nascent environmental ethic in Pythagoras' belief in the transmigration of souls from human beings to animals and from animals to human beings, extending ethics beyond the sphere of human relationships to non-human natural beings. However, the pythagorean ethic has closer affinities to the contemporary animal liberation/animal rights ethic than to an ecological/environmental ethic. Moreover this concept of the soul as contaminated by its bodily and earthly prison or tomb and thus alienated from the natural environment is profoundly antithetical to an environmental ethic preaching the harmony of humanity and the environment.

This dualistic concept—a divine soul in an alien, mortal body—became a cornerstone of the later philosophy of Plato, and thanks to whose enormous influence, became virtually institutionalized in Western culture and civilization, both religious and secular. Meanwhile Greek philosophers were also occupied with the physical world, the nature of nature, one might say. It reached a culmination with Leucippus and especially Democritus, who developed the atomic theory of matter—atoms as indivisible, solid particles composing all material objects.

The resulting concept of nature as materialistic and mechanical, and of Man, because of his soul, as essentially divine and both separate from and superior to nature, has reinforced the notion of incompatibility rather than harmony with the environment. In this respect the Greek philosophical tradition of Pythagorean-Platonic dualism and Democritean atomism can be said to lie more heavily at the roots of present environmental problems than contribute to an environmental ethic. However, the other

aspect, namely, the Greek stimulus to a scientific attitude, while resulting in a technology which has so often had negative environmental impacts, can also develop appropriate, environmentally conceived technology to prevent and correct the problems created by the former.

In this sense, too, Greek philosophical tradition can contribute an essential component of an environmental ethic—scientifically sound environmentalism, that is, the rationale of a secular environmental ethic.

Although the culture and civilization of the Middle East and North Africa are rooted in the Judeo-Christian and Greco-Roman traditions, there is a third major element which spread worldwide, Islam. During the European Dark Age, Greek science was preserved and developed by Islamic scholars and Mohammad, the Prophet of Islam, regarded himself to be a prophet of the same God and in the same prophetic tradition as Jesus, Moses, and Abraham before him. The Islamic cultural tradition, therefore, has been substantially influenced by Judeo-Christian and Greco-Roman ideas, although it constitutes a distinctive historical and cultural context for environmental ethics.

The *Koran* is less ambiguous than Genesis about the relationship of human beings to nature. It makes explicit certain themes which are only suggested implicitly in the more ancient account in Genesis. According to the *Koran*, Allah created the first man and woman, Adam and his wife, from a clot, or clay, or dust, and breathed into His creation the breath of life. All other things are explicitly created by Allah for the sake of, the use of, and the benefit of man.

Adam and his seed are explicitly made to be the viceroy of God on Earth. According to Islam, then, man is at the moral center of creation and is, indeed, the very purpose of the creation. As in Genesis, so also in the *Koran*, it is man's right to have dominion over and to subdue the Earth and all its non-human denizens. Indeed, in the *Koran*, not only are animals and plants subjected to man, the rivers, the sea, even the sun and moon are subjected to and subservient to man. Man's dominion over the earth and the subordination of the creation to man is spelled out in no uncertain terms.

Man's role is viceroy or agent on earth should not, however, be confused with tyranny. Man's dominion over the Earth should be benign, not wantonly destructive. The doctrines of Islam are equally explicit and emphatic that man's relation to nature should be one of stewardship not mastery.

The creation of Allah is, as it were, a divine work of art. The whole world and all of its parts are understood in Islam as << signs >> to man indicative of the greatness, the goodness, the subtlety, the richness, and so on of the creator. To deface, defile or destroy nature would be an impious or even blasphemous act. Although man is accorded the usufruct of the Earth, he is not given the right to abuse it with impunity.

The sanctions on environmental abuse (direct abuse of the natural environment, setting aside, for the moment, the indirect effects on people) are of two kinds. The Earth is a temporary abode for man, and Allah, according to Islam, rewards and punishes deeds done on Earth in the next life. Persons, therefore, who blaspheme

against God by defacing, defiling, or destroying His creation will be punished accordingly in the next life.

However, even though the Earth is only a temporary abode for man, and meant to be at the service of man, man is very much at one with the Earth, at least while living on it. Man is made of the stuff of the Earth, dust or clay, and he is, albeit exalted above all others, a creature among creatures. There should, thus, be a kind of fellowship between man and other creatures, according to Islam. Islam, moreover, values scientific knowledge of the environment, whose study is encouraged and supported by the doctrine of signs. As we learn more about the natural world, through the geological and biological sciences, it has become abundantly clear that the natural environment is systemically integrated, a seamless whole. Hence, the destruction of one part of the environment will reverberate throughout the whole. Now as man, according to Islam, is, after all, made of the stuff of the Earth, a creature among creatures, environmental destruction is necessarily self-destruction. This too is a kind of sanction against environmental abuse—a this-worldly, not other-worldly, type of sanction.

The Islamic tradition clearly supports, perhaps even more unequivocally than the Judeo-Christian tradition, a direct biocentric environmental ethic of the stewardship type. The environment, though given over to man's role and subservient to man, is the direct object of respect and care, because it is the handiwork of God and a sign of His power and majesty. The Islamic tradition also clearly supports an indirect anthropocentric environmental ethic.

According to Islam, all human beings are descended from Adam and Eve. Hence all human beings, regardless of race, colour, or national origin, are equally members of one extended family; no people are privileged or chosen; no one is inherently better than anyone else. In Islam, moreover, there is a strong emphasis on justice. Justice, indeed, is one of the cornerstones of the Moslem religion. Since environmental abuse and/or destruction are, more often than not harmful to people, they are a form of injustice. To ruin or destroy the environment is tantamount to either bodily injury or the destruction or theft of property or both. Further, ignorance of the complex or delayed effects of action in the environmental arena is no excuse, since Islam stresses the moral importance of knowledge, no less than of justice. These are all truly elements of an environmental ethic with universal implications.

Reviewing the foregoing traditional cultures and religions to find what they have in common with regard to humanity's relationship and responsibility vis-a-vis the environment—in other words, the common ingredients of a universal environmental ethic—is the his-

toric role of environmental education. An ethical attitude toward the environment personally and professionally, individually and collectively, and universally valid, is both the assumption and the goal of this new great field of education, making EE the principle, indispensable instrument for its development.

Indeed the aim of this article has been to provide the cultural and religious background and elements for just such an EE programme activity. The nascent environmental ethics demonstrated in the various traditional beliefs may be developed in two complementary ways. Firstly, both inside and outside the formal school system, by contemporary cultural custodians—priests, rabbis, mullahs, scholars, and religious and secular educators generally, who are environmentally aware, who speak with authority for their respective intellectual traditions, and who realize that living bodies of belief change and evolve in response to the vital needs of the times.

Secondly, they may be developed through alliance with contemporary scientific concepts and research findings of the biological and environmental sciences.

Some modern scientists even argue that they are often simply *rediscovering* concepts intuitively grasped in traditional cultural world views. For example, Taoism appears to have understood the cyclical nature of biological processes, the American Indians ecological interdependency, Hinduism and Jainism the continuity of life. Animist religions, as well, strongly emphasize the link between humanity and the environment. And so on. Traditional environmental attitudes, resting upon such intuitively grasped ideas, can frequently be reinforced, enriched and developed by means of the more detailed theories and findings of the contemporary life sciences.

In turn—and as a conclusion—environmental education and its ethical component not only find their roots in these world cultures and religions, but their sound development requires that they be solidly anchored in them—with due regard for the requirements of changing, evolving and differing civilizations.

(The above article is based on several studies prepared in the framework of the UNESCO-UNEP International Environmental Education Programme).

—Courtesy: Connect, June 1991.

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Launching the Environmental Revolution

LESTER R. BROWN

THE health of the planet has deteriorated dangerously during the last few years. As a result, the world faces potentially convulsive change. The crucial question is, will the change come from strong worldwide initiatives that reverse the degradation of the planet and restore hope for the future, or will it come from continuing environmental deterioration that leads to economic decline and social instability.

Muddling through will not work. Either we turn things around quickly or the self-reinforcing internal dynamic of the deterioration-and-decline scenario will take over. The policy decisions we make in the years immediately ahead will determine whether our children live in a world of development or decline.

Building an environmentally sustainable future depends on restructuring the global economy, major shifts in human reproductive behaviour, and dramatic changes in values and lifestyles. Doing all this quickly adds up to a revolution, one defined by the need to restore and preserve the earth's environmental systems. If this Environmental Revolution succeeds, it will rank with the Agricultural and Industrial Revolutions as one of the great economic and social transformations in human history.

People facing starvation today are not likely to worry about the effects of climatic change tomorrow. The situation has come where we can no longer separate the future habitability of the planet from the current distribution of wealth. Unless a strong net flow of capital from rich countries to the poor is restored, international environmental effort is doomed to be a failure. Lester R. Brown in this article talks about the issues that are to be solved for the smooth ushering in of the Environmental Revolution — the only action that can save this planet from the impending disaster.

A Faster Pace

The pace of the Environmental Revolution will be much faster than that of its predecessors. The Agricultural Revolution began some 10,000 years ago and the Industrial Revolution has been under way for two centuries. But if the Environmental Revolution is to succeed, it must be compressed into a few decades.

Already the planet's degradation is damaging human health, slowing the growth in world food production and reversing economic progress in dozens of countries. A scarcity of new crop land and fresh water plus the negative effects of soil erosion, air pollution and hotter summers on crop yields is slowing the growth of the world grain harvest. Combined with continued rapid population growth this has reversed the steady rise in grain output per person that the world had become accustomed

to. Between 1950 and 1984, the historical peak period, world grain production per person climbed by nearly 40 per cent. Since then it has fallen roughly one per cent a year, with the drop concentrated in poor countries. With food imports in these nations restricted by rising external debt, there are far more hungry people today than ever before.

On the economic front, the signs are equally ominous: soil erosion, deforestation and overgrazing are adversely affecting productivity in the farming, forestry and livestock sectors, slowing overall economic growth in agriculturally based economies. Converting to an environmentally sustainable economy in the time available depends on accelerating the process of change.

Our choice now is either to rally behind the Environmental Revolution or to continue on the current

path, moving towards a world where famine expands beyond the capacity of international relief agencies, where cancer reaches epidemic proportions, and where the decline in living conditions now under way in some 40 countries continues to spread, dropping more and more of the world's poor below the survival level.

Redistribution

Social and economic change always starts with individuals, even when it occurs within large organisations. Some of the conditions of sustainability can be satisfied by individual lifestyle decisions or by local community action. Individuals can use energy more efficiently. But phasing out Chlorofluorocarbons (CFCs), replacing fossil fuels with solar energy, or protecting the planet's biodiversity depends on national Governments and international agreements. Without clear policy guidance from Governments, corporations, which control a large share of the world's investment capital, are not likely to make the required changes in investment pattern.

Barber Conable, the former World Bank President has, noted that "as the 1990s unfold, success in reducing poverty should be the

measurement of global economic progress". It is difficult to imagine an effective international environmental effort if a strong net flow of capital from rich countries to poor ones is not restored. As others have noted, when we reach the point where half the world watches the other half starve to death on television, the civilization will have come to an end.

If deepening poverty continues to threaten the survival of part of humanity in the short run, the Environmental Revolution will fail. People facing starvation today are not likely to worry about the effects of climate change tomorrow. We can no longer separate the future habitability of the planet from the current distribution of wealth.

To Succeed

In the years ahead, environmental influences can be expected to increasingly dominate the evolution of the global economy. Phasing out fossil fuels, shifting to a reuse-recycle economy, protecting the stratospheric ozone layer, reducing air pollution and acid rain, minimising hazardous waste generation and adapting to water scarcity are among the environmental influences shaping the economic future.

Local limits on the earth's waste absorptive capacity are forcing industries to redesign their manufacturing processes to generate less waste. Already doing this in response to Government regulations, firms will find an even greater incentive to cut waste as environmental taxes are levied, such as those recently adopted on plastic bags in Italy and nonreturnable beer and soft drink containers in Finland.

Unless more of us become environmentally active, both as individuals and in organised groups, the Environmental Revolution will not succeed. Success depends on overcoming human inertia, vested economic interests in the status quo and some of the structural impediments of society.

Although the Environmental Revolution has been described here largely in environmental and economic terms, it is in the most fundamental sense a social revolution, the product of changing values, of seeing ourselves again as a part of nature rather apart from nature, of recognising our dependence on the earth's natural systems and resources and on the goods and services they provide.—

(Courtesy: State of the World Report, 1992)

The urban crisis

The world is at a turning point. It is faced both by the massive degradation of the natural environment and by the accelerating decline in the quality of life of many of those who live in the built environment of cities. The two crises are related. The consequences of urbanization make a major contribution to the global environmental changes that threaten the very existence of life in the future, while changes in the biosphere increasingly affect health and social conditions in the cities. Dealing with this twofold crisis calls for unprecedented cooperation among the people of the world and their governments.

— Environmental health in urban development. Report of a WHO Expert Committee. Geneva, World Health Organization, 1991 (Technical Report Series, No. 807), p. 1.

ENVIRONMENTAL TERMINOLOGY

Environment

Environment is the surround which includes all external conditions and influences affecting the life and development of organisms. It is broadly divided into two parts biotic and abiotic for ecological purposes.

Biotic Environment

The biotic environment consists of living organisms, which both inter-act with each other and are inseparably inter-related with their abiotic environment.

Abiotic Environment

The physical or abiotic environment includes all those physical and non-living chemical aspects which exert an influence on living organisms. Among these are soil, water, the atmosphere and the influence of energy from various sources.

Biosphere

Biosphere is the surround which is of direct relevance to the living beings inhabiting the planet. It is thin layer of soil, rock, water and air that surrounds the earth which we utilise for our living. In short, it is the life zone of the earth.

Ecology

Ecology is the scientific study of the relationship between organisms and their environment.

Ecological Systems

Ecological systems are the intimate relationship between living organisms and the non-living

surrounds which comprise the biosphere.

Ecological systems powered by solar energy are known as ecosystems. These are basic to support life on the planet earth.

Conservation

Conservation is the management of human use of the biosphere so that it yields greatest sustainable benefit to mankind. It includes preserving, maintaining, sustainable utilisation, restoring and enhancing of the natural environment.

Development

Development is the modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and to improve the quality of life. For sustainable development, socio-economic, ecological, living and non-living resource base, choice between alternative decisions, short-term and long-term advantages/disadvantages are crucial factors in the process.

Desertification

Desertification is a process of any piece of living habitat becoming a desert due to vegetation being so scanty so as to be incapable of supporting any considerable human population. Apart from prolonged drought, large scale human activity including overgrazing and over exploitation of natural resources are the principal reasons for desertification. Experts at the UN estimate that 10 percent of the

earth's population have already been affected to some extent by desertification.

Resource

The resource is a constituent of each element of the surroundings. Natural resources include air, water, land, biotic components, fuel and raw materials. Man-made resources include cultural heritage, human population and socio-economic infrastructure among other things.

Social Forestry

Social Forestry programmes were started in the late 1970s. These include raising rural fuel-wood plantations and village wood lots, starting tree nurseries, distribution of tree saplings, encouragement of plantations around agricultural fields as well as promotion of farm forestry and strip plantations on roadsides and canal banks.

Acid-Rains

The precipitation of rain-clouds and the resultant shower are exposed to unnatural atmospheric oxides due to industrial pollution. These gases are generated due to manufacturing activities and disperse into the atmosphere. Consequently, the rain has to pass through an atmosphere polluted with two poisonous gases namely sulphur dioxide and nitrogen dioxide. These gases are mostly emitted from power plants and factories. The falling rain and snow react with these oxides and precipitate new chemical properties. This mixture, often of sulphuric acid, nitric acid and water is

being described as "Acid Rains" by scientists. This causes wide spread harm to the environment.

Greenhouse Effect & Global Warming

A part of the sun's rays pass through the atmosphere into the planet earth which we inhabit. Some portion of these rays are absorbed by plants, soils and the atmosphere. These rays are necessary for maintaining the minimum temperature to sustain human life in the planet. The word greenhouse is derived from the phenomenon of the sun-rays easily passing through transparent plastic and glasspanes enclosing vegetation. In the larger context of the earth, it means penetration of the sun-rays into the planet and its ecology. A part of the heat received is reflected by the earth in the infra-red range of long wavelength. This is trapped by clouds, dust particles, carbondioxide and water vapour in the lower layers of the atmosphere. This combined with large scale human activity are changing the earth's atmosphere. The increase in the earth's temperature is being described as large scale global warming. The consequent acceleration in the melting of glaciers and snow-fields could raise the level of oceans by 70 cms.(more than 2 ft.) per century to begin the drowning of most of the sea-ports in the earth. This whole effect is known as the greenhouse effect.

CFCs

Popularly known as Chlorofluorocarbons, CFCs are Chlorine compounds extensively used for refrigeration, air-conditioning, foamed plastic and as aerosol propellants.

Ozone Layer

The ozone gas is caused by the action of the sun's ultraviolet radia-

tion with ordinary oxygen in the upper atmosphere. It is found as a band of gas in the atmosphere about 15 to 50 kilometres above the surface of the earth. This zone is called Ozonosphere. Near the ground level, ozone is an undesirable pollutant, a constituent of smog that irritates the eyes and impairs breathing. But in the upper atmosphere it acts as a screen against harmful ultra-violet rays which would otherwise reach the earth. These rays can cause extreme sunburn, skin cancer and damage to the body's proteins and nucleic acids.

Ozone Hole

Scientists monitoring the ozone layer had noticed that it became thinner each spring over the South Pole. In 1985, researchers from the British Antarctic Survey discovered a hole in it. The major cause for this is the breakdown of ozone by the chlorine compounds of CFCs. These substances are estimated to be present in the atmosphere for a life span of 100 years.

Toxic Waste Disposal

Niagara Falls in New York, became the centre of a horror story in 1978. About 25 years earlier, a chemical manufacturing company had disposed of 20,000 tonnes of highly poisonous wastes by burying them in a landfill at the site of an old canal. This is only of thousands of places where the toxic wastes of industry have been stored or dumped. Distance from a dumping site is no guarantee of safety, because rainwater seeping through the dump carries contaminating material through the soil and may reach wells or rivers serving as water supplies.

Scientists are also finding high levels of extremely poisonous chemicals being disposed of into

the river and sea beds. A global ban on all such dumping at the sea by 1995 had been proposed. Alternatives are available for scientific and harmless disposal of toxic waste. These are building better dumps which are leak proof, breaking down the poisons and eliminating output of toxic wastes in the production process itself.

UNEP

The United Nations Environment Programme (UNEP), was established in 1972 by the UN General Assembly as a result of the Stockholm Conference of Human Environment. UNEP works on assessment, review and formulation of policies and programmes on environment protection. It also administers a fund for this purpose. The UNEP world report published in 1983 is considered to be a major policy document on the environment scene in the world. It outlines concerns, strategies and policies to protect the environment and to create a safe planet for human inhabitation.

Stockholm Conference

The Global concern for Environmental Protection found expression in the UN Conference on Human Environment held at Swedish capital Stockholm in June 1972. The Conference adopted an action plan relating to subject areas of human settlements and human health, territorial eco-systems, environment and development, oceans, energy and natural disasters. It proposed institutional arrangements for implementing the action plan within the UN systems. The recommendations of the Action Plan were accepted by the UN General Assembly and institutional arrangements were made under the UNEP.

SWASTH HIND

UNEP Session

Ten years after the Stockholm Conference, UNEP convened a session of a special Charter of the Governing Council of the UNEP. This Conference was held in 1982 at Nairobi to commemorate the tenth anniversary of the Stockholm Conference. The session reviewed major achievements of the Stockholm Action Plan and recommended action in the field of environment to be taken by the UNEP over the next decade. The Conference adopted a Nairobi Declaration and a decision on Environment in 1982—Retrospect and Prospect. The Conference felt that the principles of the Stockholm Declaration were as valid 10 years later as in 1972 and together with the decisions adopted in the Nairobi Conference, provided basic guidelines for effective and sustained environmental progress.

Vienna Convention

The Vienna Convention for the protection of the ozone layer was initiated by the UNEP and was adopted in 1985. It came into force in September 1988. The Convention provides for a general framework for addressing the ozone problems at the international level through coordinated research, exchange of information, etc. It also envisages action through specific protocols to control ozone depleting substances.

Montreal Protocol

The Montreal Protocol on substances that deplete the ozone layer, adopted in September 1987 has come into effect since January 1989. The protocol in its original form (prior to amendments at the recent London Conference) aims at a phased reduction by 50 percent in the production and consumption of some controlled substances in

the next ten years and for freezing the consumption of halons. The protocol says developing countries including India which have a low level of consumption of such substance will follow a similar schedule, but with a ten year delay. The protocol also provides for restriction of trade in the controlled substances with non-parties to the Convention and in general terms for technical and financial assistance to developing countries to comply with it.

Funds for Assistance

Till a multilateral fund is established, an interim financial mechanism has been set up under the protocol for the purpose of providing financial and technical cooperation, including technology transfer to the signatories to the protocol. The fund will meet the incremental costs of developing countries for developing alternate technology and substances for protecting the environment in their industrial activity.

Basel Convention

The Basel Convention on the control of transboundary movement of hazardous substances was adopted at a Conference in Switzerland in 1989.

Brundtland Report

The linkages between environment and development were clearly brought out in the report of the World Commission on Environment and Development chaired by the former Prime Minister of Norway, Ms. Gro Harlem Brundtland. Popularly known as "Our common future" 1988, this report was prepared at the behest of the UN General Assembly and was presented to it in 1988. Its recommendations were endorsed by the world body.

UNCED

One of the major outcome of the Brundtland report is the decision to organise the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro in Brazil in June 1992. The primary goal of this Summit level conference is to establish relationship between environment and development. The UNCED is likely to cover virtually every subject which is related to both environment and development issue and the mechanisms and modalities by which sustainable development may be achieved. In particular, it would seek to identify the constraints and obstacles which the developing countries face in their pursuit of development and necessary action to ensure sound and foolproof strategies for environmental protection. This includes the nature of the international economic order, trade patterns, aid terms, the working of the international financial institutions and even the functioning of the UN systems.

New Delhi Conference

A preparatory official level conference of 21 developing countries to discuss the emerging global environment issues was hosted by India in New Delhi in April 1990. It took stock of the ground work done for the earth summit and outlined broad priorities.

Beijing Conference

As a follow up to the New Delhi Conference, a ministerial level conference of developing countries was hosted by China at Beijing in June 1991. It was the first ever such conference of developing countries in which 41 of them participated. An important outcome of this conference was the adoption of the Beijing Declaration which substantially met the concerns put
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HEALTH SERVICES IN URBAN SLUMS

—Need for a Micro-planning Approach

DR A.T. KANAN, DR S. VENKATESH AND DR K. PANDIT

INCREASING urbanisation with rapidly growing number of urban slums and slum population and accompanied health consequences, has been a matter of concern for urban planners, economists, environmentalists and health administrators alike. The bulk of the urban poor are living in extremely deprived conditions with insufficient physical amenities like low cost water supply, sanitation, sewerage, drainage, health care, nutrition, pre-school and non-formal education, etc.

A survey by the Delhi based National Institute of Urban Affairs estimated that 50.5 million people (about 27.7%) of the urban population were living below the poverty line in 1984-85 and that another 100 million people would be added to this in the next 10 years, thus further aggravating the situation. The survey also revealed that of the population below poverty line in urban areas, women and children number about 33 million (women 15 million and children 18 million).

Considering their poverty, living conditions and usually precarious nature of work, it is not surprising that the urban poor are the easy targets to various illnesses. The most common illnesses among slum dwellers are respiratory diseases, gastro-intestinal disorders, skin diseases, fever, worm infestations, ENT ailments and tuberculosis.

An I.C.M.R. study covering slums in three cities in 1984-85 showed that 85% of the people did not avail of the available maternal and child health services and that 75% of the births were unattended by any health functionary. While the average rate of infant mortality in urban India is half that for rural India, the rate in slum sectors of the larger cities was found to range between 51 to 93 per 1000 live births. The prevalence of low birth weight varied from 25.9% to 56.9%. Around 6,000 urban children become blind annually due to Vitamin A deficiency. Nearly three lakh urban children die every year from diarrhoeal dehydration. Incidence of diarrhoea in urban areas is estimated to be 500 per 1000 among infants and 299 per 1000 among pre-school children. 82% of the pre-school age children in urban slums have some degree of Protein Energy Malnutrition. The changing trend from breastfeeding to bottle feeding in urban slums may be contributing to this increased morbidity in children below 5 years of age. Anaemia and Iodine Deficiency disorders have also been reported in these children.

Urban malaria, tuberculosis and respiratory ailments and leprosy are important diseases affecting the urban slum population. The prevalence rate of leprosy was 22 per 1000 in a slum in Bombay against the city average of 6.9 per 1000.

The energy intake data of National Nutrition Monitoring Bureau from 15 major cities showed a lower energy intake for urban slum dwellers similar to that of the landless and was lower than the rural average. Situation in relation to other indicators was also far from satisfactory. 30% of live births were of parity four and above. Female enrolment in schools was low with 2/3rd of girls between 10 to 14 years of age in Delhi slums being out of school.

Mothers in urban slums working to supplement the family income face problems relating to child care facilities during the day. The situation as regards sanitation is also poor with an estimated 93% of the households having no independent source of water supply.

Environmental improvement in urban slums

Rightly recognising the need for urgently addressing the problem of urban slums, the National Housing Policy enunciated by the Government of India in 1988 had, as one of its five important goals, "the creation through housing.....of conditions conducive to the achievement of crucial goals in health, sanitation and education sectors". Health considerations are also inbuilt in the building regulations, public health and urban planning acts and slum improvement legislation. The Policy emphasises the necessity to keep in

sharp focus the needs of the homeless and those living in extremely poor shelters and unhealthy neighbourhoods. Shelter has been viewed in a broad perspective as including not only the structure but also the various physical and social services which form a part of the housing environment.

Emphasis is being given to environmental improvement of urban slums (rather than their massive clearance or relocation) with provision of seven basic amenities viz. water supply, sewer, storm water drains, community baths and latrines, widening and paving of existing lanes and pathways and street lighting.

Health posts have been set up under Family Welfare programme for providing out-reach services in urban slum areas. The present urban health care delivery system, which was reviewed in depth by the Krishnan Committee in 1982, is being revamped and streamlined with assistance from international and bilateral agencies like WHO, UNICEF, ODA, USAID, etc.

Urban Basic Services for the Poor

The Urban Basic Services for the Poor (UBSP) Programme is aimed at convergence of social and physical services rendered by different specialised departments like Health, Education, Social Welfare and Industry/Industrial Training in urban slums with special emphasis on women and child survival and development through immunization, nutrition supplementation, pre-school and creche facilities, training for income generation, water supply and low cost sanitation.

Introduced in 1986 as a Centrally sponsored programme with UNICEF assistance, the Urban Basic Services programme was reviewed and enlarged in 1990-91 and came to be called U.B.S.P.

The programme presently covers 169 towns of 36 districts. The revised programme has enlarged the social services to be provided to urban poor by including special inputs for street children, handicapped, poor, aged and destitutes and for solving socio-economic problems of the slums like juvenile delinquency, communalism, gambling and alcoholism.

The programme encourages slum dwellers to take the lead in the developing process by identifying their obstacles and finding solutions appropriate to their needs and capabilities. Resident community volunteers—usually women from the slum themselves—provide immediate daily assistance and ultimately creating linkages to the Government development agencies responsible for providing services.

Urban India lacks a structure similar to the rural health set-up which has defined territorial responsibilities. Though U.B.S.P. Programme tries to fill up this gap in the areas in which it is functioning, there is necessity for a well organized health care programme covering urban slums all over the country. There is also a need for proper coordination and monitoring of the various health and development agencies—both Governmental and Non-Governmental working in urban slums.

Need for micro level action plan

A Micro Level Action Plan should be prepared for each slum area which should be available with all the Departments/Agencies involved in delivery of health care services in that area. The Plan should incorporate the following elements :

1. Service Delivery agencies providing health care services directly or indirectly. MCH Services,

including ante-natal, under five care and immunisation should be provided on fixed dates and times at fixed locations. Proper system of referral should be implemented. Coordination of activities of the various organisations is necessary to ensure optimum delivery of services.

2. Enumeration of the population where it is not already done and should be made available with the Anganwadi workers or other service agencies. This can be carried out with the help of NGOs, NSS Volunteers, teachers, etc. The trainees of ANM, MPW Schools could also be involved.

3. Identification of Nodal Officers—The overall responsibility should lie with the Municipal Officers. Some officers may be made responsible zone-wise after dividing the town into zones with a population of 50,000 slum dwellers each.

4. Health Coordination Committees should be formed at all levels—Community, ward and town levels—with the involvement of locally elected representatives and leaders and volunteers from the community.

5. Training and Continuing Education Programme—The training needs of the various volunteers involved should be identified and suitable curricula and programmes developed and organised with emphasis on community orientation, e.g., community based distribution of oral rehydration salts, conventional contraceptives and chloroquine.

6. Monitoring & Coordination—The responsibility for this should rest with the local administrative body under control of the local administrative chief. The Health Officer may be the Nodal person who will coordinate and

monitor. Members from other related departments like Education, Sanitation, Public Works, etc., should be involved. A proper Management, Information & Evaluation system should be developed and used for this purpose.

7. Logistics & Demand Generation—The requirement of health care equipment, medicines, chemicals and other supplies should be properly estimated in advance based on the needs of the community, and their supply should be ensured. Proper maintenance of the equipment is also essential for which linkages have to be

established with servicing departments/agencies. Decentralisation of financial powers to the periphery would help improve efficiency. Information, Education and Communication (I.E.C.) programmes may be organised to encourage community participation and increase the demand for the services.

8. Schedule of activities—A proper scheduling of the activities should be done which should include time, place, persons, etc. This would help ensure proper implementation of various phases of activities.

9. Health Systems Research—Research on Biological, Psychosocial Environmental and other factors related to health as well as on the components of health care services on the delivery mechanism would help identify lacunae and suggest measures for improving the efficiency.

Unless such suitable time bound Microlevel Plans are prepared for the urban slum areas, it may not be possible to ensure optimum provision of primary health care services to the vast population living in urban slums. □

“BREAK-BONE FEVER” INCREASING WORLDWIDE

THE severe viral disease dengue, which can be fatal to young children, is spreading and worsening throughout the globe, with tens of millions affected annually, and urgent measures must be taken to bring it under control, the World Health Assembly—the governing body of the World Health Organisation (WHO)—resolved on 14 May, 1993 in Geneva.

The incidence of “classical” dengue, called “break-bone fever” because of the intense pain it can cause in bones and joints, has been increasing since the Second World War—when the disruption of warfare is believed to have spread the daytime—biting mosquito that transmits the disease throughout Asia. These mosquitoes—principally *Aedes aegypti*—breed rapidly in clean water in tins, abandoned tyres, cement tanks, drums, water jars, the tops of bamboo fence-poles and

hundreds of similar sites, and have continued to spread widely with increasing urbanization, in the litter of unplanned urban settlements.

As with most viral diseases, there is no specific treatment, and no vaccine is yet available (although WHO has sponsored dengue vaccine research for many years, and at least one promising candidate vaccine has recently entered human trials). Patients with classical dengue must be given bed-rest and analgesics, and cool sponging if the fever becomes extreme. Children with severe DHF/DSS develop high fever, vomiting and bleeding from capillaries, and must receive transfusions to compensate for fluid loss. Without proper medical attention, death rates can average some 15%; with attention this can be reduced to 1–3%. Nearly three million child-

ren have been hospitalized by dengue in South-East Asia in the past three decades.

The World Health Assembly resolution called for increased resources to be devoted to *Aedes* control—involving training, planning and educational measures—at every level from the affected communities to WHO itself. WHO should establish strategies which will be sustainable at the country level; and increase the Organization’s capacity for research in dengue surveillance, epidemiology and vaccine development. WHO needs US\$ 2.8 million for dengue control in 1994-1995 much of it to be drawn from extrabudgetary (voluntary) donations. The resolution adopted by the World Health Assembly today calls on the Director-General in addition “to increase efforts to find extrabudgetary resources for support to national and international dengue prevention and control activities”.

—WHO

SWASTH HIND

PAIN RELIEF DEVICE

AN electronic drug-free pain device named Xenos, which won a 1991 British Design Award for its manufacturer, is based on the proven method TENS (Transcutaneous Electrical Nerve Stimulation), and is used for conditions such as sports and spinal injuries, arthritis and post-operative pain.

Electrodes are placed on either side of the pain area (as shown in photograph), and a low frequency current is applied between them. The patient experiences the stimulation as a mild tingling sensation.

Xenos operates by activating two natural pain relieving mechanisms within the body. The 'Gate Control' mechanism, whereby pain impulses from a painful area are intercepted and weakened within the spine on the way to the brain, which reduces the perceived

intensity of the pain, and by increasing levels of the body's own natural pain-killing substances, endorphins and enkephalins.

The product has innovative touch-control technology which overcomes the problems of conventional operation. To operate it, the patient simply holds the intensity 'increase' button until stimulation is felt. The control is then released and 'single touch' operated until the right level of pain relief is reached. Using a microchip, the electronics have been miniaturised, producing a small compact product which can be worn discreetly and comfortably on a belt or in a pocket.

Other features include an automatic memory to retain settings for future use, a sensor which shuts down operation on detection of a loose lead or electrode, and a



new randomly modulated output waveform which helps overcome long term 'patient accommodation' that can occur when the body is subjected to a repetitive stimulus for long periods, thereby reducing the pain-relieving effect of TENS.

—Spectrum, March-April 1993.

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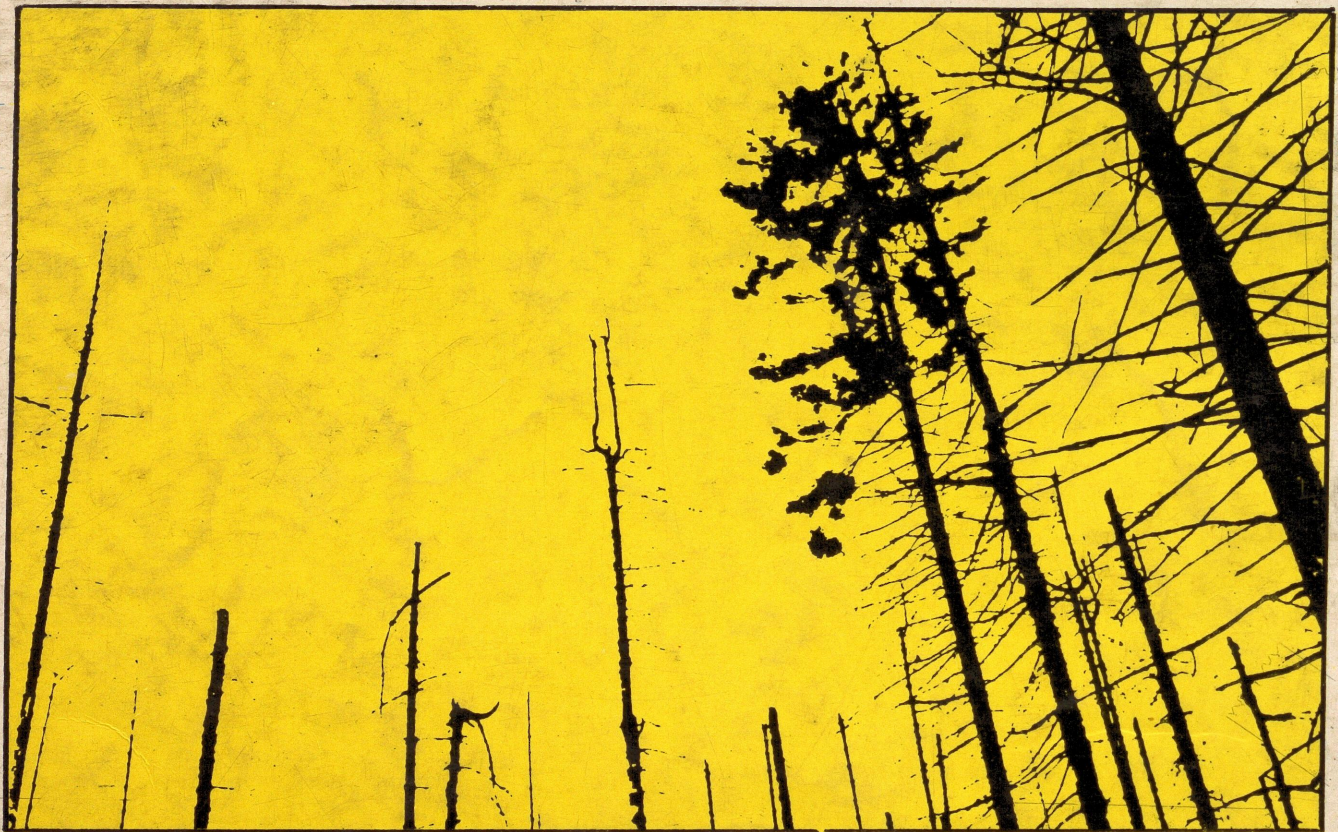
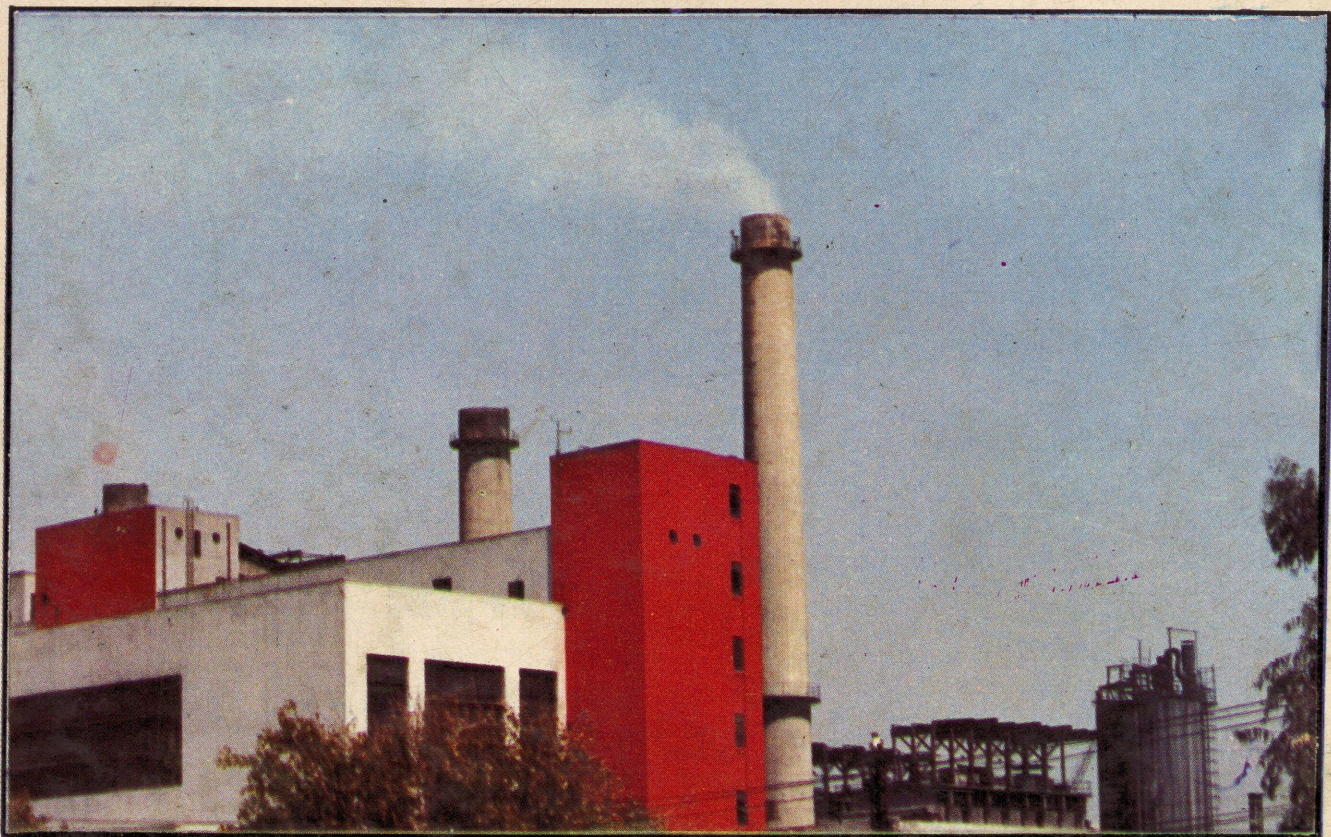
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The world is fast losing its "green" cover. The challenge is to reverse this trend before it is too late.