

MAN MADE ECOLOGICAL CRISIS

Earth planet is amazing creation of God Almighty. Earth, Moon, Sun and other planets are constantly in motion in perfect order as Guru Nanak has expressed in Asa Di War.

ਭੈ ਵਿਚਿ ਪਵਣੁ ਵਹੈ ਸਦ ਵਾਉ ॥ ਭੈ ਵਿਚਿ ਚਲਹਿ ਲਖ ਦਰਿਆਉ ॥
ਭੈ ਵਿਚਿ ਅਗਨਿ ਕਢੈ ਵੇਗਾਰਿ ॥ ਭੈ ਵਿਚਿ ਧਰਤੀ ਦਬੀ ਭਾਰਿ ॥
ਭੈ ਵਿਚਿ ਇੰਦੁ ਫਿਰੈ ਸਿਰ ਭਾਰਿ ॥ ਭੈ ਵਿਚਿ ਰਾਜਾ ਧਰਮ ਦੁਆਰੁ ॥
ਭੈ ਵਿਚਿ ਸੂਰਜੁ ਭੈ ਵਿਚਿ ਚੰਦੁ ॥ ਕੋਹ ਕਰੋੜੀ ਚਲਤ ਨ ਅੰਤੁ ॥

(ਅੰਗ ੪੬੪)

The air flows as per His laws due to order of the Lord.

Lakhs of rivers flow as per His laws due to order of the Lord.

The fire is serving His creation due to order of the Lord.

The earth is carrying the weight of all the creation due to order of the Lord.

The Lord Indira is going about on his head due to order of the Lord.

Dharam Raja the king delivering justice in his court is also working in the order of the Lord.

The sun and the moon are working on the orders of the Lord.

They are travelling tens of millions of kosas in the fear of the Lord. There is no end to their journey. (One kosa is about 1.6 mile)

Earth planet is habitat for human beings and countless varieties and species of flora and fauna. Every creation is in perfect balance and God has assigned duties to various species so that His creation should sustain for long time and it must look beautiful. The slightest disruption in His order can bring havoc in the world. We have witnessed so many ecological hazards in our life time like, Tsunami,

earth quakes, floods, storms in America and so on. Man has become very greedy and because of this sin he has become insensitive to Nature and Natural Resources.

According to Arnold Toynbee “air, earth and water including deep sea are already being polluted to a degree at which we are being poisoned- what mankind needs is a new ways of life with new aims- new ideas and a new idea of priorities. Health and Happiness are more valuable than wealth and power.”

Scientists studying on environment have discovered the reasons and causes of ecological crisis and made people aware of it by writing articles on various subjects. Bhagat puran Singh Ji had immense love for God and His incarnations i.e. human being, nature and animals. He studied voraciously and gathered these articles from news papers and magazines and got them reprinted and distributed among the people to make them aware of man-made ecological hazards and find their solution. This book ‘man made ecological crisis’ is the collection of articles by Bhagat Puran Singh Ji.

In this book there are few eye opening articles and I wish to mention these over here. In the name of development we are cutting trees without understanding the importance and benefits of trees.

Someone has rightly said, “Trees are the only barriers between civilization and destruction the best bastion of oxygen production and an enormous filter that supplies clean water to the cities and town by way meandering streaming and rivers.

Forests are not merely for beauty. Our entire food system depends on them as the mountain people say, “If you must cut one oak tree, plant at least three others. And one might add as you expertly wield your beautifully fashioned ash wood cricket bat or sit down to dinner at your beautifully polished dining table, spare a thought for the high price that

others have paid for your pleasure.”

Besides meeting the fuel requirement of the people, trees are needed for conserving soil, arresting the advance of deserts and preventing floods and silting in reservoirs and canals.

Underground water and the water in rivers and canals are polluted by pesticides, herbicides, urea used in agricultural farms and industrial effluents which contains heavy metals like mercury chloride (used in battery making) manganese dioxide and selenium dioxide (used in ceramics industry) were all found to induce industry.

Dr. Das said these metals in small amounts “produce abnormal sperms which can lead to production of an abnormal child.” Now the number of MR children and children with congenital abnormalities is increasing.

As far as dams are concerned, we have to understand whether the dams are short cut to development or they are long jump to disaster. Few people like Claire Sterling was aware of the after-shocks in eco-system and these are as under, when a dam piles up.

- 1) When a dam piles up water behind it, everything changes the water’s chemistry.
- 2) The kind and number of indigenous flora and fauna.
- 3) The way of life for all the people who lived on the land before lakes came.
- 4) The fertility and salinity of the soil down stream.
- 5) Due to the pressure on the earth’s crust there is and tendency, therefore to earthquakes and landslides.

The destruction of thick tropical forests will upset carbon dioxide cycle, the accumulating carbon dioxide will create green house effect by trapping solar radiation and raising atmospheric temperature.

Bad effects of Nuclear station: nuclear power stations

produce about 100 times more waste heat than thermal plants of the same size. Excessive heat gives rise to cyclones.

Because of this, during the cyclone which hit Andhra coast in Nov., 1977, the sea was literally on fire for a while according to eye-witness reports. This extraordinary phenomenon is known to occur very rarely and only when air currents bear exceptionally high electric charges then friction causes ignition resulting in flames spread over the water.

According to Sailesh Kottary, “Unbridled economic growth, pollution and a fast dwindling supply of natural resources have brought the world to the verge of disaster.”

How can we save our future

Ecological problems caused by deforestation can be avoided by a well thought tree plantation programme. According to Mr. Abbas “If you have the interest of your country and your world, at heart, support my tree planting project. Make it a national programme. Plant a tree and save a life. Plant ten trees and save your future generation.”

Affluence

If we are to survive, we must cut back an extravagant affluence and re-arrange our priorities. A luxurious way of life is alluring but disastrous, and the world makes a painful choice while there is yet time.

I am thankful for the contribution of the people who helped in editing this book. S.Navjeet Singh & Ms.Mandeep Kaur for sorting the pamphlets on Environment. Parminder Singh Bhatti to get these printed and Bibi Jasbir Kaur who placed these articles in chronological order.

To save the world and future generations, All India Pingalwara Charitable Society is printing such books and distribute among the public free of cost. Please donate generously for this mission.

Dr.Inderjit Kaur,
Mukh Sewadar,
All India Pingalwara Charitable Society (Regd.)
Amritsar

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THE PLACE OF TREES IN HINDU MYTHOLOGY

“The future of India hangs not in the political but in the physical balance... the shape of things to come a couple of hundred years hence will depend on how we conserve our soil... how in short, we protect OUR FORESTS.”

K.M. Munsli writes that Matsya Purana says: “One who sinks a well lives in heaven for as many years as there are drops of water in it. But to dig ten such wells equals in merit the digging of one pond; digging of ten such ponds was equal to making a lake; making of ten lakes was as meritorious as begetting a virtuous son but begetting ten such virtuous sons had the same sanctity as that of planting a single tree.

There is an urgent need to stop further degradation of our land. Otherwise India will become a desert by 2010 A.D. with the increasing demand for food, fuel, fodder and our ever-growing population. Every inch of the waste land has to be brought back to productivity and maximum utility either by way of afforestation, social forestry or farm-forestry.

The major task is to afforest the wastelands, conserve the remaining good forests, and afforest the protected forest areas which have been degraded.

By Pawan Priya, Hindustan Times, June 17, 1986.



TREES AND INDIAN CULTURE

BY R.K Luna & HRIDESH

An extract (The Tribune April 27, 1986)

The Buddha says: “forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends protection to all beings, offering shade even to the axeman who destroys it.”

WORSHIP

Trees have been worshipped in Indian society as generators of life, a practice developed not merely as a blind faith but because of tradition. It has been proved by scientists in recent times that the services rendered by a single peepal tree amount to not less than Rs 1.57 million in 50 years of age. But think of the trees in the compounds of temples, shrines and historical places which have lived through ages. Trees on the roadside and in the temples are even more important as they not only shelter endless stream of people but also act as green lungs for purifying the air in the crowds that gather on auspicious occasions.

Nature has been kind to India by endowing her with fragrant woods like santalum (chandam), timber like teak (sagwan) and medicinal trees like barkat and neem. Sandal oil is famous for its use in the manufacture of perfumes and cosmetics. Incense sticks are also products of sandal wood.

Description of sandalwood is significantly absent in the Vedas and the Upanishads. However it forms an integral part of Indian lore. An interesting quotation from Kali Dasa is:

Yasyavarodh sthanam chandhanam;
Prakshalanat vari vihar kale.
Kalinda kanya Mathuram gatapi;
Gangormi samsakt jalai bhanti

In Punjab

It describes the river Yamuna near Mathura. The Yamuna is known for its bluish colour. The poet says that when the queens of the palace bathe in the river, the sandal ointment applied on the bodies gets washed away and imparts whitish colour to the water. This gives the illusion of the Yamuna having met the Ganga. The water at the confluence of Prayag does not remain blue.

Seals and painted pottery recovered from the Indus Valley show the figures of “peepul and babul”. These were regarded as celestial plants and supposed to be loved by divine spirits. Peepul was the abode of the supreme deity of the Indus Valley. This was a tree of creation and Knowledge, and was to impart the highest knowledge to those who donned its branches on their heads.

When the Aryans arrived in India, they first settled in Punjab. They cleared forest for the purpose of their settlements. As the population increased, more and more forest clearings were done for cultivation, habitation and pasture. They used wooden vehicles, such as carts and chariots. They also paved paths by clearing forests. The villages (grams) of Aryans consisted of thatched cottages. The doors, windows, posts, rafters, ridges and floors were entirely made of wood, which was obtained from the forests. The forest dwellers used to kill wild animals for their livelihood. They also used to cut the forest for their own requirements and also for supply to the Aryans.

MEDICINES

It is believed that rishis in the Vedic times had knowledge of the poisonous and medicinal values of various

trees, shrubs and herbs. The plants (or any part of a plant such as flowers, seeds, roots, fruits etc) which yielded potions have been referred to as “aushadhi” in the Rigveda. The famous Rishi Athrawan composed a number of mantras to extol the “aushadhi”. He was considered as “bhishak” (physician). His mantras are included in the Rigveda. The importance of medicinal herbs has been sung by some Aryan Rishi in the following manner:

The breeze which is blowing is sweet honey,
Sindus are emitting sweetness as honey,
Medicinal herbs be sweet as honey,
Sweet as honey are the nights and the dawn,
Sweet as honey are the dust of the earth,
Sweet is honey if our forefathers lived in heaven,
Sweet as honey are our shaded trees,
May the sun and cows be sweet as honey.

Trees benefactors of mankind

...Tree is, the greatest benefactor of mankind. Trees alone can protect material civilization and its advance is, therefore determined and measured by the degree to which the trees in a country have been preserved. Let us not, therefore, forget this basic fact and factor for development.



HEARTLESS NEGLECT OF FORESTS

By ARUN GANDHI

The Times of India, Wednesday, July 16, 1980

On the 13th day after Mr. Sanjay Gandhi's death, various units of the Youth Congress (I) in Bombay planted trees to commemorate his memory. Intentionally or otherwise, it was, no more than a symbolic gesture, as meaningless as all the other gestures we have been making towards our dear departed leaders.

A few days later, the Chief Minister of Maharashtra Mr A. R Antulay reportedly advised the citizens of Bombay to plant trees wherever space can be found in non-forest areas.

He said the forest department was already engaged in large-scale afforestation and tree-planting programmes in forest areas. But this would not be effective if considerable areas outside the forests remained denuded and barren and exposed to soil erosion.

Sweden's Example

Mr. Antulay's message was delivered on the occasion of the 31st Vanmahotsav and was just as symbolic as the Youth Congress (I)'s programme. One does not doubt the Chief Minister's intentions but there is a yawning gap between precepts and performance. If the Chief Minister really believes that the forest department is doing what is expected of it, he is probably not aware of the bureaucratic penchant for twisting statistics and facts.

A forest ranger in Maharashtra, who prefers to remain anonymous for obvious reasons, told this correspondent that

for years the practice was to allow illegal felling of trees in the middle of a forest, leaving a lush fringe for ministers and officials who generally confined their inspection tour to jeepable roads.

Mr Lars Kaersgaard, a Swedish forest expert, who has looked at forestry in India, firmly believes that the country has a great potential provided we take greater care and stop vandalism. He said in spite of the harsh climatic conditions in Sweden they were able to produce 3.7 cubic metres of wood per hectare. They have exactly half of their total area of 450,000 sq. kms under forests which sustain a highly developed sawmill, pulp, paper and finished wood product industry. If Sweden is the most affluent nation in the world with the highest per capita income, it is due largely to its forests and allied industries.

The produce is so abundant that in spite of the inordinately high domestic consumption they are able to export 40 per cent of their total output.

Maharashtra is just a little smaller in area than Sweden and though it has a much more conducive climate for afforestation the per hectare yield in the state, as indeed the country as a whole, is a dismal 0.5 cubic metres per hectare while the world average is 2.1 cubic metres. This, according to Mr. Kaersgaard, is due to crass indifference and neglect. To cite a simple example, he said trees are normally cut one foot above the ground to get maximum yield of timber but in India they cut trees three to four feet above ground, in spite of being advised against it. The reason is that workers are paid on the basis of trees cut and they naturally want to pick on the thinnest part of the tree to get a bigger return.

The use of an axe to chop trees is also out-dated. One wastes another two cubic metres because of the angular cut that chopping entails. A handsaw that can be operated by two people is ideally suited for India with its vast resources of manpower but this too is not acceptable to officials who say they will continue to use the axe till such time as the country can afford the sophisticated automatic machinery.

One has only to drive down any highway in the state to see the shocking barrenness and the consequent erosion of the soil. For a distance of 450 km on the way to Ratnagiri, and as far as the eye can see on both sides of the highway, there is not a tree worth the name. Instead, in an around Khed and Ratnagiri, there are mountains of charcoal meant for the fuel-starved cities. Charcoal-making has been a legitimate activity with about 13.7 million cubic metres of timber earmarked for this essential fuel. But with the recent shortages of coal, kerosene and cooking gas the demand for charcoal is so great that all rules and regulations are flouted with impunity.

The konkan coast is regarded by experts as ideal for a tropical moist deciduous forest. But what one sees there are a few scattered shrubs and the tell-tale signs of soil erosion. According to Mr Kaersgaard, if we do not take immediate steps to rectify the mistakes, the damage to ecology and soil will be so immense as to set us back by about 200 years. This is not a very happy augury for a nation that is struggling to find its economic balance.

The scenario is not much different in other parts of Maharashtra. The highway to Sholapur is just as barren for miles upon miles. What is more the few trees lining the

highway for about 40 km from Pune have been mercilessly chipped so that many of them are about to fail.

First warning

A month ago when a village in Himachal Pradesh was buried under a landslide we suffered the first recent casualties of indiscriminate deforestation. This should be regarded as a preliminary warning. Worse disasters may yet follow.

There is no gainsaying that trees in the cities are also important but they are much more useful in a forest. It is, therefore, difficult to believe that Mr Sanjay Gandhi's tree planting programme was meant only to beautify the urban areas.

India has the climate and the capacity to produce a much wider variety of wood than any other country. But, ironically enough, we need to import Rs 500 million worth of forest produce every year, besides suffering acute shortages of wood, paper and pulp. Forests in India are divided into 16 different categories, each supposedly yielding its own exotic varieties of produce. In reality, of course, there is very little substance left in any of them.

Though Maharashtra has only 20 per cent of its area under forest, it can improve its income and resources ten-fold by intensifying cultivation to catch up with the per hectare yields achieved elsewhere in the world.



Man's Greed For Land Threatens Forests

By Vishwanath Padma

The Tribune 10, January, 1976

The recent meeting in Hyderabad of the Central Board of Forestry expressed grave concern at the increasing deforestation and its long range effects on India's economy.

The board, which is the highest policy-making body on forests, meets once in two years. All the states as well as Union Territories are represented on it by their forestry ministers and forest officers. This year's meeting underlined the need for increasing the pace of afforestation, preservation of wildlife and revision of the 24-year old policy with regard to forests. The need to revise the national forest policy of 1952 was felt even at the last meeting of the board when sub committee was formed to draft a revise policy.

At present forest lands occupy 76 million hectares out of the country's total land area of 328 million hectares. This is barely 23 per cent as against the required minimum national average of 33.3 per cent.

While forest area is roughly 50 per cent of the area under agriculture, there is a wide disparity of income between the two sectors. Agriculture accounts for nearly 46 per cent of the gross national product while forestry's share is only 1.6 per cent.

Important Decisions

At last month's meeting, the board took three important decisions. First, forest lands should not be surrendered under any circumstances. If absolutely necessary for mining or

construction of reservoirs, approval of the concerned state legislatures should be sought. Second, unsurveyed vast areas covering a few million hectares, which are not being used for any purpose because they are fallow and uncultivable, should be afforested and hilly areas should be allowed to increase their forest areas up to 60 per cent to achieve an all-India average of 33.3 per cent of afforestation. Third, trees should be planted on open places in all cities. Here, the members were advised to follow the trend set up by the Maharashtra Government which has passed a law in this regard.

Another subject that came up for discussion was whether “forests” should be made a concurrent subject under the constitution. The consensus of opinion however, was that it should continue to remain a State subject.

A general complaint members voiced was that in several States. Finance Ministers do not support their counterparts dealing with forests. The board, therefore, urged all Finance Ministers to extend full cooperation of Forest Ministers.

Vital Role

Forestry in India made a beginning in the mid-nineteenth century with the establishment of Imperial Forest Department. The classification of forests made then as “reserved” and “unreserved” continues even now because of the vital role they play in the national economy. Since the provisions made and the restrictions imposed for preserving the reserved forests and their management were not sufficient to meet the destruction of forests including private forests, the Government of India adopted a new policy in 1962 exercising control over private forests and making provisions

for their management.

The importance of professional education and research was duly recongnized with the establishment of a Forest Rangers’s School at Dehra Dun in 1878 and later a Forest College at Coimbatore.

Since independence about 3.4 million hectares of productive forests have been diverted to construction of multipurpose dams, extension of cultivation, establishment of industrial units and so on. Studies conducted since 1958 show that India’s annual requirements of industrial wood would be 32.17 million cubic metres in 1980, and 49.50 million cubic metres in 1990 as against the present annual production of only 9 million cubic metres.

The position is even worse with regard to fuelwood, whose shortage is developing very fast in some parts of the country and scarcity pockets are expected to widen in the next few years. If immediate action is not taken, “this situation will further deteriorate, raising severe socio-economic problems in the rural sector and posing serious problems to maintenance of industrial forestry.”

The National Commission on Agriculture has emphasized the need for utilizing institutional finance to promote forestry through increased outlay on social forestry. Eleven States have already set up forest development corporations to mobilize institutional finance for development forestry. Mr Jagjivan Ram, in his presidential address (read in his absence by Mr. A. P. Shinde, Union Minister of State for Agriculture) asked the concerned State Governments to extend special care and guidance to such institutions to ensure greater results.

Forestry activities, being labour-intensive, do not demand much skill or technology and as such have considerable potential for generating employment. The Andhra Chief Minister, Mr. Venegal Rao, rightly said: “There are jobs when trees are cut in the forests; there are jobs in the factories when the trees are converted into products; and there are more jobs in the forests; when trees are planted.”

The board has recommended that a detailed study should be conducted for “harnessing” the vast potential of this sector for providing a meaningful existence to the rural masses living in and around forests.”

Mr. Jagjivan Ram told the member that the total direct investment in agriculture in the first four five-year plans was Rs 5,466 crores besides sizable investment in irrigation and other allied sectors for the benefit of agriculture. On the other hand, the total investment in forestry during the same period was only Rs. 212 crores.

The board noted that several so-called “minor” forest products have so far been practically neglected. It was possible to substantially increase revenue by making intensive use of fruits, barks, leaves, roots and by investigating the medicinal properties of shrubs, herbs, grass etc.

Technical Problems

Unlike mines which, once exhausted, cannot be replenished, forests can be renewed or reforested and used indefinitely. For proper management of timber, a forest must be divided into a number of smaller units or coupes and cutting operations should be undertaken keeping in view their productivity.

The forest departments should plan their manpower, carefully indentifying the areas and species to be planted. They should also be in a position to solve the technical problems that may arise in raising successive plantations. The area to be reforested or to be planted afresh should not be less than the area which has been cut or destroyed due to a variety of reasons.

The board urged forest-based industries to encourage and support research in this field. Mr. Jagjivan Ram said: “Research in several directions regarding high-yielding varieties of seed balanced nutrients, plant protection measures and better utilization of products has been continuously made by agricultural scientists throughout the world. The same cannot be said about forestry.”

Several States, especially Andhra Pradesh, UP, Punjab and Madhya Pradesh felt that the Fifth plan outlay of Rs. 16 crores on Forestry was inadequate and stressed the need for allocation of more funds under the annual plans for development of forests—(NPA)



TREE RENDERS SERVICES WORTH MANY LAKHS

The Hindustan Times, Monday, January 5, 1981

Varanasi, Jan 4 (UNI)—The value of services rendered by a 50-year old tree is Rs 15.7 lakh, according to estimates worked out by scientists.

The contribution of the tree is estimated as follows: production of oxygen Rs 2,50,000, control of air pollution Rs 5,00,000, control of soil erosion and soil fertility Rs 2,50,000, recycling of water and control of humidity Rs 3 lakh, bird and animal shelter Rs 2,50 lakh and protein conversion Rs 20,000.

The contribution of the tree in terms of prices of timber, fruits and flowers have not been computed in the estimates.

This was revealed by Prof T. M. Das, of the Agriculture University Calcutta during his presidential address on “Plants and Pollution” at the Science Congress here today.

Prof Das said trees generally survived for 100 to 200 years and a life span of 400 to 500 years was not uncommon. Red wood trees remained alive for 2,000 to 3,000 years.

A medium size tree as per current market rate would hardly fetch more than Rs 5,000 which was only 0.3 per cent of its real value. More often it was simply destroyed for a nominal price.

Utter ignorance coupled with influx of population has made people choose short term material benefits regardless of future irreparable ecological damage to the society, he said.

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INFLUENCE OF FORESTS IN THE ECONOMY OF MAN

The various ways in which forests exercise an influence in the economy of man and of nature may be summarized as follows:—

1. Forests supply timber, fuel and other forest produce, (valued at £ 200,000,000 in Europe alone).
2. They offer a convenient opportunity for the investment of capital and for the enterprise.
3. They produce a demand for labour in their management and working, as well as in a variety of industries which depend on forests for their raw material.
4. They reduce the temperature of the air and soil to a moderate extent and render the climate more equable.
5. They increase the relative humidity of the air and tend to reduce evaporation.
6. They tend to increase the precipitation of moisture.
7. They help to regulate the water supply, produce a more sustained feeding of springs, tend to reduce violent floods and render the flow of water in rivers more continuous.
8. They assist in preventing erosion, land slips, avalanches, the silting up of rivers and low lands and arrest shifting sands.
9. They reduce the velocity of air currents, protect adjoining fields against cold or dry winds and afford shelter to cattle, game and useful birds.

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10. They assist in the production of oxygen and ozone.
11. They may under certain conditions improve the healthiness of a country.
12. Finally, they increase the artistic beauty of a country and thus exercise a beneficial influence upon man.

Reproduced from the book Schlich's Manual of Forestry. Volume 1. BY W. —Schlich, Ph. D., C. I. E., F. R. S., M. A., Oxon.

With 34 illustration, and a rainfall map of India. London—Bradbury, Agnew & Co. Ld. 10 Bowverie Street 1906.



MAN-MADE FORESTS

The interim report of the National Commission on Agriculture published in August last year stated that 22.7 per cent of India's land is under forest. That is a questionable figure because in the case of Maharashtra for example (one of our better-run states) during the last 13 years as much as 6 per cent of forest lands has been given away for various purposes. These include lands which have been encroached upon illegally by agriculturists, regularization of ek-sali tenures, lands allotted for resettlement of refugees and land released for other uses on the basis of criteria established by the High Power Committee.

Curiously, one criterion used by this committee was that when there were less than specified number of trees in an area, it could no longer be designated as forest land. It should really have been the other way round: any land which had been under forest till recently and which had less than a specified density of trees should have been intensively replanted and protected.

Under the present dispensation there is an open invitation to despoil forest land and get it designated for other uses. This self-defeating mechanism must be ended. We know that we are far way from the target set by our National Forest Policy of having 33 per cent of our land under forest cover for both its productive and protective functions. We also know that unless there is a minimum density of trees the requisite canopy over the soil is not maintained, and the

forest ceases to perform its protective functions.

The NCA report stresses that our conservation-oriented forestry must give way to a production-oriented one, so that the so-called 22.7 per cent of the total land area gives a return commensurate with its size. Agriculture, it is stated, contributes 46 per cent to the gross domestic product while forest land (one half of the agricultural land in area) gives a disproportionately low return of 1.6 per cent. From each hectare we in India, get a return of just Rs. 11.30 against Rs. 140 in the United Kingdom and Rs. 190 in Switzerland. It is recommended by the commission that one lakh hectares should be clear felled annually, and that an expenditure of Rs. 242 crores should be undertaken during this decade so that our pulp and paper factories could get the required raw material, and the forests begin to yield a return commensurate with their potential.

There can be no quarrel with the commission's recommendations to get the most out of our productive forests. But the fact is that even our protective forests are in such a bad shape today their non-concern is inexcusable. The tardy reference to Social Forestry and the ecological role of forests is completely out of perspective. It is well known that most of our catchment areas lack adequate cover and the damage from floods, whose fury increases year by year is estimated to be of the order of Rs 3,000 crores in the last 25 years. The siltation of lakes and reservoirs and water courses has been going on unchecked, and the severity of drought is being intensified in several parts of our country.

Before, therefore, trying to squeeze the last rupee from

our jungles we must remedy the situation of our protective forests. The remarks made by the Famine Commission of 1880 cannot be repeated too often:

“There is before us a great amount of evidence from all parts of India that the destruction of forests is believed to have acted injuriously by allowing the rain waters to run off too rapidly. They descend from the hillsides in furious torrents, which carry down the soil, cause landslids, and form sandy deposits in the plains, so that the surface drainage which if gently and evenly distributed over an absorbent soil protected by vegetation should furnish a perennial supply of fertilizing springs, passes rapidly away, and the streams into which it collects quickly cease to flow, after causing mischief instead of good.”

There is no doubt that the best defence which our forests have today is their inaccessibility. Once they became accessible to human beings the pressure of human and cattle population and the demand for firewood is such that the administration would be incapable of protecting them. The commission refers to the forests of the Eastern Himalayas, particularly to the Darjeeling district, and recommends that hardwood species like *Michelia excelsa* should be replaced by *Pinus petula*, *Cryptomeria japonica* and several others. To make this change a vast infrastructure of roads and logging centres will have to be built. There is little doubt that if this happens some of the best forests of India will go the way the others have done. The seven million man days of employment which these operations are expected to provide would be very poor recompense for the destruction of our

protective forests and the ecological functions which they perform.

Regarding the need for firewood and the inadequacy of the same the commission says: "In conservation forestry, where investments are low, the forester may not have noted the pilferage with much alarm, but a programme of commercial forestry should make him think whether he can afford to look upon pilferage with the same blind eye."

The fact is that pilferage continues in the most blatant manner even in our national parks and reserve forests, and it is not for lack of awareness of what is happening that the situation is so deplorable. The Expert Committee on National Parks and Sanctuaries which presented its report in August, 1970, said:

"It must be admitted that if we look at the position realistically, we shall find that we lost about 50 per cent of our natural forests in the past 50 years. This has happened principally because we have lost sight of the protective role of forests and given far more emphasis to their productive role and not protected them adequately. We have also not taken sufficient account of the important truth that natural beauty is a vital part of man's spiritual and cultural heritage."

But let us not blame our foresters for what is happening. The main responsibility lies with the State Governments which have been unable to appreciate the protective, leave alone the spiritual, role of our forests.

The cavalier manner in which our forests are treated was brought home again to the writer during a recent visit to Melgha. To enable the Prime Minister to land in the

Dhakna-Kolkhoz Sanctuary, where incidently she spent less than an hour, a helipad had to be created. The Conservator of Forests, quite sensibly, wanted this to be constructed on bare land some distance away from the rest house. But the other civil servants wanted the Prime Minister to land just next to the rest house to cause her the minimum of inconvenience. And so a large area of newly planted teak was bulldozed for the helipad. For the benefit of these unimaginative officials I would like to quote the message which Mrs. Gandhi sent on the occasion of the inauguration of project Tiger on April 1:

"Forestry practices designed to squeeze the last rupee out of our jungles must be radically reoriented... The attitude of the accountant must give way to a wider vision of the recreational educational and ecological values of totally undisturbed areas of the wilderness."

-By zafar Futehally, Hony. Secretary Bombay Natural History Society

The Indian Express, May 10, 1973



FOREST MANAGERS DO NOT PROTECT FORESTS

By KISOR CHAUDHURI

The article titled Best Use of Forest (August 14-15) by P. K. Ray, a former Chief Conservator of Forests, West Bengal, reflects the shortsighted outlook of the present forest managers of our country.

Mr Ray begins with some figures of the national property lost during the last few years. He seemingly agrees with the conservationists that the staggering loss was due to environmental degradation. However, the article seeks to shift the entire blame for such damage to the environment, to the rise in population, extension of agricultural land, illicit felling and related factors. It quite overlooks the Forest Department's own responsibility for this situation.

EASY REVENUE

It is an agreed fact that environmental degradation now poses a positive socio-economic problem. But poverty alone cannot be blamed for this, nor can we avoid mention of the effect of vested interests. The result of the Government's exploitation of a source of easy revenue cannot to be denied either. During 1974-75, West Bengal earned Rs 51.30 million from the 1.16 million hectares of forests under the Department's control.

The socio-economic needs of the majority of our countrymen, especially of villagers who, incidentally represent 80 per cent of the population, were taken into account when the National Forests Policy was formulated.

Forests were then classified into Protection Forests, National Forests and village forests. The Policy statement recommended the establishment of tree cover in barren lands to stabilize physical and climatic conditions, and, above all, for the well-being of the people. It also emphasized the need for providing fuelwood to villagers till such time as conventional fossil fuels are made available to all in place of cattle dung and agricultural waste, which has a better use as manure.

During 1975-76 an estimated 133 million tons of firewood was burned, mainly for cooking purposes along with 73 million tons of cattle dung and 50 million tons of agricultural waste. It is estimated that India's fuelwood requirement will be 300 million cubic metres in 1990 against the 256 million cubic metres consumed in 1980. Firewood still provides 70 per cent of the energy needed for cooking in the villages, and an unbelievable 50 per cent in the cities.

Thus, an ever depleting forest cover is ultimately depriving the majority of Indians of their minimum necessities. In the name of "development" the forest development corporations in various States are sacrificing the basic interest of the people. For whom is this "development" intended? If it is for the public benefit, forest managers should have no reason to object when conservationists recommend extension of tree cover to 80 million hectares of available waste land.

Traditionally villagers who live near forested areas conserve and protect their vital source of survival. The conflict starts only when they are deprived of their rights in what they

have always regarded as “their” forests, and are forced to watch the disappearance of trees removed by loggers trucks operating under the guise of “scientific forestry”. Violence often follows, with the ultimate surrender of the weak to the power of corporations strongly backed by official sanction.

The picture today is no different from what it was under British rule. When they came to India, the British found thick forest cover all over the country barring the actual land that was under cultivation. This landscape changed fast. It was the rule’s right to permit indiscriminate felling for the up-keep of worldwide industrial interests. The two world wars hastened the process of denudation. However during those days the private ownership of forests was allowed, and, to some extent, this helped village forests to survive.

Immediately after independence, property rights on forest were withdrawn by the Government that era saw hectic despoilation (to steal from using face) of these forests as the owners were offered compensation based on the revenue earned in the immediate past. The forest managers who succeeded then, and who are really colonial officials by another name, could not accept the fact that forests have other uses for the people than to be solely a source of government revenue.

Little or no effort was made for the afforestation of denuded tracts, as is amply proved by available figures which show the loss of 321,000 hectares of forest land in West Bengal along during 1952-73. Mr Ray pleads that insufficient investment in the forestry sector is the primary reason for the poor rate of regeneration our country as

compared with the international average. But the relatively large sums of Rs 204,20 crores and Rs 420 crores were invested in forestry during the Fifth (1974-79) and Sixth (1980-85) Plans respectively. It was also made known that priority would be given for extension of man-made forests and for forestry by business houses for “commercial” and “social” use.

In spite of this encouragement, the present demand of the wood-based industries is for more than 20 million cubic metres against a production level of only 10 million cubic metres. The shortfall is met by depriving the village population of their age-old rights to forest produce. The Planning Commission’s recommendations for extension of tree cover to 1.5 million hectares each year is still not being implemented for reasons best known to the administration.

It is time our forest managers placed some emphasis on actually growing new forests for the country’s woods-based industries instead of pursuing the “50 or 60 year-old practice of clear felling” of forests for their raw material requirements. Today’s critical situation could have been averted if they had realized the need for afforestation a little earlier, instead of sticking to the 100-year-old “scientific forestry” syndrome.

One way out would be to ask large business houses to grow quick growing species of trees on specified tracts of land: this would be for their own consumption so that the supply of timber from government forests can be discontinued in a phased manner. This will possibly save the country from total denudation. Unless something like this is done, the

process of steady desertification will not be arrested.

Eucalyptus monoculture is condemned under the Social Forestry Scheme mainly because this particular species does not really help the rural poor in any way; its main purpose is to serve the interests of the large paper and man-made fibre industries. The impact on the ecological system comes next.

Good Money

In States like Gujarat and Karnataka large landowners have converted valuable agricultural lands into eucalyptus plantations thereby depriving the village poor of traditionally recurring earnings and also failing to provide anything that they can use for fuel, fodder or for building logs. The only advantage is that eucalyptus ensures good money to the owners.

The point that environmentalists wish to make is that while preparing “working plans” for forest exploitation, forest department and managers should also keep the human factor in mind. Had this been done, the devastating floods which last year alone took a toll of 2,080 live affected 43 million people and accounted for the loss of property worth Rs 805 crores might possibly have been avoided.

The Statesman September 18, 1984



LICENCE TO KILL FORESTS ?

The Tribune, Saturday, December 15, 1979

SIMLA, DEC.14—A Press report that the Himachal Pradesh Kisan Dal is planning an agitation to vest private forest owners with the right to fell trees at will and dispose of forest produce without Government interference has been received in official circles with much concern.

According to this report, the Kisan Dal wants the Government to state its forest policy by December 15 failing which members of the Dal threaten direct action, including hunger strikes. Certain political leaders are said to be at the back of this agitation.

MEMORIES OF 1978

Himachal Pradesh has a land preservation law aimed at preserving forest wealth and soil conservation. The memories of the 1978 floods and landslides are still fresh in people’s minds. The destruction wrought by the forces of nature is still evident.

The forest cover of Himachal Pradesh is not of the desired level. As against 60 per cent viable forest cover out-lined in the national policy, Himachal Pradesh has only 22 per cent. However, earnest measures have been and are being undertaken for afforestation and preservation of forest wealth.

It is surprising that a group of private owners wish to denude the hill areas of their forests and pose threats to the plains people of Punjab and Haryana whose well-being depends on the ecological balance of the wooded hills.

CONFLICT OF INTERESTS

This is clearly a conflict of interests between the commercially-oriented forest owners and those who want the well-being of society. The area under forests is fast shrinking and any act that may worsen the situation is, naturally, viewed with apprehension.

The Land Preservation Act will need to be enforced by the State Government rigorously if the existing vegetation cover is to be maintained and preserved. There is no room for softening of regulations.

If what is demand by the Kisan Dal—freedom to fell trees in areas owned by them and sell forest produce as they desire—is conceded it will wreck the states economy. It is commonly accepted that the cause of forestry is not the cause of a few but covers larger regional and national interests.



THREAT OF DEFORESTATION: SOME SUGGESTIONS AT SEMINAR

By Ashraff Sayed, Ahmedabad

A FOUNDRY workshop-cum-seminar organized here recently by the union Agriculture Ministry has urged the Central Government to adopt “Social” forestry as a national programme.

It has suggested that loans should be given at a nominal interest to individual farmers and village communities for growing trees on their land. It has also recommended that exemptions from land ceiling laws and relief from income-tax and wealth-tax should be given to agriculturists, industrialists and housing societies for planting trees.

“Social” forestry has special relevance to Gujrat which has only nine per cent of land under forests. In the Saurashtra-Kutch region, forests cover only four per cent of the land area. This has disturbed the ecological balance in the region and upset climatic cycles resulting in prolonged summers, severe winters and erratic monsoons. Frequent droughts and famine conditions have become a permanent feature of life in the state.

The low forest area has created difficulties about meeting the fuel requirements of the villagers who have been burning large quantities of cow dung and wasting valuable manure. With the forests fast disappearing, the poorer sections go to neighbouring areas in search of wood to cook their meals. So, human beings attack the vegetation with a destructive force that no locust swarms can match.

FUEL REQUIREMENTS

The seminar, which was attended by more than fifty experts, including a member of the Planning Commission, pointed out that for a predominantly agricultural country like India, the afforestation campaign has an additional significance. Besides meeting the fuel requirements of the people, trees are needed for conserving soil, arresting the advance of deserts and preventing floods and silting in reservoirs and canals.

While keeping the need for preserving the balance of the ecosystem in mind, the first and foremost objective of forest management is to meet the day-to-day needs of the rural poor who depend on forests for firewood, timber and fodder.

Some participants in the seminar pointed out that rural areas and small urban centres will continue to use wood as fuel since such alternatives as briquetted coal, lignite, natural gas, giogas, gas from town refuse or coal, solar energy, wind power, natural oil and kerosene will not be available on a large scale for the next ten years or so. For instance, even if two million gobar gas plants are not set up by 1990-91, the gas available from them will be able to meet only a fraction of the fuel requirements of the country's 550,000 villages.

So the rural population in non-forest areas is compelled to use cowdung as a fuel on a large scale. According to one estimate, the manurial value of cowdung burnt at present is equivalent to eight times the output of the Sindri Fertilizer Plant.

Though a forest area of 33.3 per cent, was decided upon in the national forest policy only 22.7 per cent of land in this country is covered by forests. Actually, 3.4 million hectares of land has been deforested since 1947. This alarming trend prompted the National Development Council to resolve in 1973 that no deforestation should be allowed in the future for the expansion of cultivation and the forest areas already lost should be compensated through afforestation on suitable wastelands.

In fact contrary to the national forest policy, between 1951 and 1959 more than 836,300 hectares of the productive forests was submerged in the rising water behind the new dams built during that period, or cut down to permit the extension of agriculture, the building of new townships, the setting up of new industries and the construction of roads, canals and transmission lines. What is worse, while the area under forests is dwindling the demand for firewood, timber and other raw materials is rapidly increasing.

Moreover, the existing forests are not evenly distributed throughout the country. For example, while forests occupy 80 per cent of the sparsely populated Himalayan tract in Uttar Pradesh, they account for only two per cent, of the Gangetic plains which have a very high density of population. The uneven territorial distribution of forests makes it necessary to transport forest produce over long distances and adds to their prices.

A warning was sounded at the seminar that deforestation was one of the major calamities which the country was facing. If some order is to emerge from this

chaos, the government has to take both legislative and organizational measures without further delay.

In view of the limited availability of land and the land hunger of the rural masses, there is no scope for bringing additional land under forests "Social" forestry can play crucial role here. It can include farm forestry, extension of forestry to waste lands and grasslands, the growing of trees to provide windbreaks and shelter belts, the re-afforestation of denuded forests and the establishment of recreation forestry.

The National Commission on agriculture has pointed out that in chronically drought-prone areas, agricultural land is covered by sand regularly, and the dry winds cause excessive evaporation of water from the top soil, and the crops. Judiciously placed wind breaks of trees and bushes can be of great help in checking both these tendencies.

In this context, the suggestions at the Seminar to earmark a certain percentage of the state's revenues for the development of farm and "social" forestry, and the introduction of a rural development cess, or a plantation development fund, deserve the Central Government's earnest consideration. The setting up of a Forest Development Corporation in State also appears necessary for carrying out these programmes.

The Times of India, 11, March, 1976.



VANISHING TROPICAL FORESTS

Deforestation has reached a critical stage in India, says Mr V. M. Meher-Homji of Institute Francais, Pondicherry.

Speaking on "Developments without Destruction" at a science conference organized by the Bangalore station of All India Radio recently, Mr Meher-Homji said that tropical forests were being deforested at the rate of 150,000 sq km a year.

Statistics supplied by the Central Soil and Water Conservation Research Institute at Dehra Dun showed that during the last 25 years four million hectares had been deforested in the country 70,000 hectares in the last three year alone.

GANGA BASIN

In the Himalayas, out of 1.5 million sq. km. of watershed, soil conservation measures were applied to only 1,000 sq. km. A flood in the Ganga basin in 1978 affected 43 million people with a loss of about Rs 15 crores.

The area under forests, Mr Meher-Homji pointed out, was gradually shrinking because whenever there was a demand for more land for expanding agriculture, industries, rehabilitation programmes and establishing hydro-electric, mining or railway projects, the forests were the only victims.

The area under forests in the country was estimated at 75 million hectares, constituting about 23% of the total land area. Of this, only one-third of the area came under better preserved forests and remainder was nothing but depleted scrub-jungle.

Mr Meher-Homji quoted FAO estimates which said that about 40% of the tropical forests of the world had been destroyed in the last 150 years. Perhaps, all of the remainder would disappear before the end of the century, during which time the population of the tropical countries would have at least doubled.

Intensive destruction of forests in India, according to Mr Mehar-Homji, started towards the end of the 18th century. Tea and coffee plantations were introduced on a large scale along the Western Ghats, in Darjeeling and Sri Lanka. Systematic exploitation of the timbers began about the same time.

Following the European settlements in India, the tropical teak was found to be a suitable substitute for the temperate oak for ship-building. In order to relieve pressure from the over- exploited oak forests, the teak forests of Malabar were the first to be taken over by the East India Company. In 1700 alone, 10,000 teak trees were cut in Malabar for Ceylon (now Sri Lanka).

In North India the sal forests were heavily exploited for the railway in the 19th century. The network of railways was expanded after the mutiny of 1857. Each rail track of 80 km required 20,000 tonnes of wood, almost exclusively of teak. In the “sleeper operation” carried out between 1890 and 1920, hundreds of thousands of sleepers were supplied to the then Bengal-Nagpur Railway from the Sambalpur district of Orissa. Almost all the available sound sal trees down to 35 cm diameter were exploited. Only a check was placed in 1924, enabling the forests to recover.

The two world wars in this century necessitated overfelling and prior to the abolition of proprietary rights, all the utilizable trees were exploited, thus deteriorating the forests that were even free from shifting cultivation.

The forests of chir pine (*Pinus longifolia*, of the Himalayan region attracted attention because of its multipurpose uses. It was a source of resin for the turpentine industry and provided wood for the railway sleepers. The result was that the mixed forests were converted into pure formations of chir pine, just as many of the tropical mixed deciduous forests of Peninsular India were turned into either teak or sal—dominated man-made formations.

HORNBEAM TREE

As soon as research showed a new use of a particular species, industry heavily exploited that species bringing about its near disappearance. The common periwinkle (*Vinca rosea*), once abundant on the coastal sands of Mahabalipuram—Pondicherry tract and in Coimbatore, vanished as soon as the medicinal properties of its root alkaloids were discovered. Soon after, another herb belonging to the ginger family (*Costus speciosus*), growing in the ground-cover of deciduous forests, came under focus for its steroids.

More recently, the hornbeam tree caught the attention of shuttle makers because research showed that its wood was suitable for it. The result was that a factory making shuttles wanted these trees growing in the remote hills of Tehri-Garhwal felled. However, the local inhabitants, who knew the value of the hornbeam tree in preventing landslides and

providing fodder for cattle during the scarcity season, saw to it that it did not happen.

Realizing the disastrous effects of indiscriminate deforestation on the ecology of the hills, the U.P. Government has banned tree-felling above an altitude of 1000 metres.

The humid evergreen forests of the Western Ghats, Mr. Mehar-Homji pointed out, were in a very delicate balance with the environment. Once cleared, their regeneration was almost impossible. In the Silent Valley areas, the grasslands were not showing any traces of progress towards the forest state stage. In fact, during the hot, dry summer months, relative humidity came down to such an extent that the strike of a match-stick was sufficient to set the grassland on fire.

The main argument in favour of preserving the forests of the Silent Valley and those in its vicinity such as the Attappadi and the New Amarabalam forests, was that they were one of the least disturbed sites in the whole of the Peninsular India and contained the largest extent of woodland in a single block that was neither much perturbed nor transformed. There was practically no human habitation inside it. It was one of the very few instances where both the upper and middle canopies as well as the undergrowth and ground-cover were preserved in good condition.

Mr. Meher-Homji said that for the last three years Institute Francais was carrying out litter studies in the Silent Valley forests. It had come to the preliminary conclusion that the litter production was very much less in this evergreen forest compared to those of West Africa and other countries where there was practically no average dry period. In the

Silent Valley there was four months of dryness. This made the ecosystem fragile because the forest had to cycle its own minerals and the slightest interference resulted in an imbalance.

VEGETATION MAP

The Pondicherry Institute in collaboration with the Karnataka Forest Department was preparing a detailed vegetation map of Western Karnataka in order to provide suitable guidelines for forest management. The Forest Department, Mr. Mehar-Homji said, was interested in introducing some species of economic value such as the clove tree from Africa and America.

Stressing that the emphasis should be on renewable resources, Mr. Meher-Homji commended the example of the Gujarat Energy Development Agency. Its programme included popularizing solar cookers, solar powered cold storage and decentralized power plants based on plantations which provide a renewable, cheap and clean source of energy without causing pollution.

(The Stateman, 20 May, 1981.)



DEFORESTATION MEANS DISASTER FOR INDIA

The Times of India, 12 February, 1981

By GAUTAM S. G. VOHRA

PERTURBED by the damage being caused to the ecology Mrs Indira Gandhi never misses any occasion to highlight the necessity to preserve it. Even during her recent rushed two-day tour of Gujarat, she made it a point to spare time to inaugurate a conference on ecology at Sasan Gir.

But despite Mrs Gandhi's exhortations, the states, in fact, are taking a lead in upsetting the ecological balance. The policy followed by the forest development corporations set up by them is the major cause of the destruction of the country's forest. Since the corporations are interested primarily in making as much money from the sale of trees to contractors, they plant only those which fetch the highest commercial returns.

MONO-CULTURE

Chir pines, which provide resin not only for domestic use by export as well, have been planted throughout the Himalayan foothills. It is precisely this practice of mono-culture that is responsible for the floods which wreak such havoc with unfailing regularity.

For one, as the trees are planted in blocks together, they mature at the same time and are thus cut at one go. As a result large hilly tracts have no protection. For another, under mono-culture no scrubs or "secondary trees" are planted, which facilitates soil erosion during the rains.

The chir pines are of little use to the local people. Before the introduction of "Scientific forestry", as the authorities describe it, the natural forests used to yield a

variety of fruits for consumption by the villagers. And the grass and shrubs fed the cattle.

District collector Walton wrote in the Almora Gazetteer in the nineteenth century: "The hillman is indeed specially blessed by the presence in almost every jungle of fruits, vegetables, roots to help him over a period of moderate scarcity".

Mono-culture has put an end to this state of bounty. Even if smaller trees, shrubs and grass are planted these are not likely to grow because chir pine needles are acidic and destroy everything on which they fall.

The inability of chir forests to absorb water, as well as indiscriminate felling of trees has resulted in far greater quantities of it flowing down the hills. The first Irrigation Commission (1903-3) estimated surface flow at 1,170 million acre feet. In 1972, it placed the flow at 1,356 million acre feet, an increase of 186 million acre feet in 71 years.

Consequently the ground water level in and around the hills has declined. This has had drastic implications for the agriculture of the people living in the region. No crops can be grown there during dry periods.

The repeated washing of the top soil from the hills has begun to affect agricultural productivity along the entire Indo-Gangetic plain. For as a result of siltation of riverbeds sand is washed across over vast stretches of land during floods.

This drastically reduces the crop yield. In Jaunpur district of eastern U. P. , despite the increased use of high-yielding varieties of seeds, and fertilizers, and improved irrigation facilities, the productivity of the cultivable land has declined.

Since the early forties, the country has lost over a hundred million acres of forested land. As wood accounts

for 62 per cent of the domestic fuel and in the rural areas this figure is as high as 80 per cent, over 250 million cubic metres of it is being removed from forests each year. This is more than 20 times the volume of timber extracted each year and exceeds many times the annual growth of wood in forests.

The benefit provided by forests, if calculated in hard currency, amounts to over a hundred thousand crore rupees: the insurance against floods, erosion and loss of soil nutrients adds up to Rs. 30,000 crores, forests store water worth Rs. 40,000 crores and they provide timber and firewood worth Rs. 45,000 crores.

Forestry can generate far more jobs than industry. A cost-benefit analysis conducted by Mr Shankar Ranganathan, an ecologist supports this point. If Rs.200 crores is invested in a petrochemical plant, it being highly automated, it will not need more than 100 operators. Since its primary product will be available for conversion into a variety of articles about 50,000 jobs will be created downstream through manufacture, transport, sales and service but this will require an additional investment of about Rs. 300 crores.

If the sum of Rs. 500 crores is used for forestry, five million acres can be covered with trees every year. After the fifth year, a million and a quarter acres can be cropped. Aside from 100,000 people who will be required for this purpose, an equal number will be employment in soil preparation, conservation and harvesting operations. In addition, the collection and processing of forest products will generate a large number of jobs. The total employment created will be at least six times greater than that by a petrochemical complex.

But as things are, trees are being cut at such a rapid rate that India will lose all her forests within 20 years. This

will lead to a drastic drop in a agricultural production and cause the death by starvation of millions.

Clearly steps need to be taken urgently to prevent such a catastrophe. According to the plan formulated by Mr Sunderlal Bahuguna, leader of the Chipko Movement in the Garhwal and kumaon Himalayas, there should be a ban on the commercial felling of trees in the hills above an altitude of 1,000 metres and on slopes whose gradient is more than 30 degrees : For the steeper the slope, the greater the danger of erosion.

There should be a restriction on the cutting of fodder species like hornbeam. At present it is being removed in large numbers to meet the needs of the textile industry.

GREEDY CONTRACTORS

Measures should also be taken to prevent the callous exploitation of pine trees. The greed of contractors makes them try to extract the maximum resin by making deep cuts on the sides of the trees which weakens them to such an extent that they cannot withstand the slightest breeze.

The practice of mono-culture should be restricted only to unproductive barren land, of which the country has over a million acres. Emphasis must be laid on planting food trees—those that bear fruits, nuts, oilseeds, fertilizer trees—whose leaves are rich in organic manure, fibre trees like mulberry and cotton, and trees that provide fodder.

The supporters of Chipko Andolan quote the government's policy in support of their demand that all commercial felling should be banned until the forests cover 60 per cent of the hills. At present this figure is as low as 30 per cent.



PROTECT OUR FORESTS:

1. They protect our soil.
2. They keep the desert at bay.
3. They minimise floods.
4. They conserve water.
5. They attract rain.
6. They prevent silting of dams.
7. They provide timber and paper.
8. They shelter our wild life.
9. They provide recreation.
10. They provide employment.

Foreword to the Book

WILL INDIA BECOME ANOTHER SAHARA?

By Shankar Ranganathan

2, Flowermead, Westfield Estate, Bhulabhai Desai Road, Bombay—26.30th March, 1973.

My sole purpose in publishing this booklet is to rouse public interest in forests and forestry. Most people in India have the feeling that forests are a luxury which the country can do without; that priority must be given solely to creating more employment and raising the standard of living of the people.

It is agreed that food production deserves top priority and agriculture has consequently achieved an eminent position in the nation's plans. Rightly so. How important then for the people to understand the vital role of forests in relation to productive agriculture !

Erosion through floods and wind every year, removes millions of tones of precious topsoil, impoverishing the

land. These millions of tons of soil which are lost, that took ages to form, represent a loss of millions of tons of food grains. Year after year this loss increases with the neglect and disappearance of the forests. Good Forestry would reduce erosion of our soil bank, ensure and enhance food production.

The danger that India faces is, that with the removal of forests, the quality of land will deteriorate to such an extent, that the country will ultimately become a desert. A desert cannot not sustain a large population. It is not high time then that the importance of forests was recognized and forests given the priority they deserve in the nation's plans?



Why trees and forests ?

SHADE EVEN FOR THE AXE-MAN

The forest is a peculiar organism of unlimited benevolence that make no demand for its sustenance and extends generously the products of its life activity, it affords protection to all beings, offering shade even to the axe-man who destroys it.

—Gautam Buddha



CALL TO PRESERVE FORESTS

The Indian Express, September 29, 1981

Renowned freedom fighter and follower of Mahatma Gandhi, Mr. Sunderlal Bahuguna, presently on his a march from Kashmir to Kohima, addressed the students of the Himachal Pradesh Krishi Vishwa Vidyalaya here yesterday.

Padamshri Award winner in the preservation of Himalayan Ecology, Mr. Bahuguna urged the students to create awareness among villagers about the importance of forests. He said villagers' poverty is mainly attributed to deforestation.

Mr. Bahuguna said there was a need to preserve not trees alone, but other vegetation and living things also as these elements help in controlling soil erosion.

Mr. Bahuguna called upon students to go to the villages in groups and educate the people to plant trees. They should also raise nurseries, he said.



STOP DESTROYING FORESTS

The Hindustan Times, March 21, 1986

By UMANG BHUSHAN

Whether one lives in a city or a village, everyone depends on forest and forest products, and yet this ignorance is the cause of one's cavalier attitude towards one of the most vital aspects of national reconstruction—the renewal and enrichment of our forests.

Forestry is the foster mother of agriculture. As a foster mother, forests feed the rivers and streams, fill the dams and reservoirs for being used to provide irrigation water and generate electricity and for increasing agricultural production. Is this not by itself a great service rendered by forests to earn the gratitude of man, specially in a country like India whose economy is based on agriculture.

Besides in the rural areas fuel wood is the main source of domestic fuel. But fuelwood supplies are dwindling fast because we are cutting down trees from the so-called wastelands without making any effort to replant seedlings in these areas. The consequence is that cow-dung is being increasingly used. The amount of cow-dung burnt thus annually is equivalent to the fertilizers produced by more than eight Sindri fertilizer plants in a year. Also, many of our farmers keep milch cattle. The dependence on dairying is much greater in the case of small and marginal farmers who earn as much from this source as from cultivation. And here again forests rise to the occasion by providing fodder for cattle.

Trees provide a large number of raw materials for cottage industries which can be taken up by the farming community and landless farm workers as a spare-time occupation. Here mention may be made of silk worm rearing, match splint manufacture, rope making, broom making, leaf plate making and toy-making etc. In certain areas of Madhya Pradesh, the Mahuva trees yield a bumper crop during drought years to myriad of tribals in our country who live in and off forests. Their future is intricately woven with the future of our forests.

Nor can the recreational value of trees and forests be lessened. They beautify the landscape and improve the urban environment to make the urban life more pleasant and a better place to live in. At the same time, philosophers and thinkers, saints have all found a welcome refuge in the thick of forests. No wonder, trees have always found a revered niche in our religious rites, folk-lore and ancient literature.

Yet against a total requirement of 184 million cubic metres (131 million tones) at present, the annual availability of fuel wood from forests is a meager 20.03 million cubic metres. The demand for fuel wood by 2000 AD would be in the neighbourhood of 225 million cubic metres. Regeneration under the Central and the State schemes as functioning at present can provide an additional 60-70 million cubic metres by 2000 A. D. The gap between the current demand and supply is made good by drawals from farm-owned plantations and by organized and unorganized poaching on an extensive scale.

This is the background against which the National

Commission made a strong plea for utilizing all available wasteland and village common for raising firewood, fodder and timber for wood-based industries. And it is here that the concept of social forestry can rise to the occasion in a big way to deliver the goods.

Under this scheme the choice of varieties is on the basis of their usefulness as firewood, straight timber and wood for pulp. These are grown as border plantations and serve as wind-breakers. The cutting cycle is such that in the seventh year, the trees cut at the end of the fourth year are ready again for cutting. Happily India has received international assistance for its social forestry programmes. Subabul (reputed as the wonder tree because of its multi-purpose utility as fuel, fodder and pulp-wood) seeds have been obtained from the Philippines. Social projects now under way with World Bank costing Rs 500 crore cover Gujarat, Uttar Pradesh, Andhra Pradesh, Bihar, Haryana, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa and West Bengal. Tamil Nadu's scheme envisages an outlay of Rs 109 crore for ten years. Under this scheme, 3.55 lakh hectares are to be planted. Trees on canal embankments and on the two sides of the rail track will account for a coverage of 12,150 Km. These projects of the State Governments, if carried to fruition, will replace to the extent of 40 per cent the green cover lost over the last decade. Which is precisely why they have to be closely monitored and protected against becoming green flashes in the pan.

The difficulty with forests is that unlike agriculture or industry, they are unable to deliver results in a short time

and instead have a long gestation period. As against this, the attitude of the people is that they wish to get immediate results. Another drawback is that while centres of industries and agriculture are located near or around the community, forests are far removed from centres of human civilization. This distance also acts as a barrier to the awareness of the importance of forests.

The services rendered by trees increase in proportion to the interest one takes in their development. A nation without forests and trees is bound to wither away sooner than later. Before such an eventuality occurs we should make it our second religion to protect our forests and expand their limits. Trees are the only barrier between civilization and its destruction, the last bastion of oxygen production and an enormous filter that supplies clean water to the cities and towns by way of meandering streams and rivers.



FORESTS FOR PLUNDER

(The Indian express, Monday, August, 18, 1980)

The move to initiate what is called a comprehensive forestry policy, with an expert group preparing a project on making forests commercially attractive and ecologically beneficial, suggests a continuing mix up of priorities. There is nothing wrong in economic utilization of forests. But first thing first. Using natural wealth for productive purposes can be viable proposition only if it is in a flourishing state. At present the question is of saving forests from commercial depredators, encroachers, and ill-conceived development projects like that of Silent Valley and Tehri dam. To design a forest policy to suit the needs of industries and contractors is just the wrong way to go about it.

The environmentalists do not exaggerating when they warn that the country is in danger of losing its best precious natural health for ever. The facts speak for themselves. The scientific view is that at least 35 per cent of the best geographical area should be covered by forests to maintain a proper ecological balance. But what do we have now? Less than 22 per cent in fact, thick forests cover less than ten per cent of the total land surface. The rest shown in Forest Department maps are in varying degrees of denudation. We are consuming for fuel and commercial needs about 200 million cubic metres of wood in the current year, while the annual wood growth is estimated at about 50 million cubic metres. At this rate—and it is bound to increase—we may well run through what is left of our forest heritage in a decade or two.

Re-forestation to suit business interests is a mockery of the very concept of conservation. The kind of trees that make quick profits will not make an ecologically viable forest. Nor will it stop the steady erosion of soil that is causing increasing floods. A World Bank aided project to raise Pine trees in a Bastar area, where till then Sal forests stood in all their primeval glory is an example of the wrong approach. The most telling evidence of how forgotten the national forest policy resolution of 1952 is can be seen in an advertisement of the M. P. Forest Development Corporation at your service, miles of beautiful Forest to make any number of wood plub base modern products or to plant with rubbe, cocoa, coffee, etc... They might as well have said that forests are for plunder.



THE ENERGY CRISIS...2

Plant a tree and save the world

By K.A.Abbas (BLITZ, 3 November, 1979)

A MAN IS WORRIED

He is an ordinary man. And his worry is no common worry.

He is an extraordinary man, a mature (70-years old) and brilliant Scientist.

And he is worried about the world—he fears the end of the world is near. Not because of any mythological or religious belief in Qayamat, Pralay, or Dooms Day. But he fears that Man is committing suicide by recklessly spending all sources of energy.

Trees for Energy

I meet Iqbal Krishna Bharati every day on the Juhu beach. He is even more of a beach-comber than I am, and whenever he meets me, he expresses pessimistic thoughts about the future of Man and his reckless habits.

In just over a hundred years, he says, Man has almost spent the entire world resources of oil—whatever remains in the bowels of the earth will be hardly sufficient for the needs of Man for about thirty years—or (maximum) for half a century. I have already written about the reckless expenditure of OIL last week.

The Western Scientists enamoured of Nuclear Energy, says Bharati, have ignored one obvious and simple Source of energy which is—trees !

Coal has been quarried for three centuries now but Man has almost exhausted the world resources of rock coal.

Use of Carbon

Just 30 years ago coal supplied 18 per cent of the world's energy requirements. The figure has dropped to 7 per cent.

But by the beginning of the 21st century there will be a revival of the world in the use of coal and natural gas to the extent of six times the present usage.

Mr. Bharati tells me it took millions of years for sufficient amount of carbon to be formed into coal and gas and Man has taken just a few hundred years to expend most of the world sources of Carbon. In a couple of hundred years there will be no carbon formation left in the form of rock coal, gas—or tree or leaves. The world will be reduced to deserts and cliffs without any vegetations.

Another cause of worry. When two million years ago, the Earth's population was just one million the Carbon Dioxide content of the Earth's atmosphere was 70 particle per million. It has gone up to 300 particles per million and will further go up to 600 particles per million by the beginning of the next century. That is the extent of air-pollution due to industrialization.

Grim prospect

That is the grim prospect of the world that worries Mr. Bharati the pessimist. But his pessimism is not negative only.

There is a way out of the crisis in which Man has placed himself. If there were enough number of trees around us the carbon dioxide would be absorbed by them.

Plant a tree

It is as simple and cheap as that. (It will not cost more than fifty rupees per tree planted.)

A massive tree-plantation is the answer to the crisis.

For a tree cut to produce charcoal, an alternative source of energy, ten trees must be planted. These trees will convert carbon dioxide into life-giving oxygen and we will be able to maintain the natural balance between oxygen and carbon dioxide.

Tree Project

Charcoal is the easiest and cheapest form of fuel. After all charcoal obtained from burning fire-wood was the world's first source of energy before it was replaced by mineral coal and later, oil. Nuclear Energy can be no real substitute because it does not produce oxygen or absorb carbon dioxide.

planting of about 1000 crores of trees to meet its requirements of energy. This will also provide jobs for million of people, thus greatly solving the unemployment problem.

Since tree plantation does not require any specialized skill, millions of humble and illiterate villagers can be involved in the project.

The British Scientist Ernest Schumacher seemed to agree with Mr Bharati. In a forward to a book on Forest Farming he wrote just before his death—

“Many people are becoming interested in solar energy. I am not sure he always appreciates the fact that a most marvelous three-dimensional, incredibly efficient

contraivance already exists, more wonderful than anything man can make—the trees.

Agriculture collects solar energy two dimensionally ; silverculture collects it three dimensionally. This surely is the wave of the future”.

“Indian tree”, Bharati points out, can grow to tall stature in just five years and there is no human need they can not meet.

Save future!

Ecological problems caused by deforestation can be avoided by a well thought tree planting programme.

“So Mr. Abbas”, Mr Bharati concludes his morning walk, “if you have the interest of your country and your world, at heart”, support my tree-planting project. Make it a national programme. Plant a tree—and save a life. Plant ten trees—and save your future generation.

A man is worried

He has reason to be worried—it the man will not heed his scientific warning.



Environment

All the physical, social, and cultural factors and conditions influencing the existence; surroundings.

Nobody is quite certain, either how many people have been forced to move by the rising waters. To the best of our knowledge, some 80,000 were displaced in Egypt and the Sudan, nearly that many in Ghana and perhaps as many as 70,000 in the Ivory coast by the time Koshou Lake is full. A quarter of a million more may join the list if the projected PA Mong Dam ever spans the Mekong river for Thailand to Laos.

The waters of dams were meant to bring instant progress to needy countries. Too late, we are recognizing their hidden perils.

Claire sterling
Readers Digest August 1973



Central Department For Ecology And Environment

(Blitz, Jul 28, 1979)

Under the guise of development, a concerted effort is being made by concerned administrations to distrub the country’s ecological balance.

The gigantic fertilizer and petrochemical complex at That will expose ten million people in metropolitan Bombay to belching pollution.

The Mathura Refinery will destroy the fine fabric of the TajMahal and other land marks of our cultural heritage.

Continued and though less deforestation in the lower Himalayas will impoverish the people in the hilly regions

and bring natural disasters and calamities in north India.

The Hydro-Electric Project in the Silent Valley will result in disappearance of the rarest example of unexploited nature of the country.

Despite this, these projects are pursued vengefully. The fact they are being executed by the various governmental agencies in disregard of warnings by ecologists shows we are least concerned with the well being of future generations.

We seem to forget that what we are enjoying today is because of the highest regard shown by our forefathers to nature and ecology. The excuse continuously put forth for this depredation is of development.

Whenever ecologists and environmentalists have warned against such development, the authorities have tried to shift the blame by saying it was not their department which was perpetrating the thoughtless action but another. So many times the excuse that the subject matter does not fall within their purview is trotted up.

This applies to the Central and State Governments and the Municipal Authority and as a result, dangerous projects are allowed to be implemented regardless of opposition. If this type of shifting and shrinking of responsibility for misdeeds continue one can imagine what could be in store for our children.

The time has come to set up a high-power Department of Environment at the Centre directly under the Prime Minister with the objective of maintaining ecology and environment. It should have adequate and comprehensive power to stop any activity at any level which is likely to endanger future generations.

—Kishan Mehta, President, Save Bombay Committee, Bombay.

ENVIRONMENT POPULATION AND FOOD

ZAFAR FUTHEHALLY

Recent debates in the West indicate that the donors of food are seriously worried that their food supplies to India, instead of being temporary measures to tide over an emergency, only worsen the situation from year to year, and seem to weaken India's resolve to be self-sufficient in food grains.

Much publicity has been given to poor ware-housing, destruction by rats and pests, maldistribution and unrealistic socialistic policies. Serious journals have published articles on the folly of continuing to assist the indigent. Suggestions have been made to discover a means of establishing direct "pipelines" between the food supplying agency and the hungry, short circuiting the government and the middlemen who have been found so ineffectual in discharging their responsibilities.

Commenting on the Rome Food Conference, Dr M.S. Swaminathan emphasised in a recent speech that it was evident that our projected shortages cannot possibly be met by donations matter as a threat from war is unlikely to make any impact in a world where the principle is "devil take the hind-most." The West does not want to be reminded about Barbara Ward's analysis that the happy situation of Europe and America is due largely to the fortuitous circumstances of the industrial revolution preceding population explosion. Increase in population, therefore, boosted consumer demand and gave a new strength to economy. In India, as in the rest of the third world, the situation has been fundamentally different. Population explosion is in full cry while the

industrial revolution has yet to gain momentum.

The lukewarm pursuit of population control measures in most states is fraught with tragic consequences. It is unfortunate that both at the Stockholm Conference on the Human Environment in 1972 and the Population Conference at Bucharest in 1974, India, and most other countries of the Third World, upheld the view that development was the best solution. In fact, this is far from the truth, for without checking our population growth there can be no economic progress at all.

It should be evident by now that if population control has to succeed in India, Government must engage the most imaginative people in the country, and give it high financial priority. But the discussions at the National Conference on population organized in Delhi recently by the Minister of Health and Family Planning revealed how casual attitude of the Government is towards this crucial task. The objective of reducing the birth rate to 30 per thousand (which still makes the population double its present size in 35 years) was considered to be too idealistic. The announcement at the end of the Conference that in the second year of the Fifth Five-Year Plan, that is 1975-76, family planning would receive less than the current year's budget of Rs 52 crores (which is just half of what the planners originally intended) shows the low priority given to this important subject. No wonder one perspective participant in the Conference remarked that if family planning has to limb along in this fashion it can only nullify all our efforts at raising the standard of life of our people.

If one studies the reports on family planning from the various States, we realize that the problem is not being

tackled with sufficient seriousness. Family planning departments are often saddled with responsibilities quite unconnected with the primary aim of birth control. In Uttar Pradesh, for example, the department has to look after a number of welfare schemes including that of supplying drinking water to villages. The report states that "35,507 villages of the State had drinking water difficulty" and attempts are being made to rectify the situation. This obviously is not a problem which should fall within the purview of the Family Planning Department. Last Year's report from Jammu and Kashmir admits that population is increasing at the rate of 2.6 per cent, and is expected to double by 1998. It says that "the State Demographic and Evaluation Cell heavily charged with various responsibilities"... has not been able to achieve too much. "Administrative difficulties and moratorium placed on expansion and filling up of already sanctioned posts by Government of India..." makes any effective implementation impossible.

The only state where family planning has been successful is Maharashtra. Here, out of total of 9.7 million couples in the reproduction age group, nearly 2.23 million or 23.1 per cent are currently protected by some kind of family planning method. Maharashtra has won 10 National Awards during the last 13 years for outstanding work in this field.

It is now reliably claimed that an investment of at least Rs 3,500 has to be incurred by the State per child for providing services for health and education and opportunities for employment. In view of this, it does not seem bad economics to slash down expenditure on birth control programmes in these difficult times.

The Sunday Standard, February 23, 1975

“AWARENESS OF ENVIRONMENTAL PROBLEMS”—2

INCREASED ATTENTION TO PROBLEM OF FOOD

The third is the problem of “food”. Here, of course, you might say we are dependants so much upon the ‘weather’. That is true? But, within the vagaries of the weather, there is a lot that can be done. As we all know, there was a World Food Conference about two years ago, and following that, many steps have been taken like the setting up of a World Food Council, an International Fund for Agricultural Development etc. But, basically the problem of food can be solved only on some assumptions with regard to population growth. The second point is that at the same time, we must be able to improve the levels of nutrition. It is not enough for the people to have food, they must also have a well-balanced diet and good quality food. In this regard, permit me to tell you that many of the global food problems can be solved if the rich countries decide to go vegetarian. It takes six pounds of cereals to produce one pound of meat. If all the foodgrains that are used to feed livestock were turned over to the feeding of the under-privileged people of the world, the food problem can be eased to a large extent. But, curiously enough, the ‘opposite’ is happening in the wealthy nations. As countries become wealthier, their per capita consumption of meat and meat products grows, and the result is greater strain on the cereals resources of the world. This is something that the poor countries have been pointing out repeatedly in forums like the World Food Council. I am not saying that there is going to be a great change of heart and everyone will become Gandhian. But, I do say that not only has it been proved that vegetarian food is better food, it is also healthier. For example, cholesterol has been one of the main health problems of people in the affluent countries, and it is closely linked to consumption of animal fats.

ENVIRONMENT WARFARE USING NATURE TO KILL

The Times of India, January 1, 1978.

Devices which modify the environment can cause more death and destruction than conventional armaments. DILIP M. SALWI warns against the dangers posed by these lethal new weapons of war.

Under the cover of darkness, three to four camouflaged fishing boats chug along the seashore or through rivers or lakes. They spray the water with hexadecanol, a fatty alcohol,



producing a thin film over the surface to stop evaporation. The desired result: a drought in a neighbouring country, which draws moisture from these natural reservoirs for cloud formation.

A pack of armoured tractors enters a dense forest and bulldozes everything that comes in their way. A massive land

clearing operation is thus carried out, and every inanimate structure razed. Land deforested in such a way—the technique is called “Rome plough”—would thereafter be of no use for cultivation of any crop or fruitbearing trees.

A fleet comprising hundreds of aircraft approaches a lush green field and bombards it till everything is burnt and wiped off. The land becomes pockmarked with moon-like craters and is rendered virtually inhabitable.

The aim of any war is to obliterate the enemy’s armed forces and terrorise the civilians so that they capitulate. Can any such aim be observed in the above tactics employed nowadays in military warfare? The ultimate purpose—to defeat the enemy is certainly achieved, but at what price?

Archaeology tells us what devastation the abuse of the environment can cause. In the past large civilizations and powerful empires have suffered through misuse—albeit inadvertent—of the environment. Where today reside deserts, once there were flourishing cities and the towns of Mesopotamia and Harrappa. Owing to ignorance and lack of vision on the part of these civilizations, irreversible soil salination and erosion caused by contamination of natural substances with soil, gave rise to deserts and changed the climate drastically.

But the destruction a civilization can bring on itself over hundreds of years, can be duplicated within a few hours by environment warfare. The recent wars in Viet Nam and Middle-East provide us a glimpse of the dangers of environment warfare to mankind using even simple and unsophisticated techniques like a napalm bombing.

Mr. Arthur Westing, a botanist at Windham College in Putney, U.S., who has studied the after-effects of the

techniques U.S. forces employed a deny cover to troops and terrorise civilians, claims that a permanent ecological collapse has occurred in Viet Nam. For instance, 10 per cent of the nation’s trees have been sprayed one or more times with anti-plant chemicals, called herbicides. About 3,000 million cubic metres of soil volume, has been displaced due to bombs, producing craters. Indeed, the land has become so ecologically debilitated that where once grew lush green forest and crops now only bamboo can be grown. About 30 per cent of mangroves, the cultered-up trees that grow about the seashore in tropical areas, have been reduced to muddy wastelands, allowing soil to erode. Using the “Rome plough”, in all, about 803,100 acres of forest has been cleared, which includes rubber plantations and fruit orchards.

In 1975, the first step to prevent any further exploitation of the environment for military ends was taken. The US and the USSR presented the 28th U.N. assembly an identical draft convention. The assembly passed on the issue to the conference of the committee on disarmament. According to the draft convention environment modification is “any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere, and atmosphere, or of outer space, so as to cause such effects as earthquakes and tsunamis, an upset in the ecological balance of a region, or changes in weather patterns (cloud precipitation, cyclones of various types and tornadic storms), in the state of the ozone layer or ionosphere in climate patterns, or in ocean currents.”

The only environmental modification technique presently feasible is that of “punching” holes in the ozone

layer, which could be done either by exploding nuclear devices or spraying ozone-attracting chemicals (such as chlorine) in the upper atmosphere. Tampering with this layer, which acts as an umbrella protecting living beings from harmful radiations (ultraviolet, X-ray and so on) would be fatal to mankind.

Partial success has also been claimed in creating floods in nearby valleys by melting glaciers and snowfields in the Chilean Andes. According to a recent report, scientists of the Geological Survey of India who carried out research in Kinnaur, Himachal Pradesh, claim that a coal dust spray of the right thickness could melt glaciers. About the research done in creating artificial lightning to produce forest fires, inciting storms and earthquakes changing ocean tides and currents, making avalanches and landslides, modification of permafrost, making snow etc., nothing at all is known nor do they appear technologically feasible today.

It is high time that research into such techniques is nipped in the bud. The threat posed by these weapons is in no way less than that of the nuclear bomb, the consequences of which are well known.



COST OF DESTROYING ENVIRONMENT

By a staff reporter

The Statesman, May 10, 1986

The Prime Minister's recent tour of drought-affected areas has shown him what happens when man destroys his environment.

Disclosing this while opening the first seminar of the newly formed Science, Technology and Environment Cell of the AICC (I) in New Delhi on Thursday evening, Mr Rajiv Gandhi said, "last year the country had to spend Rs 1,000 crores on drought relief, a figure that might keep increasing because we have taken some short term benefits by cutting forests."

On another plan, when evaluating the environmental cost of building a large dam, the Prime Minister agreed that "the job was not going to be easy, but if we are on the wrong side, the cost is going to be very heavy, and future generations will never forgive us."

Mr Rajiv Gandhi also talked about the need to be careful about accidental damage to environment and human lives, and referred to the Bhopal holocaust. He criticized the tendency of "politicians to fight to keep dangerous industries in town for the votes, not realizing that in this way we will lose not only votes but people as well."

He stressed that politicians could not keep pushing back these issues and pretend that they did not exist.

The Prime Minister gave a call to his party men "to gear ourselves for emergency measures, and raise public awareness on these issues. Otherwise we will not be ready when the crunch comes, and people will have to know the hard way, as they did in Bhopal or Saurashtra. These are not esoteric values but real dangers."

WORK ON ENVIRONMENT

WEAPONS-1

By A. K. MAJUMDAR

The Statesman, September 23, 1980

A major war, if waged today, would have serious effects on our ecological balance. Even if damage to the environment is not intended, the impact of war itself could result in large scale radioactive contamination, chemical and biological poisoning. But the environmental consequences of an all-out war have not been sufficiently emphasized by environmental scientists and organizations.

Modern war can impinge on the environment in two main ways: through deliberate or incidental damage during fighting and through the use of actual environmental weapons. Though it would appear, at first sight, that indiscriminate development of nuclear weapons, together, with delivery capability, poses the greatest danger for the future, information emanating on the development of environmental weapons reveal a prospect of equally serious concern.

The world has been frantically acquiring increasingly sophisticated weapons. Even before the end of World War II, the big Powers raced towards development of weapons based on newly acquired scientific knowledge. Today, the potential for organized violence to both people and our eco-systems has assumed grotesque proportions. That the possibility of using environmental forces to achieve military ends has become a reality became clear from Congressional hearings in the USA, which revealed how rain-making operations and systematic destruction of vegetation were conducted in the

Vietnam war.

Research and development on environmental modification for war are still at an early stage. But there is reason to believe that further research could release gigantic forces which might lead to a world catastrophe. Once released, these forces would be uncontrollable.



Is The Weather Changing ?

Sir,—According to Dr. Derek Winstanley in his article in "Nature" his records show that rainfall in the monsoon belt has been reduced by half since 1957. Our meteorological department should check with their records wheater this is correct. If it is corroborated, we need to take urgent and drastic measures.

The first is to have a much more active and widespread programme of budding, grass and forest raising, which conserves moisture and checks erosion. The second is to conserve as much of the food as we can, that is at present being spoilt or wasted by rodents and insects.

Lastly, knowing that without water we will not be able to raise adequate food for our exploding population, we need a much more vigorous drive in birth control.

In fact, if the climatic change has occurred we must inject an element of compulsion in the birth control programme.

—Yours etc.

V. G. JHALA, S-532, Greater Kailash-1, New Delhi.

The Hindustan Times, July 11, 1973.

Industrial greenhouse gases are commonly blamed for global warming. But agriculture too contributes 10 per cent of the load, of which 74 per cent comes from low-income countries. Punjab and Haryana can do their bit by taking up low-carbon-footprint practices.

Combat changing climate, and fast

Manjit Kang

The Tribune, July 18, 2013

US President Obama's June 25 speech at Georgetown University in Washington DC and US Secretary of State John Kerry's Speech on June 23 in New Delhi—both involving climate change—have put forth the challenges posed by climate change. Obama indicated that his climate change strategy included enhancing engagement with emerging economics such as India and China while Kerry emphasized that combating climate change and reducing poverty were intrinsically linked : challenges. Putting things in an Indian context, he remarked: “when Himalayan glaciers are receding, threatening the very supply of water to almost a billion people; we all need to do better.”

The concerns are justified because in May 2013, the concentration of the major culprit of climate change, carbon dioxide in the Earth's atmosphere passed the worrisome 400 parts-per-million mark, as recorded at the Mauna Lao Observatory in Hawaii. The consequences of global warming caused by carbon dioxide emissions include increase in mean temperature, unfavourable changes in precipitation (e.g.erratic monsoons); more frequent occurrence of extreme climatic events such as drought flooding and coastal storms and sea level rise. These events have cascading effects on

food and livelihood security, shelter, and human health.

Emerging economics

There is fear that the economic growth of emerging economics will be constrained by limiting carbon dioxide emissions because increases in atmospheric concentrations of carbon dioxide are positively linked with economic growth. Total gas emissions decline in times of economic downturn. This was witnessed in western countries in the 1930s and 1980s, in eastern countries in 1990s, 1960s, and initial years of the 21st century, greenhouse gas emissions increased tremendously as during these periods, rapid economic development occurred.

Agriculture contribution to the GDP is much higher in developing countries like India and China. According to the World Bank, in 2010, the contribution of agriculture to the GDP in the US was only 1.2 per cent while in India it was 17.2 per cent. Agriculture provides livelihood to 40 per cent of the world's population that is able to work. In India, this proportion is around 60 to 70 per cent.

Agriculture contribution

Agriculture impacts global warming directly and indirectly. In developing countries, in addition to the production of carbon dioxide through the burning of fossil fuels, it is generated by the burning of agricultural biomass or stubble, farm yard manure usage, and aggressive tillage operations. Methane and nitrous oxide, the two other greenhouse gases, also cause global warming. Methane is produced through digestive activities of live stock, rice cultivation via flood irrigation, and heaps of farm yard manure. Nitrous oxide is produced from microbial activities and nitrogen fertilisers especially when used in excess of

requirement. Agriculture directly contributes 10-12 per cent of all greenhouse gases that are attributed to “human” activities.

Indirectly, these gases are produced via change in land use; for example bringing forest land or wetlands under cultivation. The amount of gases thus produced is equal to that produced directly. Therefore, total agricultural contribution is about 24 per cent. A portion of the agriculturally generated carbon dioxide is used up in photosynthesis. At the global level, 74 per cent of all agriculturally generated greenhouse gases are contributed by low-income countries.

Food production

Research has shown that every 1^oc increase in temperature would cause a 5 to 15 per cent yield reduction in maize in the US and Africa and in wheat in India. Shifts in geographic boundaries and frequency of crop insects, weeds, and pathogens are expected to occur. If atmospheric temperature were to increase by 5^oC, food production in most countries would be expected to decrease and food grain prices expected to double. Increased temperatures could be beneficial for a few heat-loving crops such as melons, sweet potato and okra.

Effects of climate change on commercial forestry will be similar to those on crop production and natural forest ecosystems. Heat stress reduces milk yield, weight gain and reproductive activities. Production of meat and milk is projected to decline with increases of above 3^oC.

Indian scenario

With the increasing population and climate change, demand for water will increase for agriculture, and other uses to meet food, fiber and energy security needs of society.

Sustainable supply of fresh water will likely to be adversely affected because of the rapid melting of major glaciers.

Research has shown that to maintain a good standard of living, renewable water resources capacity of 1000m³ per capita per year is required for thriving economies. India’s planners are using 250m³ per capita per year to sustain its economy—half of what China plans.

In India, the heartland of Green Revolution (Punjab, Haryana and western UP) already face a serious ecological crisis because of exploitative and unsustainable use of natural resources, especially land and water. This agriculturally most productive area has been contributing almost 100 per cent of the wheat and around 67 per cent of the rice towards national food grain reserve in India. Punjab, merely 1.5 per cent in area of India, alone has been consistently contributing between 40 and 60 per cent wheat, and around 30 to 40 per cent rice to the national pool. Punjab (0.03) per cent global area) even figures prominently at the global level as it produces world’s 3 per cent wheat, 2 per cent rice, and 2 per cent cotton.

The ‘food bowl’ states have paid a heavy ecological price in that they have severely depleted their underground water resources. Punjab alone has 13 lakh tubewells while China has 35 lakh and US 140 lakh for irrigation. In 2010, at the prodding of the Central Ground Water Authority, the Punjab Government had to ban tubewell connections for 300 villages in Sangrur, Moga and Ludhiana districts.

Scientific studies from Punjab Agricultural University have shown that combined availability of water from canals and rainfall and seepage is 3.13 million hectare metre per year, whereas water demand is 4.33 million hectare metre per year. The 1.20 million hectare metre per year deficit

is met by overexploitation of water resources. Predictions for central Punjab are that mean watertable depth, which was 22.8 metres in 2006., will increase further to 34.2 m in 2016 and 42.5 m in 2023. Withdrawal of water from deeper layers requires increased amount of energy, which results in increased amount of green house gases and infrastructure.

A satellite study conducted by NASA during 2002-2008 estimated that under-ground water in Rajasthan, Punjab and Haryana was being depleted at a rate of 17.7 + 4.5 km³ per year. During the six-year study period, the total net reduction in water was 109 km³, which is twice the capacity of India's largest water reservoir on land.

In addition to receding water table in northwest India, soil health has been adversely impacted and air pollution has been rampant because of open burning of crop residue. Most of these problems can be attributed to a lack of suitable land-use and water-use policies.

A sophisticated WORLD CLIM-DIVA system has predicted Ludhiana's average annual rainfall to decrease by 75-100 mm (11 per cent) from the current rainfall of 600-800 mm between 2000 and 2050. Predicted change in average temperature of Punjab is more than 2.5°C between 2000 and 2050.

India's increasing population (166 crore in 2050) will put further stress on natural resources. To feed this population, India will need to increase its food grain production by 80 per cent from its current 253 million tonnes.

Adaptation strategies

The major options available to manage agricultural and livestock systems to reduce emissions are changes in feed and feeding practices, manure management and more

efficient fertilizer application. Carbon footprint of agriculture can be reduced by sequestering soil carbon, shifting to crops with higher carbon storage potential, and reducing forest clearing for agricultural expansion. Conservation agriculture (e.g., zero tillage) and precision farming should reduce greenhouse gas emissions.

Efforts must be made to control population growth. Use of renewable energy (solar energy, wind energy and nuclear energy) must be incentivized. Much carbon can be sequestered by growing trees, along with crops, i.e., practicing agroforestry. Wetlands must be preserved as they can store three to five times more carbon than forest trees. Currently, Punjab only has a handful of natural (12) and man-made (eight) wetlands. Efficiency of water use must be enhanced by introducing innovative irrigation systems, such as drip irrigation.

Biochar (carbonization of biomass) can be used to sequester carbon in terrestrial ecosystems. India could produce 309 million tonnes of biochar annually to offset 50 per cent carbon generated by the burning of fossil fuels.

—Former vice Chancellor
PAU Ludhiana

WARNING SIGNS

- ♦ Increase in mean temperature
- ♦ Unfavourable changes in precipitation
- ♦ Frequent occurrence of drought, floods, coastal storms
- ♦ Sea level rise

WHAT TO EXPECT

- ♦ Every 1 degree rise in temperature will cause a 5% to 15% yield reduction in some crops ; 5-degree rise will hit food production globally

- ◆ Food grain prices likely to double
- ◆ Heat stress will reduce milk yield
- ◆ Frequency of crop insects, weeds, pathogens expected to occur
- ◆ Meat production to decline with temperature rise of above 3 degrees.
- ◆ Shift in geographic boundaries

WAYS TO CUT GAS EMISSIONS

- ◆ Change in feed, feeding practices
- ◆ Manure management
- ◆ Efficient fertilizer application
- ◆ Shift to crops with higher carbon storage potential
- ◆ Reduce forest clearing
- ◆ Scientific grain storage
- ◆ Impose carbon tax
- ◆ Incentivise use of renewable energy

◆

HOTTER HERE, COLDER THERE BUT IS THE CLIMATE REALLY CHANGING ANYWHERE ?

The Hindustan Times Magazine, July 2, 1978

From the sweltering heat we have been experiencing in Delhi this summer, and from reports we read in newspapers about heatwaves sweeping most parts of northern India, and even some areas of the south, we may be inclined to think that the climate is probably getting warmer. But, then, one swallow does not make a summer. Let us therefore, before forming an opinion, briefly see how the climate of the earth has varied from the very remote past to the modern age.

Multifarious evidence has been found to suggest

that within the last million years the world has experienced at least four great ice ages, each building up over a period of some 90,000 years and terminating in the comparatively short time of about 10,000 years.

During the ice ages the temperature was generally lower than now by about 6 degrees centigrade. But some places were colder still. In the European lowlands, for instance, annual mean temperatures influenced by this region's proximity to the ice sheet, were probably 12 degrees lower than today's. On the heights of the mountains in Europe and North Africa and the Himalayas temperatures, as judged by lowering of the snowline, probably fell by four to six degrees.

In the periods between the ice ages (known as interglacials) the climate was warmer than it is now by about one to three degrees.

Many complex theories have been advanced concerning the origin of the ice ages, such as a change in parameters of the orbit of the earth round the sun, a sudden change (by chance) in the distribution of heat storage in the atmosphere and oceans, and so on. However, a study made by H. H. Lamb in 1964 perhaps suggests the most simple and plausible explanation—some reduction in the supply of heat energy from the sun in the remote past have cooled the earth sufficiently to extend the polar ice limits.

When the last major ice age was retreating we had two warm stages—around 12,000 and 9,000 BC. But there was once more a return of the cold climate which lasted about 600 years, roughly from 8,800 to 8,200 BC, and within this period we had a climate disaster of unparalleled abruptness accomplished within just 50 to 80 years. The northern forests were destroyed, and the glaciers returned to many places.

including north of England.

Proceeding further, we find the warmest period between 5,000 and 3,000 BC, and then a markedly colder and stormier period from 900 to 450 BC.

Coming to the period after the birth of Christ, we encounter a warm and relatively storm-free epoch from 1,000 to 1,200 AD. This was followed by a markedly cold climate, particularly in the Northern Hemisphere, between 1,430 and 1,850 AD. This period is known as the “Little Ice Age”. Thereafter the temperature began rising slowly, reaching a maximum around 1940, after which a downward trend was observed.

It may be noted that instrumental observations began only from 1640. For the rest of the vast spectrum of time the temperatures have been estimated from the moraines and eskers left behind by former extensions of glaciers, fossil tortoises and other vanished faunas, and various other records left on the earth in the past. Nevertheless, these estimates made by experts in the field after years of research are considered quite authentic.

It may also be noted that the warming and cooling that we have talked about was very slight (within one or two degrees centigrade) during, say, the last 8,000 to 10,000 years. Before, that, particularly during the ice ages, the variation—as we have seen—was of the order of six degrees at least.

It has been observed that temperature variations from year to year, as also from epoch to epoch generally increase towards high latitudes, while rainfall variations are greater in low latitudes.

These, then, are the chief climatic fluctuations that took place during the past one million years.

We have so far considered the changes in the climate brought about only by natural processes. But man also is

modifying the climate. “Modern man” may be said to have walked the earth for about 50,000 years. However, we are concerned with the last 10,000 years or so only during which man began to achieve a degree of mastery of his local environment, and has been changing the face of the land, the composition of the atmosphere, and the balance of living things.

The most widespread modification of the climate by man perhaps began some 8,000 years ago by conversion of the natural vegetation into arable land and pastures. The conversion of well-developed forests began somewhat later. Large parts of Europe, the eastern parts of the United States and the mountains of southwest Asia and Turkey to Afghanistan, all of which were originally covered by dense coniferous or deciduous forests, were changed by man.

In tropical latitudes the Savannab grasslands are entirely man-made, the natural forests having been gradually destroyed by widespread bushfires started by local inhabitants during the dry seasons. This type of conversion has largely affected tropical Africa, north-eastern Brazil, and some semi-humid areas of Central America and southeast Asia. In India the conversion into arable land has predominated.

The net result is that 18 to 20 per cent of the total area of the continents has been drastically changed by man, with serious consequences for the climatological heat and water budget. Furthermore, in many areas of the old world including India, the deserts are apparently spreading with a speed of around one kilometre a year, as a consequence of grazing animal (notably goats).

Coming to recent times, we find industrial and other urban activities within the cities, and in areas between them, influencing the parameters that determine the climate. Industrialization is steadily adding heat to the atmosphere by the burning of coal, gas and petroleum products. The rapidly

increasing contribution of nuclear energy for generation of electricity should also be considered in this connection. Besides, industrialization injects water vapour, volatile organic compounds and particles in the air which change the heat balance of the atmosphere.

Establishment of large hydro-electrical power plants has required large-scale damming of rivers with the consequent formation of new lakes, some of them large enough to appear on the world map. River-flows have been regulated and some rivers diverted.

All this has had its influence on the atmosphere. Open water has a lower reflecting power than a frozen, snow-covered water surface. Hence both the amount and seasonal distribution of the heat absorbed from the sun can be changed by altering the area covered by water. Groups of buildings and other huge structures in cities have created what are called 'climatological domes'. This also affects the heat balance of the atmosphere, though only slightly.

But by far the greatest impact on climate by man has come in the form of atmospheric pollution which is growing day by day with the increase in industrialization and energy production. In this respect the greatest contribution has come from the highly industrialized countries of Europe and from America, China and Japan. And it so happens that all these countries lie in the mid-latitude zone of the Northern Hemisphere where the zonal westerly flow of winds prevails. Hence there is a steady eastward transport of the particles injected into the atmosphere. These particles usually reside in the lower levels of the atmosphere for less than a week. Their residence time in the upper atmosphere is longer.

Aircraft are the main source of pollution of the upper atmosphere. At present aviation is consuming about 10 per cent of the world petroleum production and there can be little doubt that the aviation industry will become twice as large

within the next few years.

Taken together, present estimates indicate that of the total particulate load of the atmosphere (that is, natural and man-made), contributed by man ranges from 5 to 45 per cent, depending on the type of particles.

How does this particulate load in the atmosphere affect the climate? It does so in two ways. First, particles change the radiation field by scattering sunlight. This affects the total heat reaching the earth from the sun. They also modify the total heat radiated by the earth in space. Secondly particles also enhance the process of condensation in the atmosphere because water vapour requires minute particles to condense upon for the formation of clouds.

Thus we have more or less touched all the important factors concerning man's activity that affect the climate of the earth in one way or the other. And as the world population continues to increase from the present 3,800 million or there about to perhaps twice that many by the turn of the century, these factors will become much more forceful than they are today. Will they really change the climate of the earth? Certainly, they will to some degree. But how far and in which direction is rather difficult to predict because we are competing here with powerful natural forces that are also changing the climate, as they did in the past when man was not there.

Moreover, whereas we do have a rudimentary theory of climate and a good deal of knowledge about how things act in the physical world, when we turn to forecasting man's behaviour, we face an uphill task. There are no laws that we know of or mathematical models that will allow us to predict the future course of human activity. Hence we can only say what could happen if man continues to act more or less in the same way as he is doing now.

However, one thing is certain. There can be no drastic

change in the climate in the next few centuries at least, even under the most favourable conditions when man's activity and natural forces act on the climate in the same sense. This is so because the atmosphere-ocean system is sufficiently ponderous and possesses huge store inertia to resist changes. A particular area may become hotter or colder, rainy or dry in the next few decades due to man's activity. But for the world as a whole the change, if any, will be negligible.



The Chilling Facts About Weather ANOTHER ICE-AGE COMING

by Geoffrey Lean

Weekly Himmat, Friday, August 8, 1975

The accumulating weather data over the past few years is increasingly pointing towards an ominous future. Scientists are seriously considering the possibility of a sudden global "climatic flip" which may bring a new ice age or melt the polar icecaps or turn the tropics into deserts. Geoffery Lean chronicles the chilling facts.

What is happening to the weather? The familiar cry, long the lament of the British holiday-marker, is being heard more and more from worried scientists. For evidence is building up that we may be in the middle of an important shift in the world's climate.

If we are, the subject of the weather will soon change from being the last refuge of would be conversationalists to one of the most crucial topics of the day. For even a relatively small shift could have devastating effects on world food production, while there are lurking fears that we could be approaching a sudden "climatic flip" which could plunge the earth into a new ice-age or the bring Sahara desert to

Europe.

And if the weather changes, we may have only ourselves to blame. For a distinguished group of experts believes that our activities—particularly our use of energy—are already altering the climate, while many more authorities are convinced that it will suffer before long if we go on as we plan to do.

COMPLEX PROBLEM

It is an enormously complex problem, and at present the only thing that is certain is that we do not really know what is happening. At the moment we do not even know for sure what makes the weather work—let alone what may change it. But a strong suspicion is emerging that our climate is very delicately balanced and that even seemingly small regional changes can have serious effects.

Evidence of change has come from both extremes of the system—the poles and the tropics. Much of the data from the tropics has come from the Sahel—the broad strip of West Africa on the southern edge of the Sahara which for six years has been in the grip of drought.

Research by Dr. Derek Winstanley and by Prof. Reid A. Bryson, Director of the Institute for Environment Studies at the University of Wisconsin and a distinguished meteorological in his own right, has come up with the conclusion that the monsoon rains are moving south again—perversely switching from lands that desperately need rain to areas that have plenty of rain already.

And according to Prof. Bryson the Sahel is only the worst example of a general trend. He reports failures of the monsoon right across Asia—in north-west India, Bangladesh,—Sri Lanka, China—and in Central America and Mexico.

Prof Bryson is now predicting that for the rest of this century the monsoons are not likely to return with any regularity to some vital regions. Prof. Paul Ehrlich, the internationally known ecologist, writing in the first issue of the magazine, "Environmental Conservation", estimates that if this is so between 300 and 400 million people may die of starvation on the Indian sub-continent alone. Prof. Bryson reckons that climatic changes will precipitate the deaths of 1000 million people—more than a quarter of the population of the world.

Meanwhile, right across the earth something strange has been happening at the North Pole. Two scientists in New York, Drs George and Helena Kukla, have been studying the snow and ice cover of the northern hemisphere shown in satellite pictures. The pictures show that in 1971 there was a sudden jump of about 12 per cent in the annual average cover of snow and ice. It would need only about seven similar jumps to bring about a new ice-age.

Even an apparently small cooling of our climate can have serious effects. During the 1960s the average temperature of typical lowland inland sites in England fell by about 0.3 degrees centigrade. This seem a tiny amount, but in practical terms means a shortening of the growing season by about two and a half weeks.

Indeed it may be that the whole of the last 40 years have been "an age of plenty". Research done on what the weather in Iceland has been over the past thousand years suggest that 1930 to 1960 was the most freakish spell of good weather in the whole of the last millenium.

But it is in these 30 years that the population of the world has doubled, agriculture has expanded to take in

almost all the world's available land and industrialization has spread around the world. The new "miracle" strains of crops bred for Green Revolution were designed for the weather of this time. What will happen if this weather—ironically officially classified as "normal" condition by international agreement—indeed turns out toa freak?

EFFECT OF POLLUTION

There are some leading climatologists who not only believe that the weather is seriously deteriorating, but that pollution is involved. Prof. Bryson pins the blame on our use of energy. Burning fossil fuels to produce power releases both dust and carbon dioxide into the atmosphere. In 1967, according to one estimate, we pushed 13,400 million tons of carbon dioxide into the atmosphere in this way.

According to Prof. Bryson this carbon dioxide, together with water vapour and ozone, is creating a "greenhouse effect" in the atmosphere, and thus heating up the tropics. This, he argues, may well be one of the factors that have thrown the monsoon off balance.

Another authority who believes that man may already be affecting the climate is Mr. Maurice Strong, Executive Director of the United Nations Environment Programme. He said this summer: "There is a strong suspicion that man may be affecting the whole cycle of precipitation. Action is needed now. We must be able to foresee the consequences of our deeds before it is too late to remedy then."

Serious changes in the weather could also come from the amount of heat we create by the use of energy. All energy creates heat, and it is likely that the climate will only be able to stand a certain amount of it. The heat we are putting into the atmosphere is increasing by 5.7 per cent a year—which

means that it more than doubles every 14 years. **And nuclear power stations produce about 100 times more waste heat than coal-fired stations of the same size.**

THE OZONE LAYER

Production of energy is not the only threat to the climate. Vaunted marvels of modern technology as different as Concorde and the aerosol could also have an effect. According to research they could jeopardize the ozone layer in the atmosphere which plays a part in determining the weather and which, by screening out lethal ultra-violet radiation from the sun protects us from skin cancer.

Last month specialists in atmospheric science at Harvard University—Dr. Michael McElory and Dr. Steven Wofsy—calculated that even if the use of aerosols was stopped as soon as possible the ozone layer would have been cut by five per cent by 1990. The gas that they say does the damage is freon, several million tons of which are sparyed into the atmosphere every year as the force that drives the squirt.



Last month, too, four experts including Dr.

Norman Phillips, principal scientist with the US National Meteorological Service and two researchers at the Massachusetts Institute of Technology, announced the result of their work. They said that exhaust gases from an international fleet of 500 supersonic planes—”a conceivable projection for the year 2000”—could destroy a high percentage of ozone.

But perhaps the most frightening possibility of all is of a “climatic flip” which suddenly plunges the earth into an ice or heat age. This may happen extremely quickly. When the last ice-age came down, many mammoths were frozen. Some have been found still standing, with undigested grass in their stomachs.

In “The Doomsday Book” Gordon Rattray Taylor writes: “The inference from these facts is that the earth’s climate can flip from one stable mode to another with undreamed-of suddenness, when once the trigger is pressed. We do not know what the trigger is, but we may be pressing it.”

One event that would certainly by disastrous, and which is being taken very seriously, is the melting of the polar ice-caps. This would dramatically heat up the world’s climate, and inundate coastal cities.

A meeting of scientists, including several Nobel prizewinners, at Aspen, Colorado, last year reported that we may well melt the Arctic ice-cap within 100 years. Ways in which it could happen include heat pollution, and a big oil spill in the area. Meanwhile, the Antarctic ice-cap may be threatened by plans to bury radioactive wastes from nuclear power stations in it.

It would seem to be worth the while of government to find out what, if anything, we are doing to the weather—and what to do about it.

ALL THINGS ARE CONNECTED, WHATEVER BEFALLS
THE EARTH BEFALLS THE CHILDREN OF THE EARTH”.

The Ravaged Mother Earth

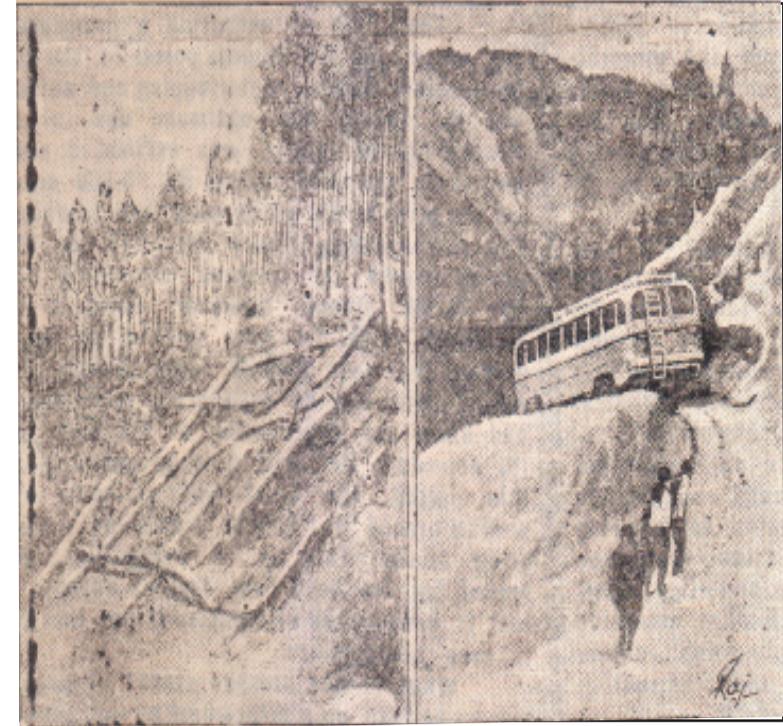
By B.B.VOHRA

The Indian Express, June 5, 1978

Visual evidence of our neglect of the soil is available wherever one might go in this huge country of ours. Denuded hillsides, ravines, water logged and saline areas, drought-stricken villages, silted-up tanks and drying wells are to be encountered almost everywhere. Floods ravage large areas year after year even as the Rajasthan desert maintains its leeward creep. In certain coastal areas, particularly Kerala, erosion by the sea is a major problem. In the north-eastern parts of the country shifting cultivation continues to strip once heavily forested slopes of all vegetations.

In quantitative terms, around 140 million hectares—out of a total geographical area of 328 million hectares—are seriously affected by erosion by wind or water, about 7 million by waterlogging and salinity in non-coastal areas alone and another 20 million also by floods—a total of 167 million hectares which need protective and ameliorative treatment to stop the further depletion of our soil resources. However we must also take note of the 20 odd million hectares of canal irrigated lands which are today being utilized only to a fraction of their potential because of the wastefulness and inadequacy of distribution system and the lack of proper arrangement for draining away excess water and for the levelling and shaping of fields so as to

enable them to be irrigated efficiently. This makes a grand total of 187 million hectares which require attention if they are to improve their productivity.



Callous destruction of hill forests (left) is a major cause of soil erosion which is aggravated by careless road construction in the mountains. As a result, landslides (right) occur frequently in the hill areas.

It is not possible to easily compute, in terms of money, all the losses suffered by the community as a result of this situation. Nevertheless certain estimates are available which show how colossal these losses are. Thus, it has been estimated that soil erosion causes the displacement of around 60,000 million tonnes of fertile top soil every year—top soil an inch of which it takes nature between 500 and 1000 years to build and which has been estimated to contain nutrients of

the order of 5.37 million tonnes of NPK and of the value of around Rs. 700 crores. A great deal of this soil finds its way to the sea but a good deal of it also gets lodged in irrigation tanks, reservoirs and river beds. A rising of the level of river beds due to sedimentation is a major contributory cause of floods which on an average take a toll of about Rs. 300 crores every year by way of damage to crops, animals, habitations and communications. Sedimentation causes the loss of storage capacity in minor surface irrigation works which is equivalent to the potential created by an annual investment of Rs. 50 crores. The damage done to major reservoirs has not been computed but it is very serious indeed—the average rate of sedimentation observed is several times greater than the rate which was assumed at the time that they were designed and built. This means that the life of the irrigation and multi-purpose projects on which the community has invested around Rs. 3500 crores is being seriously shortened.

It is impossible to estimate the value of the ground-water which is being lost on account of the excessively fast run-off of rain on denuded slopes. However, the money spent on the relief of the victims of droughts has been of the order of over Rs. 150 crores a year during the last Plan. The rate at which good lands are going out of production on account of waterlogging and salinity is not readily available but the value of the 7 million hectares which have already been lost in this way is in the region of 10,000 crores. To these losses must be added those which we are incurring by failing to put our tens of millions of so-called waste lands to work so-called because it has been demonstrated that even the Rajasthan desert can be made to grow grasses and trees if given proper

attention against over-exploitation by man and beast. Finally we must also take into account the additional production which it is possible to obtain from canal irrigated areas under optimum conditions of soil and water management.

A sensible water policy should concentrate on the conservation, to the maximum extent possible, of water as soil moisture and ground-water rather than, as is happening now, on the storage of silt-laden waters in gigantic reservoirs and on the construction of expensive works for containing floods which are uncontrollable because they are bound to increase in fury with each passing year if their catchments continue to be neglected.

Every effort must be made to replenish ground-water resources to the fullest extent possible. Apart from facilitating the natural recharge of ground-water through soil and water conservation measures, efforts must also be made to undertake artificial recharge wherever this is possible.

Arid areas should, in particular, not allow any run off to be lost and must utilize all precipitation locally—whether for growing crops or merely grasses and trees. Protection against over-grazing and over-felling must, in all sub catchments, be undertaken alongside such measures as contour ploughing, contour terracing and bunding and the construction of gully plugs and detention weirs.

It is not difficult to imagine the dramatic change that the implementation of such an approach would bring about in the ecological environment that governs our fate as a nation. The denuded Shivaliks, the ravines along the Chambal, the Jamuna, the Savarmati and the Mahi would become things of the past, as would the treeless and grassless slopes of the Deccan

plateau and the bare hills of north-eastern India which have been stripped of vegetation by imprudent shifting cultivation.

The millions of hectares of so-called waste lands which yield nothing but silt and floods today would become important producers of grasses and trees and would contribute significantly to the replenishment of the country's ground-water resources. Our rivers would carry less sediment, and thanks to return flows from ground-water aquifers, would maintain more even flows throughout the year. Our storage would acquire new leases of life and the severity of both floods and droughts would be reduced.

It will be clear from the above that the penalty which we are paying for the neglect of our land and water resources is of colossal proportions in terms of money alone, not to speak of the acute human distress and suffering involved. This is not a situation which we can afford to ignore any longer, but one which we must try to remedy as quickly as we can. For what is involved is nothing less than the question of our very survival. We have no option left but to ensure that every single acre of land yields the maximum that it is capable of whether this be in the form of crops or trees or grasses. We must jealously protect our good arable lands against depletion of area or fertility, vigorously arrest further degradation of marginal lands-carefully nurse ailing soils back into health and productivity.

The cost of executing a programme for containing the threats posed to the soil by erosion, floods, waterlogging and salinity and for making the optimum use of our canal-irrigated areas, was estimated about two years ago to be around Rs. 20,000 crores at the price levels which were

then prevalent. The corresponding figure corrected for 1974 prices would be perhaps something like Rs. 30,000 crores. However, since it will be years—with the best will in the world perhaps not less than 30 years—before such a programme can be completely implemented and since the degradation of the soil and its attendant ills will proceed apace during this period, the final bill of costs may well be around Rs. 50,000 crores at current price levels. This is a staggering bill indeed but we have no choice except to foot it because the alternative is too horrible to even contemplate.

What is our present state of preparedness to take up a programme of this nature with any degree of confidence and to bring it to a successful conclusion in about 30 years? It is very poor indeed. In purely financial terms our capacity to execute soil and water conservation programmes, and engineering works for flood control, was no more than about Rs. 100 crores a year at the end of the Fourth Plan. This is a level of investment which bears almost no relationship to the magnitude of the tasks which confront us.



Our Endangered Earth

The Times of India, Sunday, May 28, 1978

M.V. Kamath

The French, so we learn, use a riddle to teach school children the nature of exponential growth. A lily pond, according to the riddle, contains a single leaf. Each day the number of leaves doubles—two leaves the second day, four the third, eight the fourth and so on. “If the pond is full on the thirtieth day” goes the question, “at what point is it half full? Answer: “On the twenty-ninth day.”

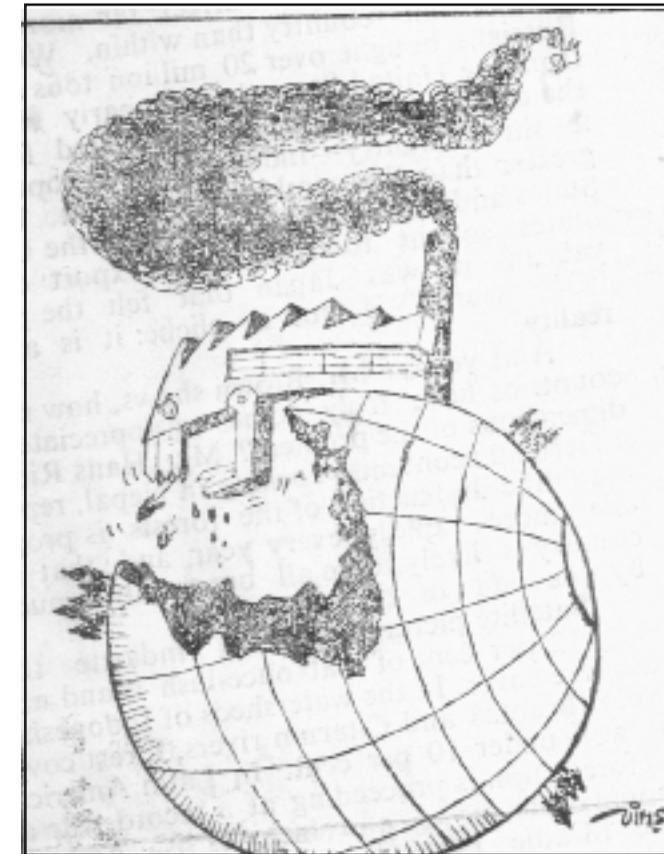
So asks Lester Brown, the distinguished economist, discussing the nature of our global lily pond in which now live four billion people. Ecologically speaking is the world at the threshold of its twenty-ninth day? When will disaster strike us?

Consider the following pressures on the earth’s principal biological systems and energy resources—oceanic fisheries, grasslands, forests and croplands—are mounting. In large areas of the world the pressure of growing human demands on these delicate systems has reached the point where it is already impairing their productive capacities. The biological systems are plainly—and in full view of observers—deteriorating.

Malthus, farsighted that he was, only warned that population would tend to expand faster than food supplies. What he failed to tell us is that population growth can actually destroy productive capacity when it generates a demand for biological resources that exceeds the regenerating capacity of natural systems. This is gradually beginning to dawn on some economists and ecologists. What even they cannot tell

us is when the axe of crisis will fall.

There are symptoms everywhere of the developing crisis, but rulers and governments are still not connecting the symptoms with the causes. Global fish catches decline, the price of soyabeans multiplies. Record floods devastate large areas of natural systems. This is gradually beginning to dawn on some economists and ecologists. What even they cannot tell us is when the axe of crisis will fall.



There are symptoms everywhere of the developing crisis, but rulers and governments are still not connecting the symptoms with the causes. Global fish catches decline, the price of soyabeans multiplies. Record floods devastate

large areas of Pakistan, but few tie the event to the extensive deforestation of the western Himalayas. There is famine in Sanella, but few link it to overgrazing by livestock. Timber is destroyed in Sweden but not many realize that the cause is acid rain, a result of letting sulphur dioxide escape into the air from industrial plants.

What is persistently forgotten and sometimes even denied in the manner of Peter denying before the cock crowed, is that one cannot fool around with Mother Nature. Just as felling too many trees can overtax the regenerative capacity of forests, creating too much waste can overtax the earth's waste-absorptive capacity, it is as if Nature is telling us : thus far and no further.

What Mr. Brown tells us it may be added parenthetically, is nothing new. In fact his excellent arguments have been congenitly made by members of his own staff on the World Watch Institute in separate tracts at great length. But Mr. Brown's study has the merit of bringing all the strands together to make a convincing case. What cannot be overstressed is the fact that the earth's waste-absorptive capacity is a prime economic resource, which alas, also happens to be a finite resource. When the amount of nature of waste generated exceeds the amount that the natural system can handle, the system is thrown out of gear: the engine is bound to fail. And then what?

It is this question that Mr. Brown attempts to answer in the global context and it is in that context alone that the question can be understood. Wendell Willkie would have been delighted at this approach. For it cannot be denied that the interdependence of societies has depended to a point where economic or political decisions taken within a given

country can affect far more people outside that country than within. When the Russians bought over 20 million tons of grain from the United States in the early seventies the effect was felt in an aggravated form in a third country—India, with a population greater than the combined one of the United States and the Soviet Union. When the United States sought to restrict the export of soyabeans it was Japan that felt the pinch. “One world” is not a cliché: it is a grim reality.

And yet, as Mr. Brown shows, how many countries have truly come to appreciate the dimensions of the problem? Mr. Hans Rieger, a German economist working in Nepal, reports that “the destruction of the forests is progressing more rapidly every year and that the country is likely to be all but totally denuded by the end of century.

Satellite pictures of java indicate that only 12% of that once lush green island now has free cover. In the water sheds of Inodnesia' solo Brantas and citarum rivers, forest cover is well under 10% In latin America, deforestation is proceeding at are cord rate as population grows and income rises. Areas in Middle East, which were densely settled ages.

Ago have long been treeless and now are desert. Rightly did the French philosopher Chateaubriand say: “the forests come before civilization, the deserts after them.”

Basic to the problem, Mr Brown is at some pains to show, is the increase in world population. And that increase, it is relevant to point out, is in the developing countries, not in the developed ones. No matter how reluctant the OECD countries are to help the poorer nations, at least they cannot be found fault with in the matter of population growth. In this instance they behave with an exemplary sense of responsibility towards themselves and the rest of the world.

It is “the rest of the world”—including presently, India—that shows no sense of urgency in the matter of birth control.

Mr. Brown mentions India almost casually: economic planners there, he says, have impressed on the political leadership the virtual impossibility of the raising living standards unless the population growth curve is quickly flattened. Where he fails is not to trace the origins of all the recent riots, bandhs, gheraos, strikes and close-down of universities to the simple fact that the system in India has become overloaded. Mr. Brown, of course, is not writing a political tract, but those who refuse to draw the relevant lessons from his remarkable study are doomed to live from crisis to crisis. From a demographical point of view, India seems already doomed, no matter what sort of government is in power.

But again, what’s the answer? Like most western economists, Mr. Brown too, is reluctant to offer viable solutions. How is birth control to be effected? To what extent is compulsory sterilization defensible? “Anxious to preserve the meagre hard-earned gains in per capita food consumption and social services,” Mr. Brown notes, “the Chinese leadership has applied the demographic brakes vigorously”. And how were these brakes applied? Are they applied in a democratic context? Can they be so applied? Mr. Brown, unfortunately, has no answers. India has provided one not so very happy or reassuring answer. It is that in a democratic context haphazard process. It does not require Mr. Brown’s fellow economist Mr. Bruce Stokes to tell us that in 1978 more than half of the world’s couples go to bed at night, unprotected from unplanned pregnancies.” The ratio is much higher in India and it is a frightening prospect.

Mr. Brown’s attitude towards drastic measures is highly ambivalent. He does not have much to say about official interference in family life in China in regard to who should have children and when. But of the emergency measures taken in India has shown that poverty and democracy can go hand-in-hand. What India has yet to show is whether poverty and family planning can interact positively. To that there is no answer yet, neither from Mr. Brown nor from the Indian people.

But the relevance of Mr. Brown’s study is in his identification of issues. As he very rightly points out the deterioration of the biological system is not a peripheral issue of concern only to environmentalists. It has social, economic and finally political repercussions affecting not just one country but very likely the world at large. Population pressure, of course, is only one even though vital, aspect of the problem. Denudation of the world’s natural resources whether fish, grass, timber or oil is another central issue of how to maximise the well-being of homo-sapiens, on the only planet he owns. To ignore the picture would be an act of self delusion.



CREEPING PERIL

The great Indian desert, said scientists of the Central Arid Zone Research Institute two years ago, has been Stationary since its formation in the mid-Miocene period, that is, some 20 million years ago. But recent topographical surveys made by the Planning Commission show that Rajputana desert is advancing at the rate of eight kilometers a year into Haryana, desert sands palpably affecting soil fertility. This contradiction is proof enough that not much is known yet about such a puzzling organism as a desert. Land mismanagement (overcropping and overgrazing which invariably lead to erosion and the disappearance of trees) worsens the situation, allowing the peril to creep along surely, though imperceptibly. Last April the Haryana government initiated a Rs. 29 crore lift irrigation scheme in Gurgaon district, as a supplement to the Rs. ten crore integrated desert reclamation plan drawn up by the Central Desert Development Board for Haryana, Rajasthan and Gujarat. The problem is largely ecological and trees are the basic solution. Geologists insist that underneath every desert there are lakes and rivers. A most remarkable enterprise in desert reclamation was undertaken by an English lady, Wendy Campbell-Purdie, who, initially encouraged by the FAO, went to the Sahara to plant trees. First she tried the desert's edge at Tiznit in Morocco. Seedlings grew in four years into tall trees; but politics drove her out. In Bou Saada, once a large dune in Algerian Sahara, there today are thousands of flourishing trees—and the desert has been pushed back. The technique used by her is to plant hardy trees (like eucalyptus) in a wide circle to form a protected

area, within which she plants trees belt as windbreakers and sand halters. A similar thing can be done in selected areas in Rajasthan and elsewhere; given persistence and patience, trees can be made to beat back the creeping peril.

The Times of India, May 6, 1972



Air, earth and water—including the deep sea—are already being polluted to a degree at which we are being poisoned... What mankind needs is a new way of life with new aims, new ideals, and a new order of priorities. Health and happiness are more valuable than wealth and power.

—Arnold Toynbee.

MEDITERRANEAN- THE DYING SEA

By—WILLIAM TUOHY

The Sunday Standard, May 28, 1972

Staring pensively from his office window overlooking the spectacular Bay of Naples, Prof Peter Dohrn remarked, "It looks magnificent from here. But the Bay is unimaginably filthy. We are in a race against time to keep the Mediterranean alive."

For the "wine-dark sea" of Homeric poetry is getting darker, blackened by oil dumping and other forms of industrial and private pollution.

Scientists fear that the Mediterranean Sea, cradle of Western civilization, is dying. But they believe that it is also not too late to save it.

“We must make the politicians and Governments realise the urgency of the problem,” says Dohrn, a marine biologist who heads the Naples Zoological Station.

Cesspool

“We’ve got to get cracking before it’s too late,” he says.

And Lord Ritchie-Calder, the British scientist who is an associate fellow of the Centre for the Study of Democratic Institutions of Santa Barbara, California, declares, “The Mediterranean is like an invalid whose prognosis is: You have only so long to live unless...

“The ‘Unless’ offers reprieve from the death sentence but it means the reversing of present trends, providing care and treatment and the stopping of pollution.”

And Swiss marine scientist Jacques Piccard predicts that life in the sea will be dead within 25 years unless society acts urgently to stop pollution.

The Mediterranean’s plight is that despite the beautiful setting it is bordered by heavily populated industrial areas producing enormous amounts of pollutants of all kinds.

Further, the Mediterranean, 2,300 miles long and 850 miles wide and comprising 970,000 square miles, have only one real outlet, the Straits of Gibraltar into the Atlantic.

Some pollutants like the wastes from industrial plants simply poison animal, fish and plant life with which they come in contact, and the number of species of life in the Mediterranean is dwindling.

Other pollutants like oil make such demands on the oxygen in sea water that other living things competing for oxygen suffocate for lack of it.

Last year, as much as 3,00,000 tons of oil may have

been dumped into the Mediterranean by ships cleaning tanks at sea and at oil terminals.

In the natural decomposition in sea-water, one gallon of oil depletes the oxygen from 400,000 gallons of water.

Further, oil slicks kill seabirds and cause immeasurable damage to beaches and beach life.

Still other pollutants encourage excessive growth of a single plant or animal so that it prevails over others.

For instance, nitrates in fertilizers and sewage, or phosphates in detergents cause a “bloom” of algae, which in addition to the obnoxious smells, kill other forms of life, deoxygenating the water, producing a sea-desert.

Lethal

A fourth form of pollution like DDT and other pesticides concentrates in species, with an affinity for them, without deleterious effect to themselves. But they pass on up the food chain in increasing dosages until they may become dangerous or lethal to another species including humans.

The long-term prognosis, save Ritchie-Calder, however, depends on whether scientists can set up a programme to fight pollution and whether governments will follow this advice.

The Food and Agriculture Organization of the United Nations has participated in studies to work out a concrete anti-pollution programme.

The programmes eventually will be submitted to the legislatures of the 16 Mediterranean countries: Spain, France, Monaco, Turkey, Yugoslavia, Albania, Israel, Egypt, Libya, Tunisia, Algeria and Morocco.—By arrangement with the ‘Los Angeles Times.’

THE HIMALAYAN CRISIS

by Sarala Devi

The Indian Express, July 9, 1979

So far our whole planning for development has been based on the theory of exploitation of nature in both forest and fields, the exploitation of weaker nations and the exploitation of the weaker sections within nations. Now all these factors are kicking back. 'Scientific' mechanized farming, involving monocropping with the use of artificial fertilizers pesticides and herbicides, is ruining the fertility of our agriculture soil and polluting our atmosphere and water (in fact the complete bio-sphere) on a gigantic scale.

The rapid exploitation of our forests through monocropping (especially of conifers) for commercial purposes, fuel, timber, rayon, paper etc, is interfering with the regular and natural water supply for drinking, agriculture and industry, leading to alternating floods and droughts and depriving the villagers of the traditional requirements of food, fodder, fuel, fertilizer, fibres and fats which they fulfilled from the forest. Large-scale industrial production and the consumption of fossil fuels on a large scale for various domestic purposes are rapidly polluting our atmosphere and water.

Through last year's phenomenal floods on the banks of the Ganges and Yamuna and disastrous typhoons and hurricanes in the south and east nature is demonstrating her objections to this cavalier treatment and challenging us to change our whole approach to development and planning. At the same time the breakdown of colonial system has drastically changed the question of political and economic

exploitation of under-developed nations which, instead of revolting as previously against modern western culture, on the whole tend to follow blindly the western pattern of development involving the destruction of the few remaining "lungs" of equatorial virgin forests, which is a serious menace to world climate and world health. Increasing education (of the right or wrong type) combined with abundant opportunities for travel, is causing a world-wide revolt against exploitation within and between nations and increasing inequality due to the impersonality of 'scale'.

Since in a vast country like India, with rainfall mainly only during the monsoons the climate of the whole country depends mainly on the healthy climate of and regular supply of water from the mountains, the question of planning for development in the hill areas is vital for the whole country.

Since political freedom, our governments have been aping the system developing in the West for 300 years with no original thinking or reference to local needs and conditions. The forest policy introduced by the British Government of mono-crop forestry for commercial purposes to earn revenue has been followed and intensified with desperate results. The denudation by felling of large tracts combined with the deterioration of ecological conditions owing to the excessive development of coniferous forests in place of ecologically favourable mixed forests resulted in the disasters of 1978. Yet, in spite of nature's warnings, the growing opposition of local and national public opinion, and the approach of the Central Government, the UP Government (and I understand many other state governments also) are obstinately insisting on their policy of mass felling, even in most sensitive areas.

The recent felling of a vast virgin spruce fir forest in Gangi block, a very sensitive area, the source of the Billangana river, in spite of the recommendation and appeal of the recent conference on forestry at Unani Ki Reti and that now contemplated at the source of the Lastergad, a tributary of the Alaknanda, are exceedingly dangerous for both the hills and the plains.

While one welcomes the policy of development of “social forestry” for the supply of the six main local needs (food—fruits, nuts and honey—fodder, fuel, fibre, fertilizer and fats—oils) even with phenomenal success these forests will fail to influence the environment (and particularly the water supply) for a period of a least fifteen to twenty years. It is therefore imperative that during this period there should be a moratorium on large-scale green fellings for commercial purposes and on all mass fellings.

All this calls for planning in an entirely new direction. The following outline suggested for Himalayan planning will apply with minor local modification to hill areas—Satpurus, Aravalis, Orissa, the Western and Eastern Ghats.

(1) **Forestry.** There should be harmonious development of forestry and agriculture. The forests should be developed mainly for the supply of local needs of food etc and on ripening mono-forests should be replaced by mixed forests for the same purposes. Until the minimum prescribed forested area of 33 per cent (it should preferably be up to 60 per cent) is achieved, and /or flow of sediment to the plains in the monsoons is reduced to normally acceptable proportions, there should be a moratorium on green fellings for commercial purposes and permanent moratorium on all blanket fellings.

(2) On higher slopes bordering the forest areas, forest farming mixed with horti-culture should be encouraged in place of orthodox agriculture, but no forests should be cleared for either horti-culture or agriculture.

(3) **Agriculture.** Traditional mixed crops and biological fertilizers should be encouraged.

(4) **Animal Husbandry.** People should be encouraged to keep fewer milch cattle of better quality and as the situation improves, to stallfeed rather than graze them. In suitable areas where fodder can be available without danger to forest, sheep-breeding should be encouraged on a family scale rather than large flock. Goats should be discouraged they are one of the greatest enemies of the forest cover.

(5) **Irrigation with the proper development of forests.** The water level even in the higher villages will slowly rise. Irrigation from small channels should be encouraged. Large dams for supply of electricity on a large scale to the places should be banned. They are ecologically dangerous in such a sensitive seismic area. Full use of available water for local use, consistent with proper control of silt should be planned.

(6) Long supply lines dependent on diesel are not only a source of atmosphere pollution, but also owing to shortage of diesel, an uncertain source of supply. Therefore planning of forest and field should be mainly directed to local self-sufficiency involving a minimum of long distance transport.

Planning of road construction is not merely a question of engineering. It should be planned in coordination with silvi-cultural and agriculture experts under the guidance of geologists. Heavy explosions during construction should be banned since they endanger the underground reservoirs.

(7) **Power.** Experiments should immediately be conducted on a large scale on the use of sun, wind and water and bio-gas. Small-scale hydel-projects may also be under taken.

(8) **Industries and employment.** The hills are not suitable for the development of large scale industries which would increase the need for road transport. Local industries under cooperative management should be established for the manufacture and processing of local forest products and mainly for local consumption only, surplus produce should be exported. The organization and development of such independent small-scale industries on a broad scale can help to solve the problem of unemployment and under-employment and avert the large-scale export of brains to the peaks.

(9) Experiments in ropeways for the transport of forest products from the summit to the valleys should be undertaken.

From the above it is clear that we must return in the direction of the ancient pragmatic wisdom of living in harmony with nature while making intelligent use of the scientific and technical knowledge of nature's processes which we have acquired in order to understand and intensify her methods, not to conquer or subjugate her.



DENUDING MOUNTAINS

The Hindustan Times, Sunday, January 15, 1978

The "benefits" of modern civilization, a favourite debating subject on university platforms and at erudite seminars, is a matter of life and death for thousands of hill people in the Western Himalayas. In the early 1960s the hitherto neglected region was opened up by a wide network of roads, largely for strategic reasons and the people had welcomed the convenience. But the extensive blasting and deforestation required to increase erosion, disintegrating hillsides and sinking mountains. Living by the roadsides has become precarious. Pilgrims to the many religious shrines and tourists have poured in; more trees have been cut for fuel. Worse still, instead of "development" the roads have brought in wealthy businessmen exploiting the rich forest resources through contracts on nominal payments. The number of trees actually felled, to fashion expensive sports goods and furniture, or to meet the timber industry's needs often exceed those marked. Besides every year thousands of trees are damaged through unauthorized cuts for resin. Large logs rolled down the hillsides have caused top-soil erosion and landslides. The villagers too have been guilty of over-grazing pasture lands.

The cumulative evils of all this are perhaps nowhere more evident than in the flash floods caused by large scale deforestation in the upper reaches. River banks are eroded, landslides occur, much rock, silt, logs and forest waste are carried down the tributaries. Natural dams develop at the confluences with the main river and the water pressure behind them increases, until the dams collapse, causing

sudden and massive inundations. This is what happened in the 1970 monsoon when the turbulent Alaknanda burst its banks in an unprecedented flood. Within two hours the rivers had risen 60 meters sweeping away entire villages, fields, the roads, innumerable bridges, heads of cattle and busloads of pilgrims. The silt deposits were so enormous that the irrigation system and the crops in the plains of western Uttar Pradesh were drastically affected.

The message is loud and clear. But scientists, bureaucrats, politicians, albeit well intentioned have done precious little. Forest trees continue to be auctioned. The Government's forest department, unscrupulous industrialists and their men pocket the earnings, not much of this revenue finding its way back to the people. Oblivious to local needs, outside exploitation of forest wealth continues. There have even been instances of raw resin being supplied at a higher rate to small local units than to a big company in the plains. The spark that set off the Chipko Andolan (cling to the trees movement) in Uttarakhand, five years ago, had been the local authorities's refusal to allow a village industrial unit to cut ash trees to make the light durable yokes needed for farm bullocks, even as the same trees were being allotted to a sports goods factory.

For the people whose existence depends on the fast vanishing forests, "conservation" is not just a slogan but a matter of grave and imminent concern. These trees are their life and soul, the forests their "mother's home", which they are determined to protect. Their demands are simple but far-reaching. A five year ban on felling in catchment areas and on river banks would not only keep their homes and fields safe from erosion but go a long way to prevent

the silting and flooding of rivers in the plains. Forest labour co-operatives replacing the contract system would ensure a fairer deal to labourers. Forest based industries would not only keep the wealth of the mountains within the region but help men find employment near their villages and prevent migration of labour to the plains and big cities. A fresh forest settlement would determine the people's rights to the forest. For since the last settlement made 60 years ago, the population has doubled and new villages with no forests of their own have come up. Perhaps most important of all is greater local participation in forest management. A few steps have been taken, some innovations made. But alas, the bureaucracy move painfully slowly unlike landslides which come hurtling down.

“Forests are not merely for beauty. Our entire food system depends on them”, as the mountain people say, “If you must cut one oak tree plant at least three others. And one might add, as you expertly wield your beautifully fashioned ash wood cricket bat or sit down to dinner at your beautifully polished dinning-table, spare a thought for the high price that others have paid for you pleasure.



GETTING RID OF DESERTS

The Hindustan Times, September 29, 1977

Last month, after an 18-day session in Nairobi, the United Nations Conference on Desertification ended with the setting up of a joint consultative group of generate resources for implementing an agreed “plan of action.” This 89-Page document consists of 26 detailed recommendations which together encompass the existing wisdom on the subject. The plan is time-bound. If it is put thorough, the world should be free of its bone-dry regions by the year 2000. In India, as Dr. M.S Swaminathan, Director General of the ICAR, and this country’s delegation leader to the conference has pointed out, 12 per cent of the total land is affected by what the UN rather inelegantly described as “desertification”, which means “the diminution or destruction of the biological potential of land which can lead ultimately to desert-like conditions”. A desert has been defined as “a region receiving no more than 100 mm (about 4 inches) of rainfall a year.” Parts of Rajasthan, Gujarat, Haryana, Karnataka and Andhra Pradesh have desert-like conditions.

Desertification also results from man-made factors: principally over-cropping of land, and over-grazing by cattle which erodes the topsoil, leaving behind rock, sand and dust. That this can be an ecological menace came to be realised only in the early seventies after reports of the terrible human tragedy caused by the catastrophic drought and famine in Africa’s Sahelian regions had reached the world. Desert-like conditions today affect roughly one-third of the world’s landmass. Desertification in one form or another is said to

threaten the lives of some 630 million people the world over, of whom about 50 to 70 million are directly affected by the decreased productivity associated with it. It is spreading so fast that experts have recently declared it to be one of civilization’s major environment menaces. In the Rajasthan region, often called the dustiest place in the world, the area of sand cover has increased by about 8 per cent in the past two decades.

The picture is grim but, as Dr. Swaminathan observed, not totally without a remedy. In various countries—the United States, USSR, Israel and China—the march of the desert has been successfully arrested. Fortunately, many of the remedies are simple and do not need heavy investment. These have been tried out successfully in some parts of the world. Thus, the Chinese delegate at the conference said how a systematic programme of digging wells, constructing irrigation works, and planting green belts of trees has transformed the below sea-level desert areas of Sinkiang into new grassland, vineyards and cotton fields. Saudi Arabia, besides planting forests of quick-growing trees to prevent the sand dunes from spilling over, has experimented with a petro-chemical glue to spray the sand so that its fine grains are bound together and kept in place. Under their own regional co-operative scheme, seven Sahelian nations are trying to persuade their meandering, nomadic tribes to settle down in one place and, wherever this is not possible, ensure that their animal herds graze only in the wetter and hardier lands to the South. Finally Israel, through an imaginative use of existing technologies, has been able to make the Negev region bloom with drip irrigation systems, cultivate vegetables and flowers under greenhouse conditions, and raise protein-rich algae in

brackish ponds for animal feed.

Civilizations Destroyed by Soil Erosion

Nearly every empire through out history had ended in deserts. What is now denuded Morocco, Tunisia and Algiers was once the wheat-growing area of the Roman Empire. The dreadful erosion in Italy and Sicily is another product of that Empire. The present desiccated lands of Mesopotamia, Syria, Palestine and parts of Arabia were the sites of the great empires of Ur, Babylon, Sumeria, Akkadla and Assyria. Persia was once a great empire. Now it is largely a desert. Greece under Alexander was an empire, now its land is mostly barren. The soil of the land of the empire of Tamerlane now produces only a small fraction of what it did in his day. The three empires of modern times, British, French and Duch, have not yet produced deserts but they have done much to help exhaust and despoil the soils and mineral, resources of Asia, Africa, Australia, New Zealand and North America. The cutting of timber in Kenya, Uganda and Ethiopea may presently destroy the massive even flow of the Nile. In this, these empires have, of course, been much aided by the modern developments in transportation, mould-board, plough-shares, farm tractors, finance commerce and communications.

From the book 'Which Way Lies Hope' an examination of Capitalism, Communism, Socialism and Gandhiji Programme by Richard B.Gregg. Navajivan, Publishing House, Ahmedabad.



WILL INDIA BECOME ANOTHER SAHARA?

BY RAMESH CHANDRAN

(The Illustrated Weekly of India, September 2, 1973)

Our forests are our most precious asset. Our climate and our soil depend on them; they bring rain and prevent floods; they maintain our wild life and are our lungs. Our forests are being recklessly by hacked down. We are losing millions of tons of-precious top soil. The desert is on the march. If we do not look out, India will become another Sahara desert land—our future generations will be riding camels in cactus recklessly. How many years will our forests exist Before they end up in smoke ? How many years will our people exist.

If they think the forest a joke ?

Listen. How many crops
will a desert produce?

And how much water to drink?

The answer, my friend, is blowin' in the wind

The answer is blowin's in the wind.

(with apologies to Bob Dylan)

Will it be said of India in 2074 that it was a populous land with an ancient history, that it was ranked among the industrial countries of the world, but the people multiplied so recklessly that they ate up all their greenery till the land become a desert and then their millions died of starvation?

Will it be said that the subcontinent of India ranks with the Sahara and the Gobi (deserts) as one of the great man-made deserts of the world? Will it be said that in this land, which supported 600 million people, only a few scattered nomadic tribes remain? At the rate we are denuding our forests, this will certainly happen. What an ignominous end to a great nation!



NATURE'S BALANCE

(The Indian EXPRESS, March 27.9.80)

The Union Agriculture Minister's categorical statement in the Lok Sabha that the Government would give due priority to soil conservation and afforestation will be widely welcomed. The assurance comes in the wake of the concern the Prime Minister expressed at the recent World Conservation Conference over the rapidly deteriorating ecosystem of the Himalayas and her assurance that the Government would do its best to repair the damage to restore the ecological balance. These are hopeful signs that the national authorities are at last becoming aware of the gravity of the situation.

The need to protect national forests was officially recognized soon after independence. The result was the much-celebrated Vanamahotsava programme. Whatever good it might have done initially was more than offset by the simultaneous damage to the forests at the hands of all manner of people with their own axes to grind. Little wonder then that the area under forests has substantially reduced, and in recent years rapidly dwindled. According to the National Commission of Agriculture, the country today consumes four times as much wood as is being regenerated. It is this dreadful state of affairs that prompted the Agriculture Secretary to warn recently that "wood will soon become a rare commodity".

A certain amount of poaching and pilfering has perhaps always been there. What has happened in recent years is the emergence of an entire tribe of contractors and profiteers engaged in a systematic operation to denude the

forest and tree lands. If they have succeeded so well, it is in most cases because of official approval and connivances.

The existing national policy of forests has hardly been worth the paper it was written on more than a decade ago. The new policy reportedly under consideration must view the question in perspective; lay down clear guidelines or minimum forest cover for the country as well as for every region, and most important of all, provide for a proper and powerful machinery to monitor its implementation forests are protectors as well as providers. If they are gone, it will be a catastrophe.



WILL THIS BE SAID A HUNDRED YEARS HENCE ?

“India was a populous land until the end of the 20th century with an ancient and stirring history. It was ranked among the industrial countries of the world. But the people multiplied recklessly, destroyed their land and its greenery and then in millions starved to death.

Today, the subcontinent of India ranks with the Sahara and the Gobi as one of the great deserts of the world and the first one that was entirely man-made. A few scattered nomadic tribes are to be found in the vast barren land eking a wretched existence on desert plants and animals, only so many as the desert can feed.”

Will this be said of us a hundred years hence? The answer depends entirely on us. Unless we heed the warning signals and act quickly, the above quotation is likely to pass from fantasy into recorded history.



BLOWIN IN THE WIND

How many years will our forests exist

Before they end up in smoke ?

How many years will our people exist

If they think the forest's a joke?

Listen. How many crops will a desert produce?

And how much water to drink?

The answer, my friend, is blowin' in the wind

The answer is blowin' in the wind.

The USA faced a similiar situation in the earlier part of this century. Rapacious logging had laid low half of the country's forests creating dust bowls, erosion and floods. But during the depression years in the thirties, Franklin Roosevelt created the Civilian-Conservation Corps and more than 2 million youths and young men were provided both employment and challenging work to replant trees, create lakes and reservoirs, forests roads and fire-lines and in the space of a decade the country's forests were saved. There is hope still for India if she follows that shining example. From the book, “Will India Become Another Sahara?”



DAMS—A LONG JUMP TO DISASTER ?

By K.P NARAYANAN

Patriot, 13 June, 1986

Are dams a short cut to development or are they a long jump to disaster ? Are the dam projects impressive pieces of engineering marvel that appeal to financial donors like the World Bank ?

Perhaps, it is in answer to these and other questions that the Central Government has set up a three-man committee to conduct a study of all relevant aspects of Rs. 2,300 crore Narmada Sagar project in western Madhya Pradesh. The project, the foundation stone of which was laid by Mrs Indira Gandhi in 1984, is yet to receive environmental clearance from the Centre.

A recent study on dams by British environmentalist Edward Maltby says:

“Dams are a complex issue. On the one hand, their reservoirs can displace a large number of people, their irrigation water can spread snail fever and other diseases across large areas, they can disrupt fisheries, land use systems and natural eco-systems downstream. They can saddle poor governments with recurrent costs which can not be met and demands in trained manpower which cannot be found”.

In spite of this and such other notes of dissent, dam building all over the world is accelerating at such a pace that by 1990 there will be 113 dams higher than 150 metres. Maltby notes that opinion, has hardened among politicians, aid officials and engineers that major dams are vital to the progress of the Third World. He also says Indian ecologists have already warned the Government about the destabilizing effects of dams on ecology.

According to a study by Mr H.K. Divekar of the Bombay Natural History Society (BNHS) 42 dams were built in India before 1900. Between 1901 and 1979, as many as 1033 dams were built, and over 700 major and minor dams are under construction by the State and Central Governments, the Central Water and Power Commission the National Hydro-power Corporation and State Irrigation and Electricity Boards.

The experience of dam projects already completed in India, according to the BNHS study, is far from satisfactory. The study mentions, for example, Gujarat's largest irrigation project, the Ukai dam on the Tapi river, where over 1.2 million hectares of forests were submerged by the formation of a 462 km reservoir and 50,000 adivasis were displaced.

In a case study of the Balimela Hydro-electric Project in Orissa, Mr Divekar found that the century-old game reserve, “Kondakamberu”, was completely submerged along with over 40,000 hectares of primary forest in the man-made lake across the river Sileru. In the process, the last of the few herds of wild buffaloes in India, almost came to extinction. The Rs 100 crore Tawa project at the confluence of rivers Tawa and Narmada near Hoshangabad has created a host of problems like water logging, salinity, and loss of production to cultivators.

Countries like Canada, Sweden and Norway meet their power needs mainly from hydel sources. Hydro-power generators, if properly designed, can use nearly 88 per cent of the water potential to generate electricity, whereas no more than 30 per cent of coal or oil can be converted into energy.

But then, asks Mr Divekar, will it be viable to measure with the same yardstick our hydel resources against the background of the pressure on our forests and our

exploding population. “How much of funds are being allocated by the Planning Commission to rebuild the ecosystem which have been destroyed in the last two decades when the rush of dam building in India continued and which is likely to continue for the next few decades?”

Studies on Hydro-electric projects conducted by research teams funded by the Ministry of Agriculture show that soil erosion and siltation have assumed alarming proportions. Concern about the location of Narmada Sagar dam in an earthquake prone area has been voiced by many experts. Mr R.L. Gupta, former Irrigation Secretary and for some time consultant to the Narmada Valley Development Authority, refers to reports that the nearby Khargone district had experienced tremors several times in few years and two of these quakes had proved disastrous. The quake at the koyna dam in 1967 took a heavy toll and raised the question whether the quake was caused by filling the reservoir for the first time.

The review panel appointed by the Madhya Pradesh Government, on the suggestion of the World Bank, came to the conclusion that the foundations of the Narmada Sagar Dam and the “abutments” were safe enough for the designed height and that there was no need for further geological studies to assess the strength of the foundations. The panel headed by Dr. Y. K. Moorthly, former Chairman of the Central Water Power Commission consisted of James Logos, expert on hydraulic structures and Prof. R.W.Clugh, seismological expert, both from the United States, M S Balasundaram, former Director General of the Geological Survey of India, R. Ghosh, former Chairman of the Central Water Power Commission and P. M. Mane, former member of the commission

PTI Feature.

Super Dams—And Bitter Lakes

(Reader’s Digest, August, 1973)

By Claire Sterling

Their waters were meant to bring instant progress to needy countries. Too late, we are recognizing their hidden perils.

What happens when we dam the flow of a great river and create an immense body of water where there was none before? Not enough thought was given to this ecological question in the 1950s and 1960s as dozens of big dams went up from Pakistan to Ghana, Egypt to Brazil. Everybody thought big dams meant instant progress, and developing countries were easily persuaded that there was nothing like a big dam for a fast economic leap forward. Few people worried about after-shocks in the ecosystem.

In the last few years, however, dam owners the world over have begun to compare notes and to discover that, when a dam piles up waters behind it, everything changes: the water’s chemistry, the kind and number of indigenous flora and fauna, the way of life for all the people who lived on the land before the lake came, the fertility and salinity of the soil downstream, the pressures on the earth’s crust and the tendency, therefore, to earthquakes and landslides. Moreover, while the promised progress is usually less than expected, these changes produce problems that are real and proliferating.

Water for irrigation and hydroelectric power in boundless supply were supposed to be the big prizes of dam building. What wonders would not then result, development

planners asked, for those underfed nations with too many people and too little arable land? What economic advances would not be possible from the electric energy generated? Less than hoped for, it turns out.

Perhaps the most spectacular disappointment is Egypt's High Aswan Dam, which is enriching neither the land nor its people. Its electricity-generating capacity is enormous—10,000 million kilowatt-hours yearly. But power installed is not necessarily power consumed. The Egyptians have yet to make use of the abundant electricity that the Aswan produces.

Into Thin Air: For all the hopes that went into its making, Lake Nasser, designed to store some 160,000 million cubic metres, may *never* be full. Why? Evaporation alone takes 15,000 million cubic metres of water a year from the lake, 50 per cent more than the engineers' original estimate; (it is rumoured that they forgot to calculate the higher wind velocity on a big body of water). Moreover, Lake Nasser's entire 500-km. western bank is porous Nubian sandstone, which can absorb still more quantities of water. Altogether, the lake is losing 30,000 million cubic metres yearly—about one-third of the water flowing into it.

Obviously, Lake Nasser's limited waters are not going to coax much barren desert into bloom. True, Egyptians are no longer threatened by the Nile's yearly floods. But they are also no longer getting the floods' priceless gift: the annual hundred million tons of silt that made the Nile Delta so fertile. This precious substance is dropping to the bottom of Lake Nasser.

A foreigner like me, looking down on the now

translucent green Nile from my Cairo hotel balcony, finds it lovely. To an Egyptian agronomist, it is frightening. "I'd give my soul to turn it muddy brown again," one said to me. This cannot happen, ever. Indeed, all 2½ million of Egypt's cultivated hectares will soon be needing much more fertilizer—to make up for what used to come from the Nile's once inexhaustible silt. Already the yearly cost of the necessary extra fertilizer comes to more than Rs 73 crores. At least that much is going to be a fixed cost always.

Egypt has lost 18,000 tons of sardines a year because the now diminished silt was part of the aquatic food chain at the Nile's mouth. What's more, generally poor drainage and the heavy use of water in irrigation projects have caused a rise in underground water levels and a consequent accumulation of soil salts. Egypt has been forced to start installing expensive underground drains on 400,000 waterlogged hectares in the delta—the most ambitious drainage project on earth, costing more than Rs. 146 crores.

Although some super dams are turning deserts green, a good many have engulfed more and better land than any they could ever reclaim. Nobody knows the value, in money, of all the land, plants, timber, ancient monuments, villages and towns lying at the bottom of man-made lakes. Lake Nasser covers the Sudanese town of Wadi Halfa. Some of Ghana's rich farmland lies beneath 1964's Volta Dam, and prosperous cacao and coffee farms in the Ivory Coast's Bandama Valley died as the waters rose behind the Kossou Dam, sealed in 1971.

Nobody is quite certain, either, how many people have been forced to move by the rising waters. To the best

of our knowledge, some 80,000 were displaced in Egypt and the Sudan, nearly that many in Ghana, and perhaps as many as 70,000 in the Ivory Coast by the time Kossou Lake is full. A quarter of a million more may join the list if the projected Pa Mong Dam ever spans the Mekong River from Thailand to Laos.

Small Recompense: Even when Rs 7,300 is spent resettling each displaced person, the going rate, they are often miserable. Those who have lost good land cannot always be resettled in a similar environment; in some populous Asian countries, there is rarely any unoccupied land except the poor, arid kind. The Ivory Coast, trying to resettle President Felix Houphouet-Boigny's fellow-Baoules on the populated lands of neighbouring tribesman and around the new port of San Pedro at the other end of the country (at an estimated cost of at least Rs 36.5 Crores, half the cost of the Kossou Dam itself), seems to be heading for a political snakepit, for all its efforts.

I've met displaced Baoules and Ghanians, as well as the Nubians of Upper Egypt in their squat, dreary cement huts at Kom Ombo. Nearly all showed symptoms of the classic resettlement syndrome; they were passively aggrieved, dispirited, unself-reliant. The Baoules I visited were still in their thatched village of Angouisse, waiting for the rising waters to overtake them, full of complaints, premonitions.

Fatal Transplants: This is not just a matter of land. People whose families have lived for centuries where the lakes form may die of unbearable traumatic shock when forced to part with their homes and ancestral graves. Mortality rates shot up among evacuated Ghanaians when Lake Volta formed.

Wherever a super dam has gone up in tropical Africa and Asia, the reservoir lake and the irrigation canals have also brought an explosion of water-borne disease. This happens partly because people accustomed to relieving themselves in the bush do so in the water instead. Also, the surfaces of lakes and canals offer superb breeding conditions for malarial mosquitoes. Similarly, conditions favour the kinds of mosquito that bear yellow fever, dengue fever and elephantiasis; the guinea worm that grows to a metre long in the human body and causes painful ulcers and that scourge of so many Africans, Asian and South American countries, the bilharzia carrying snail.

The snail doesn't attack humans. It simply plays host to do the prickly-spined blood flukes which do, and which can multiply 50,000-fold in four months. Any healthy person setting foot in infested waters can pick up the fluke without a bite or scratch of warning; once lodged in his bloodstream, the fluke lives happily ever after, perpetually copulating.

Because of continuous re-infection, no known treatment has any lasting effect. A man can die of bilharziasis, but is more often condemned to live in growing pain and exhaustion. He can rarely work more than three hours a day. Egypt now has 14 million of its 30 million people ill with bilharziasis, and the infection rate in previously unirrigated areas which have new canals is rising in a staggering way.

The list of super dams' hidden dangers keeps growing. Silting has cut the storage capacity of Lake Austin in Texas by 95.6 per cent in 13 years. The reservoir formed by Pakistan's Rs 438-crore Mangla Dam is expected to silt up completely in 50 years. Landslides have been induced by

the dam building; also earthquakes, like the one touched off by India's Koyna Dam in 1967, which killed 200 people.

Key calculations simply weren't done thoroughly enough until recently. Engineers honestly didn't know they were committing ecological sins. Rich countries putting up the money sincerely thought of themselves as benefactors. Poor countries were suitably grateful, and displaced people getting pushed around never seemed to fall into anybody's department.

Disturbing Hindsight: Times have changed. Wherever I've gone to report on these projects, I've met officials eaten by doubt. Even in Cairo, where the High Dam's spell is still strong, I heard private admissions that it would not be built if Egypt could do things again.

Not that all such big-dam proposals are being, or should be, turned down. But poor countries should ask if the potential benefits are *worth* the tremendous cost. They now know that once a giant dam is built it is *there*, breaking timeless natural laws and banishing people.

And nobody is giving the dams away. All the rich countries and international organizations offer is hard currency, technicians and equipment—mostly on loan, at interest. In the end, it is the poor countries that pay, and pay, and pay.



REQUIEM FOR SILENT VALLEY ?

Not immediately anyway, the Kerala High Court has stayed the implementation of the Hydro-Electric Project and the Prime Minister has called the Kerala Chief Minister for further discussions. Ramesh Menon discovers there is little to be gained and much to be lost if it comes through.

SILENT Valley. The name sounds ironical now. There was a time when the valley resounded with the music of rustling leaves, the sound of the gurgling waters of the



Kunti river which flows through its heart and the songs of exotic birds.

In spite of repeated warnings from scientist about the potential havoc that can be caused if the Silent

Valley hydro-electric project is implemented, the Kerala government seems to be going ahead with the Rs. 78-crore project which is expected to produce 120 MW of firm power.

Today, human voices echo from the camps that are being pitched in the virgin forest. Trees are being felled and roads are coming up rapidly. Dr. S. Nair of the Kerala Natural History Society visited the valley in January and said that the destruction of the forest is already staggering. He saw burnt patches where tall trees once stood. Occasionally, he heard gunshots.

One of the six remaining rain-forests in the world and the only one in India, the Silent Valley in Palghat district of Kerala is about 45 km. from Mannarghat. It is densely covered with tall trees with broad evergreen leaves. Smaller plants find it difficult to survive as the thick foliage does not let any sunlight through. Every year, it receives more than 200 cm. of rain; humidity rarely drops below 80 per cent.

Many rare denizens of the forest will vanish once the project is completed. A lion-tailed monkey lives on the banks of the Kunti and lives on a plant which only grows along its shores. It cannot adapt to any other environment. According to a Japanese survey in 1962, there were only 1,000 of these monkeys left in the world. A decade later the number had halved. Two out of every three survivors are in the Silent Valley.

The Geological Survey of India organized an expedition to the valley in the wake of the raging controversy over the project. The experts were astounded. They found much more than they expected: deep hallowing snakes, catsnakes, brown whipsnakes, flying snakes and the pit viper. They also found rare species of fish and insects.

Their most important discovery was the limbless

amphibian which had vanished from many areas in south India some decades ago. They also detected 23 rare species of plants, the existence of which has not been recorded anywhere in the world.

Ecologists have warned that weather patterns in the entire area may change if this Primeval forest is submerged by the dam. It was only after forests were mercilessly destroyed on the slopes of the Himalayas that floods have started ravaging the plains, bringing untold grief to the people.

Scientists point out that rainfall, especially in Malabar, may plummet. The Silent Valley forests regulate water supply to the plains, by retaining moisture in the soil and releasing it slowly.

Government officials scorn the arguments of ecologists and scientists and have sarcastically said that it is stupid to "put money before man". They point out the requirements of human beings are more important than the preservation of monkeys, animals and plants. They are obviously parading their ignorance of the delicate interdependence of all life forms within the eco-system.

The destruction of the thick tropical forests will also upset the carbon-dioxide cycle, resulting in a dangerous build-up of CO₂ in the atmosphere, according to some scientists. The consequences of such a build-up may not be confined to Kerala. The accumulating carbon dioxide will create a "green house" effect by trapping solar radiation and raising atmospheric temperature.

The task force constituted by the National Committee for Environmental Planning and Co-ordination, (NCEPC) attached to the Union Ministry of Science and Technology, has stated that if the present trees are removed, the top soil will be washed away in a single monsoon and the land may

become unproductive because of excessive denudation. Similar havoc has taken place at Idukki after a dam was constructed there a few years ago.

Despite the NCEP's dire warnings, the Kerala government is determined to go ahead. The Chief Minister, Mr. P. K. Vasudevan Nair's statement—"being a backward state, Kerala cannot afford to have any ecological luxuries"—epitomises the official attitude towards the "suicidal" project.

Out of a total area of 8,952 hectares in the valley, the project will take up 1,022 hectares, of which 950 will be thick evergreen forest. The 430-metre long and 130-metre high concrete arch dam is expected to create an artificial lake of about 75 sq.km.

Recently, Kerala ministers have been saying that as only a part of the forest will be disturbed, the ecology will not be seriously affected. However, the factors are so numerous and inter-related that once one link is tampered with, the long term damage is likely to be enormous.

Officials of the Kerala State electricity board nonchalantly say that they will only be destroying about 800 hectares. These 800 hectares being in the heart of the forest contains the most valuable flora on both sides of the Kunti river.

Till now, the valley remained a virgin area merely because it was very difficult to reach. Now, with roads, it will be extremely difficult to stop timber contractors and trigger-happy hunters from getting into the area and making a fast buck. Judging by the experience of the other Indian forests, this one too, will vanish in the course of time.

While the opposition to the project was mounting in many parts of the country, thousands of CPI-led

power workers of the Kerala power workers' union were demonstrating for its immediate implementation. The power workers have proved a strong lobby. CPI ministers have always had the electricity and mine portfolio in their pockets in Kerala. The workers are very keen to see that the project comes through since it will mean jobs and promotion to hundreds of workers. The CPI Chief Minister, Mr. Nair, has said that even if the Centre refused to grant the project aid, Kerala will not scrap it.

Dense forests once grew where the Idukki hydro-electric project now stands in the south of Kerala. Now, almost all the natural forests have been razed to the ground after 30 years of felling trees. The repercussions are evident. Devoid of any natural protection, climatic conditions in and around Idukki have undergone drastic changes; the summer heat is intense. Landslides during the monsoon have become a regular feature and ponds and wells dry up in summer. Scientists feel that the 2,000 million tonnes of water in the Idukki reservoir pose grave geomorphological problems. After the dam was completed in 1976, seismological stations have frequently recorded frequent slight tremors in that area.

The Idukki project increased Kerala's power output by 21 per cent with its 130 MW generator. Ironically, none of this electricity has reached the backward areas of Kerala: it is wholly exported to Tamil Nadu and Karnataka.

Malabar is a backward area and needs power. It must, however, be understood that it is not backward due to the lack of generation of electrical energy. In fact, Kerala only uses half the power it produces. Another 20 per cent is "lost" in trans-mission and distribution, and the rest is exported. The KSEB has at no time supplied power to all the

applicants within the state as they do not have the resources for transmission and distribution inside the state.

It will take at least eight to 12 years for the Silent Valley project to start functioning. But Malabar needs power immediately. Alternate methods have to be found. If there is a will to avoid this “ecological blunder”, there are plenty of ways. The Idukki—Karnataka line can be expedited and extended to Cannanore in north Kerala to convey bulk power to this area. Northern Malabar can also be fed from the Karnataka grid in exchange for the energy given to it from Kerala. A crash Programme can make the transmission effective within a year.

There are instances elsewhere in the world where projects were abandoned because they posed an ecological threat. In 1967, two dams across the Grand Canyon of the Colorado river in Arizona were not sanctioned because they posed a threat to wildlife. Similarly, the Rampart Dam on the Yukon river in Alaska was turned down in favour of forests and wildlife. In Tamil Nadu, a state less endowed with hydropower than Kerala, the Mayar project with an estimated 150 MW capacity was abandoned to save the Madumalai and Bandipur wildlife sanctuaries.

But as the state has already sunk Rs. two crores in the project, one feels that the strong arguments to save the rain forests will be brushed aside despite the fortnight’s stay that has now been obtained from the high court. Once again, politicians and other vested interests will preside over the death of one of the few remaining natural preserves in the country.



Civilizations Destroyed by Soil Erosion

Nearly every empire through out history had ended in deserts. What is now denuded Morocco, Tunisia and Algiers was once the wheat-growing area of the Roman Empire. The dreadful erosion in Italy and Sicily is another product of that Empire. The present desiccated lands of Mesopotamia, Syria, Palestine and parts of Arabia were the sites of the great empires of Ur, Babylon, Sumeria, Akkadla and Assyria. Persia was once a great empire. Now it is largely a desert. Greece under Alexander was an empire, now its land is mostly barren. The soil of the land of the empire of Tamerlane now produces only a small fraction of what it did in his day. The three empires of modern times, British, French and Dutch, have not yet produced deserts but they have done much to help exhaust and despoil the soils and mineral resources of Asia, Africa, Australia, New Zealand and North America. The cutting of timber in Kenya, Uganda and Ethiopia may presently destroy the massive even flow of the Nile. In this, these empires have, of course, been much aided by the modern developments in transportation, mould-board, plough-shares, farm tractors, finance commerce and communications.

From the book ‘Which Way Lies Hope’ an examination of Capitalism, Communism, Socialism and Gandhiji Programme by Richard B. Gregg. Navajivan, Publishing House, Ahmedabad.



CARBON DIOXIDE

level rise may spell earth's disaster

The Times of India, Saturday, June 7, 1980

Bombay, June 6.—IN 50 TO 70 years, nearly 65 per cent of Bombay city may be submerged by water, after a 20-foot rise in the sea level—and the culprit will be carbon dioxide.

The growing accumulation of carbon dioxide in the atmosphere is leading to a warmer earth, and this may result in the melting of polar ice.

At a meeting organized by the Bombay Civic Trust to observe the World Environment Day yesterday, Dr. Rashmi Mayur, environmentalist, highlighted the problem of carbon dioxide environment and the climate as a major issue.

Sunlight passes through carbon dioxide and reaches the earth, but the reflected heat is absorbed by it. This is known as the “green-house effect” by which heat is trapped in the earth's atmosphere, leading to a rise in temperature.

By 2020, if the present rate of increase of carbon dioxide is continued, its concentration would be doubled, according to Dr. Mayur.

When the carbon dioxide level is doubled, the global temperature will increase by 3 degrees C. effecting a drastic change in the rainfall pattern and the climate. Possibly, South India will become dry, with an increase in rainfall in the North, or most of India will experience heavy rains and floods along with Europe, North and East Africa and South China.

Massive afforestation, curtailment of fossil fuel consumption by the industrialized, nations, development of

cheap, clean and perpetual sources of energy such as bio, solar and wind energy, introduction of air pollution control laws, global study of potential risk of carbon dioxide, and stabilization of global food production are among the measures suggested by Dr. Mayur.

Mr. Arvind Deshpande, a joint honorary Director of the Bombay Civic, Trust and a Director of The Environment, Liason Centre, Nairobi, said the Trust would actively impress upon policy makers the issues of land tenure, land use and financial help to slum-dwellers to build houses.



NATURE IS NOT TO BLAME FOR ERRATIC MONSOON

by Dhun Kalapesi

(The Indian Express July 16, 1979)

Every year, around this time, we seem to stand on the brink of disaster, not knowing what the monsoons will bring. Vast areas of the country now suffer chronically from severe droughts and floods. The ferocity of such vagaries of nature has been increasing despite various programmes launched to control them. We have a drought prone area programme and a drought prone areas project as well as a similar project for hill areas, and sundry schemes for arid zone and desert development. Now there is also a scheme for flood control. Best of all we have an experienced cadre of the armed forces for conducting annual, large scale rescue and relief operations.

India is also a participant in the 'monsoon experiment'—the recently launched international project MONEX-79. The scope of this project is not just limited to gathering 'agrometeorological data, to help countries whose annual agricultural outputs depend on the behaviour of the monsoons. Its aim is total investigation of the monsoon phenomenon. In fact, it is part of a larger programme which includes WAMEX (West African Monsoon Experiment) and POLEX (Polar Experiment). Taken together these may be regarded as the first global effort to understand the climatic changes which have caused grave anxiety for some time in international scientific circles.

More than 5,000 research scientists and a small army of technicians are involved in Monex alone. The programme

is using 9 earth satellites some of which will remain fixed over the tropical oceans and others will cover the earth from pole to pole. At least 3,400 land stations are doing round-the-clock duty for Monex and more than 50 ships and airplanes specially equipped for research are engaged in data collection. In this task 7,000 merchant ships and 1,000 commercial airliners, hundreds of high altitude balloons carrying sensitive instruments, and drifting ocean buoys are also being used. A battery of super-computers which take as many as 80 million instructions per second will process the gathered data.

Scientists who have been investigating the impact of environmental abuses on global weather, rainfall and climate say that the adverse effects should be expected in the regions which are climatically the most vulnerable—the tropics and the poles. They have been studying reports of adverse new weather trends persistently affecting tropical Asia, Africa and America. While most scientists say that it is still too soon to tell whether it means that the climate has become permanently hostile others are impatient with this "let's wait and see" attitude. However, one outcome of this debate is the launching of the Monex, Womex and Porex.

"We have underestimated the importance of the tropics", says Verner Suomi of the US team of scientists working on MONEX, and he goes on to list reasons why such underestimation is unwarranted. The tropics cover practically half of the earth's surface and the solar radiation they receive is so intense that they constitute the 'boiler' of the earth's atmospheric energy. This is why the tropics need to maintain a tight heat and energy budget and anything that tips the balance causes the most violent reactions. Tropical

storms—cyclones or hurricanes or typhoons (as they are variously called)—are well known for their fury; but even the relatively minor disturbances such as thunderstorms, dust storms, and sand storms have exceptional strength. One of the adverse new trends is their increasing frequency and ferocity.

The monsoons are a tropical wind system and not always and necessarily rainbearing. Their vary name (derived from the Arabic mawsim or as we say it, mausum) suggests their seasonal character, and there is an almost complete reversal of their prevailing direction from season to season. Whether they bring too little or too much rain is said to depend largely on the ‘cycle of precipitation’. Another adverse new trend is the seeming disorganization of this cycle.

Our experience and meteorological records attest to the occurrence of cyclic phases of abnormally dry and wet years, the periodicity of the cycle varying from region to region. Previously there was a degree of predictability because where the cycle showed weak modes, there was only a year or two of partial failure of rains, and a year or two of unusually heavy rains in the course of a cycle of long duration. Where the modes were stronger, the periodicity of the cycle was shorter and the cycle phases more frequent. In some regions there has always been total failure of rains during the dry phase. Today the dry and or wet phases seem to have become more frequent and prolonged. Only recently a dry phase of nearly 30 years ended in the Sahelian region of Africa with torrential rains.

However divided the opinion among scientists on whether or not the trends imply permanent climatic change, there is agreement on one point. They warn us that rather

than blaming them on nature, we should attend to the various environmental abuses that are inducing these adverse changes. Intolerably high levels of pollution and a drastic reduction of the natural plant covers of the land have not occurred of their own. Plant covers are known to modify climate and rainfall to such an extent that they are said to create their microclimates.

Reid Bryson of Wisconsin University, an eminent meteorologist who has studied the conditions in the Himalayas, leads the group which maintains that the Chief cause of the trouble in the tropics is excessive thermal (heat) and carbon dioxide pollution which becomes fatal in an already torrid zone, especially if the major natural sink of carbon dioxide—oceans and forests—are not functioning as they should. Widespread destruction of forests mean that they are simply not there to function as sinks which absorb CO₂ from the atmosphere, and, it is presumed that the ocean cannot accept larger loads.

This bring to mind a great crime about to be committed, Sanctioned by none other than Prime Minister Mr Moraji Desai—the destruction of the precious Silent Valley forest in Kerala. It seems to be the fate of this country to be led by ecologically illiterate politicians.

Large concentrations of carbon dioxide are known to cause atmospheric turbulence and violent storms, even in non-tropical regions, and to upset the heat energy balance. Approximately 40 per cent of the incoming solar radiation is reflected (or should be) from the earth’s surface back to outer space as terrestrial radiation—a phenomenon described as the earth’s ‘albedo’. Carbon dioxide concentrations act as screens which allow passage of incoming solar radiation

but block the outgoing terrestrial radiation, reflecting it back to the earth—the so-called ‘greenhouse effect’. As great heat domes build up in the lower atmosphere conserving excess heat energy, the Kinetic force of these heat domes causes shifts in pressure zones and deflection of currents. Sometimes these disturbances are strong enough to throw the ocean-atmosphere system into disarray.

The monsoons carry thousands of tons of energy-charged air between regions with different temperatures. Where a ‘depression occurs under a rising mass of heated air, the winds are drawn to its core and sent out swirling as cyclonic winds which gather strength and velocity. The ‘meteorologically vulnerable’ areas in their path are hit the hardest. During the cyclone which hit the Andhra coast in November 1977, the sea was literally on fire for awhile according to eye-witness reports. **This extraordinary phenomenon is known to occur very rarely and only when air currents bear exceptionally high electric charges. Then, friction causes ignition resulting in flames spread over the water.**

India owes her meteorological vulnerability to her geographical position. It is in the downwind paths of the monsoons which arrive after having traversed a vast expanse of oceans where major disturbances brew from time to time. The Bay of Bengal has always been a turbulent area of cyclonic activity. However, due to increasing pollution and destruction of forests in India, when trouble brews in the Bay of Bengal these days, such violent forces are unleashed that they not only ravage her eastern coast but turn the corner and lash part of her western coast as well. The neighbouring countries do not enjoy immunity either.

Today the mobile elements—wind and water—are transporters of dangerous pollutants and distributors of their effects. The atmosphere is an indivisible mass enveloping the earth and all the oceans are unified (their artificial delineations are only for geographical convenience). Hence adverse reactions spread through the entire ocean-atmosphere system with far-reaching consequences. India is already highly industrialized and other tropical countries are now pursuing rapid industrialization. But, unfortunately, little attention is being paid in these countries to industrial pollution control.

Soaring rates of fossil fuel consumption necessarily mean intolerable levels of heat discharge and carbon dioxide discharge. In addition to these, a number of other dangerous pollutants are discharged by industries. Heavy blankets of haze hang over industrialized areas and there is a build-up of aerosols which affect weather and rain fall. Sulphur dioxide causes acid rains which have devastating effects on monuments. Then there are motor vehicles which also release pollutant’s affecting rainfall.

Apart from the deadly carbon monoxide, motor vehicles also discharge lead iodine which is known to have the same effect as the nucleating substance (silver iodide) used by weather—men to seed clouds for artificial stimulation of rain. Initial discharge may have the effect of cloud seeding, but as residues of such substances accumulate in the atmosphere, they can cause an overseeding of clouds which hinders or prevents precipitation. There is no way of controlling the dispersal of these substances in the atmosphere by air currents from the heavy discharge areas to other areas.

FLOODS: (In India in 1973)

A MAN-MADE CALAMITY



“OUR VANISHING FORESTS” IS A PAMPHLET OF 28 PAGES CONTAINING MANY ARTICLES ON FORESTS AND SOIL EROSION. I HAVE TO PUBLISH MANY MORE ILLUSTRATED ARTICLES TO PRESENT A COMPREHENSIVE PICTURE OF THE SUBJECT.

Bhagat Puran Singh

Irrigation and Power Minister K. L. Rao has said that we must learn to live with floods. Floods are not a natural

but a man-made calamity. The Government's Forest Policy lays down that the area under forests in the hills should not be less than 60% and in the plains it should be at least 20%. As a whole, the total area under forests should not be less than 33%. If the percentage falls below 33% the rivers overflow their banks after heavy rainfall, causing devastating floods. Further, forests should be uniformly distributed throughout the country. But in India we have only 23% of our total area under forests. In Punjab, the figure is only 4.2% or about 1/5th of the required minimum. No wonder we face the fury of floods.

Take an extreme example, if all the trees on the slopes of the Himalayas were cut, the towns and villages in the Indo-Gangetic plain would be swept off during a single monsoon season. Trees store a lot of water in their roots which they release slowly in the form of springs, evaporation from leaves, etc. The roots of trees have a strong grip on the soil. When a tree is cut, this grip is relaxed, the soil becomes loose and is washed away by rain thus causing devastating floods downstream. Forests, therefore, act as natural dams and reservoirs. We have spent thousands of crores in constructing artificial dams and reservoirs to improve our economy but have destroyed our forest wealth.

Here are a few suggestions for Punjab: People who own 10 acres or more of land may be asked to reserve 20% of their holdings for fruit orchards and other trees; all roads should have rows of shady trees on both sides; railway tracks, canals, rivers and stream-banks should have trees on both sides; in Ferozepur, Faridkot and Bhatinda districts every town and village should have a belt of trees, 50 to 100 metres wide, all around.

Forests should be a Central subject so that a national forest policy could be implemented.—Gurdip Singh, Hosiarpur.

(The Tribune, September 6, 1973)



THE FACTORS BEHIND FLASH FLOODS

By Bharat Dogra The Indian Express, JULY11, 1980

The floods which have ravaged a large part of the countryside in recent years have been attributed to two factors: swelling of rivers due to heavy rains in catchment areas and excessive discharges from reservoirs. A general impression has been created that heavy rain in catchment areas leads inevitably to the flooding of rivers and this in turn necessarily fills up the reservoirs so fast that excess discharges become unavoidable. Consequently, the flash floods were seen as natural disasters about which man can do little by way of prevention.

The fact is that heavy rain in catchment areas need not necessarily lead to as massive a rising of rivers as now takes place. It depends on how much water is absorbed into the soil and how much of it immediately flows into the river. Also on the ability of the flowing water to erode the soil and carry it down the river, thereby raising its bed and reducing its water carrying capacity in the plains. These factors, in turn, depend on the state of forests and pastures as well as on the agricultural and soil conservation practices in the catchment areas.

Heavy rain may be a natural factor but the destruction of vegetative cover and neglect of soil conservation in catchment areas are not. Landslides which block river flows can cause very destructive flash floods. As is well known, the possibility of the occurrence of landslides is enhanced greatly in hills which have been denuded of their greenery.

The inflow of flood waters into the reservoirs also does

not necessarily mean that sudden and excessive discharges leading to flash floods in downstream areas are unavoidable. After all, these reservoirs are designed to receive the expected flood flows and release them only gradually. If they have to resort to sudden and heavy discharges, it means that the level of water flowing immediately into them was not anticipated on the drawing boards. On the other hand, it may well be that the reservoir is kept full even during the rainy season in order to maximize the generation of hydel power. The flood protection aspects gets neglected in the process.

In 1978 the Bhakra reservoir was filled up to 1,684 feet while the maximum storage capacity of the dam is 1,688 feet, and then panicky discharges had to be made to save the dam, which caused large-scale floods rendering 65,000 people homeless. One of the major causes of the immense distress caused in the West Bengal flood in 1978 was the collapse of the Hinglow Dam. According to the available statistics, some of our reservoirs are known to have experienced a siltation rate three to four times higher than what had been originally anticipated.

Regarding floods as natural disasters caused by heavy rains is an outdated concept which ignores that many new mostly man-made reasons for floods. The foremost of these is the unchecked ecological ruin in the catchment areas, caused by the rapid expansion of agriculture and the even more rapid acceleration of the commercial exploitation of forests. The Forestry Department of Uttar Pradesh frequently expounds its conservation objectives, but does not desist from sending contractors to axe trees in already badly mauled catchment areas of the Ganga and its tributaries. The Forest Department Corporation in West Bengal is reported to

have taken up a massive programme of mechanized logging in an area of 33,000 hectares in a hitherto inaccessible part of Darjeeling-Kalimpong hills. It was revealed some time back at a meeting of the Central Board of Forestry that the total area to be ultimately covered under this project in 82,200 hectares.

Some of our ill-planned or badly designed protection works have served to accentuate floods. The reference here is not just to the badly silted or less than optimally managed (from the point of view of flood control) reservoirs, but also the bunds, embankments and other structure raised for providing local protection. These are often constructed without considering the larger river flow, with the result that the protection afforded to one region often creates even worse problems for another.

Corruption in the construction of these works often leads to use of substandard materials which explains the frequent breaches at the time of floods, an additional hazard of poor construction work is that the water released by a broken embankment over a restricted area can gather a tremendous speed and thus cause greater destruction.

It is in the context of these and allied factors that the problem of floods has to be viewed and tackled.



HALF OF GUJARAT MAY TURN INTO A DESERT

Gujarat is on the brink of an ecological disaster and unless the afforestation programme is turned into a mass movement, half of the State will become a desert.

This gloomy picture of the State on the ecological front was painted by Gujarat Govenor R. K. Trivedi while speaking to newsmen at Raj Bhavan yesterday evening.

The frequency of drought and floods, shortage of fodder, fuel and drinking water and the change in the rainfall pattern in several parts of the State and allied problems, including the increasing inaccessibility of aquifer levels, could be directly linked to lack of vegetation cover and ecological imbalance.

Mr. Trivedi said that this year's drought had affected over 13,000 villages and should serve as a "final warning". For the first time this year, as many as 24 towns and over 12,000 villages had to be supplied drinking water and trains had to be requisitioned and pressed into service for this purpose.

To top it, the ground water level had also been receding at an alarming rate and at many places, new wells and borings yielded brackish water. Depletion of permanent pastures and lack of fodder resulted in moving of 2.75 lakh cattle-heads to cattle camps. The overfall scenario, he said, could not have been 'more alarming'.

—(Hindustan Times, July 31, 1986)



MISGIVING ABOUT TOTAL COMMITMENT TO NUCLEAR ENERGY

Weekly Swarajya, Madras, Annual Number, November, 1977

Another possibility is nuclear energy. My good friend, Dr. Eklund, the Head of the International Atomic Energy Agency, is very much in favour of it. But we must recognize that over the whole world, there is a very considerable feeling of misgiving about total commitment to nuclear energy as the solution to the energy problem of the world today. There are still so many problems like safety of operation, risk of accident, disposal of waste, and so on, which nuclear energy raises, to which as of today, nuclear technology does not have a complete and reassuring answer. But, let us assume that the energy problem is resolved in one way or another. Does this mean that the way to economic and social development in the future is unrestricted consumerism? I beg leave to doubt that. Here, I am not a prophet of gloom and doom like the participants in the Club of Rome Discussions, who believe that the world will run out of oil before long. It has been estimated, for example, that if the per capita consumption of oil of two countries, China and India, were to be at the same level as the present per capita consumption of the United States, the world will run out of all known, not only existing sources of oil, but all known and proved reserves of oil, within ten years. Today, as you know, 6 per cent of the world's population are supposed to consume 30 per cent—40 per cent of the world's resources, and that is the United States. But, are we to assume the way to economic and social well-being of human beings all the world over is to emulate the level of consumption in the U.S.A ? I beg to differ.

As I grow older I become more and more attached to Gandhian economic thinking, and to my mind, the future of the world, and the future well-being of humanity at large depend upon a complete change in our style to a simpler life style which will not only be a better and happier, but also a much healthier life style.



HAZARDS OF THE NUCLEAR AGE

What is implied by the word society or what is defined as human society? From Malthus to Morgan and Gordon Childe the concept of human society has gone through a spectrum of analysis based on the sum total of human historical experiences.

What is this sum total of historical experiences? From the cave-dwelling gregarious animals struggling with the ever-hostile natural environments for survival at the dawn of the neogene era about 1 ½ million 2½ million years B.C. man today is the most powerful living-being exerting a tremendous geologic force within the geosphere. Man's conscious confrontation with his hostile environments and endeavours for adjusting and modifying them started with the revolutionary discovery of making fire and raising crops. Following evolutionary changes and revolutionary upheavals through the various stages of social and production relations man has today entered the nuclear and space age. It is curious that geoscientists are not always aware of the fact that the stages of human history are cardinally designated by components of the earth (the old Aristolian elements). Lithic

ages are defined by rock and stone implements corresponding to the cave culture. Subsequent ages are named after metals, the last but no the least of which is the nuclear metal age. This only underlines man's pre-occupation with extracting resources from his natural environments for the basic purpose of sustenance and obtaining material and cultural benefits—in a nutshell, for social needs.

The stages of development of human society are marked by uneven characteristics particularly in respect of the relative time span of each. Taking broadly the holocent time, there has been a slow evolution of a rural-feudal culture depending mostly on agricultural practices with a little bit of primitive metallurgy thrown in. Science and technology had yet to make an impact on human environment. Eighteenth century industrial revolution in Europe ushered in the era of industrial-technological-urban culture. Following the footsteps of Lavoisier, Watt, Faraday, Woehlen Darwin, Rutherford, Curle, Bohr Einstein, Fermi and Oppenheimer (to name only a few among many more illustrious intellectuals) human society has now rapidly come to a point when it is trying to invade the environment of other stellar bodies. In the process just in 200 years as compared to the preceding thousands of years, man has suddenly reached a crisis.

How is this so ! Let us examine a few random pointers to today's reality. Recently in Minamata Bay, Japan, aquatic life was severely affected by chemical effluents from industries.

On any summer noon, during peak hours, a traffic cop in Osaka or Tokyo has to don masks for self-protection from polluted air.

More and more fossil fuels and nuclear fuels are being

used causing increased air pollution and larger quantities of nuclear wastes are being generated, by the problem of the safe disposal of which has not yet been solved by scientists.

Phytoplanktons, which maintain the balance of the atmosphere are facing gradual though slow extinction in the wake of sea pollution because of the increase in maritime oil traffic.

Contrary to the anticipated natural lowering of the earth's atmospheric temperature in the coming centuries there is evidence already of an artificial warming up because of the large quantities carbon-monoxide produced as a by-product of chemical industries.

For the needs of urbanization energy production and agriculture more and more geomorphic set ups are being modified or disturbed and as result overland sheet erosion and flood havoc have become recurring causing untold suffering and loss.

There has been land subsidence due to the excessive withdrawal of groundwater in San Joaqui Valley in the USA.

The city of New York with a population of 10 millions generates 30,000 tons of garbage a day compared to Calcutta's 2,000, though the latter's population is nearly equal. But Calcutta is dirtier. The environmental implication for both cities is obvious.

These are a few signs of the times or they the writings on the wall? Why have we come to this pass ?

The basic malady emanates from the age-old confusion of man is drawing the line dividing the essential resource needs for healthy human sustenance as well as existence and those for non-essential peripheral consumption. The course

of human history is punctuated with actions and events resulting from the workings of a compulsive psychology: the psychology of the individual, groups, society or a nation to pursue the goal of more and more material comforts and cultivate the power game for the same purpose. A self-propelling and needless philosophy of achieving more bigger, greater, higher and so forth in all forms of social activity, has all along been the cornerstone for human action “Growth” is today an obsessive goal for humanity. Judging the cumulative effect at this point of time, it is found that there has been an alarmingly rapid degradation of the environment. The industrial technological-urban culture has grown to be an essentially consumption culture. Resources are being recklessly extracted from the geosphere and as a result the environment itself is being severely affected. Ironically it is rarely reckoned that all extractable resources are finite and thus exhaustible.

What is the way out? The direct and simple answer is—though it may sound utopian—a decreasing consumption level of the expanding material culture of the affluent sections and providing a healthy and secure (need not be even luxurious or comfortable) existence for the rest of humanity. This is the only way to manage properly the human environment and eradicate tensions and war through international collaboration and control with the ultimate aim of coexisting with nature and not harming irreparably its environment.

Now we are aware that the offshoot of man’s interaction with nature is beset with apparently grim consequences. The situation demands management on a global scale, though local and national problems should

provide the basic and structural data for the identification and quantification of their problems. The immediate objectives broadly should be along the lines suggested by UNESCO’s Advisory Committee on Natural Resources Research: (1) inventory and assessment, (2) systematic observations and monitoring, (3) research into structure and functioning of terrestrial and aquatic eco-systems, (4) research into changes in biosphere brought about by man and effects of these changes on man, (5) education and supporting activities.

The Statesman, November 11, 1975



POLLUTION Is Fate Of Rural India

The Statesman, 9 June, 1980

June 8—In a recent survey on rural water supply made by the World Health Organization, it has been revealed that more than 80% of rural population in India live without safe and germ-free water supply, according to Prof. N. Mazumdar, former Director of National Environment Engineering Research Institute.

Speaking at a seminar on “Development without Destruction” organized to observe the United Nations World Environment Day in Calcutta on Thursday, he said “the picture is indeed gloomy.”

Except Bangladesh, where the percentage was 37.8, the percentage of rural population living with polluted water in almost all the countries in the South-East Asia region was as high as 80. In Nepal the condition was worse as 95% of the people in rural areas lived with unsafe water,

Mr Mazumdar said.

The urban population of India, Mr Mazumdar said, by the end of 1990 was estimated to rise to 205 million. By that year, 119 million of urban population would require to be provided with potable water, Mr. Mazumdar said.

Not much hope

Mr Donald Sheehan, the U.S Consul in Calcutta, did not find much hope for a solution to the growing problems of the complex environment. He said the atmosphere would grow “atomically” more polluted when the Third World would equip itself with nuclear power.

Mr. R.N. Mukherjee of Jadavpur University, stressed the need to conserve energy and to produce “biomass” in a world of dwindling resources, increasing cost and growing population.

The seminar was organized jointly by the Institution of Engineers and the American Centre.

The rate of urbanization in West Bengal is one of the lowest in the country, Mr S.K Neogi, Secretary-general of the Institution of Public Health Engineers India said in Calcutta on Wednesday on the occasion of the United Nations World Environment Day.

He said Calcutta apart, the State is backward in respect of urbanization. While some investment are made in the big cities, the urban environment in smaller towns has deteriorated continuously.

At another meeting at the All India Institute of Health and Hygiene Mr Prasanta Sur, Minister for Local Government suggested that the issue of pollution should be looked into before an industrial licence was granted.



CAN OUR POLLUTED PLANET SURVIVE

BY JOHN DAVY The Hindustan Times, November 24, 1968

A few centuries ago, men used to plant oakes which would take 500 years to mature. They must have had a quite different relationship to time. Today, we peer a mere 30 years ahead through a haze of unreality. The plan-span of most Governments, extends no further than the next election, and more usually not beyond the next Budget. For the average citizen long-range planning means looking at holiday brochures in January and dreaming about next August.

A Few uneasy paragraphs appeared in the newspapers recently following the revelation that North Sea gas may run out in two or three decades. The idea of looking so far ahead—let alone four or five centuries, as the oak planners did—now preoccupies only the science-fiction writers. Yet within the next 30 years, not only North Sea gas, but a vast variety of more easily accessible resources on which we now depend will be running low. This assumes that we survive that more immediate problems of land, food, population and water supply which show every sign of compounding a major planetary crisis within the lifetimes of every one under 45.

Most people perceive that we live in a most unusual period of history, that we have become quite remarkably inventive in technology, that there are a lot of cars and aeroplanes about more noise and fumes, that life is crowded and somewhat tiring. But it is not realised, with full imagination, what we are doing to the planet.

Need For Action

Five hundred years from now, one thing is quite certain. Historians—if there are any—will look back on the twentieth century as a time when men plunged into a reckless transformation and exploitation of their global environment quite without precedent. They will study with awe our incredible confidence that something would turn up—new techniques, new resources, new discoveries. They will survey, with cold shivers running down their spines, the insouciance with which we exposed the delicate, and to us largely mysterious, balances in nature and in our own bodies to new and ingenious stresses and environmental insults each year. They will examine, dumbfounded, how we blundered somehow into the twenty-first century, and contrived, by means which are still obscure to ourselves, to preserve a world capable of supporting future historians.

But they may also ring with a red pencil the 1960s and 70s as a period when growing numbers of men, including a swelling proportion of respected scientists, began to perceive with full clarity the need for urgent action.

Last September, delegates from all over the world attended a UNESCO conference in Paris to debate ‘the scientific basis for the rational use and conservation of the resources of the biosphere.’ In other words, they were wondering if we know how to keep the earth habitable. Soon there seems likely to be a monster UN conference to survey the same ground, the immediate effect of conference of this kind is to provide remunerative employment for typists and generate stacks of paper.

For it is the accumulation which needs to be appreciated. The water engineer perceives that his problems of the next 10 years are difficult but apparently soluble. The agriculturist sees a change of stepping up production which may just fend off mass starvation for the next generation. The municipal engineers hope they can just about dispose of a rising tide of sewages. It is when these and many other environmental problems are surveyed as a whole, in a 30 or 40 year perspective, that some sense of the effort needed to keep the earth habitable emerges.

The population explosion is the most familiar of these looming planetary stresses, and it is fundamental to the rest. For while twentieth-century man would undoubtedly have done drastic things to his environment with a static population, he is doing a lot more with an exploding one. In 1860 the world’s population was probably about 1,000 million, and it is thought to have taken 200,000 years to reach that figure. Sixty years later, it had doubled. By 1975 it will have doubled again, to reach 4,000 million. By the end of this century 6,000 million citizens are confidently expected to be living or partly living on earth and if there is no pause, children now being born could spend their old age among 12,000 million others.

Eating into Land

If the earth were all covered with earth, so to speak, there would be no immediate problem. But it is not. Three-quarters of the globe is covered by sea. Half of the land is uninhabitable, being covered with snow, ice, deserts, rocky peaks, etc. We have to share what is left—about 25 million

square miles. British citizens live in one of the most crowded corners. Even shared out, we could each expect about one acre of the British Isles; Americans would get 12 acres each.

We are eating into this land at an alarming rate. In the United States a baby is born every 12 seconds and a car every five seconds. The two together set up a new demand for living space and road space which eats away two acres of countryside every minute. Urban expansion may swallow up a sixth of Britain's farmland between now and the end of the century. This is the land—a foot or so of fertile top-soil with a few more feet below—on which our terrestrial existence ultimately depends.

The soil is being treated pretty roughly in many parts of the world, although this is not a new phenomenon. Centuries ago, goats were eating parts of the Middle East bare; Merino sheep gnawed away at the hills of Spain; iron smelters cleared Scottish hillsides of trees, and millions of tons of fertile soil were washed steadily into the sea. However, the American dust bowls of the 1930s set new standards of environmental destructiveness. Partly, as a result, the whole problem of 'conservation' of the environment has attracted more energetic attention in the US than anywhere else.

Meanwhile, greedy and ignorant farming and timber felling, coupled with urban growth are spreading to subtropical and tropical regions, where both the soils and the populations are far worse equipped to cope with the stresses that result.

The soils of tropical forests, accustomed to warm

semi-darkness, collapse and disintegrate when trees are cleared, and wash away in the next rains. And urban growth often means malignant expansion of shanty towns and settlements. The advanced nations of the world are deeply preoccupied with preserving some kind of habitable conditions in their cities. The shanty towns are growing up with none of the services which are just enabling European and American cities to hold their own.

Yet it has been estimated that urban growth in undeveloped regions is now going ahead far faster than in developed regions. Between 1920 and the end of this century, the urban population of the developed countries is expected to quadruple; the urban population of undeveloped countries will multiply 20 times, so that nearly twice as many people will be town dwellers in poor regions as in rich.

The rich are now discovering the enormous overheads of city living, the vast investment and maintenance involved in keeping the great conurbations functioning at all (and even then, there is horrible decay in the centres of places like Chicago): There seems little prospect that the poor regions will be able to invest even a fraction of what will be needed to prevent the development of tropical slums which will make Chicago's ghettos seem like a Garden of Eden.

To appreciate the problems, it helps to look in more detail at one or two of the urban problems of advanced countries. Take the generation of waste, an activity pioneered with special energy in the US, which shows the shape of things to come.

Refuse Industry

Each American citizen produces some three-quarters of a ton of solid refuse per year, and this thriving industry is growing at 4 per cent year. Los Angeles alone dumps 12 million cubic yards of refuse each year into tips and landfills. The wonders of the modern packaging industry mean that a growing proportion of this refuse is virtually indestructible—48,000 million aluminium cans are discarded annually, 28,000 million long-lived jars and bottles, and uncounted plastic containers and wrappings. If they are incinerated, there is an air-pollution problem.

Giant car-dumps are a familiar feature of the landscape, and have prompted the development of colossal plants which grind up old cars into small bits (the first of these has now arrived in Britain and is installed at Wilesden). Mining companies are said to be eyeing certain American scrap-heaps as a potentially richer source of minerals than those provided by nature.

Even more formidable is the US sewage industry, which by the year 2,000 will be dealing with almost 37,000 million gallons of municipal sewage a day, or about 132 gallons per head per day. In Britain, the current flow is about 30 gallons per head per day, to which are added 1,300 million gallons a day of industrial effluent.

It is currently costing us some £ 133 million a year to treat and dispose of the country's sewage and industrial effluent and the cost is expected to double, within a few years. In Britain we are exceptionally fortunate in that no city is very far from the sea and we have relatively abundant

water to sluice away our wastes. Even so, a survey in 1958 showed that over 5,000 miles of rivers were polluted, often grossly.

The water Pollution Laboratory is just completing a second survey, and preliminary indications are that there have been some improvements (notably in the Thames, following a gigantic £ 40 million treatment and disposal scheme recently completed by the GLC). But even so, rivers near cities are often dead, smelly and totally unfit for bathing.

Sewage Problem

The latest sewage problem comes from the urbanization of farming. Instead of depositing their manure as precious fertilizer on fields, animals on factory farms have the equivalent of running water and flushing toilets. The result is vast quantities of odorous slurry, which is becoming a major disposal problem. The National Farmers' Union recently protested that if the river authorities enforced current anti-pollution regulations, British farmers might have to invest £ 250 million by 1972 to control their farm wastes. Thus we have the weird spectacle of farmers buying in subsidized fertilizer from the chemical industry, and operating a subsidized farming system which may need more subsidize to dispose of the unsubsidized fertilizer produced free by the animals.

The rivers are not our only sinks. We use the air as well. It is estimated that into the air over the US there are dumped annually 65 million tons of carbon monoxide, 23 million tons of sulphur compounds, 15 million tons of oil and sooty substances, 12 million tons of dust, eight millions

tons of acrid nitrogen compounds, and two million tons of other gases and vapours. It is predicted that even with severe controls, these amounts will more than double by the end of the century.

In Britain, there is a parallel situation, with an emission of one and a half million tons of grit and ash, two million tons of smoke and five million tons of sulphur gases annually. The Ministry of Technology estimates that resulting corrosion, soiling and other damage is costing £ 350 million a year.

These are some of the gross features of the situation. They add up to a very expensive and messy problem. But they also add up to something more. For despite our best efforts we are releasing into the environment substances and processes never before encountered by the living organisms of the planet, including ourselves. A great many subtle balances, with millennia of evolution behind them, are being changed with quite unprecedented speed.

Lung Cancer

Some of the effects we understand. Detergents have fouled our waterways with foam and are still liable to block the bacterial digestive processes in sewage works. 'Soft' detergents which can be attacked by bacteria, are solving the first problem and a solution has also been found to the second. But many effects we do not fully understand.

People in towns get more lung cancer than people in the country irrespective of how much they smoke. Air pollution may be involved but the details are obscure.

Rain fall over parts of Europe has become increasingly

acid, almost certainly because of pollution by sulphur gases from oil burning. Acid rain appears to be depressing the yield of Scandinavian forests. It may be having other effects. We do not know.

Traces of pesticides are now found in virtually all animals and man including Antarctic penguins. Some animals, particularly birds of prey accumulate large amounts through food chains. Their eggs may be sterile.

In the US 400 new chemicals come on the market each year. They are commonly tested for direct health hazards. But after use they are disposed of—and sooner or later they or their breakdown products become involved in biological processes of one kind or another most of which we know little or nothing about.

It is no help to go round prophesying doom. The fact that we survive at all in an urban environment is a demonstration of the rugged resilience of biological systems which have a built-in ability to resist stresses and bounce back after injury. Nevertheless, there have recently been some unpleasant environmental surprises, and there are certainly more in store. The sheer variety and scale of the things we are doing to the planet suggest that a variety of biological balances must be near breaking point.

A growing number of biologists and ecologists (whose speciality is the interaction between communities of living things) have begun to utter serious warnings about these trends—some of which could conceivably upset not only local but global balances.



Pesticide in blood of every 4th person in Punjab's cotton belt

Vishav Bharti

Hindustan Times

CHANDIGARH: Pesticides residues are present in the blood and urine of every fourth person in Punjab's cotton belt.

A Post Graduate Institute of Medical Education and Research (PGIMER) study has found that around 24% of the people living in rural areas of the cotton belt have residues of pesticide in their blood.

The study titled 'Reducing Pesticide Toxicity in the Exposed Population of Punjab' was funded by the Indian Council of Medical Research and conducted by the School of Public Health of the PGIMER, Chandigarh, and Bloomberg School of Public Health, Johns Hopkins University US.

Under the study, blood and urine samples of 139 people from eight villages of Bathinda district were collected. The analysis established that 33 samples (24%) had residues of pesticides in their urine and blood.

"Pesticide residues of ethion, chlorpyrifos, endosulfan sulphate and parathion were detected in the urine and blood samples of the people. Environmental samples such as soil, feed and vegetables also revealed the presence of these pesticides."

It found that the amount of pesticides found in blood and urine of the people was quite low. While discussing the effect of these pesticides on their bodies, the study found that signs and symptoms to chronic pesticide exposure included

fatigue, sleeping disturbances, depression, dizziness, hypertension, anxiety and Convulsions. These are more or less equally prevalent among the study participants.

The study couldn't establish a link between the presence of pesticide residues and major diseases like cancer.

Of 139 people studied, 68 were sprayers of pesticides and 71 non-sprayers. The study concluded that there is widespread environmental pollution due to pesticide exposure among sprayers and non-sprayers in study population, which requires public health interventions, including creating awareness among farmers and strict enforcement of regulatory control measures.

FARM WOES

- ◆ Every year, Punjab uses 6,900-tonne pesticides
- ◆ Punjab is the largest consumer of pesticides in the country
- ◆ India ranks 10th in pesticide consumption
- ◆ India ranks 12th in pesticide production
- ◆ 400 pesticides formulators spread all over the country



WATER BECOMING A SCARCE COMMODITY

Patriot, 23 June, 1986

Drinking water is becoming a scarce commodity for an increasing number of people in various part of the country, reports PTI.

As summer advances, the misery of villagers in Maharashtra, Karnataka, Gujarat, Tamilnadu, Rajasthan, and several other parts of the country deteriorates. The situation may be further aggravated in coming years because of drop in water table, the drought the drying up of traditional wells, reports recieved from PTI bureaux, reveals.

A top government official said the irony is that increasing number of borewells being dug in scarcity stricken villages are drying up water resources of neighbouring villages which never had a water problem.

An expert in New Delhi said "if current trend of deforestation continues and the droughts keep recurring with their present frequency, the water table in the country will continue to drop and more villages may in fact be waterless that now."

In Maharashtra about 22,700 villages are suffering from acute shortage of drinking water and nearly 40,000 wells and bore-wells have either dried up or contain water which cannot suffice for more than a week because the water table is failing. Hundreds of tankers have been hired to pump water into dried wells in about 1,000 villages.

The State Government had provided drinking water at a cost of Rs 350 crore to 12,016 of the 12,930 villages that had been declared waterless villages. Unfortunately new

developments render waterless even those neighbouring villages that never had a problem there and because of this the number of problem villages had gone upto about 22,700.

In Gujarat, about 65 towns and over 13,000 villages are facing acute drinking water scarcity due to failure of monsoon this years. Areas of Saurashtra region and Kutch are the worst hit.

The people in Rajkot and Jamnagar are facing the worst drinking water scarcity in living memory, a State Government official said. Broken pipelines and ditches in the middle of the road are common sight in Rajkot. In the neighbouring Jamnagar, the city's main drinking water source, the Ranjitnagar Dam, has dried up for the second time since it was built in 1936 he added.

To solve Rajkot's problem, water is being brought daily by rail tankers from Gandhinagar and Dhaterwadi Dam near Rajula since 15 May.

In Karnataka, two-thirds of the 243 towns fails to meet minimum supply standards. Bangalore, the twin cities of Hubli-Dharwar and 34 towns tottered on the brink of water crisis. A large chunk of the affected towns recieved water supply of less than 20 litres per capital per day. However, onset of monsoon has changed the situation in Bangalore.

In Rajasthan, the entire State is facing acute drinking water shortage with all the towns and cities getting restricted supply.

A survey in June 1985 showed that out of its 192 towns only two were providing 40 litres of water per capital daily.

The worst hit was Ajmer where drinking water is supplied only once in three days as all the sources of drinking

water have gone dry. Walled city of Jaipur is getting water supply only once a day as water level in the Ramgarh Dam, the main source, has gone precariously low.

The drinking water problem is particularly alarming in the western desert and the southern tribal areas. Hundreds of remote desert villages have been abandoned as the population along with the cattleheads have migrated to other places in search of water and fodder.

In Bihar which is also reeling under acute drinking water crisis, the worst affected areas are Munger, Nawada, Gaya, Begusarai, Hazaribagh, Aurangabad, Ranchi, Dhanbad, Singhbhum and Santhal Pargana. The scarcity of water has been attributed to the drying up of rivers, tanks, wells, tube-wells as underground reserves had been exhausted.

All major towns in Goa-Panaji, Vasco, Margao and Ponda and number of villages are facing water shortage during the current summer.

Reports of water scarcity have been received from several towns of Uttar Pradesh, Madhya Pradesh and the union territory of Dehi.



WHAT ABOUT AIR POLLUTION

Monthly Herald of Health, Poona

Many indict air pollution as the major cause of respiratory disease, but much of this publicity is designed to shift the blame away from cigarettes. Air pollution does not constitute a health problem in some areas, but it is not the major cause of chronic bronchitis as some claim.

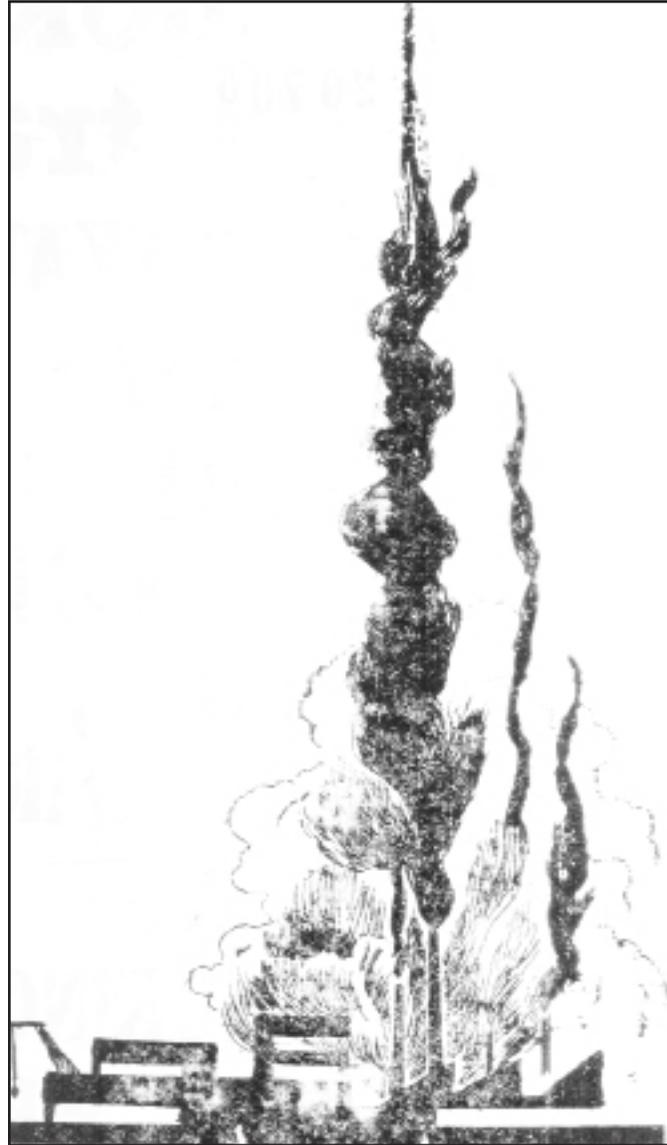
Scientists say that a person breathing normally for an entire day during a period of high air pollution in an industrial city would inhale from .02 to .2 milligramme of solid substance, a small proportion of what a smoker would inhale. Medical men estimate that air pollution causes a threefold increase in lung cancer, whereas cigarettes are responsible for a twenty-fold to thirty fold increase.

Moreover, another factor to be considered here is that a person breathes polluted air through his nose, which is an efficient filtering device, while the smoker draws his tar-laden smoke directly through his airways without the advantage of prefiltering.

In a smoker the tars and heat inhaled from one cigarette may inhibit the ciliary or cleansing action of the air passages for as much as two hours. therefore, if this smoker goes in a polluted-air area, foreign substances not strained out in his nose are not removed by the filtering action of the cilia either, as they are for the nonsmoker. In other words, the smoker becomes victim of a double dose of irritating chemicals—first from his cigarettes, then from the polluted air he breathes. For this reason such pollution does much more damage to the smoker than to the nonsmoker.

As to the relative importance of air pollution and

smoking in causing chronic bronchitis, the U.S. Surgeon General's report says, "The importance of cigarette smoking as cause of chronic bronchopulmonary disease is much greater than that of atmospheric pollution or occupational exposure."
—Courtesy, LISTRE. Monthly Herald of Health, Poona.



OZONE

HAS TO FIGHT ON TWO FRONTS...

Earth is the only known planet to sustain life. All the other known celestial bodies have so far been found to be barren. What makes earth sustain a wide variety of life forms? Of course, a simple answer is that this planet has all the ingredients essential for life such as oxygen and water. But the question is, how does it protect life forms the lethal cosmic rays and solar radiations? Earth has a protective umbrella known as ozone layer whose main function is to cut off lethal rays and radiation from reaching the earth. In this manner, life forms continue to flourish on this planet.

Ozone is nothing but three combined atoms of oxygen (O₃). Ozone is found in stratosphere, which begins from the altitude of 16 kilometres from the earth's surface. The most interesting fact

...Ultra-violet rays from the sun and the pollutants from the earth

about ozone is that it is a trace gas and does not exceed a few parts per million of total gas density in the atmosphere. Though thin, it effectively shuts off harmful radiations from reaching the earth's surface. Even a slight reduction in the ozone concentration may lead to a catastrophe for life on the earth. The ultra violet rays of the sun are the cause of skin cancer in man. When ozone density becomes thinner, sun's ultra violet rays will be able to penetrate the earth's atmosphere. According to scientific studies, as 1 per cent fall in ozone concentration could cause a 2 per cent increase in the ultra violet penetration for the earth. In terms of human tragedy, it will mean ten thousand more people becoming victims of

skin cancer. Plants will suffer considerably because the ultra violet flux will inhibit photosynthesis, a process by which plants manufacture their own food. Eventually, the earth's climate will vastly change, leading to serious repercussion on the ecological balance on this planet.

Scientific studies show that the ozone layer is an endangered species now. The most important cause of ozone depletion is the use of supersonic aircrafts. These aircrafts release exhaust gases which contain carbon dioxide, nitrogen-oxide, sulphur-dioxide and hydro-carbons. As there is not much circulation of air in the stratosphere these poisonous gases pile up.

Other factors contributing to accumulation of harmful gases in stratosphere, are increased use of nitrogen fertilizers, gasoline and coolants. All these compounds can stay in the atmosphere from 40 to 150 years. The greatest worry of the scientists is that all these poisonous chemicals are going to be increasingly deposited in the earth's atmosphere in the years to come. All nations are now engaged in the mad race of industrialization and urbanization. More industrialization means a greater release of poisonous gases in the atmosphere. It is estimated that by 2025 A.D. the world population will double itself. Energy consumption is increasing by 10 per cent every year. There will be more nuclear power plants to add to the already expanding pile of harmful pollutants on the earth. The use of supersonic transport will increase and by early 2000 A.D. 2000 of such aircraft will be in use. All this means greater assault on the thin layer of ozone in the earth's stratosphere. It will then be an irony that ozone layer will have to protect itself not only from the lethal rays coming from outside the earth but also from the lethal

chemicals being released into the atmosphere by man. How long will ozone defend itself from the attacks from above and below ?

Scientists fear that there is a real and serious threat of ozone depletion by the end of this century which will mean a threat to life on the earth.



UNDER WATER

Just as dirt has been defined as wealth in the wrong place, so floods consist of liquid in the wrong place—or time, for much of the water which is now an affliction would have been only too gratefully received earlier in the year. Such, however, are the vagaries of nature in the tropics, as the country usually finds out at least somewhere once a year, but this year with a specially extensive severity and shock, since coming after a series of generally good monsoons. On August 20m 1973 the Union Minister for Irrigation and Power told the Lok Sabha that losses due to floods were nearly Rs 46 crores with 238 people dead. But before the end of the month the estimated bill had gone up to Rs 50 crores, and is presumably still rising, 11 million people were said to be affected, probably an under estimate. Vulnerable areas, such as north-eastern India, Punjab, has its worst flood for 20 years, there has been wide spread damage and distress in Kashmir, and sporadic almost every- where north of the Vindhias, including normally dry Rajasthan.

—The Stateman, September 4, 1973.



ATMOSPHERIC POLLUTION HITS CROP PRODUCTIVITY

Calcutta, February 4(PTI)—Apart from causing health hazards to man, atmospheric pollution affects crop productivity, Mr T.M. Das, a Calcutta scientist told the Science Congress here today.

He said suspended particles in the air absorb and scatter the sunlight so essential for photosynthesis of plants. This results in decrease in crop yield.

The pollutants depositing on the leaves prevent solar radiation from entering the plant thereby decreasing the plant's efficiency to convert sunlight into food.

MR. Das presented meteorological records for the last 50 years to show that the solar energy falling on crop plants had been decreasing as a result of pollution.

Another scientist from the Defence Research Institute in Gwalior, told the meeting that metallic pollutants cause sterility in man.

He said studies at the Institute had shown mercury chloride (used in drug industry), cadmium (used in battery making), manganese dioxide and selenium dioxide (used in ceramics industry) were all found to induce sterility.

He said these metals, even in small amounts, “produce abnormal sperms which can lead to production of an abnormal child”.



AWAY WITH CAR POLLUTION !

The Times of India, January 4, 1976

It is frightening to think that 150 children were run over and more than 2,000 lost a limb or more last year. Even the most wary pedestrians lose their lives in street accidents.

The biggest single killer, the automobile, claims over 25,000 lives in India every year. It is estimated that 42,000 deaths on the road may occur in India in 1980. The comparative world figures are 250,000 killed and 7.5 million injured.

Besides causing instant deaths roads are a major source of pollution, dust and motor exhausts, posing hazards to health. Noise pollution, often reaching harmful levels, is yet another injurious byproduct. Traffic jams and traffic islands are increasing in Bombay, Delhi and Calcutta. The high price of oil has done little to reduce the use of automobiles.

With its 130,000 automobiles, and traffic congestion of about 200 automobiles per sq. km. the urbs prima of India is comparable with any world metropolitan city. During the last decade vehicular traffic has almost doubled with the result that the existing roads cannot accommodate heavy and fast-moving vehicles. The traffic snarls of today —the confusion of cars, jeeps, taxis, buses, trucks, vans, scooters, mopeds and heavy earth-moving vehicles—also indicate the shape of things to come. Our silent zones are anything but silent. Horns are often blown indiscriminately. Evidently the drivers do not realise that noise is a form of pollution too.

Calcutta follows Bombay in the amount of vehicular traffic and over 90,000 vehicles ply on the roads of Delhi,

Madras and Kanpur are not far behind in regard to vehicular congestion and pollution. In fact, world figures show that vehicular traffic has zoomed to six times its number in the last 25 years or so from 50 million in 1948 to some 3,000 million today. Los Angeles tops with the concentration, with 350 automobiles per sq. km.

The proliferation of vehicles no doubt provides a desirable means of mobility of people and goods, meeting the social and economic needs of society, but it has also encroached on urban space and led to the deterioration of the environment.

Vehicles spewing smoke increase pollutants such as carbon monoxide, oxides of nitrogen, sulphur dioxide, lead and black carbon. In the last century, the burning of fuel has resulted in the consumption of 2.5 million tonnes of oxygen, thereby pumping out 3.6 million tonnes of inert carbon dioxide, which does not support life and has a toxic limit of 5 per cent.

The incomplete burning of fuel and release of carbon monoxide cannot be avoided in conventional untuned vehicular engines. It is said that India can save some 200,000 litres of motor fuel a year if automobile engines are tuned when they stop for petrol at stations. This would benefit the economy by Rs. 3 crores.

Exposure to carbon monoxide for about three hours at 0.01 per cent concentration in the air is toxic causing pain and discomfort; exposure to 0.3 per cent for 30 to 60 minutes is dangerous causing visual difficulties, and one per cent, is likely to cause fatigue and coma.

Immobilized on a traffic island in a busy part of the city, a Bombayite can very well feel the effects of carbon

monoxide, especially in still air conditions. Residents of high-traffic density localities usually suffer from the ill effects of traffic exhausts. The traffic police, doing an eight-hour shift on traffic islands, are the worst sufferers and should be provided with anti-dust and anti-gas respirators.

discomfort; exposure to 0.3 per cent for 30 to 60 minutes is dangerous causing visual difficulties, and one per cent, is likely to cause fatigue and coma.

The standard internal combustion (IC) engine presents the crux of the problem, and so far no alternative has been found despite sustained technological efforts towards a solution. It gives out a trail of smoky exhausts containing as much as 13 per cent, carbon monoxide when the vehicle is at a standstill. There is a lesser amount of pollutants discharged as cars accelerate and decelerate or while cruising at optimum speed, but it again increases with speed as in the case of super-fast cars.

Japan is ahead in the improvement of IC engines having an almost smokeless performance on petrol with little or no output of the poisonous TEL compound.

A spate of invention and novelties like the LPG car, methanol car, hydrogen car and even fuelless automobiles have led to fresh interest in development work. If the techno-commercial feasibility of the hydrogen car is established, it would mean running the car on water and all one need do is to drive to a nearby pump and fill up with a liquid somewhat like petrol. It depends on how soon an inexpensive process of splitting water into hydrogen is achieved.

The basic question is whether or not we can impose a drastic limit on traffic concentration, without which all efforts to reduce traffic hazards will be futile. Amateur drivers of

owner-driven vehicles are largely responsible for accidents. Apart from high vehicular density and poor traffic regulation, socioeconomic factors too interact to cause mishaps.

In a recent experiment samples of breath from drivers were collected in balloons and analysed for alcohol content. Every fourth driver operating on five important highways leading to Delhi was found to have drunk enough alcohol to pose a traffic hazard.

If the use of small vehicles and cars is discouraged, favourable conditions for travel by mass transportation can be created. Why make the car a status symbol ?

Now that the spectre of two out of three is hanging over our cities. We can retrace our steps. We can improve the organizational, institutional and managerial framework for road traffic safety, rationalize the use of vehicles for different purposes and thereby avert disaster. Architects should no longer think of planning cities without taking into account the problem of automobiles, toxic gases, noise safety, parking lots, garages, camping and maintenance stations.

—R.C. Misra



DEOXYGENATION OF WATER

The Sunday Standard, May 28, 1972

Other pollutants like oil make such demands on the oxygen in sea water that other living things competing for oxygen suffocate for lack of it.

Last year as much as 3,00,000 tons of oil may have been dumped into the Mediterranean by ships cleaning tanks at sea and at oil terminals.

In the natural decomposition in seawater, one gallon of oil depletes the oxygen from 400,000 gallons of water.

Sunday Standard, May 28, 1972



RECYCLING WASTE SAVES TREES

The Hindustan Times, March 11, 1980

New Delhi, March 10 (UNI)—About 300 million trees can be saved each year if the quantity of wastepaper recycled in the United States was trebled, according to one estimate.;

This was stated by Prime Minister Indira Gandhi at the plenary session of the FAO regional conference here. Mrs Gandhi was emphasising the need for recycling of wastes to save more energy.

While recycling was important for energy-deficient countries like India, more recycling in affluent countries would be good for them and the world, she said.



CLEANING UP THE GANGA

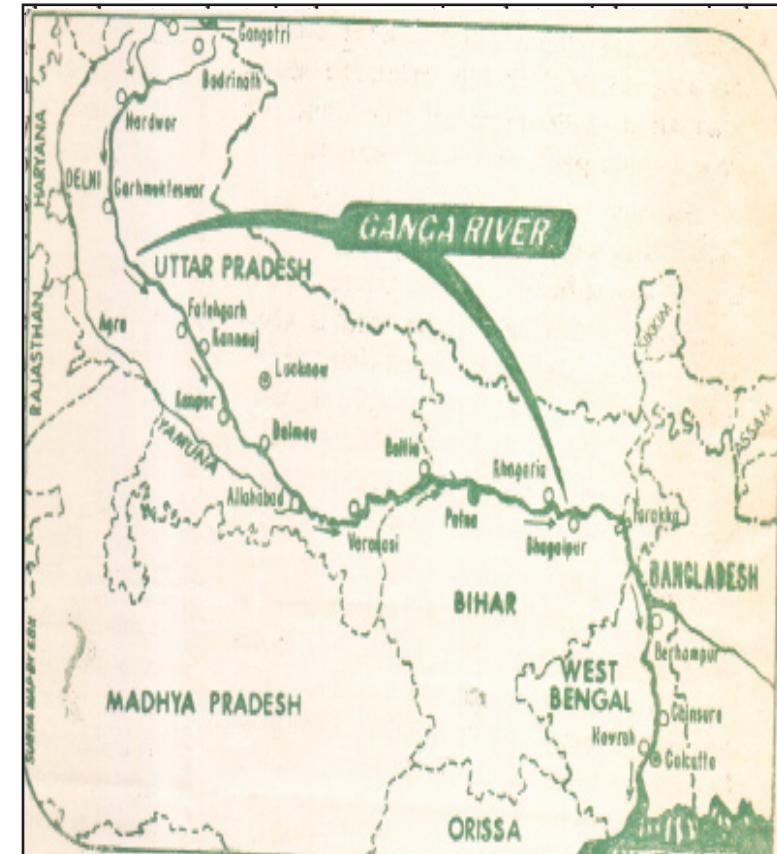
SURYA INDIA, September, 1985

The Ganga is over 1,550 miles long from its small beginning high up in the Himalayan mountains to its end in the Bay of Bengal. It covers about 26 per cent of India's land mass and 25 per cent of its water wealth and it has many tributaries, large and small. From time immemorial there have been human establishment by the side of its banks and countless caravans have passed by, as Iqbal in his beautiful poem *Sare Jehan Se Achcha* has noted. One can identify today about 27 cities and big towns on its banks, none, it is becoming apparent, with any sense of social responsibility. With hardly any exception, they let their sewerage into the waters of the Ganga with no care for those living downstream. In the circumstances, the Ganga must be about the most polluted river in India, if not the world.

The pollution consists not merely of sewerage and sullage which is bad enough. At Varanasi half-burnt bodies are thrown unceremoniously into the river to be eaten by the fish. Carrion can sometimes be seen floating in the water, the flesh in a state of putrefaction and vultures hovering hungrily over it. The scene is disgusting. Two scientists of the Bhabha Atomic Research Centre (BARC) M V M Desai and AK Ganguly, have noted that "bodies of cattle and infants stuck up in near stagnant water along the holy ghats attract the carnivorous birds and dogs", and evidently this does not bother anybody. We are a nation of insensitive people.

Varanasi, as a matter of fact, is a city of the dead and the dying and must be the most depressing city in the world to live. Old people, mostly poor, flock there to die

in the hope that some-how they will attain *Moksha*. It is a philosophy of resignation, but worse, it is a sick philosophy, but there it is and nothing is ever likely to dissuade people from acting the way they do. So these living in Varanasi take a somewhat cavalier attitude towards the dead. Bodies are unceremoniously cremated and thrown into the river—and



Little thought is given to sanitation, but that seems to be a typical Hindu approach to life. Take the case of Haridwar, for instance, one of India's holy cities. Here according to Desai and Ganguly, there are some 15 open drains, big and small, which carry untreated sewage and filth of the town directly into the Ganga. Unbelievable, but true. This is social

irresponsibility of the highest order. Furthermore, we are told, Hardwar Municipality clears a large part of its garbage into a dry stream at Kharkhari, near Saptrishi Ashram which, during monsoon, becomes a gigantic drain carrying the town's sewage into the sacred Har-ki-Pauri, barely three kilometres downstream. When dry, the stream is used as a vast lavatory, rendering the air thick with unbearable stench. What sort of people are we that permit this? Are we a civilized people or are we barbarians?

Hardwar, Kanpur, Varanasi, Allahabad, Patna... name a city and its social irresponsibility is to be seen to be believed. The Gangetic basin serves some 250 million people, which is about the population of either the Soviet Union or the United States. And the people living by the Ganga are susceptible to all kinds of disease which are waterborne, like diarrhoea, gastroenteritis etc. And yet, few people seem to care.

According to one estimate, the 27 cities along the Ganga contribute some 902 million litres of waste to the river every day. As the river moves towards the sea, its waters get so polluted that they are not even fit for cultivation! That is the extent to which we respect Ganga Mata, Mother Ganga.

According to one reckoning some 132 industrial units, large and small, discharge their waste into the Ganga and no questions asked. Hardly a dozen among them have any pretence of treating their effluents. It is as if they couldn't care less for people living downstream. Everything goes.

Now irresponsibility is not a peculiar Indian phenomenon. London was at one time equally heavily polluted. So, for that matter, was the Seine. But these rivers have now been cleaned and so should be the Ganga and an

agreement has recently been concluded between India and France to clean the river in a cost of about Rs. 250 crores. That is not much considering that only recently, six companies in Bombay were discovered trading in illicit *havala* transactions to the extent of Rs 1,000 crores, the monies evidently have been impounded. There is enough money available in the country but it is not the money so much as the social attitude of the people that has to be changed.

The first and foremost is the attitude towards insanitation. There is not one major city in India which does not flaunt this problem. One would have imagined that the municipalities of such "holy cities as Varanasi, Hardwar and Allahabad would take special care to keep their cities clean, but that is more a hope than reality. And this is true of other places as well, whether it be Nasik in the west and Madurai and Rameshwaram in the east. Our temple tanks are filthy and remain uncleaned for years. The *tirth* that is offered in many temples will not stand bacteriological examination. Yet we tolerate this without questioning. The inevitable answer is that such things have gone on in years past without any measurable deleterious consequences. And why should anything be changed?

As one who has visited temples in almost all parts of India, I have reached a stage where I would rather not worship at any of them, any more. They evoke no sense of wonderment or spiritual bliss in me. Is it too much to ask that some Authority make a study of our temples and our modes of worship? Do we have to go on as before? Are things beyond change? Why is it that Jain and Buddhist temples, like churches, are scrupulously clean and neat while Hindu temples reek of dirt and mud? Why do we allow people

to pollute our rivers in the name of religion? And why don't our political parties do something in this regard? Surely, all political parties, what ever their other differences, can get together to clean up our rivers and our habitations? Is sanitation, too a matter of politics?

We have had political leaders in the past. Now we need social and religious leaders to lead us along right paths. We need a contemporary Vivekananda who has the courage to speak out about the iniquities of our religious customs and cleanse our religion of the accretions of the centuries. We need men of courage and vision—and we don't have them. Hopefully, the Ganga will some day be cleaned. But more than the Ganga we need to clean Hinduism itself if the country is to emerge as a mighty power in the future. People who commit nuisance everywhere are hardly the ones to give an example to the rest of the world.

M.V. Kamath



He brought to the notice of his countrymen the wonderful
manurial

VALUE OF VEGETABLE PEELINGS

Waste from the Kitchen dump and barn sweepings
George Washington Carver 1861-1943

On January 6, 1943 the New York Herald Tribune writings of Dr. George Washington Carver said, "perhaps there is no one in this century who has done more to promote a better understanding between the races." Carver was born of slave parents in America's deep south. He became the foremost Negro scientist of his age.

He was an agriculturist working on the staff of an IOWA school, when one day he got a letter from Booker T. Washington, the acknowledge spokesman of the American Negro. This letter came from Tuskegee in Alabama, where Washington had a coloured people's Institute of Education. it read, "I ask you to give up money, position and fame. I offer you in their place work, hard work, the task of bringing a people from gegradation and poverty and waste, to full manhood."

He set out for Tuskegee. When he got there, Washington said, "Your department exists only on paper, and your laboratory will be in your head." "I will manage", replied, Carver.

He did. He thought of the use of ready-made fertilizers produced from the compost of vegetable peelings, waste from the kitchen dump and barn sweepings. The effect of spreading this on the soil so increased the yield of sweet potatoes and cotton that the local farmers came to stare in

wonder. They took up Carver's methods and speedily their own crops began to increase.

Then came a plague of the boll weevil. Thousands of farmers were driven to bankruptcy and despair. Carver turned his mind to the groundnut. He urged the farmers to burn the cotton, and plant groundnut instead. Soon they had bumper crops. This forced him to discover new uses for the groundnut. He tirelessly experimented in his laboratory and the results were astounding. Milk, dyes, ink, shoe-polish, shaving cream and butter were among the synthetic products he created.

By the time he died there were well over 300 by-products of the groundnut being made. The growing list of products on the market included cheese, linoleum, metal polish, shampoos and plastics. Today the groundnut is America's sixth most important agricultural product.

The epitaph they put on his tomb read, "He could have added fame to fortune, but caring for neither, he found happiness and honour in being helpful to the world."

—Weekly Himmat, Bombay.



IMPORTANCE OF ORGANIC MANURES

by Surinder N.Sud

Krishi Bhavan's spurt of interest in exploiting the country's organic manurial potential has come none too soon. with the estimated fertilizer shortage. In the coming years being of the order of about 40 per cent or more, this is the least it could do.

The recent deal with the Soviet Union for the supply of 3.25 lakh tonnes of fertilizers at a cost of Rs 58 crores is likely to ease the situation somewhat during the coming season. But the global energy crisis, which will adversely affect fertilizer production, does not warrant dependence on imports. The only alternative, therefore, is judicious use of cowdung, night-soil, sewage, city garbage, industrial and organic wastes, forest litter and crop residues for manurial purposes.

Organic manure, however, is no substitute for chemical fertilizers; it is an essential supplement. Organic manure, coupled with commercial fertilizer, ensures better crops and higher yields. Its application, however, reduces the dose of chemical fertilizers needed for good results.

An adequate supply of manure is necessary for maintaining and improving soil structure, water-holding capacity and resistance to erosion. The preparation of manure offers one of the best means of utilization of wastes and simultaneous production of humus which Indian soils lack. Besides nitrogen, phosphorus and potash, manure also adds to the soil almost all the micronutrients and vital bacterial and algal organisms.

Organic manures, like farmyard manure, compost, green manure, various oil-cakes and to some extent products

of animal origin like dried blood, bones, fishmanure, etc; have been used by Indian farmers in the past. But due to lack of proper management technology at their command the farmers could not derive full benefit from them. Cowdung and other farm wastes have been diverted on a large scale for fuel purposes.

In the extension education strategy due to stress was never laid on teaching methods of collection and utilization of farm and farmyard wastes. Farmyard manure, as it is generally prepared in India, contains the minimum of litter. Almost the whole of the liquid excreta is allowed to go down the drain. And the cowdung is mixed only with farm refuse and household waste, chiefly ash, for making manure of not so good a quality.

The situation, therefore, calls for a concerted campaign by the extension agencies at the village level to demonstrate correct methods of manure preparation. According to official estimates, there is a potential for producing about 600 million tonnes of rural compost annually.

An example of how complacency on the part of the Central and State agriculture departments mars progress is provided by the tardy popularization of an immensely valuable device, viz, "gobar gas" plant. The first plant to produce the gas and compost from cowdung was put to test successfully by the Khadi and Village Commission in 1964. Instead of recognizing its importance and taking up the project earnestly, the official agricultural agencies left it to the Commission to promote it. The result has been that so far no more than 7,000 such plants are functioning. They are chiefly in the States of Gujarat, Karnataka, Tamil Nadu, Madhya Pradesh and Kerala.

A "gobar gas" plant can be set up by a farmer at a cost of about Rs 1,500. It requires virtually no maintenance cost and the gas (methane and hydrogen produced can be used for cooking, heating, lighting and even for running gas engines and pumps.

It is estimated that the dung of three animals (about 500 kg) gives sufficient gas (about 2.8 cubic metres) every day to meet the fuel requirements for cooking for a family of five members. The compost from this plant usually has a nitrogen content of 2.0 per cent as against 0.5 per cent in fresh compost. The daily output of gas is equivalent to one litre of kerosene.

It is now learnt that nationalised banks have agreed to finance 6,000 "gobar gas" plant during 1974-1975. Due to the ever-increasing pressure on the supply of traditional fuels, including kerosene, this project assumes added importance. Care must, therefore, be taken to ensure that these 6,000 plants are installed without further loss of time during this season and the tempo is maintained in the coming year. To accomplish this task farmers' opinion will have to be mobilized by explaining the benefits of the plant. They will also have to be provided with the technical know-how which in this case requires dissemination of information about its size and working.

Besides the manure which can be made in the rural areas by the farmers themselves there is a vast scope for converting urban wastes into nutrient-rich compost. Of the total potential of 15 million tonnes of urban compost (containing about 1.2 per cent nitrogen, one per cent phosphorus and 1.5 per cent potash) every year, only 4.5 million tonnes is actually prepared at present.

The Centre's committee on urban wastes has now asked the National Industrial Development Corporation to standardize the mechanical composting process and the plant sizes. The report is expected to be ready soon.

The sewage and sullage available in urban areas is another source of plant nutrients as well as irrigation. According to official estimates about 800 million gallons of sewage and sullage containing 100 tonnes of nitrogen, 20 tonnes of phosphorus and 60 tonnes of potash are available per day. This can irrigate about one lakh hectares of land. Only about one-third of it is now gainfully used: the rest goes waste.

The Centre proposes to give Rs 2 crores as subsidy to the States during the Fifth Plan period to help finance around 200 sewage and sullage utilization schemes. The Centre is also to provide Rs 7 crores for setting up 45 mechanical compost plants in 45 cities.

These no doubt are welcome schemes. But their success will depend not so much on the investment as on appropriate planning and execution. Japan, the USA and some European countries are putting in a great deal of effort in developing mechanized composting processes. To avoid duplication of effort, some of their processes *Mutatis Mutandis* can be tried out here also.

The Gujarat Agro-Industries Corporation has prepared a project report for the production of mechanical compost from the wastes of Ahmedabad city. A plant to utilize this waste is expected to be commissioned by April. It will be worthwhile to expedite work on this project and study its adaptability to other areas in the country.

The Indian Express, February 7, 1974

DON'T STARVE THE PRODUCTIVE MOTHER EARTH

Almightly God created all things simultaneously with the creation. If commodities produced from the soil through human effort are not returned to it, of course in a changed form, the soil will not be able to maintain its productive capacity for long. Sun, water, atmosphere and bacteria assist man in this task of production. When man neglects to do his duty to Mother Earth, not unoften he receives severe punishment. Terrible famines in which human beings died like flies are facts of history. The production of food must receive top priority in any programme of national development. Not only the farmer, but all other people also must understand this basic fact. The civilized and cultured people should take upon themselves the task of disseminating this fundamental truth. The great Guru Nanak demonstrated it in the latter 17 years of life.—*Puran Singh*



SOIL FERTILITY

When plants grow and flower and seed, the natural process is maintained in the plant by the collection of the necessary materials of growth from the soil and from the air. The soil supplies the mineral-contents of the plant body as also the proteins, and the air and moisture supply the carbohydrate portion of the structure.

By repeated cultivation, the soil gets denuded of those components which contribute to plant information. There must be some method of recoupmnt, so that the

soil may not be exhausted. Not only is the maintenance of the plant-forming constituents necessary, but to get better yields of plants their increase is also necessary. These plant-forming substances have to be returned to the soil; and manuring the soil means replenishing or increasing the plant forming constituents. The more manure is put into the soil; the greater becomes the power of the soil to produce. Of course, there are limits to the productive capacity of the soil. In India the soil is not being properly manured although crops are being grown from year to year. Naturally, one might think that in course of denudation a point will arrive when the soil will lose its productive capacity. This might have happened in India, but it is not happening because there are natural ways by which the soil recoups the denudation. It appears that in India a balance has been established between denudation by crop-growing and recoument, partly natural and partly by manuring. It is, therefore, apparent that if more manure is put into the soil now, more crops will grow. Production can be very materially increased in India by scientific manuring.

Cow-dung to be conserved: Cattle-dunghas to be released from its present use as fuel and conserved for use as manure alone. But fuel replacement is only half of the problem, of the value of cattle-manure nearly half has been credited to urine. No question of securing a substitute fuel can arise in this matter of the disposal of urine.

In the estimate for valuation of the solid droppings from cattle, these have been shown at Rs. 14/-per year and urine at Rs. 12/-per year, the two together making Rs.26/-for a full-grown bullock. Half of this amount or Rs. 13/-per animal has been taken at the average of the entire bovine population.

Cattle urine to be conserved: We have to conserve not only Rs. 14/-worth of dung but also Rs. 12/-worth of urine from every adult animal. Much of the urine is wasted, and only an insignificant portion comes to be used as manure. Where the practice is of erecting temporary and shifting cattle pens in fields, the urine is utilized, being absorbed by the soil which is cultivated in a few months. But this is done in few districts and in special season. Some means should be found for conserving urine, which is practically as valuable as the solid dropping. Dung and urine, however, do not exhaust our list of manures.

The book 'Cow in India' was published in the year 1945, hence the values of animal droppings and urine given above represent their values prevalent in the year 1945.

The Cow in India by Satish Chandra Dasgupta Khadi Pratishan 15, College Square, Calcutta. Price—Vol. Rs.10/-: Vol. II Rs. 7/-Two volumes together Rs.16/-

Various manures : There are various manures besides the farm-yard manure. Household sweepings, corn cleanings and harvest sweepings, husks, ashes, stumps, useless leaf and leaf-mould, village wastes, street sweepings, oil-cakes, human excreta, bone and meat from dead animals, the entire body of the smaller domestic animals and pests, such as cats, rats, lizards, cockroaches, moths, are all manures or convertible into manures. If they are returned to the soil after proper treatment and preservation, the productive capacity of the soil will materially increase and the present problem of starving men and starving animals may be very materially solved. This list of manures may be enlarged, because materials which can be converted into manure will run into hundreds.

—From Food Shortage and Agriculture M.K, Gandhi’ Navajivan Publishing House, Ahmedabad. Price Two Rupees Eight Annas

Health is linked closely with soil fertility, for the soil contains—or should contain all the elements of which the bodies of plants, animals, and human beings are composed. If it lacks one or more of these vital elements, the foods grown in it, and therefore the animals and people who eat these foods will also lack them. The result will be sick plants, sick animals and sick people. —Monthly Herald of Health, Poona March 1966

The earth on which we live was originally a rich store house of life-sustaining elements. Its rivers and glaciers wore away the rocks of the mountains and hills and deposited them as sediments in the soil of the valleys and plains, now, after long ages, its store of these life-giving elements is relatively exhausted.



Turning garbage into gas

The Hindu, July 18, 2013

While incineration endangers lives, gasification will produce transport fuel that can meet half of India’s consumption needs. Prem Shankar Jha

Delhi’s Chief Minister Sheila Dikshit has been at her wits’ end on how to dispose of the city’s ever growing mountain of garbage. Rising population and growing affluence have raised the daily outpouring of refuse to more than 8,000 tonnes, while simultaneously pushing up the cost of land to astronomical levels. The result: Delhi has run out of land for landfills, and none of the neighbouring States intends to surrender any to meet its needs.

The obvious answer to Delhi’s problem seems to be to burn the solid waste. Cities all over the world are doing it, so why can’t Delhi follow suit? In 2006, the Delhi Municipal Corporation proposed that a small, mothballed, waste incineration plant at Timarpur, that had been put to work for altogether five days since it was built in the 1980s, be reopened to convert 214,000 tonnes of solid waste a year into 69,000 tonnes by sifting out inorganic matter, and drying and palletising the rest to increase its fuel value. Burning this garbage, it was estimated, would produce six megawatts of power per hour, or 5.5 billion units of electricity a year.

The proposal never took off, but it became the springboard for a private sector grab at Delhi’s garbage—investors figured their income would come from the highly inflated tariff decreed by the Central government for ‘green’

energy and the carbon credits they would earn by reducing greenhouse gas emissions.

Their plans are close to maturing. In her 2013-14 budget speech, Ms Dikshit announced that the city already has one incineration plant at Okhla, burning almost 2,000 tonnes a day, and that two more are being set up to incinerate another 4,300 tonnes a day. What's more, these plants will generate 50 MW of power every hour of the day. More incineration plants are on their way: since the Okhla plant went on stream, the Union Ministry of Environment and Forests has approved eight more plants in various cities.

There is, however, a catch. Incinerating garbage in Delhi will cost an estimated 200,000 ragpickers their jobs. Throughout the world, moreover, countries are closing incineration plants owing to the hazard they pose to human health. The threats come from particulate emissions that greatly exacerbate lung diseases from bronchitis and asthma to emphysema and lung cancer, and from dioxins and furans in addition to the usual nitrogen and sulphur oxide gases in the flue gas.

The dioxin threat

To residents of Indian cities who have become inured to dust, smoke, diesel fumes, as well as lead and nitrous oxide poisoning, this may sound like just one more addition to the long list of risks they face in their daily lives. But dioxins belong to another level of threat altogether. The word is a generic term for more than a hundred long lasting chemicals that are produced by burning municipal and medical waste and by a few industrial processes. Dioxins are insoluble in

water and when they settle on land and water bodies, they are absorbed in their entirety by terrestrial and aquatic vegetation. They travel up the food chain into animals and fish that feed on plants and thence into humans. Since living organisms cannot metabolise them, they are found in very high concentrations in meat, fish, milk and eggs. In human beings, a prolonged exposure to dioxins—through a 'rich diet'—impairs the functioning of the liver and the immune and reproductive systems, and raises the incidence of cancer. In sum, dioxins shorten our lifespan. Men have no way of expelling them. Women can, but only by passing them to foetuses in their wombs or breast-feeding their babies.

Not surprisingly, the U.S. Environment Protection Agency, which put together the first comprehensive report on dioxins in 1994, described them as "the most poisonous substances known to man." In Finland, the government has ordered shut an incineration plant built with the most elaborate safeguards when it found, after two years of its operation, that dioxin levels in the surrounding vegetation had risen by 15 to 25 per cent within a distance of 4 km from the plant.

whenever environmentalists have pointed these hazards out to the Delhi government, its officials and company representatives have assured them that elaborate safeguards have been incorporated into the design of the plants to ensure that they meet prescribed safety norms. But subsequent tests have falsified this claim. In tests carried out at Okhla last year, particulate emissions exceeded norms on four occasions and stayed within them only on six. A test

carried out in May 213 revealed dioxins and furans emissions from its two chimney stacks to be 2.8 and 12.7 times the prescribed maximum !

In the face of such facts, the Delhi government has merely reaffirmed its determination to go ahead with setting up the incineration plants. This has led to the usual accusations of corruption and crony capitalism, but in this case the cause probably lies in two preconceptions that are deeply imbedded in the public mindset. First, that garbage is simply a nuisance and has no economic value whatever; second, since the physical sorting of household refuse is not feasible in India, incineration is the only way out.

Both assumptions reflect the casual ignorance of decision makers. There is a third way of disposing garbage that not only eliminates all pollutants, but turns garbage into gold. This is to gasify garbage. Gasification is an incomplete combustion of organic matter that replaces a large part of the carbon dioxide we get from combustion with carbon monoxide and hydrogen. These two gases are, and have been from a hundred years, the basic building block of the world's petro-chemicals industry. They are also ideal for driving gas turbines to generate power. From India's perspective, their best feature is the ease with which they can be synthesised into any transport fuel one desires, and into Di Methyl Ether, a condensate gas that is superior diesel substitute and a complete substitute for Liquefied Petroleum Gas (LPG)

Gasification also eliminates the threat from dioxins. When gasification is carried out with oxygen, it produces only seven per cent of the flue gas obtained from combustion. The

reaction takes place, moreover, at such high temperatures—1000 to 3,000 degrees Celsius—that dioxins and furans get broken down into their basic elements, losing their toxicity. The release of dioxins from a 24 tonne-per-day plasman gasification plant that has been running for more than a decade in Yoshil, Japan, has been found to be less than one per cent of the released by corresponding incineration plants. Consequently, city and municipal corporations around the world have begun to switch to gasification. According to the U.S. based Recovered Energy Inc. a turnkey engineering company specialising in renewable energy projects, there are 200 Municipal Solid Waste (MSW) gasification plants under construction or in operation globally, of which half use the revolutionary new technology called plasma gasification.

Isolated ventures

Ironically, India already has employed plasma gasification technology—for the past four years, two 68 tonnes-a-day commercial plants employing this technology have been disposing of medical and other hazardous wastes in Pune and Nagpur. Since Indian states do not share information, however, these have remained isolated ventures.

At present, most MSW gasification plants abroad produce electricity. But this is giving way to the production of transport fuels. British Airways is partnering Solena. a U.S. based biofuels company to set up a plant that will gasify 1,300 tonnes a day of London's solid waste to produce 16 million gasification of Aviation Turbine Fuel and 9 million gallons of naphtha in addition to generating up to 40 MW

of power. This plant is expected to meet two per cent of British Airways global demand for jet fuel. Solena has won contracts for similiar plants with Qantas, Lufthansa and SAS. Lufthansa's plant will have a modification that New Delhi will do well to take note of; instead of naphtha, it intends to produce 9 million tonnes of diesel fuel.

India stands therefore at a crossroads. In 10years from now, 600 million Indians will be living in cities with more than a million inhabitants who generate at least 600,000 tonnes of garbage a day. Incinerating this garbage will endanger the lives of future generations. Alternatively, this is sufficient to produce more than 35 million tonnes of transport fuel a year and meet half of India's current consumption of the same. The saving in foreign exchange will lift threat of a foreign exchange crisis forever. It will also free domestic prices from the yoke of international all prices forever. And it will do all this without requiring a rupee of subsidies.

(The writer is a senior journalist)



CAPITAL RESOURCES

...To look at it from the gloomiest angle, if man allows himself to multiply unchecked, he may become the planet's cancer.(A cancer, after all, is a pathological growth whose cells have ceased to be controlled in their proliferation). Our planet is an organic system with interrelated parts. Until recently water, soil, mineral resources, air, plants and animals, bacteria and men have been held together in a web of balanced interdependence. But now unchecked multiplication is bringing about a state of affairs that can properly be called cancerous. Large areas once covered by forest—for instance, in China and the Middle East—have been denuded of trees, the climate has been altered and the fertile topsoil that is the basis of food production has been partly or wholly eroded. In the last century, man has started to live increasingly on captial resources—of coal, oil and other minerals; he is using up in a few generations what took tens of millions of years to accumulate. His per capita consumption of resources has steadily mounted, sometimes to a fantastic extent. The consumption of metals and minerals by one nation the United States, since 1918 exceeds the total consumed by the whole of mankind in all preceding history!

—(Sir) Julian Huxley in an article under the caption “Are there too many of us”? —Monthly Journal The Reader's Digest, January 1959.



VEGETATION, WATER AND ENERGY

By Zafar Futehally

The Indian Express, August 30, 1978

It is important for our administrators, as well as for citizens, to understand the connection between vegetation and the water cycle. As a result of geological evolution four-fifths of the surface of our globe is covered with salt water, and 97 per cent of the total water of our planet is held by the oceans. However, it is the 97 per cent of salt water in the oceans which, through a natural process, is transformed into fresh water fit for drinking, agriculture and other needs.

The whole cycle commences with the heat generated by the sun which induces evaporation from the surface of the oceans, and the fresh water is then collected in the clouds. The second stage is the dispersal of the clouds by the differential heating of the air masses, which again provides the energy for transporting vast quantities of water vapour from one part of the globe to the other. The third stage is precipitation, commonly known as rainfall.

There has been considerable controversy about whether or not vegetation and tree cover induces rainfall. No one can speak with greater authority on this subject than Henry Blanford FRS, erstwhile Meteorological Reporter to the Government of India. He is convinced that vegetation and consequent evapo-transpiration affects local rainfall in a material manner. A eucalyptus tree of 40 feet height, for example transpires 80 gallons of water a day. Being an exotic, it does not integrate well, in an ecological sense, in

the Indian landscape. But many broad leaved Indian species have probably a similar rate of transpiration and the vapour which ascends skywards sooner or later condenses and falls down as rain.

The total annual rainfall over the Indian sub-continent is estimated at 3,000 million-acre feet. Of this, 1,000 million is lost by evapo-transpiration, and 650 million through seepage. We are therefore left with a balance of 1,350 million acre feet which can sustain the animal and vegetable life of our country.

But the water falling on the land may run off directly into streams to drain away by way of rivers and marshes back into the sea. When this happens we are using water only minimally. It should be our endeavour to trap the rain water and retain it as long as possible on the land and there are several ways of doing so. Water can be impounded by check dams, in reservoirs, in canals, and by other means; but as we shall see there is no better way of keeping water on the land and within reach underground, than by keeping the soil well covered with suitable vegetation.

The most important pathway for water which falls on the land is that of infiltration into the soil. If we could take an x-ray photograph of the ground we would find that there are innumerable hollows, caused by the decaying roots of trees and by geological forces, and these underground aquifers get filled up by water during the rains. However, if these underground aquifers have to be filled it is necessary that the water which falls on the land in the form of rain does not run away too quickly, and on a national scale that only

means of doing so is by keeping the land well covered with grass, shrubs and trees. When rain falls in an area which is well covered with trees the force of the rain drops is broken by the leaves, and the litter on the ground induces seepage into the soil. Where there is thick grass cover, more or less the same function is performed.

In areas where the trees have been cut and the grass has been removed there is no opportunity for the water to travel underground and then it runs away uselessly back into the sea taking valuable top soil with it. The Famine Commission of the last century reported that in many places of India where the forests had been cut springs and streams from neighbouring areas which had sustained villages for centuries had dried up in consequence, and the villages had been abandoned.

To get information about run-off and seepage. I wrote to the nineteen research institutes in our country, including the Central Water and Power Research Station, Pune, and the Research Laboratory, Maithon, DVC, but nothing of any value was received. However, in the Department of Botany in Banaras Hindu University, R.S. Ambasht studied the soil conservation and water holding capacities of several species of grass and the results have been revealing. "Two plots, each 15 metres long and sloping at an angle of 30 degrees, were prepared of alluvial soils. These were divided into smaller plots was kept bare as a control. At the base of the slopes cement channels were prepared to receive the run-off of each sub-plot into separate compartments".

It was found that *Cynodon Dactylon* conserved

between 89 and 97.5 per cent of the water flow. Other kinds of grasses and shrubs are much less effective. If therefore our open areas with slopes up to 30 degrees are planted with species like *Cynodon Dactylon*, *Saccharum Munja*, *Cyperus Rotundus*, and other grass, and land with steeper slopes covered with trees not only would we be conserving our water, but we would escape the annual calamity of floods which at the time of writing are creating havoc in seven states of the Indian Union. Floods are caused usually by excessive run-off in the mountains and since many of our hill slopes have been over-exploited and are bare of vegetation the water descends to the plains in torrents which cannot be arrested by engineering methods.

After water our second priority is fuel. Fossil fuels are going to be exhausted in course of time and we will have to fall back on such renewable natural resources as sunlight and vegetation. No one has spoken more persuasively about this problem than E.F.Schumacher, economist and ecologist, and author of the famous book *Small is Beautiful*. He Writes: "Since fossil fuels, the mainstay of the 'modern system', have ceased to be cheap and may soon cease to be plentiful, many people are becoming interested in solar energy They are looking for all sorts of wonderful man-made contrivances to collect solar energy. I am not sure that they always appreciate the fact that a most marvellous, three-dimensional, incredibly efficient contrivance already exists, more wonderful than anything man can make—the TREE. Agriculture collects solar energy two dimensionally; but silviculture collects it three-dimensionally. This, surely, is 'the wave of the future.'"

I do not think that the authors of Forest Farming overstate their case when they say ‘of the world’s surface, only eight to ten per cent is at present used for food production...With the aid of trees, at least three-quarters of the earth could supply human needs, not only of food but of clothing, fuel, shelter and other basic products’. And they do not fail to add that wild life could be conserved, pollution decreased, and the beauty of many landscapes enhanced. This is the way, or at least one of the ways, to spiritual, moral and cultural regeneration.”

We must remember of course that tree planting, though an obvious solution to many of our ills, presents formidable difficulties. Its main drawback in rural areas is that trees have a gestation period of from four to five years before they can yield an income. In the circumstances, rural folk naturally prefer agriculture to tree farming because in agriculture the returns are available in a matter of months. If financial means can be found to sustain a part of the population for the initial years when the trees provide no return, then in the long run, tree farming becomes a much more viable proposition than agriculture. This is a problem to which our planners must give serious attention.



MAN AND HIS SURROUNDINGS

By S.A. Shah

The Hindustan Times, December 5, 1976

Man is a social being. He affects as much as he is affected by his neighbourhood. This is neighbourhood nothing other than the environment which has a profound and lasting effect on the quality of life as well as production and productivity. Development can not be sustained in a deteriorating environment. Recent studies have shown that even labour productivity depends upon environment in which the labour works and lives. Forests and wildlife inhabiting it are the most powerful and dominating components of environment. As such preservation and development of forests and wildlife is of prime importance.

Let us take some concrete examples. What would happen if all the Himalayan forests were destroyed? The Jamuna and the Ganga and other rivers emanating from the Himalayas will flood Delhi and other areas through which they pass. The river beds would continuously rise by deposits of debris washed down by these rivers from the defence-less Himalayan slopes.

Thus forests serve to discipline rivers and to hold the mountains in position. The destruction of vegetation in catchment areas has resulted in a rapid rate of siltation of our important multipurpose dams.

The average direct annual loss of crops, property etc caused by floods is about Rs 100 crore. The indirect losses resulting from erosion are enormous. It is estimated that the annual loss of fertility is equivalent to the loss of about 5.37 million tonnes of NPK, the value of which is about Rs 700

crore. The amount of soil displaced is about 60,000 million tonnes annually. All the direct and indirect losses valued at their social costs would give an astronomical figure.

Delhi could be disastrously affected by the destruction of whatever vegetation has remained in Rajasthan. We in Delhi would be choked with sand if not buried under it, Such a thing has already happened in Babylon and Mesopotamia.

Forestry and agriculture are complementary. It is rightly said that the former is the foster-mother of the latter. Forests help maintain agricultural productivity through maintenance of fertility, sustained supply of irrigation water and above all by maintaining an ecological balance. Forests provide a protective umbrella to agriculture against pest and diseases and erosion.

For 39 million tribals, the forest is their home. Ecologically and economically, they are an organic component of forests. They eke out their livelihood by doing forest work, worship trees and mountains, derive entertainment by dancing and hunting. Their life-long activities are confined to forests.

Many rural arts and crafts in India are very well known. Unfortunately, however, many of them are fast dying out on account either of non-availability of raw material or lack of encouragement destruction of natural environment. Forestry can be a powerful instrument for rescuing this culture. Revival of these traditional arts and crafts though politically unimportant is extremely important for economic reasons for cultural values.

Forests provide employment of the right type in the right places. Every activity connected with forests is labour intensive. Further more it has a large number of forward

linkages.

Forests based cottage industries are very important for rural development. Let us take the example of a seemingly insignificant activity, namely bee-keeping. Mr. Gowda of South Kanara has shown the potential of this activity. He manufactured hives with the locally available wood and bamboos. He extracted 300 kg. of honey worth Rs 2, 400 in one season of nearly five months' duration. Honey has a good market both internal and external. It has, therefore, a great potential in the rural areas.

Bamboo-mat weaving and basket making is yet another industry awaiting suitable promotional and marketing organization to develop it. The bamboo-mat weaving unit, a co-operative society of Eriyad village, Kinannoor run by Kerala State Khadi and Village Industries Board has demonstrated what can be done. This unit has developed a novel substitute "Reedex" which is obtained by treating reeds with chemicals thus making it a cheap substitute for asbestos and tiles. Bamboo is a raw material which can be easily grown even in the back-yard of rural homesteads.

Gums and resins earned valuable foreign exchange to the extent of Rs 32 crore during 1974-75, besides absorbing a employed belonging to the weaker sections. There is great scope for tapping the existing forest resources more fully and developing was ones particularly in rural forests.

Sal seed is yet another activity which has tremendous potential for improving rural economy in general and tribal economy in particular. Sal is a good seeder and occupies an area of about 9.7 million hectares mostly in the tribal belt of Madhya Pradesh, Bihar and Orissa. The Kernels contain about 15 per cent of hard fat suitable for soap making. After

refining, it can be used as Coca-butter. Deoiled sal cake is rich in starch (40 per cent) and contains 10 per cent of protein. The annual availability of sal seed is estimated to be about 25 lakh tonnes. At present hardly about one per cent of potential is harvested. It is estimated that for the collection and transport of one tonne of sal seed about 70 man-days are needed. What a tremendous potential this activity has.

Tendu leaf production and trade has intimate linkages with tribal economy—pruning, plucking, drying and bidi manufacture are highly labour intensive operations. In Madhya Pradesh alone $2\frac{1}{2}$ lakh families earn a decent living out of this trade. During 1975 an amount of about 4 crore was distributed as wages to the rural labour in Madhya Pradesh alone. This industry can be expanded very substantially. Tendu is very easy to grow from seeds and can be multiplied by root suckers. It is also hardy to grazing and fire. It is not exacting in its nutrient needs. Thus, all available derelict areas in the neighbourhood of villages can be stocked with Tendu in the programme of rural forestry. What a tremendous impact it would have on the rural economy.

In recent years, it has been observed that the developing countries have fared much better in the small scale industries sector than in the heavy industries sector. The former has the added advantage in our country of providing increasing employment opportunities of the right type in the right place with minimum investment.

Forests feed a number of large scale industries such as pulp and paper, plywood, particle board, block board. Forests keep the life-line of our country moving by providing railway sleepers and timber for coaches. The packaging materials used for packing and transporting fruits, household articles,

engineering goods, etc. are all obtained from forests. The perfume industry, the paints and varnish industry the textile industry, and a host of small and big industries make use of some product or the other obtained from forests.

For a town dweller, forests provide much needed recreation to maintain his material health, Air pollution which is relatively greater in urban areas is considerably reduced by the trees. Imagine, what Delhi would be like in summer if all the trees were removed. It would be nothing short of a furnace.

Forests though important for the development of the country have suffered from public, administrative and political indifference. The investment in the forestry sector has been woefully low (only about 0.6 per cent) with the result that its contribution to GNP is hardly 1.6 per cent though it has a much greater potential.

On paper, India has 75 million hectares of forests constituting about 23 per cent of the total land area. However, productive forests area is about half as much. As against per capita forest area of 0.24 hectares in Japan, 2.9 hectares in Australia and 1.04 hectares in the world as a whole, India has only 0.13 hectares. The situation is aggravated by the low production from the existing forests primarily because there has been poor investment for development. Scientists believe that it is possible to increase the production at least 10 times. Increasing production is a dire necessity as there is a wide gap between the demand and supply of forest product.

In conclusion may be stated that forests are needed for (i) maintaining the environment so essential for development to take place, (ii) ameliorating the socio-economic conditions of the weaker sections of the society, (iii) maintain our cultural values.



THE COST OF AFFLUENCE

Unbridled economic growth, pollution and a fast-dwindling supply of natural resources have brought the world to the verge of disaster. SAILESH KOTTARY suggests the hard choices if we are to survive.

The Times of India, April 11, 1976

The questions of surviving affluence may seem farcical at first, if not entirely ludicrous, but on closer scrutiny, the idea of our planet creaking under a surfeit of consumption is indeed justifiable.

Director Marco Ferreri puts it across powerfully in his film, *La Grande Bouffe*, when he depicts four people who go on a gastronomic orgy. Though Ferreri doesn't provide a reason for their suicidal spree, the point is our civilization is stuck fast in the mire of indulgence.

A striking parallel can be drawn between Ferreri's production and the voracity afflicting our affluent societies, with its insidious impact on our survival. Because, apart from the relatively milder evil of gluttony, it is the dangerous mentality of more and more that will finally put finish to our illusions of affluence.

Economists are now computing the price society is paying for the craze to possess bigger and better commodities. The gourmand's delight has made obesity, liver and cardiac ailments an inevitable companion of old age.

According to medical experts, the incidence of heart disease is an indicator of the level of affluence in a country. I am sure enough, in the West heart disease is the No.1 killer, and in India it is fast approaching that distinction among non-infectious diseases.

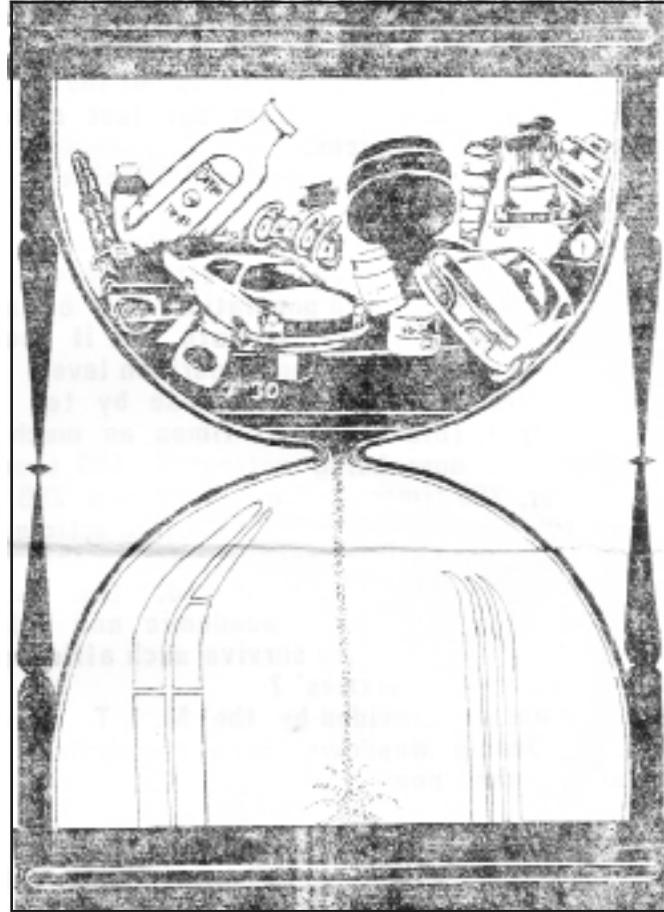
The folly of defying the automobile has come home to roost, as all those who are caught daily in the rush-hour traffic and have to breathe its fumes are painfully aware. The welter of pollution figures that constantly deluge us drives home the enormity of the problems that over-consumption has created.

The United States is a case in point. The level of affluence in the U.S. is staggering by any standard. They have more radios than people, almost half the world's total number of automobiles, and the highest ratios of TV sets, telephones and other electronic appliances to population. New York city alone has more telephones than any country, except the U.K.. France and West Germany !

The comparison is even more significant within isolated areas. New York state alone would rank as the sixth richest nation on earth if it were independent, and the state of Illinois produces more than the entire continent of Africa! In the corporate sector, General Motors—the largest manufacturing company on earth—has a greater sales revenue than the gross national product of some 60 member nations of the U.N.I.B.M., the computer giant, is 20 times larger than its largest overseas rival. Overseas, the produce of American corporations is almost equal to the Japanese G.N.P.

But coupled with such enormous wealth is the price of affluence. Industrial affluents have choked rivers killing marine life, piles of junk have disfigured the landscape, toxic chemicals have entered the human system and the air is too polluted to inhale. With 50 billion used cans, eight million discarded TV sets, a hundred million tyres and millions of tons of packaging waste annually consigned to garbage

dumps, the waste disposal systems are choked to capacity. The colossal nature of the problem can be best understood when we realise that the total amount of garbage adds up to 18 tons annually per person! Such are the ravages wrought on the ecology in the wake of extravagant consumption.



Open-ended economic growth is the sine quanon of this quest for affluence, and for long was considered the insignia of every progressive society. But increasing doubts are being expressed over the benefits of such unbridled growth.

The 13 per cent growth of the Japanese economy

has not made them happier than their impoverished Asian neighbours. Where the land is limited and the population dense, industrialization has created havoc. School children in Tokyo are some times forced to wear gas masks on days of heavy smog. Traffic police during peak hours take periodic whiffs of oxygen to avoid being asphyxiated by toxic exhaust fumes. The Minamata disease—mercury poisoning resulting in brain damage and deformities—and the toyama cadmium poisoning are symbolic of the Japanese bondage to growth.

Yet the U.S. and Japan are by no means the only nations to suffer environmental damage. Practically in all industrialized nations the rivers are no more clear, the air is no more clean and the foodstuffs no more wholesome. In our own land, the plight of the residents of the Bombay suburb of Chembur, who are the victims of atmospheric pollution, and the recent case of Zuari Fertilizers in Goa, have awakened us to the dangers of unplanned growth. With increasing growth rates, the incidence of such pollution hazards will multiply and jeopardise survival.

The pollution problem is terrifying but it may yet be surmounted. With strict anti-pollution measures and innovations in technology, the rivers may yet be purified and the air may yet be cleansed. But it must be noted that technology itself has created the present problem, and each kind of technology will have its own problems. Thus the nuclear projects designed to alleviate the acute energy crisis have their own bugs about storage and waste disposal techniques for radioactive wastes produced by reactors. Dr. Barry Commoner, a noted ecologist, says: “Our technology is highly successful in producing material goods, but too often

is disastrously incompatible with the natural environmental systems that support not only human life but technology itself”.

Nevertheless, despite the concern of environmentalists with ecology, pollution is not the greatest threat to affluence. It is rather our fast dwindling supply of natural resources.

While it may be considered illogical to question the need for growth as such, it would be extremely naive to believe in the concept of unlimited growth. To put the matter in perspective, by the year 2000, world population will be around 5 billion at a conservative estimate. And if everyone were to live at the current American level, world total production will have to increase by ten times today’s output. This means 75 times as much iron and zinc as is now being extracted, 100 times as much copper, 200 times as much lead and 250 times as much tin, according to an informative article. Even as the Western nations recover from the worst depression of the post-war period, the question increasingly being asked in academic and political circles is: Can the world survive such affluence as that of the becoming ‘sixties’?

The answer provided by the M.I.T. computer Specialist, Dennis Meadows, is a resounding “No”. His study—the now famous Limits to Growth report—was based on a model by Prof. Jay Forrester, a pioneer in computer analysis of future trends, and was sponsored by the well-known Club of Rome, an organization of eminent scientists, bankers, industrialists etc. from 25 countries.

The computer model was based on the assumption that population cannot survive without food, and since the best land is already cultivated, agricultural productivity

can only increase through more intensive use of industrial products like tractors and fertilizers. But more industrial produce consumes resources and also creates pollution. On this hypothesis, the M.I.T. computers were fed on array of factual data ranging from growth rates, birth and death rates, to pollution levels and availability of resources.

The study reveals that if the world population increases at 2 per cent annually, and industrial output at 5 per cent, (present rates), within the next 60 years the world will run out of resources like oil, coal, iron and other ores and fossil fuels. Around 2020 the lack of resources will be felt, and within the next few decades, industries will collapse due to lack of supplies. Because fertilizers, medicines and pesticides will no longer be produced to fulfil demand, famine and epidemics will rage, decimating the population. The villain of this macabre scenario is exponential growth.

The Limits to Growth report has allowed for other eventualities as well. Assuming that vast resources are still undiscovered, the computer predicts industrialization, but also an increase in pollution. Assuming that pollution can be controlled through new technology, population will then increase faster than food supply. Hundreds of such projections later, the study grimly concludes that all models and in collapse.

Though the Limits report is controversial by nature, it has been received with grudging respect. Some dissidents claim to have discovered a programming error in the model and refute the chilling finality of the report.

Nevertheless, the rationale behind it cannot be easily evaded. Because even at present rates, the increases in

mineral consumption from now till the turn of the century are staggering. Coal consumption will increase by 575 per cent, worldwide, lead by 250 per cent, iron by 350 per cent, and copper by nearly 375 per cent. Faced with such burgeoning demands, all the world's mercury will be used up within 41 years, copper 48 years, zinc 50 years and lead 54 years. Only coal is likely to last for 150 years and iron a few years more.

This accurately represents the dilemma that will face the economies of the world in a few years regarding the supply and demand positions for scarce resources. Faced with this Hobson's choice, there is only one way out: Economic (and population) growth must stop at least by 1990 if mankind is to survive.

The solution is obviously bitter and especially difficult to enforce where national pride and entire nations are involved. It would need a global gendarme to monitor and regulate the economies of the world. The problems during the formation of such a super-agency can well be imagined, but man must look beyond the welfare of his national borders for survival through cooperation.

In the ushering in of a no growth economy, it would be unfair to penalise the under-developed world for the Sybaritic life-style of the affluent world. At the grassroots level it would necessitate the changing of consumption patterns of whole societies. The need for this may be questioned, but when we realise that on an average a person in a developed nation uses as much as 25 times more resources than his Afro-Asian counterpart, such disparities do not augur well for global survival.

The third world countries have taken note of these disparities and are forging common platforms, as at the meeting of the non-aligned nations in Lima.

In a sense, the oil crisis has dramatically brought a taste of future shock to both worlds, and as many economists concede, it may actually prove beneficial to mankind in the long run. The prodigal West has been painfully reminded of the price of affluence if it wants to continue its extravagant standards of living. The price rise has clearly had a dramatic effect on consumption patterns all over the world. Whether it is the introduction of economy cars in the West or the switch-over to public transportation in India, individuals all over are learning to economise on fuel, one of our scarce resources.

Such consumer education in other fields too would be welcome. Instead of a one-use can economy, the reusable bottle would be particularly welcome. And the ubiquitous aerosol should be given its last rites; cheese as marketed in aerosols is the limit of conspicuous consumption. It is such dream-merchandising, which creates unnecessary wants, that has brought us on a collision course with nature.

If we are to survive, we must cut back on extravagant affluence and re-arrange our priorities. A luxurious way of life is alluring but disastrous, and the world must make a painful choice while there is yet time.



Public Health Enemy

Organize, January 26, 1978

Not many people remember that Gandhiji did not campaign only against drink; he also campaigned against smoke, when he started his movement. But so many people smoked in innocent bidi—and it was so much less a tax on the family that the anti-smoking movement never caught on.

However, that does not make smoking any less of a menace. According to U.S. Health, Education and Welfare (HEW) Secretary Joseph Califano Jr, cigarette smoking in “Public Health Enemy No.1”. According to him it costs the U.S.A 17 billion to 25 billion a year in health care, lost productivity wages and absenteeism.

As a result of much campaigning some 30 million Americans have given up smoking since 1964. But there are still 54 million smokers in that country. The Government is now taking more steps to curb smoking. Some 10000 Federal Government buildings will increasingly segregate smokers. Fifty largest US Corporations are also being requested to follow suit. Already there are separate railway compartments for smokers and non-smokers. There is also a proposal to ban smoking on commercial flights. Health, fire, life and other types of insurers are also being asked to offer special premium discounts to non-smokers.

In Japan a Kobe firm found smoking so much a problem that it offered 10,000 yen a month to all those who don't smoke in office—or while travelling in office conveyance or attending company meetings. The company had found that smokers spent 40 minutes of a working day each day, lighting up and enjoying their cigarettes! eighty per cent of the staff has given up smoking.

Perhaps we in India could adopt some of these methods to curb smoking. It is true that smoking does not ruin families the way drink does. But on the other hand it has no nutritive value, which a little drink does have..

THE PROGRAMME IS REVOLUTIONARY

If you want to be a revolutionary, the use of true mass Satyagraha is the greatest revolution in many thousands of years. “But”, you may protest”, “it is not revolutionary to advocate and use hand-spinning, hand-weaving, and other manual, man-powered skills in villages, that is very old-fashioned technology.” Yet, remembering the quotations from Elton Mayo in the chapter on capitalistic industrialism and the elaborate to say that technology shall not be allowed to run wild any further, but it must be subordinated to sound ecological relations with Nature and natural resources, to the annual income of solar energy, to human nature and to the cultural necessities of developing and maintaining spontaneous, happy human co-operation. If worst, comes to worst, great famines would not be as bad for India as would be the loss of spontaneous co-operation between individual and groups such as is now taking place in the industrialized West. It is revolutionary to be carefully selective in regard to technology, to take and use only what in the long run will surely help to exalt humanity, not just the body but also the spirit, it is revolutionary in this age to assert that the interests of civilization are paramount over those of science, technology and money profit. And it is still more revolutionary to take actual practical measures to assure the only means for reviving that spontaneous co-operation. It is revolutionary to say that technology should be restrained until man has learned to control his lust for power and to work toward the end. —From the book Which way lies hope? By Richard B.Gregg.—Navjivan Publishing House, Ahmedabad.

THE FROG'S REVENGE

An old saying in India has it that if you play around with nature, nature will play around with you. For long, this was dismissed as one of the myriad fold sayings to which not much attention need be paid. That of course, was in the days when there were not too many shortages and pollution and the resultant calamities had not become a cause for disquiet.

But science has now discovered that nature improves an inexorable balance and that disturbing such regimen is fraught with peril. An example has to do with China where there was a government-sponsored programme to rid the country of sparrows which were considered pests that destroyed foodgrain crops. Hundreds of thousands of sparrows were destroyed by enthusiastic young volunteers who were led to believe that they were doing a commendable job for their motherland.

The results were disastrous. Insects which were the staple diet of the sparrows, multiplied manifold, playing havoc with crops.

A similar situation has been developing in India with the great emphasis on the export of frog legs, considered an exotic delicacy in the Western countries. There are two aspects to the problem : Humanitarian and ecological. Thousands of Indian bull frogs are caught by lantern light at night. Their real legs are sliced off by crude blades and they are left to suffer agony before they die. For the land of the Buddha and Mahavira that is nothing to be proud of.

The ecological aspect is even more frightening. Frogs eat up a lot of insects that are harmful to crops. With the

decimation of the frog population, there is a natural increase in the number of pests, for which pesticides have to be imported in greater quantity with scarce foreign exchange.

Pesticides in fields destroy all kinds of insects, some of which are favourable to man. In addition, they also destroy tadpoles, thus further reducing the availability of full-grown frogs.

The chain goes on even further. Snakes survive on frogs, and when frogs are threatened snakes are also threatened. When the number of snakes dwindles, rodents thrive. Today, in the areas where frogs are caught for export, rats eat up increasing percentages of grain production.

So far, there has been a deliberate neglect of the dangers of overkilling of frogs because of the export angle. Marine products exporters have seen to it that no move is made against the killing of frogs. But the export of frog legs fetches India a measly sum of Rs 8 crore, which is chicken-feed for a country of India's magnitude. In any case, at the rate the frog population is being decimated, the export can only decline in the days to come.

There is another danger to agriculture itself, with the reduction in the number of frogs, when more pesticides have to be used, the chemicals therein add to the toxicity of the land, adding a lot of poisons to the food chain. The lowly frog might yet have its revenge.



No sparrow in sight on world Sparrow Day

VANISHING SPARROWS

Chandigarh: As the world prepares itself to celebrate World Sparrow Day on Thursday, one fourth of the city residents have not seen even a single sparrow in the past 10 years, a study conducted by the Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, and Punjab University has found.

The reasons behind the vanishing of sparrows found by various studies include loss of habitat, increase in predator populations, exceptional mortality events connected to weather, impact of vehicle emissions on ecological systems and electro-magnetic pollution by mobile towers.

The study conducted on around 1,200 people in various sectors of the city found that 25% of the locals haven't seen a sparrow even once in the past decade. Around 8% of them have not seen a sparrow in the past five to 10 years. And around 20% have not sighted a sparrow in the past one to five years. Surprisingly, 5% of the respondents could not recognize sparrow as they had never seen one.

The study found that only 24% of the city residents sighted a sparrow every day. "This mixed picture reveals that in some areas of Chandigarh sparrows thrive, but we still have gaps in our knowledge from areas where no records are received."

"Around 70% people were of the opinion that the density of sparrows 10 years ago was definitely more than what it is now." Dr Ravneet Walia, Assistant Professor,

Department of Zoology Punjab University, who conducted the study, said."

The day aims to spread awareness about the house sparrow and other common birds. In 2012 the PGI formed Sparrow Club, an informal association of like-minded people dedicated to the cause of sparrows or the urban bird biodiversity.

- Loss of habitat is thought to be a prevalent driver of population declines for many bird species including sparrows.
- Increase in predator populations.
- Exceptional mortality events connected to weather.
- Vehicle emissions: Emissions most likely to impact ecological systems include nitrogen oxides, volatile organic compounds, polycyclic aromatic hydrocarbons, metals and particulates.
- Mobile towers: Several authors have evaluated the association between electromagnetic pollution from mobile phone base stations and house sparrow abundance. 95% residents were concerned about the declining population of sparrow. 45% people showed willingness to make bird nest in their homes.

A FORTH OF CHANDIGARH'S RESIDENTS HAVE NOT SEEN A SPARROW IN 10 YEARS, SAYS STUDY CONDUCTED BY PGI



The Birds Are Fast Vanishing

The Statesman, 25 December, 1979

Many species of birds have disappeared from China, huge areas of land in Pakistan have turned salty and fishes have vanished from Malaysian rivers owing to pollution by palm oil wastes, reports PTI.

These and several other environmental problems faced by the developing countries in South Asian region were highlighted at the recent seminar on "Environment, Resources and Media" held here by the International Press Institute.

The three-day seminar made it clear that pollution problems in this region are mounting at a rate too fast for the nations to find solutions to solve them.

Mr M.K. Ranjit Sinh, the regional adviser to the U. N. Environment Programme at Bangkok said he counted only 18 species of birds in his 4,800 km journey in China.

FEW SPARROWS

Over use of pesticides had wiped out fruit-eating and groundlaying birds from China leaving only a few sparrows, he said.

While the export of palm oil has boosted Malaysia's economy, its scientists have yet to find ways to threat the palm oil wastes from 120 factories which have polluted the rivers of the Klein Valley.

In Hongkong, water has become scarce and the heavy influx of population has raised the cost of land to Rs 30,000 a square foot.

With construction projects going on 24 hours a day,

it is the world's noisiest city, the Seminar was told.

Urban Migration in Indonesia has made the city of Bandung devoid of greenery. Some 10,000 students held a bicycle march recently in Bandung to focus the problem of environment degradation.

The seminar was told that soil erosion caused by swift flowing rivers is posing a serious threat to Nepal.

The rivers carry away thousands of tonnes of top soil into India and Bangladesh and if the erosion is unchecked, Nepal would look like Afghanistan in 20 years, according to expert opinion.

Deforestation has also become the number one environmental problem in Sri Lanka where rain has become erratic possibly due to vanishing forests.

According to Mr Ranjit Sinh five million hectares of Asian forests are lost every year and "millions more degraded by improper use."



PINGALWARA DIARY

(UPTO June 2015)

Services rendered by Pingalwara Institution for the service of the suffering humanity are:-

1. Homes for the Homeless

There are 1717 patients in different branches of Pingalwara now a days:-

(a) Head Office, Mata Mehtab Kaur Ward, Bhai Piara Singh Ward	344 Patients
(e) Manawala Complex	808 Patients
(b) Pandori Warraich Branch, Amritsar	76 Patients
(c) Jalandhar Branch	38 Patients
(d) Sangrur Branch	221 Patients
(f) Chandigarh (Palsora) Branch	99 Patients
(g) Goindwal Branch	104 Patients
Total 1690 Patients	

2. Treatment facilities

(a) **Dispensary & Laboratory:-** Pingalwara has a dispensary and a laboratory for the treatment of patients. It has an annual expenditure of about Rs. 90 lakhs. Medicines are also distributed free of cost to the poor and needy people.

(b) **Medical Care Staff:-** Experienced medical staff like Nurses, Pharmacists and Laboratory Technicians are available for the care of the Pingalwara residents.

(c) **Blood-Donation Camps:-** A Blood Donation Camp is organized on Bhagat Ji's Death Anniversary every year. The blood is used for Pingalwara residents and road accident victims.

(d) **Ambulances:-** Ambulances with basic Medical aid

are available for victims of road accidents on G.T. Road, round the clock and provide facilities for taking Pingalwara patients to the hospital.

(e) **Artificial Limb Centre:-** There is an Artificial Limb Centre at Manawala Complex, dedicated to the memory of Bhagat Ji which provides free of cost Artificial Limbs to Polio-affected and amputee cases. 6752 needy people have benefitted till June 2015.

(f) **Physiotherapy Centre:-** A Physiotherapy Centre equipped with State-of-the-art equipment is functioning in the Manawala Complex since June 2005. On an average 80 patients are treated everyday.

(g) **Operation Theatres:-** There is a well equipped Operation Theatre in Bhai Piara Singh Ward Amritsar for general surgery and A Micro Surgery Operation Theatre in Manawala Complex where Cochlear Implants and major operations are carried out.

(h) **Dental, Eye, Ear & Ultrasound Centres:-** These Centres have been set up to provide these services to Pingalwara residents, sewadars and their families.

3. Education

Pingalwara Society is running five Educational Institutions for the poor and needy children.

(a) **Bhagat Puran Singh Adarsh School, Manawala Complex:-** This school provides free education to 692 students from the poor and deprived sections of the society. They are provided with free books and uniforms. Children being brought up by Pingalwara Society are also studying in this school.

(b) **Bhagat Puran Singh Adarsh School, Buttar Kalan (Qadian):-** This school is dedicated to the sweet memory of Bhagatji. 360 students are getting free education under the able guidance of well qualified teachers. The school also

provides financial help to students who have finished their school studies and are aspiring for higher studies.

(c) **Bhagat Puran Singh School for Special Education, Manawala Complex:-** This school is providing Special Education to 190 Special children.

(d) **Bhagat Puran Singh School for the Deaf:-** Bhagat Puran Singh School for Deaf Children is functional at the Manawala Complex since May 2005. The school is equipped with state-of-the-art training aid and has 150 children on its rolls.

(e) **Bhagat Puran Singh School for Special Education, Chandigarh (Palsora):-**This school caters to the needs of Special adults of the branch.

(f) **Vocational Centre:-** This Centre is providing free training in embroidery, stitching, craft work, making washing powder, candle making, painting, etc. Young girls from the villages of surroundings areas are the main beneficiaries.

(g) **Computer Training:-** Computers are available in all the schools for academic and vocational training.

(h) **Hostel facilities:-** There are separate hostels for boys and girls in Manawala Complex. Many girls are pursuing higher studies in different colleges.

4. Rehabilitation

(a) **Marriages:-** After being educated, boys and girls at Pingalwara are married to suitable partners. 36 girls and 4 boys have been married off till date.

5. Environment Related Activities

(a) **Tree Plantation:-** Bhagat Puran Singh Ji was deeply concerned about the degradation of the environment. A vigorous campaign of tree plantation is started every year on Bhagat Ji's Death Anniversary. Each year 15,000 to 22,000

trees are planted in various schools, colleges, hospitals, cremation grounds and other public places. These include Amaltas, Kachnar, Behra, Champa, Arjun, Sukhchain, Chandni, Zetropa, Kari-patta were distributed to different institutions.

(b) **Nursery:-** Pingalwara has its own Nursery where saplings of various plants and trees are prepared. Every year, the aim of nursery is to grow more than 54 different kinds of saplings every year.

6. **Social Improvement Related Activities**

(a) **Awareness:-** Pingalwara has played an important role in spreading awareness about the evils in the society. This has been done by printing literature on religious, social and environmental issues at the Puran Printing Press Amritsar and is being distributed free of cost. It has an annual expenditure of printing and publicity is about 1 crore 50 lakhs rupees.

(b) **Puran Printing Press:-** The Printing Press has been updated with an Offset Press.

(c) **Museum and Documentaries:-** A Museum, and a number of documentaries have been prepared on Pingalwara activities as well as on zero budget natural farming. The C.D.s are freely available from Pingalwara.

A feature film produced by Pingalwara Society Amritsar **EH JANAM TUMHARE LEKHE** (Punjabi) on Rev. Bhagat Puran Singh Ji, founder Pingalwara and his struggle not only for selfless services of wounded humanity but for Environment Crisis has proven as a beacon for the coming generations.

7. **Help to the victims of Natural Calamities**

Pingalwara makes an effort to provide succour to the victims of natural calamities like floods, earthquakes and famines. Aid was sent for the earth-quake victims in Iran,

Tsunami disaster victims, Leh landslide and flood affected areas.

8. Cremation of unclaimed dead-bodies

Pingalwara cremates unclaimed dead bodies with full honour.

9. Dairy Farm

180 cows and buffalos at Manawala Complex provide fresh milk to the Pingalwara residents.

10. Old Age Homes

Old age homes at Sangrur and Manawala Complex of Pingalwara caters to the needs of elderly people.

11. Projects Completed and Under Construction

Since 1997 ambitious projects of Sangrur, Palsora at Chandigarh and Manawala Complex have been completed. In the year 2009 new buildings— Administrative Block, Puran Printing Press, Deaf School, T.B. Ward at Manawala Complex and at Head Office a New Administrative Block have also been completed.

In the year 2013, a new modern Bhagat Puran Singh School for Special Education in Manawala Complex of Pingalwara and a new Block for Pingalwara patients in Pandori Warraich Branch is under construction and is fast coming up.

Wahe Guru Ji Ka Khalsa

Wahe Guru Ji Ki Fateh

Dr. Inderjit Kaur, President,

All India Pingalwara Charitable Society (Regd.),

Tehsilpura, G.T. Road, Amritsar. (Punjab).