

Environment

COMMUNITY HEALTH CELL

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India

by

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LESLIE SAWHNY PROGRAMME OF TRAINING FOR DEMOCRACY

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LESLIE SAWHNY PROGRAMME OF TRAINING FOR DEMOCRACY

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ENVIRONMENT

By

D. M. KALAPESI

INTRODUCTION.

The environmental movement has been late in coming to this country. Now that it is here, it finds most people unprepared. They are still unfamiliar with its language, vague about its goals, ignorant of the full sweep of its implications, and the radical changes in outlook and attitudes it demands. In those countries where this movement has made a real impact, it is as if a great gust of wind has swung all signposts to point in opposite directions to what they indicated earlier as the roads to progress, modernisation and civilisation.

It is not surprising then that people should be so confused in this country, and even the highly educated can barely give an answer to such questions as: what is the environmental crisis or what do we mean by a movement for environmental quality? or even, what is the environment? There will be some attempt to answer these questions in the study, that follows. So let us for the moment consider the word, crisis, which is so often coupled with the word, environment.

A crisis can mean a completely exploded situation, that is beyond saving. It can also mean an extremely critical situation where it is a matter of touch-and-go, so that any further deterioration can tip the balance and make the end inevitable. However, a crisis can also mean a turning point, if enough people recognise the seriousness of a critical situation and see it as a call to action. But action, in order to be effective, presupposes knowledge—precise enough knowledge—as to what has happened and why; what needs to be done and how to do it. We can still hope today that the environmental crisis belongs to this "third category of crises.

In this country, neither our formal nor informal education prepares us for the tasks that await us, in answering the call to

action. Certainly not the hotchpotch of 'subjects' that is ladled out in the name of education at our schools and universities, nor the information given by our mass media and the books generally in circulation in this country. We lack what is now considered *essential knowledge* today, faced as we are with grave crises in our own environments and the planetary crisis that grips the world environment.

In western countries where people are more fully aware of the nature of this crisis, they have reacted in a number of ways—not all of them desirable—since panic and mass hysteria is among them. Nonetheless a great deal of effective action is also in progress. Here, in this country, there is still an unnatural calm, that signifies ignorance and indifference. We could do with some rousing alarms, and fears that stab us wide awake, because the environmental crisis is no less grave in this country.

Needless to say environmental problems differ from country to country and even from place to place in the same country. Yet there is a certain sameness to the general pattern of problems, which is why we have a planetary crisis. There is much we can learn from the problem-solving efforts now being made in other countries and the citizen-action ideas being experimented with notable success. In fact the environmental movement is a citizen-action movement par excellence, in countries of its origin. It was not their governments that took the initiatives but their citizens.

It should be clear from the start that the environmental movement is a movement to improve peoples' quality of life; and to express its refusal to accept lower standards of living at all levels of society and sub-human standards, in the poor and neediest sections of society.

CHAPTER I.

A Changing Earth

200 million years ago, so geologists say, this earth had one great landmass which they call Pangaea or 'all lands', surrounded by one, universal ocean, called Panthalassa, or 'all seas'.

136 million years ago, the great landmass began to split in two and Laurasia, which was the mass holding together the con-

tinents of the northern hemisphere, began to drift apart from Gondwana (or Gondwanaland), which has what are mainly the continents of the southern hemisphere. Next Gondwana split into three fragments, of which the smallest was India. The other two being Africa and South America, Australia and Antarctica, still held together. India can be considered something of a geological freak, because having become detached from a position somewhere mid-way in the southern landmass, it began drifting on a long journey northwards.

65 million years ago, all the continents as we know them had split and drifted apart—with the exception of Australia and Antarctica, which were the last to separate; and the oceans, as we know them, had begun to form between the drifting continents. India had already attached itself to Eurasia, having thrust up the Himalayas with the force of the impact.

Geographers since the time of Francis Bacon, in the 17th century, have seen the different continents as pieces in a gigantic jig-saw puzzle, which if moved around, could be fitted together. So marked are the correspondences in their contours, that this could not be regarded as purely accidental.

Geologists, however, were left puzzling over the question for a long time, right upto the latter half of this century, as to how such colossal landmasses could move over the earth's seemingly rigid crust which also included the ocean basins. The theory of 'continental drift' formulated in the first quarter of this century began to gain more general acceptance only very recently as we gained more evidence to support it in the study of the similarity of structures, fossil finds, and other characteristics that seemed to verify the theory that once different continents were attached, or very near neighbours.

According to this theory, the earth's crust is not all one continuous cover, but fragmented. Geologists postulate 20 great plates of the earth's crust, which are like gigantic rafts, carrying the continents and the ocean basins on their back. These move over a hot semi-plastic layer that has formed as a cover for the earth's fiercely hot and molten core. There is no knowledge yet as to what gives the impulse to such movement. It could be the spin of the earth as it moves in its orbit.

The plates move, clash and grind together, causing earthquakes, folds on the surface layers of which the biggest are our mountain ranges, deep cracks and fissures. The plates are believed

to be anything from 30—100 miles in thickness, and thinnest at the ocean floors, where the most numerous cracks appear and the substance of the molten core comes welling out. The plates also tilt and deepen ocean trenches or tilt and subduct (slide under one another) and when portions of them break off and pierce the semi-plastic layer, they melt swiftly and explode in volcanic eruptions. It is the recurrent subduction of the African and Eurasian plates that is believed to cause eruptions in the Mediterranean region, through volcanic vents such as the Vesuvius, Etna and Stromboli.

"If all this sounds like utter fantasy," says S. W. Matthews, "so it would have seemed to many geologists only ten years ago." A revolutionary change has occurred during the past decade, with all the substantiating evidence found. As the famous US geophysicist, Leon Knopoff points out: "Textbooks are being rewritten. Teaching of geology is being totally revised." And as the leading Russian geologist, V. V. Belousov remarks, scientific studies of recent date not only show the tremendous advances but "the great excitement that now pervades this field of study." Most people, however have remained ignorant of such changes. "It is as if we have been walking the deck of a ship, eyes down to study the deck, and have never looked up and around to see that the ship itself was moving," says Tuzo Wilson of Toronto University.

The advance in geological and geophysical sciences, new methods of investigation, and a wide range of precision instruments now available, serve to provide us today with much accurate information on the geological changes still taking place. For example, geologists report today that the Alps are being thrust up higher, the Atlantic is widening, the Pacific narrowing and the Mediterranean shrinking. A great rift is splitting Africa, and another detaching California from the mainland, west of the San Andreas Fault. New islands are emerging, such as the eight-year-old island of Surtsey in the North Atlantic—paradoxically Iceland is one of the 'hot spots' on earth—and some older islands are sinking. Venice has sunk by 10 inches in the past 50 years, and Bombay is also believed to be among the sinking islands of the world.

Some changes along Bombay's coastline, however, are not of geological origin. Once Bombay was a [group of islands, till the drive for 'reclamation' began and there is still more senseless reclamation going on. It must be remembered that

in the battle between the land and the sea, the land cannot win, because water cannot be displaced. Extensions at some points of this island have meant that the sea is encroaching deeper into the coastline at other points, and (besides being a criminal waste of public funds), this may entail graver risks than can be foreseen.

In the geological time-span of 4 billion years, man's advent to the scene is extremely recent, "later than yesterday", as geologists would say. But man is altering what took millions of years to develop, "almost overnight" and blindly, without a thought for consequences.

CHAPTER II

The Human Environment

If we ask, "What is man's environment?" One answer would be, the entire earth, or all of the habitable area on earth, which is also described often as the "Living Earth." But this would indicate only his physical environment, which is only one part of man's total environment and that part which he shares with all living beings. The human environment, properly so-called is a much more complex totality. It is multidimensional, with physical and non-physical aspects. This is why we attribute so many kinds of environments to man: the social and economic, political and ideological, moral and psychological, scientific and technological, cultural and religious, and so forth. These are all aspects of a complex totality, and no less real than his physical environment because they constitute less tangible or intangible realities.

The word itself, environment, simply means surroundings. In the case of man, all the surrounding realities are influenced and altered by him and, in their turn, they are powerfully influential in affecting him, and his entire way of life. Man shapes his environment, and afterward his environment shapes him: his character, his manner of living, his future. The environment also serves as a large mirror, too large to be concealed, reflecting all that is good, bad and indifferent in the character of a people and revealing not only what it is, but strives to be. We can look at our environments to discover what kind of people we are,

because it is a mirror that cannot lie.

If we try to sum up what is central to all man/environment relationships, it can be done in two words—interdependence and interaction—with man being the more active initiator of changes, but changes that must in some way change him. Man and environment must change, more or less, together. If changes are for the better, they improve his quality of life. If for the worse, they degrade and demoralise him, oblige him to accept lower standards of living and an inferior quality of life.

For a long time, man seems to have thought of his environment only in terms of his immediate surroundings, and regarded the rest of the planet as a remote, vast reality, almost totally unrelated to him. Throughout the ages, man has tried to calculate and conjure up some image of this planet: its shape, size and properties, and always (till recently) in terms of something limitless and with unlimited resources. Today, however, human eyes have seen this planet 'hung in space', finite and vulnerable. The current concept of Spaceship Earth illustrates the truth about this planet as a fragile craft, of limited capacity, which carries our human population through its narrow orbit in the vastness of Space.

This planet has begun to prove increasingly confining to man and its resources inadequate to supply his growing needs. We are being constantly reminded today, that there is not room enough on this planet for indefinite expansion. Serious doubts are being expressed about there being enough food, fuel or anything for a much larger human population than this planet already carries: a population that continues to multiply at the rate of 2% or 74 million people a year.

Such doubts and fears seem justified when we consider the limits of the total habitable area on earth and the present state of its natural resources.

Planet Earth measures 40,000 km. at the circumference and 13,000 km, diametrically, from pole to pole. But the main bulk of it is inaccessible to man, and cannot support life. Only a thin outer layer of this planet (proportionately as thin as the skin of an apple) has life-supporting properties and this is known as the biosphere or the sphere of life. It contains landmasses that rise to their maximum height of 9 km only at the highest peak, the Everest; oceans that reach their maximum depth of 11 km, at the deepest point in the Pacific; and an enveloping atmosphere

which is viable upto a distance of 24 km, if measured from “the *deepest* point where life exists, to the *highest* point where it can, without protection, be carried and survive in currents of air.”

Such, then are the limits within which growth is possible, and they already include the inhospitable deserts of sand, ice and snow, the frozen heights of mountains, the vast stretches of arid and semi-arid land, and the great expanses of oceans. This does not give us a too ample man-to-land ratio.

As far as we know with any degree of certitude, this planet is the only one hospitable to man. However far man travels—on or off this planet—he has to travel in an earth environment. Whether he is on a jet-plane, a spaceship of the Skylab, he has to be carried in a strictly enclosed, miniature, earth environment: with its air, water, food, and other supplies drawn from the earth’s resources. The astronauts and cosmonauts who have been on missions to explore space, have not succeeded in discovering (if ever there was the intention) any alternative accommodation for our human population in outer space. Since this planet is all we have for our burgeoning human population, it is important that we know how it is constituted and functions.

CHAPTER III.

Life in the Biosphere

The biosphere is constituted of both living and non-living matter, although the latter is organised for life-giving functions. The main components of the biosphere are soil, air and water, more accurately described as the *lithosphere* or the crust of rocks covering the earth, and soils derived from it ; the *atmosphere* or the layered mass of gases and particulate matter enveloping the earth ; and the *hydrosphere* or all the water in the biosphere, in liquid, solid and gaseous (vapour) form. These component spheres have their cyclic rhythms of change which intersect, and within their intersections, there is the *biomass* or an immense variety of plant and animal life (including man), which is governed by the biological cycle.

The biosphere is dynamic, and in a constant flux of change. Scientists say that changes in the biosphere are mainly the result

of constant interaction between living and non-living matter and of the two, it is living matter which is the more active and efficient agent of changes. "The atoms of all chemical elements (non-living matter) have passed through living matter innumerable times in the course of complex cycles. The appearance of the planet has changed, and it may be considered that it is living matter that has determined the composition of the atmosphere, sedimentary rocks, soil (the lithosphere) and to a great extent, the hydrosphere."

Living matter is distributed and dispersed over the earth in groupings of plant and animal life known as *biotic communities*, which vary in size and complexity. Smallest are the most elementary life-forms, such as the mosses and lichens found on the surface of rocks; others are larger and more complex, such as the living communities of ponds and marshes which, among the more evolved species, include insects, reptiles, fish, birds and mammals. The largest and most complex biotic or living communities are those which inhabit climax forests or grasslands and especially tropical and subtropical forests and grasslands, and are known by a more specific name as the *biomes*.

All existing species are survivors of changes in the biosphere which resulted in the extinction of other species. For example, the dinosaur roams the earth no more and neither does the lystrosaurus, whose remains are found in Africa, Antarctica and India and have served to indicate that at some time in their geological history, these lands were attached to one another. The surviving species have all adopted specific environments as their habitats, and adapted themselves to their climate, structure and other characteristics. Some biotic communities are land-based, others aquatic and others have mixed land-and-aquatic environments. Some species such as the bear, have adapted themselves to a greater variety of environments, others are migratory, and like a number of species of birds, have seasonal habitats.

A living community and its environment constitutes what is known as an *ecosystem*, or a unified life-support system, where in mutual dependence and support, and dependence on the non-living elements, a living community maintains the productivity of its ecosystem and even 'creates' it. For example, soil is not soil, till living organisms (the microflora and microfauna) have worked on accumulations of fine grains of rock to create its fertility and ability to become productive of vegetation. As an

environment is made more productive, the capacity of the ecosystems is enlarged not only to support a larger population but to have a greater diversification of species.

Ecology is the science that studies the relationship between living organisms and their environment, and some of the most illuminating insights for ecologists have come from the discovery of "who eats what." Nature's food chain is an intricate and extensive device for the propagation and protection of the natural environment. Some species seem to have mainly growth-promoting functions, others mainly those of preventing overgrowth and thus protecting the environment, because when any species increases to larger numbers than it should, it becomes destructive, 'pest' species.

Ecosystems change. They can develop from simple to more complex ones through a natural process known as *plant succession*. Land that was once barren can obtain a vegetation cover, passing through different phases, beginning with a sparse cover of annual weeds and grasses, then perennial weeds and grasses, till a climax grassland is achieved. Where climate, fertility of soils and other characteristics are favourable, shrubs, bushes and trees can take over from grasses and later, trees, till a climax forest is achieved. Changes in the flora of a region have corresponding changes in the fauna. The animal community is active throughout the change processes and affected by them. During the transition stages, when a grassland is giving way to a forest cover, some animal species are gradually eliminated, those which must have a grassland habitat and forest-dwellers take over and diversify. However an animal community can prevent transitional changes and maintain the existing *biotic climax*, as in the case of a grassland community, by constant grazing, can prevent its territory from developing into a woodland or forest. With food as their bait, the different species perform other vital functions.

There are many loops to the food chain, and all of them start with plant life. If we take grass as a unit of energy, then there are species which graze on it, others that feed on its decay and still others that feed on the feeders. Herbivores are the food of the predators, and the scavengers that follow in their wake to feed on the remnants of the kill. The latter constitute nature's waste-disposal squads.

There is no room for waste in nature's finely balanced economy. Food that is in excess of the needs of one community is

passed on to another. For example the *detritus* or decaying grass which is like a greenish soup in appearance, is carried from coastal marshes to the ocean by receding tides as food for the plankton and since plankton is the food of many marine species, ranging from the mussel to the whale, this starts another loop of the food chain. Besides all dead matter of plant and animal origin is *biodegradable* or subject to decomposition through bacterial action and species of bacteria known as the *reducer*, disintegrate organic waste to reduce them to chemical compounds which are easily assimilated by soil, air and water. In this way all waste matter is constantly being re-cycled for re-use.

Balance, harmony and diversity are characteristics of all healthy ecosystems. The right *ecological balances* are maintained where the inflow of energies and materials is matched by an outflow that is used up. When ecosystems are in a state of growth, energies and materials may accumulate, so that the inflow exceeds the outflow but generally ecosystems are in a state of decline when there is any imbalance between inflow and outflow. Lack of sufficient food causes decline as also its excess. For example the presence of excess nutrients in a lake, encourages an overgrowth of algae which are heavy consumers of water and eventually turn a lake into a bog. There is harmony in a living community where all members are busy performing their allotted functions and diversification is essential, so that there are some species which restore to the elements what others use up. Nature abhors monoculture or the cultivation of only one species of crop or livestock because this impoverishes the environment. Man who indulges in monoculture, has to resort to the use of artificial inputs such as chemical fertilisers and pesticides.

Each species has a special 'position' to maintain in an ecosystem. It has what is called its *ecological niche* or a living space within which it finds adequate shelter, feeding and breeding ground and performs its allotted functions. Biologists say that only one species can occupy a particular ecological niche in a particular environment, so that its role is irreplaceable. If it is destroyed or debilitated, the whole ecosystem suffers. It may be the one species, for example, that can fertilize certain species of plants in the living community.

There is an ecological conundrum which illustrates this point: "What is the connection between cats and clover?" Darwin observed that that there was only one species of bee large enough

to fertilize the red clover, the humble-bee (bumble bee) but that this bee was also the favourite food of fieldmice, so that if there are not enough cats to feed on the fieldmice, then there are not enough bees to fertilize the clover. Towards the end of the last century, attempts to introduce the red clover in New Zealand nearly failed because the first crops would not produce fertile seed, till Darwin's "humble" bees were remembered, and a large consignment was imported from Britain.

CHAPTER IV

Growth Control

There is both death control and birth control in the natural order, so that neither the populations of individual species nor the total population of a living community exceeds the carrying capacity of its environment. This *carrying capacity* is determined by the productivity of an environment and its ability to provide the survival needs of each species and the total population. The number that constitutes the *optimum growth limit* for each species is determined by the size of its individual members and the demands they make on the environment. The larger the size of an individual of any species, the lower is the population growth allowed for it. The seeming overproduction of the smaller species is because the 'surplus' constitutes the food of a number of other species who keep its number down.

Besides the life cycles (or life-spans) of individual members, there are larger cycles lasting over a much longer period of years which bring an entire species to its peak population or steep falls in its numbers. This rise and fall in the populations of the different species occurs at different times, so that the total population of a living community is kept within the carrying capacity of the environment.

The death control mechanism includes predators, parasites, disease viruses which check the growth of the prey or host species. The birth control mechanism includes fixed seasons of mating and breeding, the tendency to stop breeding if there is not adequate provision for survival in an environment such as lack of food and living space, and if there are not enough members of the species

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left for healthy breeding.

When one considers how well regulated a natural environment can be, man seems to be altogether an odd thing out. He is practically omnivorous, does not fit comfortably into any ecological niche, breeds at all times and regardless of unfavourable conditions. Man needs other species for his survival needs but no other species seems to need him. As the latest arrival to the scene, he has been the most disruptive and destructive force in the natural environment, which seemed to do much better without him.

As far as the death control mechanism for the human species is concerned, man can boast of victories in prevention and cure of a number of diseases, lowered rates of infant mortality and female mortality during childbirth, and generally longer life-spans. The death control mechanism today include mainly wars and widespread violence, road accidents, the growing poison spirals in food, air and water, and all the excesses that can be summed up under the heading of the stress and strain of modern life. Man seems to have no natural birth control mechanism and while he is still experimenting with his own devices, for the most part, he continues to breed irresponsibly.

CHAPTER V.

Vital Linkages

One of the most profound ecological insights into the workings of nature is that "everything is related to everything else." The different natural ecosystems are in some way linked up, and with unifying forces at work, constitute *one* ecosystem which is the entire-life-support system of this planet. All living beings are caught up in one "great web of life", a vast and intricate network through which materials and energies vitally necessary to life, are constantly communicated. This is why any serious damage, anywhere in an environment, has more or less grave consequences everywhere. In the words of the poet:

"From Nature's chain, whatever link you strike,
Tenth, or ten thousandth, breaks the chain alike."

Drought and floods which are recurrent scourges in this country are the result of severe damage to vital links in the chains-within-chains of natural cycles of renewal. The causes of both drought and floods add up to an overall condition that is the loss of the land's *rainfall acceptability*. This means that the land has lost its ability to renew its stores of water during seasons of precipitation, cannot maintain large enough reserves of water to tide it over the dry season and if there is partial or total failure of seasonal rains there is more intense drought. We cannot as yet control the weather to decide exactly when or how much rain we shall have during seasons of precipitation. But we can decide how much of the fall received will be retained by the land in surface and underground storage. To fight water-famine conditions all manner of losses should be reduced to the minimum whether they are through evapotranspiration or evaporation from surface collections of water and transpiration by trees and other plant life, sometimes described as the 'flyoff'; and through excessive draining away of water from the land with a 'runoff' that empties into the sea. The different types of vegetation cover of the land serve as watersheds that break the fall and flow of water during seasonal precipitation to permit shallow seepage of water into the soil to be retained as soil moisture, deep seepage to reach underground storage and collection of water in surface storage as lakes, ponds, wetlands (marshes and swamps) as well as streams and rivers. Denudation of the land not only results in destruction of watersheds but exposes the soil to drastic erosion by wind and water. Erosion in turn is the cause of sedimentation — of heavy deposits of silt at the bottom of lakes and reservoirs and in the beds of streams and rivers, lowering their capacity for holding water so that during seasonal rains their surrounding areas are rendered flood-prone. The causes of recurrent drought and floods are practically the same.

There is a connection also between our large cattle populations and drought. Indiscriminate grazing not only strips the land of vegetation but the hooves of millions of cattle trampling the soil, cause dangerous soil compaction and waterlogging, because soil that is pressed into a solid hardpan cannot absorb moistures.

Faulty management of watersheds and creation of new ones without following scientific reforestation and afforestation methods also results in serious losses. One cannot plant any

kind of forest everywhere, and forests do not constitute efficient watersheds in all regions. In the 'humid islands' or regions of heavy rainfall and particularly where there is steep topography, only dense enough forests can serve as watersheds. But in the surrounding matrix, regions of moderate and low rainfall, grass-and-bush vegetation is needed for efficient watersheds, and the planting of forests, particularly with deep-rooted trees, or fast growing trees such as the eucalyptus, which are heavy consumers of water increases the aridity of the land.

One can stand under a forest canopy, covered by its great foliage umbrella and not feel a drop of rain even during a heavy downpour. Forests are responsible for three types of interception: they keep out solar radiation, so that lower temperatures reduce evaporation losses; they break wind velocity, so the wind speed in forests is rarely more than 1—2 miles per hour and moist vegetation is not dried up; but they also keep out rain. Showers of upto 0.04 inches may be completely intercepted. As the amount of rain per shower increases, the amount intercepted or kept out decreases, because there is a heavier throughfall and stemflow, that reaches the soil. Net interception losses in forests can vary, according to the density of forests, from 5—25% of the total annual rainfall. So forest watersheds must be so managed that lower evaporation losses are offset by lower interception and transpiration losses.

However forests alone can serve as watersheds to break the stormflow down mountainsides. Because the forest cover has been destroyed in parts of the Himalayan Ranges, unchecked stormflows are rushing down the mountain slopes swelling streams and rivers, bursting dams and barrages, and causing floods. Because of the erodability of steep topography, there is also heavy sedimentation. At a rough estimate, there would be at least 200 million cubic metres of soil eroded annually in steep topography areas in this country. Sedimentation is usually signalled by increasing frequency of floods caused by bank overflow of rivers, great spillovers from lakes and reservoirs and waterlogging of agricultural land. High sediment loads of flood waters (usually high in salt content) frequently smother crops and dispersed particles in the sediment seal soil surfaces to cause waterlogging. Blankets of sediment also cover lakes, reservoirs, rivers and open wells increasing pollution hazards.

Once cool, moisture laden winds used to blow from the Terai

up the Himalayan valleys. The destruction of the once lush and humid vegetation cover of the Terai, has resulted in warm, dry, dustladen winds flowing up the valleys decreasing the snowfall and starving the Himalayan glaciers. For centuries, the deep and generous glacier cover of the Himalayas has fed the rivers of the peninsula, including the Indus, Yamuna, Ganga and the rivers of the Punjab. These glaciers have now been reduced "to half their length and half their depth."

Sherpa Tenzing is cited to have remarked to Brig. Gyan Singh, as they stood watching the sunrise over Kanchenjunga: "God made the mountains, but man destroyed the forest of Sandakphu." Forests of pine, oak, and rhododendron have been cleared to create 'horticultural belts' of maize and potato cultivation. Ridges of mountains have been denuded and erosion in the agricultural areas has increased. Erosion is active everywhere in this country. Vaster tracts of land have been rendered arid and semi-arid, and in already arid zones, there are spreading deserts. This country now faces a threat of water famine because of an almost total dependence on seasonal rains in lands that have lost their rainfall acceptability. Drought and floods in this country today, are man-made calamities.

Greater disruption and damage has occurred in this country in the past 25 years—"since independence", as we say! We have impoverished the country by disregarding our dependence on nature. We need ecological understanding and an ecological conscience to save or salvage what we can from our general environmental wreckage.

CHAPTER V.

Man's Impact on this Planet

Today man has acquired the power of making an ultimate impact on this planet. The supra-lethal weapons of war found in the arsenals of some nations have the power of 'overkill' or a potential for destroying all life on earth. An all out nuclear war would mean the total destruction of life and human property.

A total war using biological and chemical weapons would not be much less completely destructive. It would be a slower

process, destroy all life, but leave human property practically intact. (If this can be considered an appreciable difference!) Man is the only species that plots and plans his own destruction.

The ecological crisis is a crisis within a crisis that affects man's total environment, namely, the environmental crisis. The signs of the latter are found everywhere in the growing stockpiles of human suffering and frustrations building up everywhere, ready to explode: world wide unrest, violence and wanton destruction, acute shortages of essential commodities and a host of day-to-day uncertainties characterize the world today. One does not know when undertaking air travel, if one will be highjacked to some other destination. There are higher rates of crime, juvenile delinquency, broken homes, and suicides. But the ecological crisis threatens the possibility of having an environment at all; all the increasingly unbearable pressures on the world environment now endanger the total viability of this planet.

Ironically enough, it is only after man has made vast tracts of the earth barren and unproductive; poisoned the waters of lakes, rivers and oceans; created high levels of pollution in the atmosphere, that he has now begun to realise that there is such a thing as a global unity of the environment.

Population Pressures. This is a century of unprecedented growth and intolerable pressures because with population explosions on one hand, we have seriously diminishing resources on the other.

Even a cursory glance at previous and present growth rates, reveals an alarming acceleration. According to a rough estimate, we started out at the beginning of this era, the 1st century, A.D., with a world population of a quarter of a billion. It took 17 centuries for the world population to reach the 1 billion mark, around 1830. Then in one century, 1830-1930, the world population doubled to 2 billion. In only three decades after this, in 1960, it was 3.1 billion and in the following decade, by mid-1971, well past the $3\frac{1}{2}$ billion mark. Early in the next, by 1980, we expect a world population of 4 billion.

Such dramatic increases are still more alarming when one considers the fact that it is in our so-called Third World (the poverty belt) with two-thirds of the world population, that on an average, populations double every 18 years, while the world population as a whole, doubles every 23 years. It is the few advanced and affluent nations of the world that are nearing ZPG (Zero Popu-

lation Growth). B. Pfizer, speaking of the USA, remarks : "The nation's birth rate has dropped below zero-growth level. That means our population will decrease enough, so that 20 years from now you'll be able to get a seat on the bus !"

However population pressures cannot be gauged according to the weight of numbers alone. Two equally important factors must also be taken into account : rate of consumption, and urban/industrial expansion. The few affluent and technologically advanced nations are pre-eminently consumer societies, with extremely high rates of urbanisation and industrialisation and for these reasons can be considered the most densely populated countries of the world, because of the pressures on their own and the world environment for which they are responsible.

The USA, with about 6% of the world population, consumes 33% or one-third of the world's fuel resources. "It is estimated that a child born in the USA, during its lifetime, consumes 20 times as much as a child born in India and contributes 50 times as much pollution of the environment." The other affluent nations are not very far behind. Urban and industrial growth go hand-in-hand. Urban expansion began with the Industrial Revolution.

In 1800, there were only 50 cities in the world with populations of over 100,000. Today there are nearly a thousand such 'medium-sized' cities and a new phenomenon has appeared on the world scene — the megalopolis or metropolitan cities which count their populations in millions. To name only a few with the highest concentrations of population, Shanghai leads the way with 10,820,000 ; followed by Tokyo, with 8,410,000 ; Calcutta, 8,000,000 ; New York, 7,895,000 ; Peking, 7,57 ,000 ; Bombay, 7,000,000. Such great, sprawling human settlements have environmental problems that defy description. But it has been forecast that if there is an absolute environmental disaster, it will be in one of the Third World cities where people are able to react only very marginally and the new pollution-control technology is barely employed.

If we try to break down the world population according to regions, Asia is the most heavily burdened continent with a total population of about 2,104 million or 56.7% of the world total, and separated by a wide gap from the second largest population, that of Europe, which is 466 million (12.6%). In both cases, minus the USSR. The other regions, in descending order, are as follows : Africa, 345 million (9.5%) ; North America, 327

million (8.8%) ; the USSR, 245 million (6.6%) ; South America, 195 million (5.3%) and Oceania, 19.7 million (0.5%).

Apart from the tiny states like Malta and Macau which are 100% urban, the highest rates of urbanisation are found in Belgium, 86.8% ; Australia, 85.5% ; Sweden, 81.4% ; Israel, 81.2% ; Uruguay, 80.8% ; Canada, 73.6% and the USA, 73.5%.

One can think in terms of ample man-to-land ratios even in the least populated regions of the world only in terms of encroaching on land with a natural vegetation cover which needs to be conserved. Few nations have worked to reclaim arid and semi-arid lands successfully or like Israel, made the desert bloom again.

Depletion Of Resources. This is a finite planet, with limits to all its resources. The resource system can be divided into—the renewable and non-renewable.

The non-renewable resources are those found in fixed quantities which once exhausted cannot be replenished : such as metals, non-metallic minerals and fossil fuels. They are in such great demand in our modern technological societies, that there are acute shortages already (some artificially created ones), so that plans are in progress to shift mining operations to the still practically untouched ocean floor, whatever the risks and phenomenal costs of such operations. Nations that still have Oil are in a powerful 'economic-political' bargaining position, in the arena of world affairs.

The renewable resources constitute a category of vitally-necessary-to-life resources, namely soil, air and water. These are only *potentially* renewable (which is why we said, 'renewable' was a flexible term), depending on the proper functioning of their self-renewing cycles. If this planet is kept in good functioning order, the natural resources of this category could be *indefinitely* renewable. The biomass which plays such a pivotal role in maintaining their 'renewability' is itself a resource that falls between the two categories. It remains renewable, if its survival needs are satisfied ; but it is non-renewable in the sense that once any of the species has become extinct, it cannot be recreated.

There may be more than enough soil, air and water to support a larger world population, if the populations of different regions are well distributed. But heavy concentrations of populations, coupled with grave abuses of all natural resources, has already created unnatural shortages. And since these are man-made

problems, only man can solve them. We said earlier that man fits into no natural ecological niche. But as the species with the largest brains and capacity for understanding, he can do for the environment what no other species can.

There is also a great deal of malfunctioning in the natural order—without man's intervention—such as earthquakes, other geological changes, catastrophes such as tidal waves, hurricanes, typhoons, which disrupt natural cycles and cause vast havoc. Man alone can predict them and counteract or remedy some of their effects. Generally man alone can be a world ecosystem manager, enabling all other species, through the conservation of their natural environment, to promote the health and productivity of the earth's resources, under circumstances prevailing today, where so much of the natural environment has been forced to recede before the advance of man-made environments, so that relatively little of it remains anywhere in the world.

Soil. At present only 10% of the total land surface of the earth of 136 million square miles, is under cultivation. This area is rapidly shrinking, not only because more and more of it is bound up with steel and concrete for urban and industrial expansion, but because of cropped out soils in many regions. Deeper incursions being made into the 25% of the total land surface that is still under a natural vegetation cover, our precious wetlands and watersheds. In India, for example, "25 hectares of forested and marginal lands were brought under the plough during the last decade" and approximately, "an area of 800 square kilometres was turned into sand deserts by travelling dunes."

Intensive agriculture, monoculture and the wrong kinds of crop rotations, as well as malpractice still common in this country, shifting agriculture, has dangerously impoverished soils. Excessive or unskilful use of agricultural inputs, both chemical pesticides as well as chemical fertilizers have poisoned soils and destroyed soil structures. Pest populations are growing and crop diseases are spreading, because ecological balances have been upset. Excessive and unskilful use of farm machinery and overgrazing have caused dangerous soil compaction and waterlogging.

The so-called scientific techniques of modern agriculture have failed to create healthy and productive agroecosystems. We do not have enough knowledge yet to know just how much artificial manipulation different soils can stand and practically no knowledge yet as to how that vital element in the soil, humus,

on which both the fertility and moisture absorbing capacity of the soil depends, is constituted and can be artificially induced.

Land pollution is an enormous problem. Land is littered with garbage and fouled with liquid wastes. In some countries non-geological hills—hills of garbage—are rising. The very methods of waste disposal sometimes employed such as incineration, are themselves sources of further pollution of the environment. All growth is at the expense of the environment, as mentioned earlier, because there is industrial pollution, agricultural pollution, domestic pollution, and pollution from insanitary and inadequate water and sewage carriage systems.

There are optimists who declare that we have enough scientific and technological knowhow to be able to support a much larger world population. But the immediate fact is that more than two-thirds of the present population is ill-fed, ill-sheltered, under-clothed and lacks some of the basic necessities of life.

“All the talk about our scientific and technological knowhow, is a big and empty boast,” says William Bowen, “if possibilities are assessed in realistic terms, that is to say, just how much of this knowhow will be translated generally into practical action.” Even if we multiply our skyscrapers and raise them higher; double-deck not only our highways and railroads, but entire cities; launch floating ‘townships’ on the ocean; there will not be enough elbow room on this planet in a not-so-distant future on this crowded planet.

Air. Seemingly there is plenty of air, yet this cannot be regarded any more as a “free good.” If we cannot be made to pay for using air, as we do for water, we shall soon be paying (if we are not already paying) for polluting air and making it less usable. Air, unlike water, cannot be recaptured and put through purification processes. Air pollution, like land pollution, has many sources: industrial, domestic, agricultural and insanitary municipal services and in addition, there are incinerator plants, thermal and nuclear energy plants, and our present systems of transport, along with the craze for ‘speed travel’ to be thrown in for good measure.

Chemical industries release large quantities of sulphuric and hydrochloric acids, sulphur and nitrogen oxides, among other noxious gases into the atmosphere. The metallurgical industries emit large loads of lead, arsenic, zinc, copper, cadmium, among other pollutants. Inferior qualities of fuels in domestic use in-

crease pollution hazards. Cars and other motor vehicles are the greatest single source of air pollution and in the larger cities, they can pump into the air annually a load of 75,000,000 tons of toxic wastes including carbon monoxide, nitrogen oxides, lead fumes. Not only the number of vehicles but the fact that in countries like ours they are badly constructed, kept in poor repair and badly driven (frequent breaking and acceleration increases exhaust outputs) increases their pollution potential.

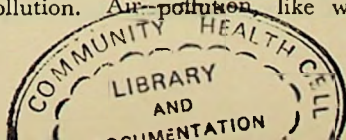
Air that is heavily laden with pollutants cannot be cleansed by natural processes. Pollution debilitates or destroys one of the chief natural agents of purification, namely, plant life. One might add at this point that in so many countries, woodland and forest belts are conserved near a city as in Paris, Brussels, or created as in Amsterdam, to serve as the 'lungs' of the city, purifying its air.

Air that is heated rises from the ground, cools as it rises, and is arrested at a point where its temperature is the same as the layer of air immediately above it. This marks its *mixing-depth* and the limits of our *usable air-space*. For us the atmosphere is not limitless, since 95% of the usable air is contained within the lower reaches of the atmosphere (the stratosphere) upto a maximum height of 12 miles, and only a fraction of this, about the first mile, is available for constant use. As levels of pollution increase, the mixing-depth decreases, and the usable air-space is drastically reduced.

This is why people in heavily congested urban/industrial complexes are breathing practically the same fouled air all the time. Autopsies conducted in Britain on road accident victims have revealed that lungs of people from remote countryside areas still have a healthy pinkish tinge, while those from industrial cities have lungs of an ugly greyish colour.

Air pollution has been defined as "the addition to the environment at a rate faster than it can accomodate it, of a substance or energy (heat, sound or noise, radioactivity, etc.) that is potentially harmful to life." This is an inadequate and misleading definition. For one thing, "potentially harmful" cannot be taken to mean that no actual harm is done but only that all the effects may not be immediately visible or easily traceable to their actual sources. For example, industrial pollution has been known to cause crop failures and plant defoliation at a distance of 300 miles from the source of pollution. Air-pollution like waterborne

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pollution, can travel fast and far. It is the known cause of the most serious health hazards such as chronic lung and cerebrovascular diseases, a larger number of diseases still difficult to diagnose, and others that may continue being dismissed as nameless 'aches and pains.'

Noise pollution has serious pathological effects that are almost totally ignored in countries like ours, *i.e.* serious physical and mental effects. It can be the direct cause, as in the case of higher incidence of deafness, or an indirect but gravely aggravating cause, as in the case of nervous tensions that precipitate mental diseases. According to a World Health Organisation estimate: "Industrial noise alone costs the USA more than \$4 billion annually, in accidents, absenteeism, inefficiency and compensation claims." But, as J. M. Mechlin points out, this leaves out of account "all the human costs in sleepless nights, family squabbles and mental illness (which) are beyond measure, but must surely be enormous."

Experiments conducted on laboratory animals as well as on school children have revealed that both were excessively restless and unruly, with a marked tendency toward violence, during pollution peak periods: when noise pollution was at a peak and/or there were increases of toxic pollutants in the air they breathed. It is being said today, that if no other death-control mechanism works in our world today, the stresses and strains of urban life in our noisy and congested cities will continue to take increasingly heavy tolls of human life.

Air pollution is also a great source of damage to human property. It causes metals to corrode, fabrics to decay, defaces with filth the facade of buildings and causes their structures to weaken. Plant and animal life are known to be more sensitive than human to dangerous levels of air pollution. This is why miners in the old days used to send in their pet canaries to test the air of new shafts and if the birds did not return this was a danger signal to indicate the presence of deadly gases. The residents of the Chembur area in Bombay now know that withering plants indicate dangerous levels of air pollution.

The effects of air pollution on climate, still remains a controversial question. No one denies the connection between pollution and unpredictable climatic changes but there is difference of opinion about attributing effects to pollution as the sole cause. There is more than enough evidence to prove that excessive amounts of carbon dioxide in the atmosphere causes serious 'per-

turbations' and violent storms. Ample evidence is there to show that it is air pollution that causes frequent smogs and also the persistent 'smaze' (smoke and haze) that hangs over the larger urban/industrial complexes.

While we are on the subject of different types of pollution, perhaps, a small mention should be made of what is known as 'visual pollution'. Ugly, filthy, or dismally monotonous surroundings have their depressive effects, that can prove demoralizing. Environments with no touch of natural or man-made beauty dehumanise man, make him lose self-respect and respect for others, because of the lack of any uplifting influence that makes him question values, and why he should submit to sub-human conditions. As a political detainee wrote from Robben Island: "Looking out from the prison bars, the sight of a small tree, a passing bird, encouraged me to believe in human freedom as the basis of human dignity." People do not realise what kind of prisons for their spirit they create in their deteriorating environments. As said earlier, an environment reflects what a people is and tries to be, the values that it upholds, the things and conditions that matter most to it in life.

Water. This is actually our most abused resource. The waterways of the world are now carrying mounting loads of wastes impossible to 'digest' or reduce by bacterial action. Some of the wastes are non-biodegradable, such as synthetic fibres, plastics and chemical detergents. Energies such as heat and radioactivity are also non-disposable. Waters nearly everywhere in the world, are fouled with sewage, poisoned with dangerous chemicals, streaked with oil, blanketed with dust and sediment, and foaming with detergents.

Pollution has caused the degeneration of destruction of entire aquatic ecosystems. There are lakes in different parts of the world which have been pronounced dead or dying, and rivers which are no more fit for any use other than navigation and power generation. Polluted seas have fouled the shores and beaches of several countries. There is a higher incidence of waterborne diseases everywhere. Since pollution has reduced surface supplies of water by rendering them unfit for use, there has been over-mining of groundwater—more tube wells for drinking water, especially—and water-tables in some areas have been dangerously lowered. In coastal areas, the lowering of water-tables or levels of underground supply, has resulted in another form of pollution,

the seepage of sea water into fresh water aquifers.

"One of the alarming aspects of environmental pollution," says René Dubos, "is that despite the new powers of science or rather because of them, man is losing all control over his environment. He introduces new forces at such a rapid pace and on such a wide scale that the effects are upon him before he has time to evaluate their consequences and can afford to change his course." Once industries have been established by a lake or river and the local economy has become geared to them, it is too late to do anything about industrial pollution without grave economic losses. All planning for development must be based on ecological investigation, so that effective environmental safeguards are observed. Pollution means that the poison spirals are rising rapidly in the food we eat, the water we drink and the air we breathe.

CHAPTER VI.

The Challenge of the Future

The prime challenge today is to maintain a perspective of hope. Hope against hope, even in the more desperate situations where one's environmental problems seem beyond solution, so that one finds courage to do what can be done. "Ecologists," says Frank Fraser Darling, "cannot afford to be optimists. But an absolute pessimist is a defeatist, and that is no good either. We see that there need not be complete disaster and if our eyes are open wide enough, world wide, we could do much toward rehabilitation.

Here, in India, we need to open our eyes at least nationwide to see that our still too generally prevalent policies of a free-for-all, laissez faire, is something we cannot afford. We cannot afford either that our 'retarded development' should mean that we are simply slow in making *the same mistakes* as the technologically advanced countries. Mistakes that they themselves bitterly regret and find prohibitively costly to remedy.

The prediction on a global scale that there is not likely to be enough food, fuel or anything for a much larger world population, is of particular significance for us, as the nation with the second largest population in the world. But other nations with more

recent population explosions, with but a fraction of our population, and much higher standards of living, have heeded the warning we continue to ignore. We seem to have grown too accustomed to living with an over-large population, despite the fact that the bulk of it lives at subsistence level and under.

When there is no hunger, there is always widespread undernourishment and malnutrition, (Hidden Hunger) that is the cause of lowered resistance to disease, lack of physical energy, physical deformities and mental retardedness. In times of crises, the poor and underprivileged sections of society are the first and worst victims.

In no country whether rich or poor, advanced or retarded, is the heavy, outdated governmental machinery equipped to face the challenges of today. The best of governments are now capable only of slow and cumbersome movement and need to be pushed, if they are to be got moving at all in the right direction. At the same time, no people that has at least some semblance of democratic institutions, is as powerless as it thinks or as helpless as it feels. There are always legitimate channels of exercising public influence and public pressures. It is the business of citizens to know how their governmental institutions are constituted and function, and make them function as they should.

The environmental movement itself illustrates what citizens can do. If we study the brief history of this movement, we find that it began as and has remained a 'popular' movement, initiated and sustained by the efforts of ordinary citizens under the leadership of few from among their own ranks who were able to accept the moral, intellectual and organisational challenges. Nowhere, did the first initiatives come from governments. And even later, the best initiatives have come because governments were pressured into taking action. This movement has shown what is true generally, that there is no alternative today to citizen action, and hope for the future lies in the citizens accepting this challenge.

In other countries where the environmental movement has made a real impact, citizen action has used a double-pronged strategy: parliamentary and extra-parliamentary pressures and succeeded in bring a number of their environmental problems "off the street, into legislation." However in these countries, the movement has also had a marked urban bias, which they can

afford, being pre-eminently urban societies. In this country the same kind of bias is dangerous, for one thing, most of our people still live and work in rural areas in the stagnation of no-change ; and for another, pressures cannot be lifted off our cities which have their cause and origin in rural areas. How do we go about 'slum clearance', for example, when there is a steady influx of people coming in from the villages to swell the ranks of the unemployed and underemployed, and in the process, convert one city after another into a vast slum ? Even building a Twin City as in Bombay will not solve that problem, because the only solution is more bearable conditions of life and work and employment for rural people in their villages.

There is a dawning realisation among younger people in the country today that this is what needs to be done, not only because its a remote but efficacious means of slum clearance in the cities but necessary in itself. There are some young professionals who are leaving the comforts of a city and more lucrative jobs to live and work in the rural areas. There are teams of students studying abroad to prepare themselves to work on rural development, and professionals from this country working abroad who make regular contributions from their salaries to support them. These may be extremely few and scattered instances, and nowhere proportionate to the need, but they are indicative of a new spirit and a heartening sign, that perhaps the winds of change are beginning to blow more freely in this country.

CHAPTER VII.

Citizen Action

There are active groups of citizens in this country, but they are scattered and each busy doing their own thing. Anything from 'befriending' birds and trees, to social service. There seems to be no overall picture in their minds of the crisis in our total environment, and no attempt to co-ordinate their activities for concerted action. Meanwhile the greater majority of people show no active interest and concern or if they have interests and concerns, are wary of joining any organisation for two valid reasons, at least : (1) either they cannot work up enough enthusiasm for

the kind of thing an organisation is pushing as a great cause ; or they have been alerted to the fact that its leadership is incompetent and not entirely trustworthy. Signs of organisational infighting can rarely be kept an entirely private matter, so that people are disillusioned and turned away. People with genuine interests and concerns are looking for the right kind and quality of leadership.

There is an imperative need of a single group to co-ordinate the activities of all citizen action groups according to a combined strategy of action, so that there is no duplication of efforts, senseless rivalry and dispersal of funds and resources while, at the same time, important aspects of a totality of problems is overlooked. Citizen action cannot make a real headway unless "the moral, economic and political bottlenecks are broken." The *moral bottleneck* is the most difficult to break because it means arousing an ignorant and apathetic citizenry from inaction to active concerns and efforts even at some personal cost. The *economic bottleneck* although less difficult to break requires constant vigilance and investigation to discover and publicly expose all the ways in which public authorities waste and misuse public funds. In no country, however affluent, are public funds adequate to meet a great multiplicity of public needs yet if existing funds were invested productively and according to a strict order of priorities, a larger number of needs could be met and many more problems solved. The poorer a society the more necessary it is that public funds should be used productively, to meet the most urgent needs of the largest number.

The *political bottleneck*, incredible though it might seem, is the least difficult to break. On the one hand citizens must carefully distinguish the problems they themselves can solve and those which only governments can solve at all levels — local, regional, state, interestate — and no citizen action group can succeed without a political action programme. However, politicians almost by definition are opportunists, and in a number of countries where political candidates are now being judged by citizens on their 'environmental viability' or record of performance on environmental issues, politicians are frantically busy jumping on to the environmental bandwagon especially as their platform during election time. But there will be discrepancies between promises made during elections and performance afterwards unless in every constituency there is a citizens committee that keeps a close watch on their local MPs and MLAs and holds them answerable for all

they do or fail to do and to see that these representatives defend and promote their interests in and out of parliament. Parliamentary pressures are usually slow in bringing results unless backed by extra-parliamentary pressures, such as public protests, representations to political leaders with a clear statement of demands and a constant barrage of criticism through the mass media. It must be remembered that no political party, not even the government as the political party (or parties) in power can afford to continue ignoring public opinion and denying public demands without grave risk to its political future.

Professional Citizens. A citizen action group that has many hard-won victories to its credit, including six new items of legislation, is the Public Interest Research Group, led by Ralph Nader. In a country (the U.S.A.) where there is a great proliferation of citizen action groups, this group enjoys the well-merited distinction of having captured the public imagination to an extent that no other group has done, and having given people the feeling that even as average, ordinary citizens, there is much they can do if they go about it the right way. This group has six new items of legislation to its credit.

The Public Interest Research Group consists of teams of lawyers whose business it is to work on a thorough scrutiny of existing legislation and its enforcement, on a wide range of issues, as varied as property tax laws, road-safety regulations quality standards for consumer goods, and 'corruption in high places.' Auxiliary forces help the research group. There are student volunteers, for example, with one group counting 200 regulars, who are now famed as "Nader's Raiders". Their particular job is to conduct fact-finding missions and exercise vigilance to detect new developments, favourable and unfavourable. 'Nader and Co.' has become a power to contend with in the land ; it makes its influence felt at all levels of authority and corporate power, in and out of government.

To arouse people to active concerns, according to Mr. Nader, there is "no need to peddle ideology, but to talk facts . . . No need to dismantle the institutions of society, but to make them work"; and, as he adds, "one does not need to agitate but to operate ; not to orate, but to dig in and discover what can be done."

According to this philosophy, citizenship has three kinds of obligations according to whether they can serve as (1) citizens-

on-the-job, (2) part-time citizens or (3) professional citizens. The main drive in every case being to check "corporate institutional power and its misuse."

Citizen-on-the-Job. This category of citizens are also variously described as the 'whistle-blowers', who alert the group. They have clearly decided the 'ethical issue of allegiance' where there is conflict of loyalties. They are citizens first, with an obligation to defend the interests of their community and society; an obligation that they will not surrender, in order to submit to the loyalty expected of them and claimed of them as employees, by the institutions for which they work. When they see what only insiders can see, they blow the whistle. Reports of abuses and malpractices from these helpers, has enabled the group to take different institutions to task for all manner of offences such as "the pollution of a river, the manufacture and sale of unsafe goods, the hustling of frauds, and bribing their way into bending laws to conduct illicit operations."

Part-Time Citizen. This category covers a great variety of people who see problems and are deeply concerned but lack the skills and/or time to dedicate efforts to problem-solving tasks, so they support the group — financially and otherwise — that is willing and able to act on their behalf; follow its directives in doing what they can in their own situations and for the rest are available when needed. Like other categories of auxiliary forces (Raiders and Whistle Blowers) they look to the Professionals for effective leadership.

Professional Citizens. This is the key group of full-timers, who dedicate all their time and skills to tasks of promoting and defending public interests. As far as possible, they are supported by the community to which they belong. Problems today are too vast and complex to be solved by amateurish efforts. Professional expertise is urgently needed: skills of research, formulation of a well-defined strategy, and directing operations. "Citizen action," says Ralph Nadar, "is about as developed today as physics was in Archimedes' time, because we haven't full-time talent on it."

The close and constant collaboration of all categories of helpers, has enabled the Public Interest Research Group to draw up astoundingly accurate reports and 'position papers' on the wide range of issues it has tackled which, in their totality, constitute a political programme that neither of the political parties in the country has been known to issue in defence of citizen's rights.

Citizen Council. Action groups have organised themselves in different localities of a city and suburb, in a number of western countries, to improve and enhance the quality of their local environment. Residents of a locality elect a council to direct community enterprises. They plan action on the basis of a thorough study of the problems of their area or locality ; and mark out specific environmental abuses and insults, for attack. Great cleaning-up programmes are organised to oblige all local residents to keep their houses and environs clean ; oblige property owners to see to proper maintenance and repair ; and municipal authorities to see to regular garbage collection, road repair and cleaning. The success of their local enterprises has given some of these groups such prestige that they have been able to obtain grants and loans from public funds to improve and extend local facilities, since public authorities are assured that their funds will be used productively.

Both persuasion and compulsion tactics are used. Where persuasion fails, compulsion tactics are employed ; imposing suitable penalties for specific abuses ; and, where necessary, taking legal action against those guilty of grave and persistent offences. Efficiently organised groups have created active communities which take pride in their environment and in all they have achieved through their own efforts to improve its quality. Vacant lots which were once garbage dumps, have been turned into small public gardens and safe playgrounds for children. Run-down property has been converted into community recreation centres and open markets, where vendors are allowed to set-up stalls for certain hours of the day, and then clear up and clean the place before they leave. Action has been taken against traffic noise and the noise of radios, stereos and TV played full volume, all day and late into the night. Proprietors of shops and eating places have been obliged to observe quality standards and vendors of unclean and adulterated food and drink prohibited entry in the locality. Such groups have discovered that anti-social habits that once had to be penalised, become, with time, the not-done-things ; and new habits are formed among the local citizenry.

It is one of the greatest contradictions of our age that increasingly larger numbers of people live in closer proximity — packed into row upon row of concrete boxes — but live as total strangers. There are neighbourhoods without neighbourliness. Some signs of a healthy reaction against this tendency are visible

in other countries, which we would do well to imitate, according to circumstances in our own local situations. There are some residential areas in Scotland, for example, where people have come together to live a shared life as a close-knit community. Younger members of the community take on all the more strenuous tasks of organisation, but each age-group contributes what it can to the welfare of the community.

Teams of teenagers help the aged and needy. They repaint and repaper homes, do rounds of window-cleaning, house-cleaning, gardening and other chores, purely as a neighbourly service or also to earn some pocket money. Elderly people organise day-care centres for children of working mothers and offer their services to couples with young families as 'baby-sitters,' to allow them some freedom to enjoy social life. Professionals offer their services to solve community problems, and there is help for all in their times of need. Such an environment is truly a human environment.

CHAPTER VII.

A Strategy of Change

Problem-solving tasks must serve to overcome subjective and objective difficulties. *Objective difficulties* will always loom large in a country so vast and poor as ours, because of our paucity of resources. However, it is often the *subjective difficulties* such as ignorance and apathy, lack of any civic or social sense, a gross selfishness and unconcern face-to-face with the sufferings of others, which pose even greater obstacles and prevent us from coming to grips with objective difficulties.

One of the most overworked phrases in environmental circles is the one voiced by Walt Kelly's famous Pogo : "We have met the enemy and he is us." It is easier both to identify and fight an outside enemy. But when there are enemies within our own ranks, it is infinitely more difficult. This is why the main task of citizen action is the formidable one of trying to change the outlook and attitudes of fellow-citizens and to fight citizen irresponsibility. If we are realistic, we must see that self-interest is the most powerful motive force in our society today. Therefore it must be

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made the most powerful ally, as *an enlightened self-interest*.

Change does not come without preparation. Our people must have some preparation of mind and heart, understand what will serve their best interests, realise that they can achieve much by their own efforts, before they will be ready and willing to accept civic and social responsibilities. This is why the first of first steps in a change-initiating process is to form and inform public opinion, in order to gain public understanding and support.

Opinion-forming process presuppose (a) the establishment of a system of communications that casts wide the net, so as not to exclude (as far as possible) any section or segment of society (b) the ability to give a relevant message that will strike home; in the case of all the elements of society ; (c) an efficient feed-back system to keep a check on what progress is made and to discover causes of failure in order to remedy them ; (d) and at least a minimal consensus of public opinion as the basis of launching action.

Two channels of communication that offer the widest possible outreach are : (1) the *Mass Media* — the interest and support of the press, radio and television, should be enlisted as early as possible and the best possible use made of the time and space they offer to diffuse information, to build up as complete a picture of problems as investigation permits, and to stimulate public discussion and debate by focussing attention on problems ; (2) the *Opinion-leaders* of different sections of society, who must be discovered and convinced of the necessity of action. They will know their followings, and how to communicate the same convictions to them.

Demonstration is also an essential and most persuasive means of communication. If, for example, certain localities (a few, and as diverse as possible) can be selected to start demonstration experiments in the organisation and operation of citizen councils, the success of such experiments could prove generally infectious, and bring more people to a willingness to attempt similar efforts to solve their environmental problems. Here, too, the mass media could help by giving publicity to the experiments. Citizen action at local, grassroots level, should be pre-eminently a community-building enterprise, and show how much people can do, even in the poorest of communities, if they are well directed and work together.

Periodic Campaigns are still another means of communication

with large sections of the public. Suitable occasions should be sought or created to proclaim campaigns, with the approval of local leaders and where necessary, public authorities, when campaign forces operate in one locality after another, pointing out specific environmental abuses, explaining their effects, and showing people what must be done to counteract them. For the duration of the campaign, all other channels of communication should also be used to focus attention on it.

Public Forum events should be organised through the news media, with a panel of experts going into operation, to stimulate discussion on specific issues ; or through mass meetings, where the panel serves as a brains-trust, to conduct question and answer sessions, and seminars for more select and smaller groups of experts and laymen.

Programmes for Educational Institutions are also extremely important. Children and youth are the section most easily available for formal education, for the rest informal means have to be used. It should be one of the objectives of citizen action to have a team of qualified teachers who do the rounds of educational institutions to conduction special classes in environmental studies, arouse the young to action in the way organising their own campaigns and even to educate their parents and elders. If the teams of teachers are young themselves, equipped with good teaching material (audio-visual material such as films, slides and printed matter) and conduct practical application sessions for students, they could fire the imagination of the young.

Research and Action. The two must go hand-in-hand. To form public opinion and keep it well-informed, there must be a thorough investigation, fact-finding missions for data-collection, a general survey of the problems in the area and their interrelatedness, and then a selection of specific issues or specific problems that need to be given top priority. One cannot attempt solutions to all problems at once, so those problems should be selected which are the most urgent and according to strategic planning, may also serve to solve other problems in their wake.

The ability to talk facts, to marshall facts and figures in a convincing manner, has already been indicated as extremely important and requiring professional expertise, and also that in each case, the message is relevant to the people addressed. The same problems do not interest and affect different lots of people in the same ways. In order to be relevant, the message should be

in the language (terms and concepts) each lot understands and appreciates, and linked up with what are the existing interests and concerns, or what can be shown as the true interests and concerns of the people addressed. This is why *graded releases* are advocated for information service.

Applied research implies the use of both the techniques of analysis and synthesis. A *synthesis* is needed if one is to discover the inter-relatedness of problems and get an overall picture wherein each problem is situated in its proper perspective; and it is possible to make a choice of the priorities to be observed in problem-solving efforts; and after each problem has been *analysed*, to discover its different aspects, and a groundplan drawn up for as complete a strategy of action, using sound campaign techniques.

It is a matter of strategic importance, that at least a minimum consensus of opinion is obtained in a section of society where action is going to be launched, and the support of its opinion-leaders enlisted. People from different backgrounds, cannot be expected too easily to become one in mind and heart. But enough people need to be rounded up who will make a *common cause* of specific issues and be united in purpose and action. This will mean making people come across professional and occupational frontiers and bringing down all barriers — socio-economic, communal, ideological, political, and the rest — so that there is a solidarity of effort, once action is launched.

The very urgency, complexity and magnitude of problems calls for a well-planned strategy. Haphazard and piecemeal planning will not serve. In order to be intelligently and effectively organised, there must be use of sound campaign techniques and there is no excuse today because there are well-tryed techniques for all manner of problem-solving tasks if one takes the trouble to study them and adapt them to local situations. One can find a highly evolved science for almost every thing, including the dynamics of public protest.

It is also strategically important that citizen action does not take a blindly obdurate anti-governmental stance. One cannot stress enough the need in this country of a healthy, intelligent opposition to the party in power. But governments need to be opposed and supported. Opposed by skillfully organised pressures — in and out of parliament: when they pursue blind policies, clear instances where they show incompetence and corrupt practices and are inefficient in their planning and implementation. They

need support, when they are trying to work for progress but are obstructed by vested-interest groups, and there are vested interest groups of an almost infinite variety in this country, in our extremely divided society.

There are always some good people in government, eager and anxious to work for progress, and competent enough, in their field of specialisation. But they are harrassed, frustrated and prisoners of the system under which they have to work. Such people should be discovered and their allegiance and collaboration sought. People who hold government offices do not cease to be citizens ; and more people should penetrate the bastions of authority which are our governmental structures, and work from within them.

AN ACTION PLAN

—APPLIED RESEARCH—	PANEL OF EXPERTS	PUBLIC FORUM
<ul style="list-style-type: none"> * Investigation and data collection. * A comprehensive survey of problems. * Selection of priorities. * Definition of problem-solving tasks. * Feasibility studies for projects. 	<ul style="list-style-type: none"> * Stimulation of discussion through the Mass Media. * Organisation of Public Meetings for Question-and-Answer sessions. * Seminars for experts and laymen conducted by the panel of experts. 	<p style="text-align: center;">PUBLIC ACTION CAMPAIGNS—</p> <ul style="list-style-type: none"> * Periodic campaigns against specific environmental abuses conducted by special campaign task forces. * Educational campaigns. * Demonstration experiments in controlled areas. * Organisation of Parliamentary pressures and public protests. * Fund-raising drives.
<p>—INFORMATION SERVICE</p> <p><i>Discussion of Graded Releases to :</i></p> <ul style="list-style-type: none"> * The Mass Media for the general public. * Public Sector Agencies. * Business-Industry-Labour Organisations. * Professionals and Academics. * Agriculturists. * Student and Youth Organisations. * Civic and Social Service Groups. <p>Publication of scientific studies written by the panel of experts.</p>		
— A FEED-BACK SYSTEM —		

- * Reporting-back of reactions pro and contra.
- * Careful scrutiny to identify sources and causes of rejection and failure.
- Revision of strategy.
- * Recasting of material for re-use.

Panel of Experts. No citizen action group can hope to have all the skills and expertise equal to its tasks. Such groups do not need boards and committees but a panel of experts for consultation and collaboration in their work. There is no such thing as an environmental science as a distinct discipline but there are different sciences which are needed to solve different aspects of environmental problems and insofar as they do this, they can be called the environmental sciences. Since problems involve subjective and objective difficulties, the social or behavioural sciences are as important as the physical and natural sciences and one cannot stress enough the need of professional expertise to direct citizen action groups.

Qualities of Leadership. We are thinking here mainly in terms of a group that provides an overall leadership for citizen action, whose role is pivotal in organising and directing the activities of existing citizen action groups, to the extent that they will allow. It should round up such groups, having investigated their character, aims and objectives, and record of performance of each group, and propose to them a common strategy which will serve to co-ordinate activities. This will not be easy, many groups may prove unco-operative and challenge the right of this 'core leadership' to establish itself in any kind of commanding position over them. The latter must enlist the support of eminent citizens in order to propose such a plan.

In a society as deeply divided as ours, compromise solutions will always be in order. But the reason why so many compromise solutions are not lasting, is that they have been dictated by false expediencies and under unjust pressure. The wounds opposed parties have inflicted on each other have not healed and continue festering. So that sooner or later, fresh hostilities break out. A leadership group cannot be effective unless it is a force for reconciliation, and for this it must itself be a 'reconciled force' capable of *teamwork*, free of internal conflicts and struggles for power and precedence; able to pool skills, insights, experiences; share responsibilities, and plan and act according to decisions taken together. It must be a company of equals, (although it may have its acknowledged leaders) which does not tolerate anything hierarchical and authoritarian in its internal organisation.

A citizen action group in Paris which has remarkable achievements to its credit, when questioned about its effectiveness—'the secret of its success'—had no ready answer to give, at first. Then

the leader of the group pointed to the legend written in big, bold letters over the doorway to the office: ICI ON TRAVAILLE EN EQUIPE (Here we work as a team) saying that this, perhaps, was the whole answer. After this the other members of the group filled in the answer. "At the beginning," said one, "we had to discover ourselves: which of us could do what, better than the others. Once this difficulty was sorted out, we began to fit well together, work well together, and this was half our battle won." Another added, "For some time, results were painfully slow in coming and we seemed to be making no advance at all. It was a matter of taking two steps backwards for every step forward. As individuals, we could not have had the strength to press on. It was our combined strength, our ability to check one another's tendencies to easy discouragement or cynicism, that pulled us through." One of the final remarks was most instructive. "We had to work hard to keep our sense of humour alive," said the youngest member of the group, "And this gave us the key to another door. We discovered that when one cannot fight opposition with all the weapons one has, one must learn to fool it or make it look foolish. Turn on the public eye and focus it on all the contradictions, inconsistencies, and the ridiculous attitudes people are obliged to strike in order to remain firmly entrenched in their position as the protagonists of no-change. No group enjoys being an object of public ridicule, and we had some surprisingly complete capitulation."

Vigilance is another essential factor. Such a group must serve as the watchdog of its society: quick to detect unfavourable developments and new dangers, and swift in alerting the people. It must also exercise vigilance over itself, because it must acquire a reputation for reliability, availability, and disinterestedness; and do nothing that would compromise this reputation. *Reliability*, because of the thoroughness and impartiality with which it conducts its investigations and communicates the results; the skill with which it directs action; the honesty with which it acknowledges mistakes and failures and tries to make amends; the scrupulously careful use it makes of funds.

Availability means, of course, being easy of access and willing to assist all who come with genuine problems and determined to make the necessary efforts to work for solutions even at some personal cost. But since one cannot help everybody with any kind of problem, the group must limit itself to those problems

which are in line with its own clearly defined aims and objectives and, where possible, pass on those it cannot help to others who can.

Disinterestedness is a quality one cannot stress enough. Among other things, it means not seeking publicity for publicity's sake and craving public applause. When facing the glare of publicity as part of the job, the group should make the best possible use of it to promote the cause, rather than to boost its own image. Many of the tasks such a group will have to undertake will prove absolutely thankless. Much of its work may have to be done unobrusively, behind scenes : persuading people to come to right decisions, and guiding their efforts in the right directions and afterwards, allowing them to take credit for any resultant success.

All the foregoing may seem to add up to an altogether too tall order, impossible to achieve. But one needs to counter a marked tendency found in this country to declare things impossible, that have never been tried. The state of our environment demands that we make unprecedented efforts and risk untried paths.

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The syllabi of these training courses, which last anything from a weekend to 15 days, cover three main heads; the principles of democracy as developed and practised throughout the world; methods and techniques of organisation; and Outward Bound exercises with an emphasis on the building of character and leadership.

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A great deal of the inspiration for this Programme came from the late Col. Leslie Sawhny; who, apart from being a distinguished soldier, a keen sportsman and an enlightened industrialist, was a great liberal and lover of freedom. He had joined in developing this project and had agreed to participate in its direction just prior to his passing away in December 1967.

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