September '94

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Single issue	**Rs.5/-**
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Life Membership	**Rs.1,116/-**

All cheques and Demand Drafts are to be sent in favour of "SOCIETY FOR ENVIRONMENT AND EDUCATION" B-98, H.A.L., Colony, Balangar, Hyderabad - 500 042.A.P.INDIA.

Phone: 040 - 277106.

ENVIRONMENT PEOPLE

ENVIRONMENT & PEOPLE
MONTHLY

Vol - I **No : 4**
SEPTEMBER, 1994 Rs. 5/-

Computerised Type Setting at
Sai Communications
Khairatabad,
Hyderabad - ✆ 315353

Edited, Printed and Published by **P. Narayana Rao** on behalf of Society for Environment and Education. Hyderabad Printed at Vamsi Krishna Printers for Pragathi Art Printers.

B -98, H A L Colony,
Balanagar, Ph. 277106
Hyderabad - 500 042.

EDITORIAL

TRADITIONAL WISDOM

Indian cultural heritage is a repository of rich traditions replenished from times immemorial. India has, to its pride, certain unique scientific and technological achievements that contributed to the universal treasure of knowledge. The knowledge of mathematics, medicine and metallurgy that was found in Ancient Indian literature was widely illustrated by scholars all over the world. Aryabhatta, Susrutha and Varahamihira were well-known outstanding scientists of that era. Town planning, Municipal water supply and drainage systems as well as sanitary installations at Mohenjodoro and Harappa have no parallel in history. Ayurveda and Yoga are recently being rediscovered by our scientists long after west had put up extensive research in those systems.

Our traditional agricultural practices like intercropping pattern, tank irrigation and compost manuring were recognised as time tested methods. Knowledge of traditional science and technology existed not only in scholarly texts but also with innumerable farmers, artisans and craftsmen and got propagated in many forms such as folk songs, proverbs, rituals and other traditions. Herbal remedies are part and parcel of tribal life even today. Unfortunately, the wave of westrenisation is relegating indigenous technology to the background upto the extent. of growing inferiority complex among intellectuals of our country to took down upon any thing "Indian" and succumbing to the external pressures even to import cowdung and manufacture of salt by multinationals. It was proved beyond doubt that much damage was done to environment by blindly aping the alien methods in several sectors of economy causing untold miseries to our people. It is high time to study for the people.

The state of our natural resources and apply indigenous techniques in preserving them. This does not mean abandoning latest discoveries during the period of scientific & Technological Revolution. Traditional wisdom and Scientific timper are to be blended to create patriofic and people's oriented Science and Technology that requires tremendous commitment to the nation and learning from the people.

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HARNESSING A NEW SOURCE OF POWER

S.M. Kumar, Sr.Dy. General Managher, B.H.E.L(R&D)

Wind Energy utilisation for various mechanical applications, such as water pumping and wheat grinding, has been practiced in several countries such as USA, Holland, Denmark, Argentina and China for quite a long period. The generation of electrical power using a wind turbine as the prime-mover is of more recent origin. This is mainly due to the fact that the intensity of energy in wind is a highly variable factor, depending upon its velocity.

Wind speed can vary from zero to as high as 150-200 Km/hr under cyclonic conditions. This variation can be measured on a daily, weekly, monthly or annual basis. The annual variation in wind velocities is the basis for establishing whether a particular site is suitable for installing a wind electric geenerating station, more commonly referred to as a wind-farm.

In our country, several prospective sites have been identified for wind power utilisation, based on a scientific measurement of the wind velocities on an annual basis for several years by the Indian Institute of Tropical Meteorology, Government of India. These sites are located mainly in the southern and western regions of the country predominatly in the states of Tamilnadu and Gujarat, where more than 90% of the total existing installed capacity of about 120 MW of Wind Power is located.

There are however a few good sites in Andhra Pradesh also such as Ramagiri in Anathpur District and the Tirumala Hills in Chittoor District. These sites have been extensively mapped by the Govt. of A.P. through its Nodal Agency, the Non-Conventional Energy Development Corporation of Andhra Pradesh (NEDCAP). Several wind farm developers in the Corporate Sector have already come forward to invest in wind farm development in A.P. It is expected that about 50 MW of installed wind power capacity would be achieved before the end of the 8th year plan period.

The technology for harnesing wind power has come a long way since the early designs of Putnam in the United States of America. The advent of microprocessors has revolutionised industrial feed back control systems. programmble control system which can start-up the wind electric generator (WEG) whenever the wind is sufficient and automatically connect it to the grid. It can also disconect the WEG under abnormal operating conditions such as extremely high velocity winds (greater than 100 Km/hr) or unsafe grid conditions such as single phasing, low/high voltage and frequency profiles, motoring of the WEG due to insufficient winds and so on. The controller can also sense any change in wind direction and align the WEG rotor accordingly.

Another major technological factor responsible for acclerating the wind electric generator development programme is the advent of fibre glass reinforced polyster resin (f.r.p) technology for design and manufacture of long aerodynamically profiled blades which can capture the wind energy efficiently enough to be of economical value. At the same time these blades must have sufficient mechanical strength to withstand the most severe cyclonic conditions with wind velocities going 200 Km/hr. The table below gives an indication of the effect of progressive increase in blade lenghs on the energy capturing ability of the WEG rotor:

Year	generator Rating (KW)	Rotor Diameter (Metres)	Approximate energy production (KW HRS)
1980	30	10	30,000
1983	55	15	90,000
1985	100	19	220,000
1987	200/250	25/27	470,000
1992	500	39	1150,000

** for an annual average wind velocity of 23.5 to 25 /Km/hr.

The economics of wind power generation depends on two basic factors. Firstly the intial cost of the WEG as well as the other balance items such as electrical distribution system, land and civil works and erection and commssioning. The second factor is the capacity factor which is dependant on the annual energy generation expected from the WEG at the particular site. There are other factors which influence the economics such as financial incentives and concessions. Based on the present fiscal policy and lending rates of finacial institutions/IREDA (Indian Renewable Energy Development Agency"), the rate of Rs.2.25 per KWhr fixed by the APSEB for wind energy can be financially

attractive for prospective developers.

Several environmental benefits can accrue from utilising wind energy for power generation. Reduction in emmission of harmful gases such as carbon dioxide, sulphur dioxide etc., due to reduce depandance on fossil fuels is an important benefit which has been recognised all over the world. Thus for every Kwhr of energy generated from wind energy the pollution avoided is as follows:

	Per Kwhr (grams)
1) Carbon Dioxide	750-1250
2) Sulphur Dioxide	5-8
3) Nitrous Oxide	3-6
4) Slag and Ash	200-250

Secondly, wind farms can utilise the available land in the most optimum manner since they permit agriculture also to be carried out in the same premises, unlike large hydro power projects which result in valuable land getting submerged under water and destruction of forests which can disturb the ecological balance in the region.

Thirdly, the development of wind farms offers excellent employment opportunities for the local population in civil construction work as well as in erection, commissioning, operation and maintenance jobs.

Lastly, the commercial growth of the wind power generation industry has helped to focus the attention of our planners and policy makers on the need to give further encouragement and support to the programme for utilisation of other non-conventional sources of energy which are available in plenty in our country.

This is one of main factors considered in favour of India by the Global Environment Facility (GEF) in sanctioning a grant of about $20 million, which is the estimated difference between the life-cycle cost of a wind farm and a conventional power plant. The GEF, established in mid1991 for use in 70 developing countries, is jointly sponsored by the United Nations Environment and Development Programmes and the World Bank.

WIND FARMS COMING UP IN ANDHRA PRADESH

Sl.No.	Site		Capacity planned for VIII Plan	Capacity under installation (MW)
1.	Ramagiri	(Anaatapur, dist)		2MW (APSEB/BHEL)
2.	MPR DAM	(-do-)	35 MW	3MW (NEPC MICON)
3.	Singanamala	-d0-		2MW (Andhra Sugars)
4.	Erradoddi	-do-		3MW(BHEL/NORDEX)
				3MW (MADRAS COMENTS)
				3MW (PRIYADARSHINI)
5.	Payalakuntla	(Cuddapah Dist)	5MW	
6.	Narasimhakonda	(Nellore Dist)		
7.	Jonnawada	(Nellore Dist)	5MW	
8.	Tirumala	(Chittoor Dist)		
9.	KAkula Konda	(Chittoor Dist)	3MW	
	Total:		**48MW**	

HOPE FOR THE FUTURE

ASHISH KOTHARI

ASHISH KOTHARI, of the Indian Institute of Public Administration, New Delhi, points out that there is hope amidst the various threats that ecology faces, and cites a success story from Tehri Garhwal.

ECOLOGISTS these days seem to have little to cheer about, faced as they are with a constant barrage of depressing news about deforestation, outcomes of destructive development. Despair and pessimism are natural in a world where newspaper headlines are only about killing, corruption, political scandal and communalism. Any success story, therefore comes as a breath of fresh air. This is one such.

Jardhar is a quiet little village nestled in the hills of Hemval Ghati, one of the numerous picturesque valleys of the Tehri Garhwal Himalayas. Typical terraced fields occupy a substantial part of the hills and valley floors. But the remaining area around the village is considerably denuded; barren hills standing testimony to the destructive hand of humans. The ideal scene of terraces intermingling with forested slopes, still to be seen in some of the less accessible reaches of the Himalayas and parts of the north-east, is a thing of the past in this part of Hemval Ghati.

It may, however, also be a scenario of the future, if the brave efforts of the residents of Jardhar village inspire surrounding villages. In the last one decade, Jardhar has demonstrated that both collective action, as well as the dogged efforts of even single individuals, can bring results which are truly revolutionary.

Over a decade ago, the hills around the village had been almost completely denuded, the result of felling both by contractors as also the villagers themselves. Shortages of fuel and fodder, soil erosion, and a host of the problems became daily occurrences. In 1980, the Gram Sabha decided that something had to be done to regreen the area. Inspired and helped by the Chipko Movement, they formed a Van Suraksha Samiti (Forest Protection Committee), consisting of village youths who were paid in cash or kind by every family of the village. This Samiti ensured that a large area of hillside above the village was left totally alone, with no grazing or fuelwood collection and no felling by contractors or the Forest Department. A bit of tree planting was also done, of the area was simply left to regenerate on its own, since the villagers had faith in the power of nature to recoup. No expensive fencing or brick-walling was done, simply a social sanction against use of the area and the dedicated efforts of the committee members. From about 1987 to 1992, two chowkidars were appointed by the village, utilizing funds made available from the Greening of Himalayas Project. These funds have since then been discontinued, and the villagers are back to their own resources.

A dozen years after protection started, the results have been astounding. A patch of several hundred hectares of mixed forest now covers much of the slope above the village. Looking for all the world as if it was always there. I walked through this forest to the top of the hill, and was surprised to see the diversity: oak (Quercus incana), burans (Rhododendron arboreum), horse chestnut (Aesculus India), walnut (Juglans regia), bimal (Grewia oppositifolia), bamboo, chir pine (Pinus roxburghii) and other species were present in wild profusion. Villagers report that not just small wildlife but also boars, deer and bears have made a reappearance on the higher slopes. And why not, they say, these animals also have a right to home....

In the last few years, the villagers have also developed a couple of nurseries, and using it to afforest other parts of the barren slopes around Jardhar. Mr. N.D.Jayal, who was officially monitoring the Greening of Himalayas Project, reported in 1991 that in these nurseries. The Van Suraksha Samiti was looking after them with help from the Mahila Mangal Dal (the Village Women's Committee).

Sustainable agriculture

Even more remarkable than this forest regeneration and protection effort are the attempts of one

farmer in reviving and modifying traditional crops and cropping methods. Vijay Jardhari is an unassuming, quiet person, whom one could encounter tending his paddy fields or feeding his cattle, much as one would encounter farmers anywhere in India. He has just a few acres of land, and is by no stretch of imagination of rich landlord. But when it comes to ideas and innovation, he would rank amongst the top.

In about two acres, Vijayji is growing experimental plots of a large diversity of crops. In 1993, he grew about 45 varieties of rice and 40 varieties of rajma (kidney beans), apart from a large diversity of other crops and fruit trees. In the last few years, he has tried out a total of over 70 varieties of rice. When I visited him, he showed me seeds of some of the varieties harvested last year: a couple of local basmati types, some red and brown ones, some small-grained and some large. To me, having spent virtually all my life in Delhi eating at the most two varieties, the diversity was astonishing. The rajma seeds were even more striking: yellow, red, brown, black, white, plain mottled, marbled. The sheer visual delight of a thali full of this diversity was reward enough for the strenuous climb up to vijayji's hut.

Beauty, however, is the least important aspect of that this farmer is attempting. What he and many other individuals are involved in is the revival of diversified, low-input, stable cropping pattern which, while learning from the past, could well be the future of Indian agriculture. In so doing, these farmers are offering to us one vital component of an alternative development patch which, unlike the one we have adopted over the last few decades, respects the rights of both humans and nature.

Consider the following facts. Traditional Indian agriculture has been characterised by the use of extremely diverse crops and cropping patterns/methods. For instance, Indian farmers till recently grew over 50,000 genetically distinct varieties of rice. I had heard this figure before, and not really comprehended it, until I visited the Angami tribal villages of Nagaland, and vijayji's farm in Garhwal. At Khonoma, near Kohima in Nagaland, I was shown rice fields where over 20 varieties are regularly grown. Here, at Jardhar, I learnt why farmers developed and maintained such diversity: one rice variety for its productivity, one for its drought resistance, one for its ability to withstand floods or insect attack, one for its deep red colour preferred in rituals, one for its taste.

The maintenance of a diversity of crops with different characteristics gave the community a buffer stock of food if droughts or floods or pest attacks occurred, even if it did not provide huge surpluses and monetary returns. A traditional rice field provided not just rice, but also fish, crabs, frogs, and other important elements of the rural diet, the market replacements of which would require money. Traditional farming also provided for the fuel, fodder, ritual, cultural, and other needs of the community., festivals, and other aspects of rural life. Truly, agri "culture" was not merely an economic activity, but also a cultural one.

Another living example of the importance of diversity in agriculture was shown to me in Jardhar. Despite the fact that most farmers have switched to highyielding varieties of seeds and new techniques of farming, some of them still maintain plots of what they call baranaja. Literally meaning 12 grains, this age-old practice involved sowing of a mixture of crop seeds into a single plot of land. rajma (kidney beans), urad (black gram), mung (green gram), kulth (horsegram), marsha (amaranthus), Jhangora (barnyard millet), mandua (finger millet), and other crops were grown in a jumbled profusion which to a modern agriculturist would look like a big mess, but which constituted an extremely well-thought out way of getting sustainable yields. Since maturity periods of these crops varied, different crops would be harvested at different times. Soil fertility would be kept up by leguminous plants like pulses. The result was higher and diverse yields which met a diversity of needs. Along both the baranja and other fields, fruit trees and other plants would be grown, to provide additional food, fibre, fuelwood, and other products of daily need.

Modern agriculture is totally different, focused almost exclusively as it is on monocultures and on maximising grain productivity and marketable surplus-

es from every square inch of land. Starting with the introduction of the Green Revolution in the 1960s, Indian farmers have increasingly been tempted into accepting a handful of so-called High Yielding Varieties (HYVs) of seeds. Being widely adaptable, and economically remunerative given appropriate inputs (irrigation, fertilisers, pesticides), these seeds have displaced the indigenous varieties over vast areas in HYVs of rice are now grown over 70 per cent of the paddy land in the country; in the case of wheat, it is 90 per cent. How much of the traditional diversity has been lost is anyone's guess; in the Godavari district of Andhra Pradesh, it was found that the loss of rice varieties was 95 per cent. Similar has been the fate of dozens of other crops: minor millets, pulses, sugarcane, cotton. This has also been the fate of livestock,. with a large proportion of India's impressive diversity of breeds being severely threatened by cross-breeding with exotics, sheer neglect and other factors.

Viability of HYVs

One may well ask: so what? After all, the Green Revolution has helped to greatly increase our foodgrains production, and we have to continue to feed a growing population. The problem is the very HYVs on which this increase in output has been achieved are dependent on genes obtained from existing crop varieties, or from the wild. By their very nature, the viability of these HYVs drops within a few years, necessitating the infusion of new genetic material. By destroying the very genetic diversity on which such replenishment is based, modern agriculture proves itself to be suicidal... somewhat like building the roof of your house by taking away the bricks from the walls.

The Green Revolution kind of agriculture is suicidal and destructive in other ways too. The use of artificial fertilisers and pesticides has caused widespread poisoning of land, water, wildlife, and ultimately humans. India has one of the world's highest rates of pesticide poisoning and pesticide residues far in excess of healthy limits have been found in foodstuffs being sold in several cities. Equally serious, surface irrigation has waterlogged and salinised land over millions of acres, rendering it less productive than in pre-irrigation times and destroying time-tested traditional irrigation systems. Farmers are spending more and more on inputs while their productivity stagnates, with severely impoverishing effects on the small and marginal farmer. This economic treadmill has frustrated millions of farmers across India, as reflected in their increasingly strident protests. A once self-sufficient peasantry is now dependent on the whims and fancies of governments and industry - dominated markets, a trend that is only going to be encouraged by the current economic policies of promoting agro-industry and exports of agricultural products, and by the increasing promotion of hybrid seeds which have to be bought anew by the farmer virtually every year.

The consequences of modern agribusiness for the very land, water, and genetic resources on which farming is based, and on the mass of Indian peasantry, are frightening indeed. Which is why examples like Vijayaji's's are important to highlight. He and hundreds of other farmers and groups in India are switching to low-input, organic farming, and showing that the goal of self-sufficiency is not dead and buried. As for productivity, several farmers have shown that they can produce surpluses with indigenous seeds and organic inputs, and with none of the negative side-effects of the Green Revolution.

Vijayji has not stopped at just trying a diversity of varieties in his own field. For the last few years, he has been going around the Tehri Garhwal region, collecting indigenous crop varieties, and documenting their characteristics as told to him by local farmers. He showed me over a hundred herbarium sheets he has prepared, of rice and other varieties, stalks and grain heads carefully pressed, characteristics neatly written down. Thapachini (tall, high-yielding, non-lodging), Nagni basmati (red and white grains, nice aroma), Gorakhpuri (fast-growing), Chowari (red grains, high-altitude tolerant, starchy), Bangooi (black-stemmed, used every three years so that weeds stand out in contrast and can be removed), Noori (early maturing)....

Once he has tested out a variety and found it having certain desired characteristics, Vijayaji encourages

other farmers in his village to try it out. Initially he met with resistance, since many of the farmers were using HYVs and were not confident that traditional varieties would earn them a similar livelihood. However, some farmers who had begun to feel the pinch of the Green Revolution treadmill, or who were conscious of the health and ecological implications of using chemicals, did take his advice. I met two who had switched to organic farming, and were using some of the varieties introduced to them by Vijayji. They assured me that their economic situation had greatly improved, since they now had to depend much less on expensive chemical inputs and HYV seeds.

They also pointed out that a great deal of wildlife had come back to their fields: spiders, frogs: butterflies, earthworms. The farmers were acutely conscious of the fact that some of these animals helped to control pest populations, or helped to keep up soil productivity, or in other ways contributed to the ecological balances which agriculture is dependent on. But equally, they were glad to let wildlife have its own place, just as they had been happy about the reappearance of birds and mammals in the forest they had helped to regenerate.

Credit for both the forest regeneration and the revival of crop diversity in Jardhar must go not only to its inhabitants, but also to a couple of movements they are linked with. Chipko inspired the former; indeed, Vijayaji is an active core member of this movement. But his agriculture-related work is partly a result of his involvement with Navdanya, a network of farmers, scientists, and environmentalists working to conserve biodiversity in parts of Garhwal, the Western Ghats, and the Deccan plateau. What this means is that Jardhar's efforts are not isolated, and are able to gain from and contribute to the experiences of other individuals and communities in the country.

Indeed, several other such organisations, movements and networks are trying to halt the destruction of India's biological diversity and the consequent loss of the lives and livelihoods of millions of people. The conventional wildlife conservation groups, including well-known ones such as the World Wide Fund for Nature and Bombay Natural History Society, are important components of these. But perhaps far more significant are the community-based movements and efforts. The National Fisherworkers Federation, for instance, recently spearheaded a nation-wide strike against moves by the Indian Government to introduce trawling into marine areas in a big way. Trawling in the past has caused immense destruction of marine ecosystems, and has also led to the loss of livelihoods amongst small traditional fisherfolk. The NFF's efforts are therefore not just aimed at securing poor peoples' livelihoods, but also at safeguarding the very marine resources on which these livelihoods are dependent.

Similarly, the Narmada Bachao Andolan and a large range of other movements which are fighting against the destruction of natural habitats and the displacement of traditional communities, are also a part of the effort. In agriculture, the Association for the Propagation of Indigenous Genetic Resources (APIGR) has been highlighting the values of tradtional crop and livestock diversity through a series of national dialogues. The Foundation for the Revitalisation of Local Health Traditions (FRLHT) is undertaking a major programme aimed at conserving medicinal plants and documenting the traditional uses of those of these plants. The Academy of Development Studies in Karjat, Maharashtra, is working with farmers to create community level seed banks, and urban consumers are setting up direct links, by which the latter get safe organic produce, and the former have the incentive to continue organic farming. Both the market and the government are bypassed in this kind of relationship.

What binds all these and other efforts is the recognition that environmental issues are not peripheral, as our planners and politicians would have use believe. Rather, such issues go to the heart of the moral, social, and political foundations of society. They accurately reflect our relationship with nature, our relationship with each other, out relative control over livelihood resources and our role in decision-making. Most importantly, these efforts offer alternative visions and paths of development, alternatives which are not imaginary but real and concrete, and which help dispel the gloom which otherwise pervades the world of environmentalists and social activists.

Courtesy "THE HINDU"

SHRIMP FARMING AND MARINE ECOLOGY

K.SRINIVAS REDDY
Academy of Gandhian Studies

The Marine Industry of India till recently completely depended on domestic market. It was only in nineteen sixties opened doors for foreign market. In fact there were days when marine products were used as ,manure in agriculture. But in last three decades there were total technological revolution in marine Industry. The storage, trasportation adequately geared to meet the expanding horizons of international trade. Fish catching continues to be mainly in the hands of traditional fishermen, who have now modern trawlers equipped with better techniques for fish catching. But recent trend of aquaculture, processing and transportation opened windows for international trade, which inturn invited other communites to this industry.

India is one of the leading countries in prawn production and also gained high position in export market of prawn in recent years. India is having 1,711 million hectares potential area of brackish water for shrimp production. Most of the Indian coastal belt is conducive for shrimp cultivation due to:

1) Availability of mud flats, swamps, marshes, mangroves.

2) Natural availability of seed.

3) Suitable brackish water quality for shrimp farming.

Prawn accounts the 70% of total marine export earnings of India. India has remained the leading shrimp producing and exporting country in the world till recently. But due to adoption of culture technology by few South- East Asian Countries and quantum of shrimp catches from Indian water is coming down despite intesification of mechanised fishing methods. In this background government is encouraging shrimp cultivation to earn the foreign exchange without taking into account of marine ecological degradation.

In the process of encouraging the shrimp cultivation government leased out brackish water bodies to industrial groups and to other non-fishing community. Large Scale conversion of agricultural fields into shrimp farms took place due to high profitability. There are mainly two catagories of shrimp farming - tide fed and intensive.

The seed in the farm of tiny larve, post larve and early juvenlies of prawn prefer low saline and mangrove areas. During high tide, water enter with seed in to the low lying areas. During low tide, water recedes back but seed remain in this area. Post larve swim in the surface water and cling to leaves and bushes of ,mangroves. Availability of natural food and other suitable environment keep the post-larve in healthy conditions. After receding of tide water, fishermen make bunds or put small holed nets and confine these tiny juvenlian to particular place and grow them, naturally is called tide fed farming.

Intensive shrimp culture was undertaken by many with greater enthusiasm for earning money by destroying the mangroves and converting agricultural fields. Those who enter into intensive shrimp culture are mostly from non-fishermen community. Their main aim is to get maximum benefits in short term itself. The feeding of shrimp is intensive for faster growth. In this process there will be lot of solid waste accumulating in shrimp farms. In order to maintain desirable salinity of water and also to bring down organic load nutrient of feed waste, water exchange is done effectively. The water effluents will be discharged into sea. The damage that could occur out of effluent disposal to the coastal ecosystem was not taken care. For the production of 1 Kg shrimp 100 to 200 cubic metres of sea water is utilised in terms of exchange. In most of the intensive shrimp farmings, one farm discharge be-

came another farm drawing source. There is ample chance of this polluted drain spreading diseases to adjacent farms.

There are three basic methods of treatment of effluents accumulated as the waste in the ponds. They are physical, chemical and biological means. Among three methods biological method is most viable. Some varieties of spiecies were already tested in Thailand, Hawai for both passing efficient filtering and feeding capab ilities by using biological method, the shrimp farm waste can be transfarmed into wealth by bringing the twin benefits of both treatment and additional food production, thereby opening avenue for sizable saving and additional income respectively.

The practice of releasing the effluents directly into the adjacent coastal zone ecosystem should be sereiously discouraged and totallly stopped. Even on the part of shrimp farmers it is better to be sensitive regarding the cleanliness of the adjacent sea and in the disposal of shrimp farm waste. They must know that ground reality that the untreated effluent water disposed will bring back very first blow to their investment and ruin their long term flourishing. in the light of experience of Thailand and Taiwan where the money spinning enterprise collapsed within a span of 10 years due to unregulated intensive farming. There is a lot of deliberations in the country that, shrimp farming should properly be regulated so as to avoid the repetetion in India. Government should enact necessary regulations to avoid impact of aqaculture effluents on sea. At the same time incentives may be given to th shrimp farmers, practing effluent treatment before discharging into sea. This would help to maintain a clean environment and also support sustainable aquaculture production. In Indian situation, it is just the begining and not late at all. Suitable precautions should be taken to use sea water carefully without subjecting to degradation of marine ecosystem.

In last three to four years many high fertile agricultural lands were converted into shrimp farms. In Andhra Pradesh alone 1.25.000 acres of agricultural land was converted into fish/prawn farms. In some cases farmers were compelled to convert their lands due to saline water entering into their fields from neighbouring shrimp farms. What is most dangerous activity is, removing of mud flats to facilitate sea water to enter low lying inland areas for shrimp farming. Prawn cultivation is encroaching whole coastline, particularly Southern States. Shrimp farms were established up to houses of fishing villages. Now they are facing problem of space even for nature calls. Floors of village houses became damp. Within a short period of one year after establishment of shrimp farms the drinking water sources in these villages turned saline. The villages adjoiningshrimp farms became unfit for human living.

The rush by a number of croporate gaints to mint money through shrimp exports has resulted in haphazard development of aquaculture during past few years. This resulted in large scale conversion of agriculture and barren lands to shrimp farms. Land became scarce commodity and prices of lands increase manyfold. This led to encroachments of government land and brackish water bodies. There is also resentment among the fishermen complaining that these large aquafarms are encroaching coastal mangroves . As there is shortage of seed, aquafarms are collecting seed from mangroves. This is causing heart burn among the fishermen community which feels that it is deprived of their livelhood. Moreever, the traditional pathways connected to their hamlets with the sea have disappeared with the establishment of large aquafarms across the coastline. This compelled the fishermen to take circled routes to enter into the sea. They also said that, aquafarms are not employing local fishermen in their works.

There is immediate need of controlling shrimp farm menace to preserve marine eco-system. Steps should be taken to ban cutting of mangroves, conversion of agricultural lands and deliberate intrusion of seawater. Only scientific farming, judicious use of resources and stringent government checks are sought to sustain shrimp farming and marine eco-system.

TEACHING ENVIRONMENT

Maneka Gandhi.

Innovative methods are the key to inculcating awareness

Over the years I have found that schools celebrate environment week, as if it were some charming oddity like the Republic Day. It is treated in the same fiesta fashion- poster exhibitions and painted models of the earth, songs lamenting the razing of trees, plays on the plight of the tribals or the whale, oratory on the green house effect...in short, utter nonsense that soothes the conscience and gives a good time to everybody.

In Delhi University a voluntary cell of teachers has begun to teach "environment" to a group from different colleges. These are only discourses on the ozone layer, CFCs, the status of sanctuaries, and the greenhouse effect. The JNU has started the school of Environmental Sciences, which hands out degrees for more or less the same sort of courses. This large macroisation makes students lose interest and, what is worse, it doesnt even begin to get to grips with the problem.

No course in India defines the academic subject "environment". It is seen as a vague intermingling of biology and geography whose solutions lie in planting trees and not causing pollution. Teachers look for their text material from the pollution control boards and give their students endless projects on "Discuss the vehicular pollution of the city or "Discuss air/water pollution" or "How do you get rid of noise pollution", driving environment into the negative "repair the world" philosphy which believes that everything has a fix-it solution.

What are the 'practicals' of these subjects as designed currently? Pious speeches at assembly about the dying tigers, events for Earth Day, visits to sanctuaries, treks to the Himalayas, camps at scenic river banks, places where the child learns a few common bird names sees a wild animal. And having disturbed all the birds and animals and trampled the plants and insects, comes back and writes copious essays on the dying something or another.

Environment is not a subject to be taught through singing or dancing. It is a serious science: the science of interrelated and inter locking crises, the cause of what we do and its effect. The student should understand, for instance, that the soap that he uses causes the deterioration of a river a hundred kilometers away. Or that the light bulb he leaves on causes lung desease because 400 kilos of coal are burnt at the power plant and fly ash fills the air that he brethes. He should understand that farmers who change from growing wheat to growing tomatoes are laying the seeds for a major food crisis; that the large fishing trawler in Kerala is going to destroy the Indian Ocean. Unless he understands the house- of- cards effect on all economic decisions on climate and land use, he cannot understand the life science that is environment. The student cannot expect the world to survive while he sings and dances about things he does not understand.

The student has to look at the creation of world crises and examine their roots. For example, it would do good to understand what ravaged Ethiopia. Certainly not lethragy or over population, but a series of very expensive dams built in the 1960s across the Awash river which cuts through Ehtiopia' famous Rift Valley. The object was to generate power for Addis Ababa and irrigate plantations for cashcrops. Rich forests, pasture lands and farms were submerged, communities broke up and began to drift towards urban areas for meagre sustenance.

Disaters piled up and scientific solutions were found. The river could not deposit fertile silt on the farms along its flood plains, to the country began to import massive quantities of chemical fertilisers and pesticides. This enriched multinationals, but destroyed the soil and poisoned its ground water. The country fell further into debt and had to put still more land into growing cash crops to pay off the debt. Then flood irrigation led to waterlogging and salinity which, together with deforestation, devastated the food crops. Sugarcane and cotton, grown for those nations which lent them the money to destroy the land and water to begin with, led to still more

starvation.

Who will teach the student this history? Who will teach him that most wars, most crises, have an ecological root, that history is filled with environmentatl crises that have led to political changes?

To teach a subject requires a language. And that language has to emerge from a sustainable philosophy and morality. Ethics is not engineering. It does not ask "how to" but "why". While developing ethics we do not search for tools to fix anything. We search for foundations which alone can justify our being and continuing on this planet. Ethics creates foundation values as the raison d'etre for the whole system, its specific subvalues, and its specific modes of action. If our deepest ethic is the conviction that life is sacred, all conservation and development strategies flow out of hat. Out of this comes action. We have to understand why we do something - and the "how" falls into place. How should we live? The simplest question is also the most profound. What are the aims of development? The ultimate end of all development is not merely life but quality living for all creatures, a life with meaning, dignity and fulfilment.

Unless we respect this, we need not bother about development. Our idea and ethic of progress has been Descartes' belief that humans should be the masters of the natural world, whose aspects need to be evaluated in terms of their use. Ours is a society where in a trade off between economics and ethics, the latter is usually dispensable.

What is the result of our way of development? Serious structural problems: a decline in real production, inflation, high unemployment, huge international indebtedness, poor balance of payments, a new dependence on foreign investment and technology, and a notoriously, inefficient bureaucracy that employs a third of our workforce. Even a change to a free market economy will not produce any change in these factors.

In both the centralised and free market state, there is no basic needs perspective or target. In fact the lowest strat is often sacrificed for an imaginary trickle-down payoff that is supposed to occur sometime in the future - the persons disposessed of their land in 1950 are still waiting for compensation in 1994.

Two years ago the Supreme Court ordered environmental education to be made compulsory in schools and colleges. No move has been made. Everyone agrees - but who will do it? The book cannot be left to academicians or to professional textbook makers that get most of their facts wrong. It must not be given to the Environment Ministry or the Pollution Control Board otherwise what will emerge is merely propaganda. It cannot even be left to professional environmentalists as these have different concerns and are single-minded about them. Some emphasise tree planting as a cure for carbon dioxide build-up, others emphasise recycling. There are more who want industries to clean up their acts, while a minotory suggests the limiting the industries.

I would suggest Prof. G.Ram Reddy, currently Head of the University Grants Commission, constitute a body of six people which understands aspects that affect environment such as architecture, economoics, philosophy, law and consumer protection. This commitee can advertise in the papers all over India and even write letters to eminent people of different disciplines asking them to send contribution to these textbooks on anything that they would like to see taught to students.

The expertise of environmental groups abroad, the knowledge in textbooks, the knowledge in textbooks of foreign universities, could be brought in., At the end of the year allotted, the committee could sit and evaluate the papers and textbooks of each class from nursery to Std. XII and then the three years of Std. XII and then the three years of BA and then MA. An education package designed carefully can then be introduced. it will have to be a multimedia package - like all sciences - with computers programmes and practical equipment.

We have already wasted two years. If UGC won't take it up, may be five individuals could sit together as a private NGO and go through this exercise. When the sample books are ready, they could show them to NCERT. I would like to see them as well.

Courtesy 'WWF'

GOODBYE FORESTS, HELLO DESERTS

Subhadra Sen Gupta

For city dwellers, a forest is something we see from a train window, or read about in books. So cutting down a forest may seem a remote problem. How can it affect me if trees are cut in the Garhwal hills, you may wonder? Or, what difference does it make if some Amazon rain forests are cleared? But it does. The destruction of the world's forests affects all our lives. Every time a tree is cut, we all pay the price.

GIFTS FROM THE FORESTS

We know about some of the things we get from forests. The wood for furniture and fuel, fruits, honey and nuts. However there are many hidden ways in which forests benefit and enrich our lives. When a forest is lost we lose much more than just the trees.

Let's take the Himalayan forests, for example. During the rains, water is trapped in the soil through the tree roots. This sustains the land during the dry seasons. However, as trees are felled, the rainwater pours straight on to the soil instead of percolating slowly through the canopy of trees. The soil is washed away. The muddy deluge floods the rivers.

The hillside loses its precious topsoil. Downhill, swollen rivers flood the plains damaging crops, and wiping out villages. Mountains without forest cover often face landslides and mudslips that kill people.

High levels of silt in the rivers blocks dams and canals. And by the time rivers join the seas, ports like Calcutta are often forced to dredge the water to clear the passage of ships.

The absence of forests is felt more during the dry months. The water table is lower, and drought follows.

Surprisingly, sometimes people living thousands of miles away pay for a lost forest. Bangladesh faces worsening floods each year because of the deforestation in the Nepal hills.

Forests also regulate rainfall. Nearly half of south west China's forest is gone. This is primarily responsible for the 15 per cent drop in rainfall.

Trees also help clear polluted air. They absorb harmful greenhouse gases like carbon dioxide, which would otherwise raise the earth's temperature, a phenomenon called global warming.

Forests also shelter diverse life forms - plants, animals, birds and micro - organisms - which die when their home is destroyed. Of the 250,000 know plant species, 155,000 are found in tropical forests. One-fifth of all bird species are found in the Amazon and 90 per cent of primates live in the forests of Africa, Asia and Latin America.

Also remember, there are still thousands of rare living species which may vanish even before they are discovered. These include plants that can cure diseases.

For example, if the fragrant meadowsweet and willow bark had not been discovered, we would not have aspirin. If Christopher Columbus had not seen the weeping tree in the Amazon, we would not have the use of rubber.

There is a long list of food items we originally got from forests - from pineapples, bananas, coffee and cocoa to spices like cinnamon, cardamom and pepper.

Finally forests are home to tribal people who know how to sustain the forest while still using its riches. If they lose their homes, we lose their traditional wisdom.

WHY ARE FORESTS LOST?

Across the globe upto 20.4 million hectares of forests are vanishing every year. That is land about the size of Uttar Pradesh. They are vanishing in the Amazon, in Malaysia and India. But why?

One reason is human greed. Wood is needed for building, furniture, fuel, paper and industries. Demand is increasing by leaps and bounds. There are controlled ways of cutting trees, which can be replaced by planting saplings. But who bothers?

Then with rising population each generation has less land to survive on. So the farmer looks to the forest. That does not help. The soil of tropical forests is not suitable for intensive agriculture.

After a few crops it loses its nutrients. So the farmer moves on, cutting deeper into the forest. A rich and verdant land becomes a desert. The Roman Empire's biggest supplier of grain was North Africa. Today it is an endless desert.

The need for firewood is also destroying forests. In India people living around national parks and sanctuaries are forced to cut trees in the forests for their needs.

In Latin America large tracts of forests are cleared to make grazing land for cattle ranches. Ranching is profitable, and is often encouraged by governments.

Land used for ranching is often permanently damaged.

In Thailand forests have vanished so that farmers can grow cassava. It is turned into tapioca for export to the Netherlands, where it is fed to pigs. Malaysian tropical forests are being put to axe to supply the Japanese with fashionable furniture.

The developed nations have little forests left. They realise they need the tropical forests, but are unwilling to change their consumer lifestyles. The United States is one of the biggest polluters of the atmosphere and needs the Amazon forests to keep itself from choking.

If the tropical forests are to be saved, the rich nations have to dig into their pockets too. One way is to cancel the debts of developing nations, another is to fund forest conservation. Most poor countries cannot save their forests without help.

A PEOPLE'S ACTION PLAN

In a Japanese school the children collect and sell old newspapers and aluminium cans to a recycling plant and use the money to buy forest land in South America. Remember the Chipko movement? In Garhwal, villagers led by women and children, clung to trees and did not allow loggers to cut them.

In India, the Bishnoi tribe has shown how trees can benefit a lot of people. In the middle of the Rajasthan desert their villages are like green, welcoming oases. The Bishnois neither cut trees nor kill animals. The forests around their villages retain sparse rainfall.

We can also encourage the use of sustainable wood in furniture. For instance, rubber trees could be used instead of tropical hardwood.

Village communities can also be taught how to sustain forests. In Kenya, a woman activist Wangari Maathai offers saplings free to farmers, and has helped to plant over 10 million trees. Environmental experts say using solar power and gas from animal waste can reduce the need for firewood.

We can all do our bit to keep our earth green. Let's start today by planting and caring for a tree.

RECOGNISING THE REMOVERS

AMMU JOSEPH

Every other day, newspapers in Bangalore publish complaints from readers about the accumulation of unsightly and smelly garbage in different localities, thanks to irregular garbage collection by the Corporation. Local dailies also periodically publish photographs of overflowing or non-existent roadside dustbins to bring home the fact that garbage disposal in the city is in such a sorry state that the "Garden City" may soon earn the sobriquet "Garbage City."

With a population of just over four million (according to the 1991 Census), Bangalore currently covers approximately 182 sq. km. Its expanding citizenry generates an estimated 2,000 metric tonnes of garbage every day, which works out to approximately 0.4 to 0.5 kg per capital.

Like in every other big city in India, two parallel systems of solid waste management (SWM) exist in Bangalore: the "formal" system of waste disposal, operated by the local government or municipality, and the "informal" system of waste recycling - mainly of non-biodegradable products _ on which the livelihood of thousands of citizens depends. In the former, waste is viewed as a health and environmental hazard, the removal of which involves huge expenditure, while in the latter it is seen as an economic resource.

The formal system

Solid waste management in the city is officially the responsibility of two departments of the Bangalore City corporation (BCC): while the health Department is supposed to look after the cleaning, collection and transportation of garbage, the Engineering Department is in charge of the purchase and maintenance of vehicles.

The Health Department, which claims that all the city's garbage is regularly "lifted," admits that official efforts are complemented by those of the "rag pickers" who scour the bins for recyclable material, as well as by other bulk consumers of organic waste, such as farmers, who directly lift garbage from bulk producers like hotels and choultries. In addition, contracts for garbage disposal are given out to private parties in many areas of the city.

The bulk of the 1,700 metric tonnes of garbage claimed to be collected every day - by the Corporation or by private contractors - is simply dumped on the outskirts of the city, where it gives rise to a host of problems: the contamination of water, soil and air, the proliferation of pests such as rodents, cockroaches and flies, and the consequent emergence of various forms of ill health among the city's population, particularly those living in the vicinity of the dumps.

The problem of disposal is compounded by inadequate dumping sites, many of which no longer exist because they have been converted into residential layouts! According to the Corporation Commissioner, the BCC is awaiting a Government Order that will enable it to take charge of the six dumping grounds in different parts of the city. Meanwhile, any open space is fair game, including some of the natural tanks which once supplied the city with water and which, saved from encroachments and properly maintained, could still help harvest rain water, regenerate ground water and thereby ward off chronic water scarcity. The formal system of SWM is, clearly, buckling under tremendous, steadily rising pressure.

The informal system

Meanwhile, relying on the traditional, ecologically wise, now endangered tendency of Indian households to recycle whatever they can - especially paper, glass and plastic items - the informal system of waste recycling provides employment and livelihood to a wide range of people, from the poorest of the poor in urban areas - represented by the "rag pickers," many of them street children - through petty traders to the entrepreneurs and workers involved in manufacturing new products from recycled material.

According to an assessment by the UNCHS-Habitat, the potential for employment generation by the

recycling sector could be as high as three per cent of the urban work force. By helping to conserve natural resources, reducing the need for certain kinds of imports, generating employment and producing goods, the informal system of waste recycling constitutes a highly productive sector of the Indian economy, but it is rarely acknowledged as such.

Different sources put the waste collected by the informal system at 300 tonnes or 40 to 50 per cent of the total solid waste generated in the city, which would otherwise have to be cleared by the formal system.

Although it is difficult to arrive at a precise and credible figure, it is clear that the informal system takes the pressure off the formal one to a considerable extent, in addition to furthering the twin environmental management principles of preservation and conservation. However, it remains by and large unrecognised. Worse, the people who work in this parallel system of waste management are not only poorly compensated for their contribution to urban life but are, in fact, socially shunned and forced to live on the margins of urban society. There is, clearly, an urgent need to acknowledge the value of this system and its workers, learn from them and integrate them into the total scheme of solid waste management so that both they and the other residents of the city can benefit.

Search for solutions

Consciousness about the need to do something about garbage is, fortunately, growing in Bangalore - among both citizens and corporators. The BCC is also increasingly cooperating with non-governmental organisations ((NGOs) to deal with the mounting problem of garbage disposal.

According to Mr. Pradeep Kumar Reddy, Chairperson of the BCCs Health Committee. "basically, it is the responsibility of every citizen to keep the city and his environment clean. The BCC also has responsibility in this direction but it will be possible to revive the name 'Garden city' only if the citizens and voluntary organisations actively participate in taking care of the garbage."

Mr. Reddy himself has recently initiated a "do-it yourself" campaign to motivate the people of Bangalore to keep their city clean. Under his leadership, a group has launched a new voluntary venture to help clear garbage in the city's Frazer Town division, which he represents. Encouraged by EXNORA International (Excellent, Novel and Radical), an NGO, citizens living in the area have formed street-wise residents' associations.

But the most significant and holistic initiative in garbage collection, disposal and recycling in Bangalore so far is Waste Wise, a project of the Mythri Sarva Seva Samithi (MSSS), an NGO which works among street children as well as women and children who live in slums.

Waste wise

This experiment in "socially and environmentally sound solid waste management" is based on the understanding that one person's waste is another person's livelihood and, further, that the nuisance potential of waste is due mainly to the mindless mixing of all waste where it is generated. It puts forward a new paradigm for SWM that involves source separation, recovery of waste, legitimisation of the informal system and public participation. The approach it has pioneered could well hold the key to effective and appropriate SWM in the future.

Waste Wise is based on the philosophy that waste materials and human beings, given wise thought and direction, could turn into useful products and productive human beings. While many other initiatives in SWM do incorporate rag pickers, what is unique about Waste Wise is that this community of workers, which includes a large number of child labourers, is virtually its raison d'etre.

This people-centred project set out to examine how an alternative system of SWM could be used to provide greater and more secure employment opportunities for rag-pickers, ameliorate their appalling conditions of work and counter their negative image in their own eyes as well as in that of the public eye. It aims to minimise the exploitation, competition and conflict involved in scrap dealing by providing rag-pickers with greater access to waste, giving them more legitimacy and recognition, and ensuring more substantial economic returns.

Through the promotion of their entrepreneurial

skills and their enhanced participation on recycling processes and technologies, it is hoped that they will gain greater social mobility and be able to articulate their perspectives on issues related to urban life, particularly SWM.

The social goals integral to the project are woven into its economic goal (cost reduction through waste reduction, source segregation and localised recycling) and its environmental goals: avoiding litter, changing public attitudes towards perceptions of waste, producing organic manure, greening the city and promoting a clean, healthy and sustainable environment for all. This alternative SWM strategy was first discussed with all the major players in the waste disposal game: the Karnataka Government's Housing and Urban Development Department, the BCC, waste-pickers and citizens.

The pilot project - based on a multi-pronged study reported in the unpublished paper, Waste People want, by Ms. Asha De Souza - was initiated in August 1990 in a section of Jayanagar, one of Bangalore's largest suburbs. The selected area had approximately 500 households belonging to both upper and lower middle class families, in addition to a few shops, offices, restaurants, motor workshops and a nursing home.

The area was selected partly because MSS already had its street base there and also because, according to a 1989 study by TECSOK/STEM, Jayanagar generates about double Bangalore's average per capita quantity of garbage. In addition, residents of the area were concerned about the situation of uncontrolled waste disposal and were willing to take the trouble to segregate their garbage.

The BCC allotted a portion of a public park as the experimental site for composting. Three waste-pickers, one supervisor and one coordinator were originally inducted into the project for waste collection, disposal and recycling. The residents were supplied with separate bins for wet, dry and insanitary waste, and the waste-pickers were given equipment and trolleys to handle and transport the garbage.

While the inorganic waste was sold to scrap retailers by the rag pickers, as usual, and the insanitary waste was burnt, the organic material was turned into compost which could be sold back to the residents for use in their kitchen gardens.

Traditional habits and prejudices, poor intra-family communication regarding the project and the customary shunting of all civic responsibility on to the Government were among the teething troubles encountered by the programme on account of citizens. On the positive side, there has apparently been a noticeable and welcome change in the attitude of participating residents towards rag pickers. In addition, source segregation and door-to-door collection have become so much a part of the household routine that the 'boys' are actually missed when they don't turn up.

While the waste-pickers have gained from the recognition and legitimisation of their role in SWM in terms of self and public image, and also enjoy the regularised income, they continue to experience the vulnerability and insecurity that arise from their being street children, including harassment by the police (who have, unfortunately, not been conscientised about the problems of these children or educated about the programme).

Worthy initiatives

Despite such initial obstacles and problems, the Waste Wise programme now covers 400 households in the pilot project area. In addition, similar initiatives are on in two other areas of the city: Sadashivnagar and BTM Layout. In the former, the local Residents' Welfare Association contacted MSSS for guidance and assistance in launching a similar programme. MSSS has helped in contacting, orienting and training the waste-pickers, as well as in educating the citizens of the area about the aims of the programme and their role in it. This is,. in fact, what the organisation would prefer to do in future schemes: focus primarily on organising, training and generally helping the waste-pickers, which takes considerable time and effort.

Since the Sadashivanagar Association is fairly strong and the BCC authorities in the area are quite cooperative, the programme, which currently covers about 200 households, is proceeding well. The Jayanagar experience has helped streamline segregation at source; all that remains is for the Corporation

to allot space for the treatment of organic waste (right now, it is still being deposited in the bins).

In BTM Layout, another NGO, Suchi (Cleanliness, requested MSSS to help them start a similar programme, using women living in a nearby slum who servental already work as domestic help in many of the houses in the area. The programme in this locality now covers approximately 100 households.

Mr. Anselm Rosario, Executive Director of MSSS, says he wouldn't claim 100 per cent success of the programmes, which he believes are still more or less at the pilot stage; he prefers to peg the success rate at 60 to 70 per cent. According to him, there can be total segregation at source only if and when the public is made aware of the problem and its possible solution through a large-scale media campaign. At present, the Corporation does not spend any money, time or energy on educating people about the hazards and potential value of garbage.

Mr. Rosario says there is an urgent need for a common platform at the city level for the exchange of information, ideas and experiences with SWM between government departments, NGOs and resident's groups. With the impending restructuring of the local government through the Karnataka Nagarpalika Act (based on the 74th Constitutional Amendment), citizens can and should participate in creating localised, cooperative and sustainable SWM services appropriate to their needs, he says. A common platform would provide information about how they can organise these, who is available to help them start off, and so on.

The BCC is currently willing to even fund NGOs involved in SWM as long as they more or less replicate the Government model, says MR. Rosario, who believes they should instead be allowed to innovate. Another problem with dealing with the Corporation is that while the higher echelons may be in favour of promoting alternative strategies to cope with the problem, that is not always the case further down in the structure.

According to Mr. Rosario, unless structural changes take place and clear policies and programmes are evolved, cooperation between NGOs and the BCC will continue to be difficult. However, he adds, there is an emerging openness among decision-makers in the Government which must be nurtured and built upon to provide an impetus at the policy level.

He admits that the Waste Wise model is feasible mainly in affluent residential areas, where population density is low. But then, he says, if such areas can take care of their garbage through such a programme - which, in his opinion, can be financially self-sustaining in addition to being socially and environmentally sound - more public funds would be available to ally sound - more public funds would be available to keep slums and other areas with high population density clean.

Mr.. Rosario says that, at an ideological level, he would prefer children not to be working, especially at this task, but, at a practical level, since they are working and need to work, he believes their work should be recognised and their working conditions as well as earnings improved.

"If people become more responsible about the amount of garbage they produce and about segregating it, perhaps we can avoid creating new generations of rag-pickers. If the children could be freed from such activity, NGOs could focus more on education and other alternatives," he says. "But, within the existing situation, we need to ensure that waste-pickers are accepted as a legitimate part of the SWM system, that they are made aware of more hygienic methods of waste-handling, and that they are provided with simple technologies which they can use to improve their working conditions and earning capacity."

As an organisation, MSSS wishes to focus primarily on the social implications of garbage generation and disposal, and the issue of social responsibility among citizens, especially towards the less privileged sections of society. Alternative SWM strategies cannot, at present, replace the formal system; at best they can be parallel and complementary systems which can take some pressure off the formal system and, at the same time, legitimise and improve the working and economic conditions of those who work in the informal system.

Courtesy "THE HINDU"

CAUSES OF ENVIRONMENTAL POLLUTION IN RURAL AREAS

There are many causes of environmental pollution in rural areas, which can be grouped under the following categories;

1. Mismanagement of natural resources;
2. Poor hygiene and sanitation;
3. Use of agro-chemicals and fossil fuel;
4. Impact of industries.

Mismanagement of Natural Resources

Our natural resources such as land, forests, water and livestock are the basic inputs for generating livelihood in rural areas. These resources should be used judiciously and carefully, the ensure its sustainability. However, with the increasing population pressure, people started over-exploiting these resources, to meet their increasing demands. Thus productivity of these resources is being eroded, while causing ecological imbalance, and environmental pollution.

Mismanagement of Lands: Land is the basic support for our food production and survival. As the land area remains more or less constant, the per-capita land holding is being reduced with the increase in population. Thus the production per unit of land will have to be increased continuously to cope with the needs of a growing population. While aiming to increase food production, several new practices have been introduced during recent years.

These include intensive tillage operations, monoculture, multiple cropping, high yielding varieties, higher doses of fertilizers, plant protection chemicals and growth regulators, irrigation systems and mechanised farming. These activities no doubt have helped to increase food production, particularly under good management. However, in some areas, where the management was poor and technology was not appropriate, crop production has suffered and sustainability of the land has been affected adversely.

The traditional practice of agriculture in hilly areas has been the shifting cultivation, where farmers cleared a piece of land in the forest and cultivated for 2-3 years. Thereafter, the crop yield decreased and the farmers shifted to a new area leaving the old area fallow. Under such a system, the plot cleared for agriculture was surrounded by bushes and forests and hence the soil and water conservation could be managed easily. However, with the increasing pressure on agricultural lands, these hilly lands are now occupied by the landless and small farmers. In the absence of surplus land, farmers have been cultivating their land regularly without keeping it fallow for a few years. This practice has resulted in depletion of soil fertility and reduction in crop yields. In such a situation, farmers have been introducing various practices such as leveling of the land, intensive tillage operations, irrigation, application of agro-chemicals, etc., to increase the yields although such practices have often failed to fulfill their expectations.

A large number of farmers still plough their land along the slope, just to save some time, ignoring the damage caused by soil erosion and rain-water loss. Poor tillage practices aggravate soil erosion.

The extent of soil erosion is high from denuded forests and undulating wastelands. As these lands are generally located on higher elevations, the soil eroded from these areas moves to lowr levels and is deposited on good agricultural fields, river basins and tank beds, Such silted rivers cause flood and change the course of the water flow, disturbing the people living on the river banks. As flood disrupt our normal life and the environment, poor land management should also be treated as a cause of environmental pollution.

Barren wasteland and denuded forests which are devoid of vegetation, when exposed to sun, get heated and raise the atmospheric temperature of the surroundings, affecting the productivity of adjoining agricultural fields. Wind blows away dust particles in the air and pollutes the atmosphere.

Thus the environmental pollution caused by mismanagement of land should be prevented by proper tillage practices, soil conservation, contour bunding, run-off water harvest, agroforestry and protection of soil through green cover.

Conservation of Forests: As against the stipulated forest cover of 33.0 per cent, required to maintain ecological balance, we are left with 11.5 per cent of the total land area under tree cover. An additional 10.0 per cent of the land measuring about 35 - 40 million hectares belonging to the forest departments is either denuded or with less than 40 per cent canopy cover. The damage to these fragile natural forests

continues unchecked due to indiscriminate felling of trees and uncontrolled grazing. It has been reported that about 1.5 million natural forests are lost every year. In reality, the extent of damage is more severe than what is being reported, because according to the National Commission on Agriculture (1976), only about 17 - 20 per cent of the fuel-wood collected from forests is being officially reported in India. Such extensive deforestation can accelerate soil erosion, floods and land slides in hilly areas, which in turn may affect crop production, both in hilly and plain regions. Denuded wastelands increase the atmospheric temperature, lose their water holding capacity and often cause changes in the climate. Such rise in temperature, reduction in humidity and increased level of dust particles in the atmosphere may disturb our environment and affect our lives. Thus deforestation is a major cause of environmental pollution in India.

Water Resource Management: Water is the life line for both livestock and human beings. It is not adequate to have an assured supply of water but it is also necessary to ensure its cleanliness for drinking. Water pollution in general is referred to its contamination with minerals, germs and other substances, which affect the safety and taste. Poor management of water resources, surface run-off in particular will also cause water pollution to some extent. Such mismanagement of rain-water can change the taste and chemical composition while polluting the environment. Run-off water carries dust and soil particles and hence changes its colour. This water cannot be used directly for drinking till the silt settles down. Such run-of-water also comes in contact with sewage, night-soil and other wastes spread over the ground and hence is prone to contamination with germs and different organic chemicals. In the absence of proper run-off water harvest, ground water reserve will be depleted and the atmosphere will turn dry. Such land may not support plant growth. The atmospheric humidity may fall and the temperature may rise, making our lives uncomfortable. This climatic change is also a kind of environmental pollution.

Water pollution of a more serious kind takes place in rural areas by contamination with drainage, sewage, agro-chemicals and misuse. In areas, where people draw water from open wells or shallow borewells, the water often gets contaminated with sewage, night-soil and agrochemicals, which are applied in adjacent fields. Such contaminated water may spread several diseases and worm infestation or acquire a bad odour or taste. Such water is unfit for drinking.

There are many cases around sugar factories where effluent has contaminated the wells and made the water unfit for drinking. Water in village ponds is often polluted by washing dirty clothes, utensils and livestock.

River is another important source of water, which is used for irrigation, but percolates into wells. In this process, although most of the germs get eliminated, harmful chemicals if present due to contamination with effluent, will pollute the well water.

Mismanagement of Livestock: Live-stock is an important component of our traditional mixed farming, which consume crop residues and produce milk, meat and manure. Livestock thus forms an important component of a nutrient cycle. However, with the growing needs, farmers have increased their herd size, while the productivity has been declining due to unplanned breeding, inadequate feeding and poor health cover. Thus stallfeeding of live-stock became uneconomical and free grazing on community lands and forests was adopted.

Presently about 90 per cent of the cattle and buffaloes in India are uneconomical, because of low production, but farmers continue to expand their herd, as the feeding cost is insignificant. These animals are causing atmospheric pollution by destroying the forests. In addition, livestock emit methane gas from their body, which is one of the gases responsible for 'greenhouse effect'. Excessive use of farmyard manure can also cause pollution of ground water. However, denudation of forests and pastures are more serious problems caused by livestock in India (Hegde, 1990).

Impact of mis-management of Natural Resources on Environmental and Economy.

Although mis-management of natural resources causes environmental pollution, in developing countries like India, where 75 per cent of the population is dependent on natural resources for their livelihood, it is necessary to conserve these resources and use on a sustainable basis for our survival. This also highlights the close link between the environment and economy. Therefore, it is necessary to implement environmental protection and livelihood activities simultaneously, as an integrated programme. In the absence of gainful employment, people start exploiting the natural resources and it is difficult to motivate the poor to protect the environment.

Poor hygiene and sanitation

Lack of hygiene and sanitary conditions cause

environmental pollution, which is also the major cause of illness in rural areas. Non-availability of clean drinking water, inadequate drainage, improper discharge of night-soils, congested housing, keeping livestock and pets inside the house, smoky kitchen, etc., are the important problems of sanitation polluting the environment. These problems are related to both economy and awareness. Provision of clean drinking water and creation of toilet facilities need capital investment, while the other problems can be solved by creating awareness.

Generation of smoke in a kitchen is due to the use of non-traditional chulhas and use of inferior or wet biogas. It is better to promote biogas whenever possible, as the villagers may not be able to procure fuelwood, which is in short supply. On the contrary, biogas plants not only provide energy, but also organic manure needed to enrich the soil productivity

The economics and environmental safety of biogas plants need a detailed study to highlight its merits, because some of the environmentalists in India have been expressing concern about the adverse effects of methane gas produced in a biogas plant on the environment. It is true that methane gas contributes to global warming, but in the Indian context, the alternative fuel used for cooking, particularly fuelwood is causing serious damage to our environment not only by emitting smoke but by way of deforestation, soil erosion and degeneration of natural resources. Reduction of health hazards is another significant benefit of using biogas plants.

Pollution due to Agro-chemicals and Fossil fuel.

With the advancements in agriculture and introduction of new technology for increasing food production, the use of agro-chemicals and fossil-based energy have increased significantly. It is difficult to achieve higher crop yield to meet the growing food demands without the use of agro-chemicals, but it is necessary to use them judiciously. Application of fertilizers is inevitable for cultivation of high yielding varieties under irrigation. However, there are instances where farmers apply higher doses of fertilizers, which percolate to contaminate the ground water. This can be easily avoided through training and awareness.

Improper use of plant protection chemicals is a serious problem in rural areas. Deliberate attempts are made by farmers to spray pesticides a few days before harvesting fruits and vegetables to ensure better price, although the stipulated gap between the last spray and harvest is a minimum of 18 - 20 days. it is unfortunate that the customers are ignorant of the residual effects of pesticides and no mechanism has been set up so far in India to control this pollution. Scientists all over the world have now found bio-pesticides to replace or reduce the use of agro-chemicals. The most important bio-pesticides have been derived from neem, which is native of India, but we have been slow in adopting this practice, due to lack of awareness and inadequate regulations on the safety of agro-chemicals.

The energy consumption in rural areas has been increasing both in household and farming sectors. Use of fuel operated pumps and motor driven equipment are becoming popular. However, it is necessary to impress upon the users about the need for conserving energy not only to reduce the cost but also to protect the environment. It is economical to make optimum use of available animal power in rural areas and avoid unnecessary automation.

The automobiles in rural areas are generally maintained in poor conditions and therefore the burning efficiency of fuel is low. Such vehicles not only consume more fuel, but also emit harmful gasses to increase atmospheric pollution. This can be reduced by proper orientation to conserve fuel and training in vehicle maintenance.

Industrial Pollution

With saturation of industries in cities, a large number of factories are being set up in rural areas. These factories pollute the atmosphere and water through harmful gases, heat and effluent. Industrial pollution may affect a large area around the factory. Acid rains caused by hazardous industrial gases, which spread over an area of 50 - 100 km have been reported in the west, but in India, letting effluent into rivers and water streams is a serious problem. In such cases, the people living in cities, who receive clean filtered water, escape the hazards of water pollution, but the villagers living along the stream use this water for irrigation and drinking, and thus suffer in many ways. It is therefore necessary to educate the villagers about the need for protecting themselves from such pollution, while imposing necessary control measures on the industries.

Strategy for Environmental Protection in Rural Areas

Environmental protection in isolation may not attract rural people to take active part, because a majority of them are struggling for their livelihood. It is difficult to protect the environment through poor peo-

(Contd.. on Page. 23)

Striking the right balance between mining and undermining...

An inherent problem in mining is that a certain amount of ecological degradation is unavoidable.

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ple. In such a situation, the best method of motivation is to link environmental protection with income generation activities. Activities such as soil and water conservation, watershed development, afforestation, livestock management, recycling of wastes, promotion of biogas, etc., will not only help in generating additional employment and income, but also improve the ecosystem and protect the environment. Providing clean drinking water, better sanitary conditions and promoting family welfare activities can help in improving the quality of life and thereby indirectly reduce the population growth in rural areas. Programmes like livestock development can help into assets while conserving the vegetation. Rural health and education programmes are equally important for improving the living conditions and protecting the environment.

Conclusion

Compared to the urban areas, pollution rural areas is less serious and manageable. However, the environmental pollution in rural areas is directly linked with the livelihood of the local people. With sustainable use of natural resources, the major problems of pollution such as poor sanitary conditions, excessive use of agro-chemicals, etc., can also be reduced to a great extent by creating environmental awareness, judicious use of energy, agro-chemicals and other resources. The villagers should be educated about their rights to have a clean environment, so that they can initiate suitable action, wherever necessary to control pollution.

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IRAN'S INNOVATIVE PRACITCE

Iran has reduced its population growth rate within only five years of ending its opposition to family planning as anti-Islamic and launching a national campaign.

Population growth rates in Iran fell from 3.4% a year in 1987 to 2.7% in 1992. By 1995, Tehran has plans to raise the number of married women using modern contraception to 44%. A team of Iranian researchers led by Homa Hoodfar of Canada's Concordia University has documented the tactics adopted by President Rafsanjani's government to curb the country's population growth.

Wher the government realized that economic and urban pressures were making it difficult to provide basic amenities to the country's 50 million people, it decided that something had to be done to bring down the population growth rate. Friday sermons in the mosques played a key role in increasing public understanding of why family planning was being proposed after the pro-natalist stance the government had adopted in the first years of the Islamic revolution.

Religious leaders explained that too many people were a domestic burden, a problem for developing nations and a strain on global resources. Western countries with low population growth rates were cited as having the capacity to provide good education and healthcare, and thus dominating the rest of the world. They argued that Islam permitted contaception in order to end dependency on the North. In times of economic hardship like these, developed nations took advantage of their less fortunate counterparts.

In addition, focus was placed on reproductive health issues - on child-spacing, the welfare of the mother and family, preventing the transmission ofgenetic diseases, and curing infertility. The arguments put forth by religious leaders were repeated in the media, and, most critically, in information and discussion sessions all over the country. The campaign focused on poor women and the provision of modern contraceptives such as the IUD, the oral pill, injectables and sterilization. The traditional method of withdrawal was downplayed as less effective.

Focusing on women produced an unexpected side-effect: it enabled women's activists to debate the interpretation of Islam in providing justice for both men and women, and to demand that the underlying reasons for high fertility - mainly Iran's discriminatory marriage laws - should be addressed. Ayatollah Khomeini responded to the pressure by introducing a new standard marriage contract, giving the first wife the right of divorce if the husband takes a second wife without her consent.

Women have used the religious leadership's own rhetoric to show that true Islam is not being practised if women suffer discrimination, and the Ayatollahs in turn have shown they can be responsive if pressure is strong enough.

"Islam is flexible, like a rope", says Hoodfar. "It wouldn't have lasted 1,400 years without that capacity".

India also can create its own approach taking lessons from Iran.

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FACTS AGAINST MYTHS

Undeniably, there is urgent need for development, in eradicating poverty as also curbing population growth. Such development however needs to be sustainable. Production of goods and services require resources and often generates certain undesirable joint-products along with desired goods and services. Ultimately, however, it is the production process that generates the particular consumption pattern. Stress has therefore to be on the type of production-consumption patterns, their resource contents and their environmental consequences. The solution to the whole environment crisis therefore does not lie in controlling population growth but in the social control o f production-consumption patterns of the rich in the North.

MYTH

Population Growth Is Responsible For The Worldwide Environmental Degradation.

FACT

The point of poverty and population growth being the cause of environment degradation is patently false. There is no evidence from anywhere to suggest that poverty causes degradation and that high population causes poverty. In reality it is the structural inequality and erosion of access to natural resources that accentuates poverty. History clearly shows that population growth and incidence of poverty are inter-connected. Once interventions aimed at eradicating poverty begin to succee there is significant impact on the rate of population growth. Hence, poverty is not a cause of, but consequence of, environmental degradation and investments in human resource along with equitable access to natural resources, can avert these trends.

The main issue therefore is not population growth. Wasteful and unnecessary consumption is the main culprit. To this, the barb that "all these people" in the South will eat up all the resources is a racist underlying reaction. If one person in the North consumes 8 times more than a person in the South, there would be fewer people in the North! For each person cut down in the North, consumption comes down by 8 times.

The production-consumption processes linkage is therefore the main issue. The North, especially the U.S. argue that consumption is a personal matter. It is a matter of personal choice and (individual) rights, and that the State cannot intervene with consumption. Yet, at international fora they maintain that population control is something that the State should enforce! So, where is human rights and respect for people of the South? Consumption is a personal right, but how many children a family should have, what they wish to do with their bodies is international and World Bank policy?! That itself is a basic contradiction.

Consumption levels therefore of the rich North constitute a major threat to the environment. The North has only 24 per cent of the world's population, but their share in global consumption of various commodities extends from 50 to 90 percent. Even basic products like cereals, milk and meat are consumed by industrialized countries in a range from 48 percent to 72 percent. Its consumption share for other products are 60 percent for fertilizers, 81 percent for iron and steel, 85 percent for chemicals and 92 percent for cars. This also means that their per capita consumption is three to eight times that of the South for items of basic needs and more than 20 times for chemicals and vehicles. The North's world's share of energy consumption is 75 percent.

Obviously, environmental degradation is proportional to these consumption levels. The North has been responsible from 1950 to 1988 for about 70 percent of the annual emissions of carbon dioxide and 77 percent of cumulative carbon dioxide emissions. The per capita carbon emissions of the rich North are seven times that of the South.

In terms of global food (meat) consumption, the North gets 40% of the calories from fat. These 1.25 billion people eat 3 times as much fat per person as the rest of 4 billion. Indirectly the meat eating quarter of humanity consumes nearly 40% of world's grain - grain that fattens the livestock they eat. Meat production is behind the major part of the environmental stress induced by the present global agricultural systems, from soil erosion to over-pumping of underground water. In the extreme case of American beef, production of 1 kg. of steak requires 5 kg. of grain and the

energy equivalent of 9 litres of petrol, apart from soil erosion, water consumption, pesticide and fertiliser runoff, ground water depletion, and emission of green house methane.

Beyond the effects of livestock production, the affluent diet rings up an ecological bill through its heavy dependence on long distance transport. North Europeans eat lettuce trucked from Greece and decorate the tables with flowers from Kenya. Japanese eat turkey from the US and ostrich from Australia. One fourth of the grapes eaten in the US is grown in Chile, 11000 km away. This far-flung agri-business food system is only partly a product of agronomic forces. It is also a result of farm policies and health standards that favour large producers, massive government subsidies for western irrigation water, and a national highway system that makes trucking economical by transferring the tax burden from truckers to the highway users.

In raw material consumption the same pattern emerges. About 1 billion rural people subsist on the local biomass collected from the immediate environment. Most of what they use each could be self-replenishing renewal resources. Unfortunately, because they are often pushed by landlessness and population growth into fragile, unproductive ecosystems, their basic needs are hardly met.

In terms of consumer expenditure, 4% of goods in the U.S. covers packaging, i.e., $225 a year. Packaging, in this throw-away of economy, is an end in itself. Disposablels proliferate at an incredible rate. Likewise the Japanese use 30 million "disposable" single-roll cameras each year, and the British dump 2.6 billion diapers. Americans toss away 180 million razors annually, enough paper and plastic plates and cup to feed the world a picnic 6 times a year and enough aluminium cans to make 6000 DC 10 air-crafts.

In the context of population figures what it is of greater relevance and even more revealing is the concept of Consumption-or Pollution-Multiplied Population (CMP,PMP). An average American consumes over 20 times the resources of the average person in the South. The US population of 250 million multiplied by 20 gives a CMP of five billion, compared to the total population of 4 billion of the South, giving a CMP of 4 billion.

The consumption of paper in the US is 137 times that of India. The paper PMP, then is 34 billion compared to 850 million for India. Similarly, a Japanese earns at least 120 times more income than an average Nepali worker. The impact of all this alone on deforestation is evident.

If one calculates the CMP or PMP - in relation to the consumption rates of the poor themselves - rather than on the basis of national averages, the results are more glaring. Since neither cars nor CFCs are used by them, the CMP and PMP for these commodities approaches infinity for any of the countries of the north.

Further, assuming that a person, from the rich North consumes 50 times more resources (whichshe/he easily does) than an average person from the South, then the effective population of Germany would be over 4000 million (its actual population being around 80 million) and the US would be over 12,4000 (its actual population being around 250 million) in terms of consumption.

Thus consumption patterns of the rich North including those of the rich in the South is significant not only by its quantitative implications, but by its qualitative character too. It is the insatiable desires for ever increasing material comforts of the economically affluent - i.e., their mass consumption life styles and consumption patterns - that lead to severe degradation of the environment and depletion of resources.

MYTH

The Poor of the South Are Destroying The Forests And The Environment At Large.

FACT

Development agencies, including the FAO, the World Bank, among others, all tend to view the poor as primary factor in the ecological crisis. But like the Agenda 21 they all fail to explain why poverty exists in the first place, and thus fail adequately to examine contemporary economic structures and the role, for instance that timber companies, ranching syndicates and TNCs have had both in creating and maintaining social inequalities in the degradation of the environment.

Evidently, the destruction and degration of the forests in the world stem not only from the present economic system but also in the nexus between the

political elites of the South and Western Corporate interests. In regions where privilege, inequality and subsequent poverty are rife, and where repressive regimes are continually supported by the American administration, TNCs virtually have a free hand in implementing 'development' projects that are causing widespread forest destruction. The economic benefits of those projects goes to the importing countries (the North) and to wealthy elites within the South, not to the people of the forested regions who become even more pauperized. To illustrate, Dr. Manmohan Singh, Union Finance Minister, on June 17, 1992 elivered the Foundation Day Lecture of the Society for the Promotion of Wasteland Development on the theme, "Environment and New Economic Policies". Apart from "poverty" and the " lack of development" he also stressed the "uncontrolled economci development" as the other factor to the economic crisis.

If the current 'regulated' model of development is causing "uncontrolled" mining of the country's natural resource base (e.g. at Palamau in Bihar, Kota in Rajasthan, etc.,) then this devastation is bound to increase in geometric progression with the advent of the new "De-regulated' economic policy.

He further stated that, "The survival strategies of the poor, particularly their search for food, fodder, fuel and shelter, often leads to over utilization of available resources, thereby accentuating the problem of environmental degradation".

It is an over statement that the survival strategy of the poor that lead to over utilisation of available natural resources and erosion, thereby of our natural resource base. Infact, it is the centralized policy of the Government to use the country's forest resources as a main revenue earner which causes this erosion. It is the forest department which claims the ownership of one-fourth of the country's total landmark. And finally, it is the state (controlling and developing India's forests, dams, hydel power stations, mines, roads and large part of its industry) which is not just the protector but also the most feared destroyer of our country's environment. And, lest we forget, the Advasis of Bastar - like most adivasis the world over- had protected their forest over centuries.

A World Bank project for so-called forest development, of tropical pines here, became a major cause for deforestation in the region. This project came to India as the Bank's Group's first intervention in Forestry, the Madhya Pradesh Forestry Technical Assistance Project (Credit 608 - IN, December 1975) and was directed primarily towards the development of plantation for pulp and paper industry. This project was part of the trend to totally convert natural forests to commercial plantation resulting in the biomass produced no longer benefiting the adivasis. The adivasis sustenance base in cane and bamboo for basket weaving, mangoes, tamarind, jack fruit, mahua and edible berries were all destroyed when natural forests were replaced by monoculture plantation of tropical pine. These trees were worse than useless for local needs. They provide no food or fodder. Villagers cannot use them for thatching. Above all these trees absorb huge quantities of water and put toxin into the soil. In surrounding farmland, wells and streams dry up and crops cannot grow. In Karnataka alone, 75,000 hectares of agricultural land have been destroyed by eucalyptus.

The Karnataka Pulpwood Limited, a joint-sector company owned by the Karnataka Government and Harihar Polyfibres of the Birlas has been given the above acreage of revenue land, forest lands and common lands in six districts of the State for captive plantation of these trees and other fast growing species for the benefit of the Limited Company. This has led to over 5 lakh people being deprived of their essential needs like fodder, fuel, shelter, timber, manure, raw material and fruits.

MYTH

The Structural Adjustment Programme Will Set Right The Problems of the Environment, Etc.

FACT

To begin with, for the poor in the South, environment is a necessary survival base, not a luxury or of any aesthetic value. Forests, grasslands, rivers, have been the source of life and livelihood for adivasis, nomads and fisherfolk. This background is necessary to bear in mind, for instance, in trying to understand current economic issues especially in the context of the Government liberalising the economy and subsequently ratifying the Dunkel Draft proposals. The mounting debt burden and widening trade deficits are being given as reasons for recent cuts in tariffs, easing of curbs on foreign investors, removal of restrictions on

imports and removal of subsidies. "Export or Perish" is the message that Government has been repeating from all fora.

The boost to export for earning foreign exchange will man an even greater pressure on our natural resources. More and more of these resources would be directed to tradeable items rather than for local consumption. Already, over 60 percent of the exports are natural resource based. These depend heavily on primary commodities such as coffee, jute, timber, marine products, ores and minerals. Since the social and environmental costs are not covered in the price of exports, such tilt towards liberalized trade will push the country to an indiscriminate exploitation of these resources.

With the definite possibility of the Dunkel proposals taking effect, global competition for agricultural output will intensify forcing to bring more and more prime land under cultivation to step up production for exports. Increasing production would mean greater use of chemicals, pesticides, clearing more forests and opening up hitherto protected stretches of land for enhancing exports. With farmers being called upon to earn foreign exchange, massive shift to cash crop production is certain, drastically reducing areas for staple food cultivation. Small and marginal farmers, lacking resources to take to export-oriented production, would be pushed out of agriculture losing out to agri-business interests. Among the several proposals cleared for foreign investments, large number of these relate to food processing.

The elevation of agriculture to the status of industry would displace small farmers, many of whom would be compelled to encroach forest areas leading to further deforestation. Export-oriented agriculture, being capital intensive, will not be able to absorb the new entrants to labour force, many of whom would then swell the ranks of the poor in urban slums. Ensuring implementation of environmental and safety safeguards will become more difficult in pressurizing industries to ensure that they do not violate safety standards. With SAP leading to the domination of more and more areas of industrial development by TNCs, the chances of ensuring social safeguards are likely to be reduced, specially at a time when there is further effort to shift more hazardous and polluted industries away from the developed countries as openly advocated by a senior World Bank official. The situation of relatively less safety regulations here is evident from the recent discourses that carbaryl pesticide is still being formulated in Bhopal.

With the inflow of foreign investment gradually increasing it is unlikely that this investment will be carefully monitored from the angle of avoiding unacceptable risks to environmental ruin and various hazards. This is because the government is so anxious to attract foreign investors that it is unlikely to pester them too much by questions about the environment and safety position of their ventures.

There is also a tremendous pressure to utilise the pending aid at a rapid pace. Piled up unutilized aid brings adverse publicity for the borrowing country in the aid bazaar and so there is great pressure to rush up the utilization of this aid. One reason for the delay of the projects is the preview in the acquisition of land on which people are already living/working and the possibilities of other adverse effects. Now in the name of speeding up the utilization of this aid, problems of the people facing eviction and related environmental problems are likely to be given a short shrift, specially in the situation when foreign investors and donors are anxious to push some hazardous projects.

SAP gives a call for making the maximum effort to increase exports. A lot of things can be excused if a project happens to be favourable from the point of increasing exports. Hence the havoc that may be caused to land, water and air resources by such projects is likely to be tolerated.

Efforts to increase marine exports, other food exports and also the products of some high polluting/ hazardous industries can cause very extensive damage to the environment. Some of the mega-projects which are most controversial from the point of environmental side effects, the environmental efforts run the risks of being created as a non-priority area and thereby subjected to heavy budget cuts. For instance in a recent paper by Miloon Kothari and Ashish kothari, "Allocation for the prevention and control of pollution have been out (in real terms) by 35.5 per cent at a time when pollution is likely to increase. Rural sanitation programmes have suffered a cut of 46.8 per cent and the rural water supply of the water mission 39.3 per cent of its budget. Other programmes which have suffered are wasteland development (down by 23.5 percent) is in the biomass development programme". and promotion of non-conventional energy sources (26.3 percent) but the heaviest reduction (61 percent).

●

నన్ను గుర్తించండి

ఈ భూమిపైన ప్రకృతి రూపంలో కనిపిస్తున్న గాలి, నీరు, చెట్లు, చేమలు, జీవ జంతువులు, పశు పక్ష్యాదులు, నదులు , సముద్రాలు, పర్వతాలు, ఆకాశం - ఇవన్నీ నేనే కదా!

భూమి మీద ఎవరికీ ఏవిధమైన కష్టం కలగకుండా, ఎవరూ, ఎవరి మీద అధికారం చలాయించండం కాని, ఎవరూ అవసరాన్ని మించి ఎక్కువగా పెరగడం గాని, లేక నామ మాత్రాలు లేకుండా చిన్నవిగా వుండడం గాని, కలుగకుండా వుండేటట్టు నన్ను నిర్మించారు. ఎవరికైనా, ఎక్కువ తక్కువలు అయినందువలన, నాకు , నన్ను ఉపయోగించే వారికిక కష్టమవుతుంది. ఎవరికి ఏవిదమైన హానికులుగకుండ తప్పులు సరిచేస్తూ వుంటాను. కాని, ఈ విధంగా ఎప్పుడూ జరగడం లేదు. మానవుల జీవితం కఠినమై పోతున్నది.

ఏ ఆవరణలో మీరు , ఇతర జీవరాసులు వుంటాయో దాని చుట్టు ప్రక్కలనున్న భౌతిక వ్యవస్థలు కలిసే , నేను (పర్యావరణము) తయారవుతాను.

గాలి, నీరు, చెట్లు, చేమలు, జీవ జంతువులు, నదులు, పర్వతాలు, మైదానాలు, ఎడార్లు, సముద్రాలు, ఆకాశం ఇత్యాదులన్నీ నా అవయవాలని, ఇవన్నీ ఉపయోగపడతాయని మీ అందరికి తెలుసు నిర్మల మయిన గాలి లేకపోతే , ఉక్కిరి బిక్కిరి అవుతామని కూడా మీకుతెలుసు. దీని వల్ల మృత్యును కూడా రావచ్చు. నీళ్లు లేక పోయినా మీరు జీవించలేరు. చెట్లు, చేమలు లేకపోతే, మీరు తినడానికి అన్నం, పళ్లు, ఇంకా అవసరమైన వస్తువులు ఎక్కడనుండి వస్తాయిఽ ఈ విధంగానే , ఆవులు, గేదెలు, మేకల నుండి పాలు దొరుకుతాయి. ప్రత్తి చెట్టు నుండి బట్టలు, పట్టు పురుగులనుండి పట్టు, తేనెటీగల నుండి తియ్యటి తేనే దొరుకుతాయి. ఇంతేకాక , మీ చుట్టుపక్కల మీకు అవసరమైన ఎన్ని వస్తువులున్నాయో, అవన్నీ కూడా చెట్లు, చేమలు, జీవ జంతువులు, మరియు భూమిపైన, లోపల దొరకు ఖనిజ పదార్థములతోనే తయారవుతాయి. వీటన్నిటిని ఉపయోగిస్తారు, తింటారు. త్రాగుతారు. హాయిగా జీవిస్తారు.

ఇప్పుడు , మీకు నేనింకొక విషయం చెప్తాను. ఒక వేళ, ఏదేనా వక వస్తువు ఎడతెరిపి లేకుండా పెరుగుతూ వుంటే , అది అందరికి పనికొచ్చినప్పటికి, దాని ప్రాముఖ్యత తగ్గి పోతుంది. మీకు నీళ్ళు అవసరమే, కాని అన్ని జాగాలలో నీళ్ళు వుంటే వరదలొస్తాయి. అప్పుడు మీరెక్కడుంటారు? అన్నీ నీళ్లలో మునిగి నష్టమవుతాయి. అలాగే, నీళ్ళు తక్కువైతే, భూమి ఎండిపోతుంది. చెట్లు, చేమలు, పంటలూ నష్టమవుతాయి. నాలుగు వైపుల ధ్వంసమైపోయి, ఎడారిగా తయారవుతుంది. అన్ని జీవరాసులు, దాహంతో విల విల తన్నుకొని చచ్చిపోతాయి. నీళ్ళు అవసరమే కాని, అది సమపాళంలో వుండాలి. ఈ విషయం అన్నిటికి వర్తిస్తుంది. చెట్లు, చేమలు అవసరమే, కాని అన్ని చోట్ల అవేవుంటే భూమంతా అడవి అయిపోతుంది. అడవిలో వుండడం కష్టం. ఈ విదంగానే, గాలి ఎక్కువయితే, గాలి ధుమారాలు, తుఫాన్లు వచ్చి, అన్నీ నష్టమవుతాయి.

వర్షాకాలంలో భూమిపైన నాలుగు వైపుల గడ్డి మొలవటం చూసేవుంటారు. భూమంతా ఈ గడ్డితో నిండిపోకుండా వుండటానికి, చెవుల పిల్లులు, గొర్రెలు, మేకలు, ఆవులు, గేదెలు, దానిని మేస్తూవుంటాయి. ఈ విధంగానే శాఖాహారి జంతువులని తినే, మాంసాహారి జంతువులు - పులి, సింహము, తోడేలు మొదలైనవి, అడవుల్లో వాటి సంఖ్య పెరగకుండా చేస్తూవుంటాయి. మానవుడు శాఖాహారి మాంసాహారి రెండింటిలోకి వస్తాడు. అతడు సింహాల్ని కూడా చంపుతూ వుంటాడు. అతను ఆకులు, పళ్లు, కూరలు, పాలు, మాంసము, చేపలు, గ్రుడ్లు ఇత్యాదులన్నీ తిని, వాటిని ఎక్కువ పెరగకుండా చేస్తాడు.

ఉదాహరణకి, మిడుతల్ని కప్పలు తింటాయి. ఇప్పుడు ఒకవేళ డేగల్ని చంపినట్లైతే భూమిమీద నలువైపుల పాములే వుంటాయి. పాములు కప్పలన్నిటిని తిన్నట్లైతే మిడుతల సంఖ్య పెరుగుతుంది. అప్పుడు మిడతలు మన పంటల్ని తినేస్తాయి. పంటలు లేకపోతే మానవుడు ఆకలితో చనిపోతాడు.

భూమిమీద, అందమైన వృక్షాలు, జీవ జంతువులు, పక్షులు వనమృగాలు, పర్వతాలు, నదులు, వీస్తున్న గాలి, పంటలు, పళ్ళు, పువ్వులు, ఇత్యాదులు, ఖనిజ పదార్థములు - ఇవన్నీ కూడా నా అవయవాలు. ఇవన్నీ కూడా మానవుడికి ఏదైనా వస్తువు ఇవ్వడానికైనా ఉపయోగపడతాయి.

ఈ వస్తువులకోసం, మానవుడు స్వార్థపరుడై, నా అవయవాల్ని బలాత్కారంగా వాడుకొంటున్నాడు. దీనివల్ల, భూమిమీద ప్రాకృతిక వస్తువులు తగ్గిపోతున్నాయి. రకరకాల రోగాలు, కోలాహలం, అల్లర్లు, నిరాశ, నిస్పృహ, పొగ, ధూళి, మురికి మొదలైనవాటివల్ల, భూమిమీద ఆకాశంలోని, నీటిలోని - అన్ని జాగాలలోను, నేను కలుషితమవుతున్నాను. ప్రజలే దోషులు, తమ కర్మానుసారం, దుఃఖాన్ని అనుభవిస్తూ, నన్ను నిందుస్తున్నారు.

ఇప్పుడు వృక్షాల్ని చూడండి, అవి ఎంత ఉపయోగపడుతున్నాయో, పచ్చని పైరు, అందమైన పువ్వులు, తియ్యని పళ్ళు, చల్లని గాలి, కళ్ళకి అందంగా కనిపించే దృశ్యాలు, మొదలైనవన్నీ వృక్షాలనుండే వృక్షాల వేర్లు భూమిలో నాల్గువైపుల విస్తరించి మట్టిని అంటిపెట్టుకొని వుంటాయి.

దీనివల్ల వర్షపు నీటితోను, గాలితోను మట్టి కొట్టుకుపోదు. వృక్షాలు ఎడార్లను పెరగనివ్వవు. సముద్రంనుండి, ఆవిరిరూపంలో నీరు

మేఘాలరూపంతో వృక్షాల సంపర్కముతో చల్లబడి, వర్షిస్తాయి. దీనివల్ల పొలాలకి, పంటలకి, నూతులకు, చెరువులకు, నదులకు తీయని నీరు లభిస్తున్నది. వృక్షాలు, మనుష్యులు వదిలిన చెడుగాలిని తీసుకొని, బదులుగా నిర్మలమైన ప్రాణవాయువుని మనకి ఇస్తాయి. ఈ గాలివలన ప్రాణులు రక్తశుద్ధిపొంది, ఆరోగ్యంగా జీవిస్తారు. వృక్షాలనుండి, వంటచెరకు, ఇళ్ళు కట్టడానికి కలప, బంక మొదలైన ఉపయోగకరమైన వస్తువులు దొరుకుతాయి. అందుకే, వృక్షాలు లేకుండా మానవుల, అన్యజీవుల జీవనం వృధా అని మీరు చెప్పగలరు.

ఇప్పుడు చూడండి, మానవుడు, వృక్షాలని ఈ అన్ని గుణాల కారణాలవలన చిందరవందరగా కోయటం (పడగొట్టటం) ప్రారంభించేడు. భూమి పాడుపడటం మొదలైంది. అందుకే ఎడార్లు పెరుగుతున్నాయి. అకాల వర్షాలు పడుతున్నాయి. సారవంతమైన మట్టి కరిగి, నదులలో కలుస్తున్నది. దీనివలన, నదులలోతు తగ్గిపోతున్నది. అవి, వర్షపు నీరుని తనలో నిలువచేసుకోలేకపోతున్నవి. నీళ్ళు నలువైపుల ప్రవహించి, వరదలు వస్తాయి. ప్రాణానికి, వస్తువులకి హాని కలుగుచున్నది. వృక్షాలు లేని కారణాన, మేఘాలు వర్షించలేకుండా వెళ్ళిపోతున్నాయి. దీనివల్ల భూమి ఎండిపోతున్నది. వాతావరణం మారుటవల్ల పంటలు సరిగ్గా పండటంలేదు. వేడి ఎక్కువవుచున్నది. దీనివల్ల పర్వతాలపై నిలువయున్న మంచు కరిగి సముద్రంలో పడి నీరు ఎక్కువై, చుట్టుప్రక్కలనున్న పట్టణాలు మునిగిపోతాయి. ఇప్పుడు చెప్పండి, ఇవన్నీ మానవుడు కాక ఇంకెవరు చేశారు? మానవుడి, వృక్షాలని గుడ్డిగా కోసే అలవాటు, నాలుగు వైపులనున జనాలను, వస్తువులను కూడా నాశనం చేసింది. కాని, నన్నే దోషిగా నిలబెట్టారు.

ప్రాణులు జీవించడానికి గాలి చాలా అవసరం. నిర్మలమైన గాలి లేకపోతే ప్రాణులు సుఖంగా వుండలేవు. గాలిని నిర్మలంగా వుంచే పని వృక్షాలు చేస్తాయని, నేను మీకు ముందే చెప్పాను. ఈ పనికి వృక్షాలు, ఒకవిధమైన ప్రాకృతిక కార్ఖానాలలాంటివి. వృక్షాలు, వనాలు నాశనం చేస్తున్నందువలన నిర్మలమైన గాలి, చెడుగాలి మధ్య వ్యత్యాసము చెడుచున్నది. ఇంకోవైపు వేలకొలది కార్ఖానాలు రాత్రి పగలు చిమ్నీలనుండి పొగ వదులుతూ గాలిని కలుషితం చేస్తూ వుంటాయి. స్కూటర్లు, మోటారు కార్లలోని పెట్రోలు, డీజల్ వలన బయటికి వచ్చిన పొగ, పట్టణవాసులకు జీవిత సమస్య అయిపోయింది. ఇవన్నీ కూడా మానవుడు తన సుఖసంతోషాలను గురించి చేస్తున్నాడు.

ఇదేకాదు, మానవుడు ఎంత బద్ధకస్థుడైనాడంటే, పాడైన, కుళ్ళిపోయిన వస్తువుల్ని అలాగే బయట వుంచేస్తాడు. గాలి కలుషితం చెయ్యడానికి కాలువలలో చెత్త, చెదారం వేస్తాడు. ప్రతిచోట మలమూత్రాలు చేస్తూవుంటాడు. గ్రామాలలో, వీధులలో చెత్త వేస్తూ వుంటారు. మురికినీరు చెత్తగాలిని కలుషితం చేస్తూవుంటాయి. ఈ కలుషితమైన గాలి కారణంగా మానవుడు అనేక రోగాలకు గురి అవుతున్నాడు. ఈనాడు దగ్గు, ఊపిరితిత్తుల రోగాల సంఖ్య పెరుగుతున్నది. గాలి, మురికినీరు, చెత్తా చెదారాలవల్ల కలుషితమౌటమే దీనికి కారణం. ఇదంతా మానవుని పని.

గాలి తరువాత, మానవునికి చాలా ముఖ్యమైనది నీరు. మానవుడికి రమారమి 80% రోగాలు మురికినీటి ప్రయోగంవల్లనే వస్తాయని వైజ్ఞానికుల అంచనా. మురికి నీటిలో రోగాలు, క్రిమికీటకాలు సులువుగా తిరుగుతూ, రోగాలను వ్యాపింపచేస్తాయి. త్రాగే నీటి సమస్య చాలా గంభీరమైనది. కాని, మురికినీరు ఉపయోగించేకన్నా, వాడటం మానివేయటం మేలు. బ్రతకాలంటే, నీళ్లు త్రాగాలికదా. నూతులు, చెరువులు, నదులే నీటి ప్రవాహాలు కాని మనిషి తన చేష్టలతో ప్రతిరోజు దానిని కలుషితం చేస్తూవుంటాడు.

ఈనాడు పట్టణాలలో ఉన్న చెత్త, చెదారం, మురికినీరు, కాలవల చెత్త ఇత్యాదులన్నీ ఆ పట్టణాల దగ్గరలోనున్న నదులలోకి వెయ్యబడుతున్నాయి. ఇవే మనకి త్రాగే నీరు ఇస్తున్నాయి. కార్ఖానాలలోనున్న చెత్త చెదారం కూడా ఈ నదులలోనే వేస్తున్నారు. చచ్చిన పశువులు, సగం కాలిన శవాలు, గంగలాంటి పవిత్రమైన నదులలో పడేసినందువల్ల గంగనీరు కూడా కలుషితమైంది. తక్కిన నదుల పరిస్థితి కూడా ఇదేమాదిరి.

పెద్దపెద్ద యంత్రాలు, కార్ఖానాలు తమ ఉత్పత్తిలో ఉపయోగించిన నీరు కలుషితమై ప్రతిరోజూ బయటికి వస్తుంది. ఈ మురికినీటిని, చెరువులు, నదులలో వేసేముందు క్రొత్త సాధనాలతో శుభ్రపరచటం మంచిది. కాని వారు అలాగ చెయ్యటంలేదు. దీనివల్ల అన్ని ప్రాణులకు త్రాగటానికి మురికినీరే దొరుకుతుంది.

కొన్ని శబ్దాలు సహజమైనవి. కాని అవి ఎక్కువ సమయం వుండవు. కాని మానవులు చేస్తోన్న కోలాహలం, శబ్దాలు నలువైపుల విస్తరించి వుంటుంది. దీనివలన కలిగే హాని, నువ్వు ఈవిధంగా తెలుసుకోవచ్చు. అవి, సంగీతం చెవులకి ఇంపుగా వుంటుంది. కోలాహలం శబ్దాలు తలనొప్పి కలుగచేస్తాయి. ధ్వనిని ప్రదూషితం చేస్తాయి.

మీ చెవులు కొంత పరిమితివరకు పెద్ద శబ్దాలని వినగలవు. పెద్ద పెద్ద ధ్వనులకి చప్పుళ్ళకి చెవుల పొరలు పగిలిపోవచ్చు. నిరంతరం కోలాహలంలో వుండేవాళ్ళకి, పెద్దగా మాట్లాడటం అలవాటవుతుంది. కొంత కాలానికి వీటివల్ల జీవులు చెవిటివారవుతారు. పెద్ద శబ్దాలతో మ్రోగే లౌడు స్పీకర్లు, విమానాల, మిషన్ల చప్పుళ్లు, రైలు, మోటారుబళ్ళు, తక్కిన వాహనాల శబ్దాలు, పెద్ద ధ్వనులతో హారన్లు వాగించడం గుంపుల గోల, గలాభా ఇవన్నీ ధ్వనిని కలుషితం చేయటానికి కారణాలు. దీనివల్ల ఈనాడు యంత్రయుగంలో జీవించటం చాలా కష్టం. ఆరోగ్యం పొందుతున్న రోగులకి ఇవన్నీ హానిచేస్తాయని మీకు తెలుసుకదా! అందుకే ఆసుపత్రుల దగ్గర హారను మోగించకూడదని బోర్డులు వుంచుతారు. ఇప్పుడు చెప్పండి, ఆ ధ్వనులు కోలాహలం కలిగించేది మానవుడు కాక ఇంకెవరు?

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పొంచి వున్న ప్రమాదం

పరిశ్రమల యొక్క చిన్న పొగ గొట్టాల నుంచీ, లారీలు, బస్సులూ, కారుల అడుగు భాగాన ఉండే ఇంకా చిన్నవైన పొగ గొట్టాలనుంచీ వెలువడే వాయువులు, ఈ విశాల ప్రపంచాన్నీ, భూమిపై కొన్ని వేల మీటర్ల ఎత్తు వరకూ విస్తరించి వున్న వాతావరణాన్ని ఎలా కలుషితం చేస్తాయి? న్యూటన్ భూమ్యాకర్షణ శక్తి సిద్ధాంతం ప్రకారం భూమి పైకి పోయే కొద్దీ తగ్గే గురుత్వాకర్షణ శక్తి లాగే గాలి సాంద్రత కూడా తగ్గుతుంది. భూమికి 51/2 కి.మీ.ల సమీపంలో గల పరిధిలో ఎంత బరువు గల గాలి వున్నదో అటుపై విస్తరించి వున్న అనంత వాతావరణంలోని గాలి బరువూ సుమారుగా అంతే వాతావరణంలో ఇప్పుడున్నగాలి, ఎంత ఎత్తుకు పోయినా ఒకే సాంద్రత గలదిగా తిరిగి ఏర్పడిందనుకోండి. అప్పుడు దాని మందం 9000 మీటర్ల కు మించదు. మరి అలాంటప్పుడు ఈ విశ్వం మరీ అనంతమైనదేమో కాదనీ, వివిధ పరిశ్రమల నుంచీ కారు, లారీ మొదలైన శకటాల నుంచీ నిర్విరామంగా వెలువడే పొగను అనంతంగా గ్రహించే శక్తి దానికి లేదని తెలుస్తుంది.

పరిశ్రమల విస్తరణతో బాటు ఈ వాతావరణ ప్రమాద కాలుష్యం అవతరించింది. ఐనా సరే ఈ క్రొత్త క్రొత్త పరిశ్రమలను ఇంకా ఎందుకు స్థాపిస్తున్నారని మీరు అడగవచ్చు. ఈ కార్లు, బస్సుల సంఖ్య తగ్గించరాదా అనిపించవచ్చు. ఈ ప్రశ్నలకు సూటిగా సంతృప్తి కరంగా వుండే సమాధానాలు చెప్పడం కష్టం. పరిశ్రమలు పెరగడం వల్ల మనకు లాభాలున్నాయి మరి.

శాస్త్రజ్ఞానం పెరిగిన కొద్దీ వైద్య పరిజ్ఞానం పెరిగింది. దీనివల్ల జననాల సంఖ్య అలాగే వుండగా అకాల మరణాల సంఖ్య తగ్గింది. తద్వారా జననాల సంఖ్య పెరగడం జరిగింది. పెరిగిన జనంతోబాటు తిండి, బట్ట, నీరూ మొదలైన వారి అవసరాలూ పెరిగాయి. ఇలా జనసంఖ్య పెరుగుతూ పోతే వారి సుఖ జీవనానికి ఎక్కువ పరిశ్రమలు అవసరం.

మనం ధరించే బట్టలు ఉత్పత్తి చేయడానికి ఎక్కువ పరిశ్రమలు అవసరం. మనం తినే తిండిని ఎక్కువగా ఉత్పత్తి చెయ్యడం కోసం, నేలను దున్నే ట్రాక్టర్లూ, భూసారం పెంచే ఎరువులూ, చీడల్ని వదిలించే క్రిమి సంహారక మందుల ఉత్పత్తీ పెరగాలి. ఎక్కువ పరిశ్రమలు ఏర్పడితే ఎక్కువ విద్యుత్తు అవసరం. ఎక్కువ విద్యుత్తు కోసం ఎక్కువ బొగ్గూ, నూనెలూ అవసరం.

బొగ్గులను "నల్లవజ్రం" గానూ, పెట్రోలును "ద్రవ బంగారం" గానూ పిలవడం మీరు వినే ఉంటారు. అవి రెండూ పరిశ్రమలకు చాలా అమూల్యమైనవి. కాని ఈ అమూల్యమైన వనరులే అపారమైన కాలుష్యాన్ని కలిగించడంలో చండాలమైన పాత్రవహిస్తున్నాయి. గత 50 ఏళ్ళలో బొగ్గు నూనె నిక్షేపాలలో దాదాపు సగం వాడుకున్నాం. త్వరితంగా విస్తరిస్తున్న పరిశ్రమల వల్ల వచ్చే 25 ఏళ్ళలో మిగిలిన సగ భాగం ఖర్చు చేసినా ఆశ్చర్యం లేదు. ఇందువల్ల మరింకెంత కాలుష్యం ఏర్పడుతుందో! పోయిగా ప్రతకటానికి పరిశ్రమలను స్థాపిస్తే అవి కలిగించే కాలుష్యం ప్రాణాలకే ముప్పు కలిగిస్తోంది.

మీ రెప్పుడైనా నీటి ఆవిరితో నడపబడే విద్యుత్తుత్పాదక కేంద్రాన్ని (థర్మల్ పవర్ స్టేషన్) చూసారా? రామగుండం, ఇబ్రహింపట్నం (విజయవాడ), కోవూరు (నెల్లూరు), ఎన్నూరు(మద్రాసు) లలో ఇవి వున్నాయి. ఇక్కడ పొగ గొట్టాలలో నుంచి పైకి ఎగబ్రాకుతున్న పొగ మేఘాలు దర్శన మిస్తాయి. ఢిల్లీలోని ఇంద్రప్రస్థ విద్యుత్తుత్పాదక కేంద్రం ప్రతినెలా ఒక చ.కి.మీ. విస్తీర్ణంలో 30 టన్నుల కలుషితమైన వాయువును వదులుతోంది. ఈపొగలో గనుక మీరు చిక్కు కుంటే ఏమవుతుందో తెలుసా?చిన్న తలనొప్పితో ప్రారంభమైన తల దిమ్ము, కళ్ళు మంటలు, చూపు మందగించడం, చెవులు హోరెత్తడం, వాంతులు కలగడం చివరకు స్పృహ తప్పడం జరుగుతుంది. ఇదంతా పొగతో వుండే కార్బన్ మోనాక్సైడ్ అనబడే వాయువు ప్రభావం.

ఈ కార్బన్ మోనాక్సైడ్ ఎందుకిలా చేస్తుంది? మన రక్తంలో హేమోగ్లోబిన్ అనబడే పదార్థం వుంది. అది ఆమ్లజనితో కలవడంతో రక్తం శుభ్రపడుతుంది. ఐతే కార్బన్ మోనాక్సైడ్‌కు కూడా హేమోగ్లోబిన్‌తో కలిసే గుణం వున్నది. అది ప్రాణ వాయువు కంటె 200 రెట్లు తొందరగా కార్బన్ మోనాక్సైడ్‌తో కలుస్తుంది. నూటికి 1 పాలు కార్బన్ మోనాక్సైడ్, 100 పాళ్ళు ప్రాణ వాయువు (ఆమ్లజని)ను మన పీల్చాము అనుకోండి. ఐనాసరే మన రక్తంలో ఆమ్లజనికి 2 రెట్లు పరిమాణం గల కార్బన్ మోనాక్సైడ్ ప్రవేశిస్తుందన్నమాట. అంటే రక్తానికి ఆమ్లజనిని పీల్చే శక్తి తగ్గిపోతుంది. రక్తంలో ప్రవేశించిన కార్బన్ మోనాక్సైడ్ పరిమాణాన్ని బట్టి తలనొప్పి నుంచీ... స్పృహ తప్పడం దాకా... ఏదైనా జరగవచ్చు.

మరి బొగ్గు గాని, నూనెగాని మండటం ద్వారా కార్బన్ మోనాక్సైడ్ ఎలా తయారవుతోంది? కావలసినంత ఆమ్లజని దొరికితే, అవసరమయినంత సేపు మండితే ప్రమాద రహితమయిన కార్బన్ డై ఆక్సైడ్ తయారవుతుంది. కాని తగినంత పరిమాణంలో ఆమ్లజని లేకపోయినా, మండుటకు కావలసినంత సమయం దొరక్కపోయినా, బొగ్గు నుంచి గానీ, నూనె నుంచి గానీ కార్బన్ మోనాక్సైడ్ అవతరిస్తుంది.

కార్బన్ మోనాక్సైడ్ మాత్రం ఒక ప్రమాద కారి ఐతే దానిని ప్రమాద స్థాయికి పెరగకుండా చేసేవాళ్ళం. కానీ బొగ్గు మండేటప్పుడు సల్ఫర్ డై ఆక్సైడ్ వాయువూ, నైట్రోజన్ ఆక్సైడ్ వాయువులూ కూడా

వెలువడుతున్నాయి. పొగతో బాటు వచ్చే సన్నటి పొగరేణువుల సంగతి చెప్పవలసిన పనేలేదు. పరిస్థితులిలాగే కొనసాగితే వచ్చే 15 సం.లో ఈ ప్రమాద కరమైన పదార్థాల పరిమాణం ఇప్పటి దానికి రెట్టింపవుతుంది.

మనదేశంలో బొగ్గు నిల్వలు అధికం. తక్కువ రకం బొగ్గు తూర్పు ప్రాంతంలో అధికంగా లభిస్తున్నది. కాలుష్యానికి కారణమైన బొగ్గును ఇంధనంగా మనం ఉపయోగించకా తప్పదు. కాబట్టి కాలుష్యం తగ్గే పద్ధతులు ఆలోచించాలి.

ఇందుకు ఒకపద్ధతి మంట పూర్తిగా మండేటట్లు చూడటం. అదే జరిగితే ప్రమాదకరమైన కార్బన్ మోనాక్సైడ్ ప్రమాదరహితమైన కార్బన్ డై ఆక్సైడ్‌గా మారుతుంది. ఇందుకోసం కొన్ని రకాల పరికరాలు రూపొందించ బడ్డాయి. ఇవి మరీ ఖరీదైనవేమీ కాదు.

కాలుష్యాన్ని తగ్గించే పరికరాలు లభ్యమవుతూ వుంటే మరి పరిశ్రమలు వాటి నెందుకు ఉపయోగించవు? ఇది చిక్కు ప్రశ్న.దీనికి సంబంధించిన ఒక యదార్థగాథ ఇదీ. 1971 సంవత్సరంలో అమెరికాలోని టెక్సాస్ రాష్ట్రంలో ఒక క్రొత్త ఉక్కు పరిశ్రమ ప్రారంభమైంది. ఆ పరిశ్రమ ఒక పెద్ద వన్యమృగ సంరక్షక కేంద్రం ప్రక్కనే ఏర్పాటయింది. ఆ నోరులేని జంతువుల కేమాత్రం ఇబ్బంది కలుగు కూడదనే ఆశయంతో ఆ కంపెనీ వాయు కాలుష్య నిరోధక పరికరాలను అమర్చుకుంది. దీనికి మూల ధనంలో పదిశాతం ఖర్చయింది. కాలుష్యం లేని పరిశ్రమ ఏర్పాటైంది. జంతువులూ మనుషులూ సంతోషించారు. ఇలాంటి పద్ధతులేమీ ఏర్పాటు చెయ్యని ఇతర ఉక్కు పరిశ్రమల ఉక్కుధర దీని ఉత్పత్తి ఖరీదుకంటె తక్కువకావడంతో ఈ పరిశ్రమకు కష్టాలూ, నష్టాలూ ప్రారంభమయ్యాయి.

ఇలాంటి చోట్ల ప్రతి పరిశ్రమా విధిగా కాలుష్య నివారణ పరికరాల్ని వాడి తీరాలనే నిబంధనని ఏర్పాటు చెయ్యడం, దానిని కఠినంగా అమలు జరపడం జరగాలి. మరొక పద్ధతి తక్కువ కాలుష్యం కలిగించే ఇంధనాలను ఉపయోగించడం. అణుశక్తి ఇలాంటివాటిల్లో ఒకటి. ఐతే అణుధార్మిక ధూళులను దూరంగా, జాగ్రత్తగా విసర్జించాలి. మరొక పద్ధతి సౌరశక్తి (సూర్యరశ్మి) ఉపయోగం . దీనికి కాలుష్యం బెడద లేదు. ఐతే సౌరశక్తితో నడిచే విద్యుత్కేంద్రాల నిర్మాణం ఇంకా పరిశోధనా దశలోనే వున్నది. ఇంకా గాలితోనూ, సముద్రపు కెరటాల ఆటు పోటులతోనూ నడిచే యంత్రాల కోసం పరిశోధన సాగాలి.

విస్తరిస్తున్న అఖాతం

కుళాయి త్రిప్పగానే నీరు రావడం సాధారణమైన విషయం. ఒకవేళ కొళాయి లేకపోతే నూతినుంచే, కాలువ లేక నదులనుంచే మనం నీరు తెచ్చుకుంటాం. సర్వసాధారణమైన ఈ నీరు "అమూల్యమైనది" అంటే మనకు వింతగా విడ్డూరంగా వుండవచ్చు. కానీ ఇది యదార్థం.

నీరు చరిత్ర గతినే మార్చివేసింది. నాగరికతలన్నీ నదుల ఒడ్డునే విలసిల్లాయి. సింధునది ఒడ్డున విరాజిల్లిన నాగరికతనే మనం సింధు నాగరికత అంటున్నాం. పంపానది ఒడ్డున (హంపీ)విజయనగర సామ్రాజ్యం వెలిస్తే, పెన్న గట్టున, కృష్ణవేణీ తీరాన, గోదావరి నానుకొని రాజధానులే వెలిసాయి. రాజ్యాలు స్థాపింపబడ్డాయి. ప్రాచీన మెసపటేమియా (ఇప్పటి ఇరాక్)లో టైగ్రిస్, యూఫ్రేట్ నదుల జీవజలాల కోసం యుద్ధాలే జరిగాయి. అంతెందుకూ? ఇప్పటికీ మనకూ బంగ్లాదేశ్‌కూ పరిష్కారం కాని సమస్యల్లో గంగానది జలాల పంపిణీ ఒకటి.

మరి ఇంతటి ప్రాముఖ్యత కలిగిన నీటికి మనం తగినంత ప్రాధాన్యత ఇస్తున్నామా? ప్రాధాన్యత ఇవ్వకపోగా పనికిమాలిన వస్తువులన్నిటినీ ప్రవాహాల్లోకి పారేసి పరిశుభ్రమైన జలాల్ని కలుషితం చేసేస్తున్నాం.

గుంటూరు జిల్లాలోని మలప్పాడు గ్రామం విషయమే తీసుకోండి. ఈ గ్రామం చవ్వడిబాగు అనే వాగు ఒడ్డున వుంది. జన సంఖ్య వెయ్యికి మించదు. గ్రామంలోని పశువులు వాగులోని నీరే త్రాగుతాయి. 1977 వ సంవత్సరం లో ఉన్నట్టుండి ఈ జంతువులన్నీ ఎడతెగని విరేచనాలతో బాధపడసాగాయి. మరికొన్ని రోజుల్లోనే వాటిలో పక్షవాత లక్షణాలు స్పష్టంగా కనిపించాయి. కొన్నిటిలో వ్యాధి తీవ్రతరమై అకాలమరణం పాలయ్యాయి. శాస్త్రజ్ఞుల పరిశోధలో తేలిందేమిటంటే అవి త్రాగిన నీరు సీసపు సంబంధమైన రసాయనాలతో కలుషితమైందని, ఆంధ్రప్రదేశ్ ప్రభుత్వం కాలుష్యానికి కారణమైన ఆ పరిశ్రమను హెచ్చరించిందనుకోండి.

పరిశ్రమలు బాధ్యతా రహితంగా విసర్జించే రసాయనాల వల్ల మన నదులూ, సరస్సులూ, చెరువులూ (కొన్ని చోట్ల బావులు కూడా) ఎలాంటి దురవస్థకు లోనవుతున్నాయో చెప్పటానికి ఇది ఒక ఉదాహరణ మాత్రమే. కొన్ని చోట్ల ఇవి మానవ ప్రాణి హానికి కూడా కారణమవుతున్నాయి.

గంగానది ఒడ్డున, కాశీ సమీపంలో ఒక నూనె శుద్ధి చేసే కర్మాగారం వుంది. అది శుద్ధి చేయగా మిగిలిన వ్యర్థ నూనె పదార్థాన్ని గంగానదిలోకి వదిలేస్తోంది. ఒకసారి ఈ నూనె అంటుకుని నీటిపై భగ్గున మంటలు లేచాయి. (కాలుష్యాన్ని సహించలేని గంగా భవాని మండిపడుతోందని కొందరు చమత్కరించారు.) ఇదికాక రోజుకు పదివేల లీటర్ల మరుగు దొడ్ల నుంచి వచ్చే మురుగు నీటిని ఈ నదిలోకే వదిలేస్తున్నారు. మనకు పరమ పవిత్రమైన పూజలందుకుంటున్న గంగమ్మ తల్లికే ఈ దౌర్భాగ్యం తప్పనప్పుడు మామూలు నదుల సంగతి వేరే చెప్పాలా?

శ్రీనగర్‌లోని దాల్ సరస్సూ, నాగ సరస్సూ, విహారయాత్రకూ, నౌకాయానికి ఒకప్పుడెంతో బాగుండేవి! ఇప్పుడో? నీటిపై పెరిగిన తీగలతో డొంకలతో...ఒక్..తలచుకోక పోవడమే మంచిది.

ఇప్పటిలాగే కాలుష్యమంతా నదులలోకి చేరుకుంటూ వుంటే క్రీ.శ. 2000 సంవత్సరం నాటికి అమెరికాలోని 22 నదులలో ఏ ప్రాణి బ్రతకదని, బ్రతకలేదనీ తేల్చారు. బాంకాక్‌లోని చావో ప్రయానదీ, మనిలాలోని పసిగ్ నదీ ఇప్పటికే ఆ స్థితిలో వున్నాయి. వచ్చే ముప్ఫయి, నలభై యేళ్ళలో మన నదుల స్థితీ అంతే కావచ్చు. కాబట్టి మన మిప్పటికైనా పరిస్థితులను చక్కదిద్దుకునే ప్రయత్నం చెయ్యకపోతే రాబోయే కాలంలో జరిగే కాలుష్యం ఇప్పటి దానికి కొన్ని వందల రెట్లు కావచ్చు.

నదులలో, సరస్సులలో తళతళ మెరిసే అందాల, వినీల, నిర్మల జలరాశుల్ని ఏర్పరచడానికి ప్రకృతికి కొన్ని వేల సంవత్సరాలు పట్టింది. సంకుచిత దృష్టితో, స్వార్థంతో, మదంతో, అహంతో, వివేక శూన్యంతో, భవిష్యత్తు గురించి ఆలోచనా రాహిత్యంతో మనం ఈ జల సంపదను కలుషితం చేస్తున్నాం. ప్రపంచాన్నే విషపూరితం చేసేస్తున్నాం.

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SOCIETY FOR ENVIRONMENT AND EDUCATION

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