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Global
Perspectives



Global Perspectives

The global connection will be a major focus of environmental concern in the 1980's. Increasing desert. Drained wetlands. Polluted seas. Many of these problems cannot be solved by one nation alone. This issue of EPA Journal offers perspectives on some of these growing planetary concerns, with articles by distinguished scientists, government leaders, and authors, several of whom appeared at a Washington, D.C., conference last October titled Environment: The Global Connection.

The process by which productive lands are turned into barren desert is described by Dr. Mohammed El-Kassas of Egypt. The hope that man's knowledge can be used to actually improve on nature rather than destroy it is expressed by a famed scientist, Dr. Rene Dubos.

International actions to protect one of the most basic and threatened resources, water, are outlined by Dr. Mostafa Tolba, Executive Director of the United Nations Environment Program. The increasing need to protect the globe's wetlands and marshes is explained by Dr. Ruth Patrick of The Academy of Natural Sciences in Philadelphia.

The process of getting a World Conservation Strategy adopted in a unified global approach is reported by Dr. Lee Talbot. Action by the Organization of American States to insure that development meets conservation principles is explained by Alejandro Orfila.



The citizen role in the global environmental scene is explained by Tom Stoel.

At the national level, the settlement of the environmental dispute at Storm King Mountain on the Hudson River is reported by Truman Temple. The story of the Hudson River, its people, economy, and water quality, is related by Chris Perham.

The cover photo of a desert reminds us that much of our

oil in the Middle East comes from land, now covered with sand, but which had to support lush plant life at one time in order to provide the region's vast quantities of oil, a fossil fuel.

The view of the sand stretching as far as the eye can see also recalls a noted poem by Shelley on the fate of an arrogant king who thought, as some think today, that they can ignore nature. The poem, reporting the finding of the remains of a huge statue in the desert, reads, in part:

"And on the pedestal these words appear:
'My name is Ozymandias,
King of kings.
Look on my works, ye mighty,
and despair!'
Nothing beside remains.
Round the decay
of that colossal wreck,
boundless and bare,
the lone and level sands stretch
far away."

EPA JOURNAL

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EPA is charged by Congress to protect the Nation's land, air and water systems. Under a mandate of national environmental laws focused on air and water quality, solid waste management and the control of toxic substances, pesticides, noise and radiation, the Agency strives to formulate and implement actions which lead to a compatible balance between human activities and the ability of natural systems to support and nurture life.

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Opposite: Scenic Japanese landscape near Hokkaido, including Mount Komagatake and marshland on the edge of a lake. (Article on p. 6)

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Keeping the Desert at Bay

By Dr. Mohammed El-Kassas

There is a whole category of the world geography that I call the "man-made" desert. These are areas in the semi-arid and sub-humid territories of the world. They are places with rainfall of 250 millimeters* (about 10 inches) every year that still have desert life and desert-like landscapes. Let us compare this area, the man-made deserts, with those made by God. The climatic deserts of the world (a total of 48 million square kilometers) are equivalent to 36.3 percent of the global surface. But taking the global maps and finding out where all the deserts actually are from a technical point of view, from a human point of view, this covers 43 percent of the global land.

The difference between the 36.3 percent and the 43 percent amounts to 9,116,000 square kilometers. This is the area of land that was once productive and now is not. It is the man-made desert. To appreciate its size, let me tell you that the remaining food-producing land in our world today is about 13 million square kilometers.

You may ask: How do we recognize desertification? What is its process? I would say that desertification means two things. From an ecological point of view, it means ecological degradation that would make the land less productive.

But this is not always true, because in certain forms it is a process by which one type of vegetation replaces another. Take for example the encroachment of mesquite on the grass and pastures in many of the rangelands of the semi-arid parts of the United States. This encroachment would produce more plant life from a botanical point of view, but, from an economic one, it is not productive. And that is why there is energy expended in this country to com-

* A millimeter is .04 inches, a square kilometer is 0.4 square miles, and a hectare is 2.5 acres.

Mother picks leaves for food in drought-stricken area along the southern edge of the Sahara Desert.





bat mesquite. So, there is a process of desertification by which a piece of land becomes less economically valuable.

We went through a time when we perceived deserts and encroachment of desert as if this desert were expanding on areas that are productive. There is one aspect of desertification that seems like this, namely, the encroachment and movement of sand dunes. In the Sahara we have families of sand dunes, great walls of sand that move and may overwhelm cultivated lands in oases and villages. This is one aspect of desert march. But it is not the common aspect of desertification, which is actually deterioration from inside. Land becomes non-productive and, hence, added to desert.

In the semi-arid territories, we have three principal agricultural land uses: pastureland, rain-fed agriculture, and irrigated farms. And we estimate that we are losing the equivalent of 3.2 million hectares of productive pastureland every year. They are becoming non-productive. Every year we are losing rain-fed agricultural land at the rate of 2.5 million hectares. And we are losing irrigated farmland at the rate of 125,000 hectares every year. The total is almost 6 million hectares every year lost for production. You may add to this that we are losing a considerable area of land for urbanization, road-building, and for new structures. This is a very serious loss.

Describing the loss of land to desertification, I quote from the Global 2000 Report: "Perhaps the most serious involvement of development will be an accelerating deterioration and loss of the resources essential for agriculture. This overall development includes soil erosion, loss of nutrients, compaction of soil, increasing salinization of both irrigated land and water used for irrigation, loss of high quality cropland to urban development, and crop damage due to increasing air and water pollution, etc."

The loss of land to urbanization is one important aspect that I want to underline. A country like the United States loses something like 3 million acres of cropland

every year due to urbanization and development. If you multiply this with what will happen between 1981 and the year 2,000, you come to the figure of about 60 million acres of land lost. Meanwhile, we estimate that the richest, the mightiest, the most advanced country technologically in the world will be able to reclaim only some 70 million acres of new land by the year 2000.

If present trends continue, this will become a very serious problem. Worldwide by the year 2000, we estimate that we would be losing 300,000 square kilometers of land to urbanization. We would also be losing 300,000 square kilometers of cropland to desertification and land degradation. And the total world capacity to reclaim new land by the year 2000 would be no more than 300,000 square kilometers. It means whatever we do, if we let present trends continue, the total cropland of the world would be less by almost one-third of a million square kilometers by the year 2000. And, if we want to actually increase productivity, we need to think very differently.

Before I deal with the causes of desertification, let me submit that with this, as with all environmental problems of the world, we face a dilemma. The dilemma is that mankind lives within the framework of three interacting systems.

First, we live within the biosphere—air, water, and soil—which preceded man in its appearance.

The biosphere is controlled by ecological processes, some of which we know and some we will eventually learn. But these are not under human control except to a very mild degree.

The second system is the technosphere—the man-made structures that we build within the space of the biosphere—all the cities that we build, the pastureland that we manage, the roads, the highways, the airports, and ports. Some of these technospheres are totally under human control. Others dealing with the resources, the life-support systems, and the agricultural systems, the fisheries, and the like are only partially under our control.

The third is what I call the social sphere. These are socio-cultural systems, the socio-

political system that human society forms as tools to manage their affairs.

Development means the management of the interaction among the various factors of those three systems. Developed countries are the countries that have indigenously the capability to manage this interaction. Lesser developed countries are those that do not have the capability of managing this interaction. All the varied environmental problems that we face, including desertification, mean there is some failure in the interaction between the systems.

Take Egypt, for example. The Egyptians live within two ecological systems—the River Nile and the desert. The Egyptians tilled the Nile Valley successfully for over 7,000 years. They have maintained the fertility and productivity of the agricultural land continuously for this long period. This is an achievement unparalleled in the world. It means that Egyptians managed to apply the appropriate type of technology. They established within the River Nile Basin the mechanisms to maintain the productivity of their land and to increase this productivity and to maintain the quality of their product. It is a success story of the interaction between the biosphere, which is the natural existence, and the type of technology that has been applied there.

But where did the Egyptians fail in this interaction? The widespread of the disease of schistosomiasis or bilharzia is one example of failure.* Bilharzia was reported in the hieroglyphics of ancient Egypt 6,000 years ago. It persists to this day. Where is this environmental disease coming from? Where the Egyptians failed here is in the socio-cultural situation. The interaction that was successful between the biosphere

* (Schistosomiasis, also known as snail fever, afflicts millions of persons in Egypt. Irrigation to improve farming there actually has spread the disease, which is transmitted from freshwater snails to humans. It has been estimated that more than half the deaths in Egypt are at least in part caused by the disease.—Ed.)

and the technosphere was not equally so between the socio-cultural structure and the rest of the systems.

If we want to get perfect development with no environmental repercussions, we need to maintain and manage the interaction between the three systems. Since the early 1950's, the Egyptians have tried very hard to expand the agricultural land outside the Nile Valley. Since 1960, they have invested enormous amounts of national resources to expand that agricultural land. They have reclaimed 912,000 acres of land in many projects. In every one of these projects there are ecological and environmental problems that are undermining the economic viability of this great effort. We have problems of waterlogging; we have problems of salinization. We have many problems. Where did we fail? We failed there because we moved into the deserts with the same technology that was successfully applied in a different ecosystem—in the Nile Valley. We moved out into the desert facing a new ecological situation, a new set of ecological factors, and applied the same technology that we have applied successfully elsewhere for 7,000 years. The incompatibility between the biosphere and the technosphere was the reason for failure.

Let me quote an example. In Western Sudan we have a bed of sandy soil with some rainfall. It is the area where the Gum Arabic tree grows best. Gum Arabic is the second most important product in the Sudan which produces approximately 85 percent of the world supply.

The land in the Gum Arabic belt follows what I call the shifting cultivation. To understand what I mean, take a piece of land and follow its history. In the past, the farmer would find a plot where there is some grass and some wood, and he would set fire to it to clear it. This is an area where rainfall cannot support cultivation so the man would raise crops mostly for subsistence, such as sorghum or cereals. Then, the land would be left fallow for the rest of the year. Next year he would come back and cultivate his crops again. He would do so for probably four to six years. By the fourth or fifth year he would know that the

productivity of the land was becoming less and less because his crops were infested by parasites. Then he would know that this piece of land was tired. So he would move his cultivation to some other plot.

Once left fallow, the land would be taken over by grasses, and eventually trees would regenerate. Within ten years time, this area would be taken over by an orchard-like woodland, and the man would come back. He would call it his gum orchard where he would use his axe to tap the Gum Arabic, and this would be his cash crop for six to eight years. Then, the trees become old due to continuous yearly incision and tapping, and they would begin to fall. He would leave the area and, because the fallen trees with their spines would protect this piece of land against any grazing, grasses would come up. Later, when he came back to it, this land would be ready for him to set fire to and begin to cultivate his crops again.

This system of land use is ecologically perfect and has been sustaining this area for millennia without deterioration because the residents have developed, through experience, the technology of land use that is appropriate.

But, due to population pressures and increased demand, what is happening in the Gum Arabic belt is that the farmers there are expanding the cultivation fields beyond the ability of the land. They are shortening the time the land is left fallow, and the result of this process is that gum trees are not growing back. The land has become less productive and desertification is setting in.

In 1950 the United States faced droughts no less hazardous than the 1930's, but it did not cause the dust bowl. Why? The answer to this question should be considered by everyone who wants to combat desertification. How did the Americans manage to develop a system by which they established harmony between the biosphere and the technosphere and social system? In 1934, the Taylor Grazing Act was passed. But it was not left at that. The government developed machinery to make

sure that this Act was carried out. The Grazing Service Department, later called the Bureau of Land Management, was instituted and established to supervise the implementation of the law. A new science called range management was developed, as was soil conservation and applied ecology.

Technological development also helped—development of things like railway lines and highways to mechanize American nomadism. They became mechanized nomads moving their animals, not on their feet, but transporting the animals quickly and more effectively from the winter ranches to the summer ranches or from the ranches to the marketplace in trucks or on trains. The development of these types of transportation has enabled more mobilization of resources and the improved interaction between animals and pasture.

It took these elements of development, the legislation, the machinery which enforces the legislation, the appropriate technology and development, and the scientific and technical development to do the job. The combination and the integration of these elements enabled the United States, and would equally have enabled any other country, to manage the relationship between the biosphere, the technosphere, and the social sphere. With this approach we can combat desertification.

This leads me to the comment on the strategy of development. If some want to aid developing countries, they will not help them by isolated single projects. Not by building roads alone. Not by building fancy hotels alone. Not even by building schools or hospitals. But by enabling those countries to develop the capability to manage the integration between the biosphere, the technosphere, and the socio-cultural sphere. □

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Farmland in North Jutland, Denmark.



The Wooing of Earth

By Dr. Rene Dubos



On a sunny morning of June 1964, my wife and I were in the Boboli Gardens admiring the city of Florence across the Arno River. It was a holy day, and at noon an immense paean of bells reached us from all the city's churches, each bell with its own voice. We were in an enchanted world, but the enchantment was purely of human creation. The whole Arno Valley was a forested wilderness before historical times, whereas every part of it is now imbued with human intelligence. There are, of course, the monuments of Florence mentioned by Malraux, but also the olive trees that ancient people introduced into Tuscany from Asia. The Tuscan landscape has been sculpted and embellished by generations of peasants, prelates, and princes.

My first intention in writing this book was to deal exclusively with the creative and appealing aspects of human interventions into nature—the equivalents of the Tuscan countryside and its olive groves that can be found in many parts of the world, including the United States. Such a one-sided view of the environmental problem, however, might give the impression that I am blind to the present realities of life. I could not forget in any case that Florence suffered a disastrous flood in 1966, almost certainly caused by excessive deforestation of the Arno Valley and rendered more destructive by the enormous amounts of oil carried by torrential waters from central heating plants. The world's environmental crisis has been discussed to death and hardly needs further elaboration, but it raised its ugly head whenever I considered the creative human interventions into natural systems. I could not celebrate the wooing of the Earth without constantly having in mind the rape of the Earth.

Sweet and Sour

The Wooing of Earth thus turned out to be both sweet and sour. The sweet comes from my belief that human beings can improve on nature and, from my knowledge, that they can correct environmental damage by deliberate social action. The sour also has

two ingredients: our propensity to spoil desirable environments, whether of natural or human origin, and my fear that nature's mechanisms of recovery may eventually fail to cope with our increasing use and misuse of resources and energy.

Environmental degradation of human origin has been going on in many parts of the Earth for thousands of years, but the process has been vastly accelerated by the Industrial Revolution and by the pursuit of economic growth.

The reckless use of energy by industrial nations has probably begun to alter the global climate by excess heat production, the accumulation of dust particles, and the increase in atmospheric carbon dioxide.

Air pollution used to be regarded as a local affair, especially manifested by different types of smogs associated with a few large cities and heavy industries. Smogs have long been known to rot people's lungs; to kill the pines of Rome; to drive song birds away from New York City; and to erode Cleopatra's Needle in Central Park, the Parthenon in Athens, and statues and buildings in all modern cities. But only recently have we realized that air pollutants are carried by winds; in some cases, over the entire globe.

Various kinds of wilderness are being destroyed or spoiled all over the world. Laws may prevent exploitation or permanent occupation of wilderness areas, as in the case of national parks, but they cannot protect them against the damaging effects resulting from the mere presence of innumerable tourists.

Over many parts of the Earth enormous areas of arable land are being lost every year to desertification and erosion. Although much of the Middle East is now an arid desert, the region was rich in trees and animals when Moses led the children of Israel through the Sinai wilderness. Paradoxically, the tropical rain forest, which is the apparent opposite of the

Excerpted from The Wooing of Earth by Rene Dubos. Copyright © 1980 by Rene Dubos. Reprinted by permission of Charles Scribner's Sons.

desert, is also undergoing a process of desertification. Of the world's ecosystems, the tropical rain forest contains the largest biomass and has the greatest variety of animal and plant species; hence, its crucial importance for global ecology. As soon as the trees are cut down and the soil exposed to the sun, humus begins to decompose and is soon destroyed. The soil, becoming dry and hard once exposed to the scorching sun, looks like baked clay and is unsuited to any kind of vegetation or to other forms of life.

Similar losses of environmental quality are occurring in Europe. The familiar patchwork of small fields and thick hedges that has dominated the scenery of East Anglia for more than two hundred years is disappearing, as is also the bocage type of country in continental Europe. Yet, the hedges provided habitats for song birds and an immense variety of small animals. They were once among the most valued amenities of the European landscape. But they are incompatible with the use of large-scale agricultural equipment and must therefore be sacrificed at the altar of economic efficiency.

Faith in the Future

Yet, I have faith in the future because I believe that our societies are learning to anticipate the dangers they will face and to deal with them preventively before irreversible damage is done. Furthermore, I am inclined to agree with Confucius that lighting a candle is better than cursing the darkness.

When the Bengali poet Rabindranath Tagore (1861-1941) first traveled as a student from India to England in 1878, he realized immediately that the visual charm and the agricultural productivity of the European countryside were the result, in his words, of "the perfect union of man and nature, not only through love, but also through active communication." Traveling by railroad from Brindisi to Calais, he "watched with keen delight and wonder that continent flowing with richness under the age-long attention of her chivalrous lover, Western humanity." For him, the shaping of the European continent by human labor constituted the "heroic love adventure of the West, the *active wooing of the earth*" [italics mine].

Tagore's use of the phrase "wooing of the earth" suggests that the relationship between humankind and nature should be one of respect and love rather than domination. Among people the outcome of wooing can be rich, satisfying, and lastingly successful only if both partners are modified by their association so as to become better adapted to each other. Furthermore, the outcome is more interesting when both

partners retain elements of their individuality—of their own wildness.

Improving on Nature

Human interventions into nature have often been destructive. Many of them, however, have revealed potentialities of the Earth that would have remained unexpressed in the state of wilderness. We can improve on nature to the extent that we can identify these unexpressed potentialities and can make them come to life by modifying environments, thus increasing the diversity of the Earth and making it a more desirable place for human life.

In southern China, the very artificial "water and mountain" landscapes are among the most monumental sceneries of the world and also the most productive of edible animal and plant life.

In the agricultural areas of the island of Kyushu and other agricultural parts of Japan, trees and land seem to be trimmed to human specifications, measured to human scale. Visitors to the islands of the Rising Sun in the nineteenth century were amazed to find them laid out as an all-embracing park with farms, villages, and temples beautifully interspersed and integrated.

Although the conscious transformation of the wilderness is more recent on the North American continent than in Asia or Europe, it has taken similar directions. The villages of New England, with their green and open fields cozily nestled in the valleys, could not have come into existence without the clearing of the primeval forest.

Changes in Attitudes

Conversely, there has also been going on what could be called a planetization of mankind, which began when Stone Age people changed from hunting-gathering to agriculture.

Thus, while the biological aspects of the human species have not changed significantly during the past fifty thousand years, human attitudes have been constantly modified by the evolution of our relationships with the planet. Stone Age people related almost exclusively to their immediate surroundings, whereas today we begin to have the whole planet in mind and to be concerned with its distant future even when we engage in local action. We are becoming planetized probably almost as fast as the planet is becoming humanized, both processes being greatly accelerated by the increase in world population and by technological development.

Managing the Earth

The belief that we can manage the Earth and improve on nature is probably the ulti-

mate expression of human conceit, but it has deep roots in the past and is almost universal. The manifestations of this conceit can be recognized in the Stone Age people who domesticated animals and plants some ten thousand years ago; in the farmers of all ages who created agricultural land by cutting down the primeval forest, draining the marshes, or irrigating the deserts; in the planners of all historical periods who have converted natural landscapes and waterscapes into artificial parks and gardens; in today's homeowners who maintain lawns where brush and trees would naturally grow.

In the western hills some six miles from Peking are still to be found the waterways, island groves, and hills of the famed Yuan Ming Yuan, or Garden of Perfect Brightness. This enormous complex of landscapes, waterscapes, palaces, and smaller residences was created by the Manchu emperors in the first half of the seventeenth century. There were two principal units, the Old and New Summer Palaces, the so-called palaces consisting in reality of numerous self-contained idealized living units so distributed among the valleys, hills, and lakes that the many branches of the emperor's family could each have peace and privacy. Both palaces were destroyed by the British in 1860. The New Summer Palace has been restored and now extends over 823 acres of artificial scenery, four-fifths of which are water.

The islands, mainland forms, and even the hills of the Peking Summer Palace are entirely built from excavation in a marshy floodplain. They had been originally planted with species introduced from the farthest reaches of the then known world, and these contributed still more to the artificiality of the landscape.

Eighteenth-century European travelers were enormously impressed by the "natural" charm and beauty of the complexes and by "all the Bridges and all the Groves . . . planted to separate and screen the different Palaces and to prevent the inhabitants of them from being overlooked by one another." They did not seem to have realized that the Chinese landscape architects had achieved this "natural and wild view of the country" by creating a completely artificial environment out of the natural marshy floodplain.

Construction of the earthwork and garden grounds of the Chicago Botanic Garden was started in 1966. Three years later, the land sculpturing had been completed, the lake basins and streams filled, and the new landscapes seeded. Horticultural collections from many parts of the world are being assembled to create a garden second to none, as had been the ambition of the Manchu emperors in the Peking Summer Palaces.

If the landscapes and waterscapes of the

Chicago Botanic Garden continue to develop successfully, this will justify the hope that wastelands unfit for human use and providing only marginal habitats for animal and plant life can be converted into settings of ecological interest and visual beauty. Simple observation reveals that environments seemingly as unpromising as railway sidings actually permit the spontaneous development of many types of wildflowers, including those that contributed so much to the spectacular aspect of the American tall-grass and short-grass prairies. Moreover, the seclusion provided by railroad embankments permits large colonies of flowers to build up and thus to produce large masses of colors. Rubbish heaps, worked-out quarries, and the sides of abandoned canals are among the many other types of degraded environments that are rapidly occupied by a diverse flora and fauna. During World War II, unexpected types of vegetation commonly appeared on bombed urban sites. The number of species of plants and animals that appeared without any human help was surprising. Within a few years even trees grew up among the rubble and provided cover for insects and birds, including rarities like the black redstart, several pairs of which nested and reared their young within the boundaries of the city of London.

Since manipulating nature is an inev-

itable aspect of the human condition, it is a natural attitude and not a manifestation of arrogance, especially when efforts are made to base action on knowledge and judgment of values. I have been allowed by Rufus E. Miles, Senior Fellow of the Woodrow Wilson School of Public and International Affairs at Princeton University, to quote from a letter he wrote me after participating in a conference during which Ehrenfeld and I expressed slightly different views concerning human interventions into nature:

"I would have much preferred to have you mention the concept of noblesse oblige as man's appropriate role at the top of the animal kingdom. A person of noble birth and outlook learns to accept his elevated status and knows that others will serve him, yet he treats them with thoughtfulness and kindness. He accepts a reciprocal responsibility toward them. This is a far cry from arrogance. Do you not think it would be well to preserve the word arrogance for its intended usage, which is a vain, condescending, and unkind form of behavior by a person in a position of power toward other persons or fauna or flora?"

Miles's use of the expression noblesse oblige seems to me to be an admirable way of expressing the attitude with which we should approach all environmental problems. We shall continue to intervene into nature, but we must do it with a sense

of responsibility for the welfare of the Earth as well as of humankind, and we must therefore attempt to anticipate the long-range consequences of our actions. Human modifications of the Earth can be lastingly successful only if their effects are adapted to the invariants of physical and human nature. Fortunately, such constraints are compatible with diversity; there are many ways to deal with nature that accord with natural laws. A forest in the temperate region lends itself to the creation of parks as different in style as those of England, France, and Japan. In England, the so-called New Forest has been under constant management since 1079, and different parts of it are treated according to different ecological formulae—some left *au naturel*, some carefully pruned, some reserved for recreational activities, and so on. The individuality of a cultural environment is achieved through the choices made by a particular culture among the several options available to it at a given time in a given place.

These different ways of life have left their stamp on human nature, in part through genetic coding, but chiefly through physiological and social conditioning. As a consequence of this complex history of our species, most human beings long to recapture now and then each of the various experiences of their evolutionary past: that of the hunter-gatherer, of the farmer and pastoralist, and of the urban dweller. The wooing of the Earth thus implies much more than converting the wilderness into humanized environments. It means also preserving natural environments in which to experience mysteries transcending daily life and from which to recapture, in a Proustian kind of remembrance, the awareness of the cosmic forces that have shaped humankind.

We cannot escape from the past, but neither can we avoid inventing the future. With our knowledge and a sense of responsibility for the welfare of humankind and the Earth, we can create new environments that are ecologically sound, esthetically satisfying, economically rewarding, and favorable to the continued growth of civilization. But the wooing of the Earth will have a lastingly successful outcome only if we create conditions in which both humankind and the Earth retain the essence of their wildness. The symbiosis of wildness will constantly engender unexpected values and new hopes, in an endless process of evolutionary creation. □

Dr. Dubos is an internationally recognized scientist and environmentalist at Rockefeller University in New York City.

Another Danish farm



Water and the World Environment

By Dr. Mostafa K. Tolba

Fresh water of adequate quality is becoming more and more scarce. Water quality degradation of rivers and lakes has been observed for a long time. Sewage has long been an important cause. With growing industrialization, a great number of industrial wastes and pollutants find their way to surface and groundwaters. Urban and agricultural runoff constitute major sources of pollution.

Sulfur oxides and nitrogen oxides emitted from industry and burning of



The Port of Martigues near Marseilles, France, on the Mediterranean.

fossil fuels are removed from the atmosphere as acid precipitation.

Water development projects such as the construction of dams have environmental impacts regardless of the dam's geographical location.

Concern has been recently voiced about groundwater pollution which is among the most difficult types of pollution to overcome. Groundwater contamination can result from agriculture, industrial, municipal and other types of wastes. Industrial



lagoons and impoundments are the most common sources of contamination in some countries.

Public concern about the quality of drinking water supplies has risen sharply since the early 1970's. Water quality in many developing countries falls far short of the World Health Organization safety standards. Over half the peoples of the developing countries—some 80 percent of which are in rural areas—have no access to an adequate or safe water supply.

All these problems of fresh water availability in the future are clearly basic problems of management (rational exploitation and use) and of protection of water quality.

More emphasis has to be placed on demand management rather than on supply management, as has generally been the case so far.

What is urgently needed, therefore, is the formulation of long-term policies that reflect changing water demand patterns consistent with efficient use and better appreciation of the social and environmental effects, with a view to minimizing the adverse impacts. In fact, one can argue that the time has come when the emphasis should shift to comprehensive land and water planning, treating land and water as an integrated and interacting unit, rather than water planning per se.

As for water quality, a series of institutional, legal, and economic measures are necessary to induce pollution control including standards for effluents and the appropriate techniques of their disposal. Monitoring of water quality should serve as an early warning of damage that could occur. However, two main conditions make monitoring difficult. Firstly, the concentration of pollutants in aquatic ecosystems is affected by many external conditions. Secondly, it is uncertain how a given dose of a particular polluting substance will adversely affect humans, fish, benthic, and other organisms in the environment. The difficulties of monitoring water quality constitute a challenge to the scientific community to accelerate research efforts to solve these problems.

Role of the United Nations Environment Program

These are all issues which have been debated during the last decade and in the United Nations Water Conference in 1977, which brought forward all the facts and suggested specific actions. The same problems were generally on the minds of the world community when they met in Stockholm in 1972. Several recommendations in the Stockholm Action Plan refer to the importance of proper water resources management and protection from pollution. To translate these recommendations into programs, our Governing Council decided that

the main objectives of the water program of UNEP should be:

- to develop and promote the application of integrated and environmentally sound management techniques for the conservation and utilization of water resources;
- to promote the development and application of integrated and environmentally sound water supply and sanitation techniques for rural and urban poor populations;
- to promote the development and application of methods for assessing water quality; and
- to promote the development of training, education, and public information programs in the field of water resources management.

An important area of UNEP's work has been, and continues to be, assistance in the elaboration of international standards for the use of shared water resources. The latter constitute an integral part of UNEP's effort to establish principles for the guidance of states in the utilization of shared natural resources.

Water management certainly figures as a key element of the World Plan of Action to Combat Desertification, which is implemented essentially by UNEP. The World Conservation Strategy—the result of five years of cooperative work between the International Union for the Conservation of Nature (IUCN), the World Wildlife Fund (WWF) and the United Nations Environment Program (UNEP)—puts special emphasis on the issue of environmentally sound management of water resources. These are a few examples. Our program is not static.

Oceans

Oceans cover 71 percent of the world's surface. This vastness has largely contributed to the myth that the oceans have an infinite diluting capacity, and that, therefore, they can be considered as one huge garbage dump for all of man's wastes. This turned out to be wrong and ocean pollution is becoming a serious problem.

Although the impact of pollution on global fisheries is still inconsequential in terms of total world output, there are already signs of serious damage to local fisheries resources which could eventually multiply to significant proportions.

A real challenge to scientists lies in separating out the various fishery and natural environmental effects so that the changes brought by marine pollution and other man-made disturbances can be clearly discerned.

Coastal Pollution

It is estimated that coastal waters to the edge of the Continental Shelf constitute 10 percent of the area of the world oceans. But 99 percent of the world fish catch originates from these coastal waters and from the relatively small oceanic areas of upwelling. Most of the open ocean, lacking in nutrients to sustain life, is a biological desert.

In terms of protection of living marine resources—and this is a rather vital consideration in pollution control—it is obvious that one would have to give prime attention to the coastal region.

The serious problems of coastal pollution first became apparent in those heavily industrialized nations where there are concentrations of people and industry along the coast. The estuaries are some of the first aquatic areas that succumb to the insults of man.

However, the problem of global marine pollution is where international concern must be particularly expressed. This has been quite clear in the minds of the delegates negotiating the Law of the Sea. They are all aware of the state of the marine environment and have included in the Law of the Sea provisions directed to environmental protection.

Let us look at a few examples of the state of the marine environment:

- In the Baltic Sea, the input of domestic sewage is about 2.3 million cubic meters a day (with 40 percent treatment). In the northern parts, the load of liquids from paper and pulp industries is about 400,000 tons a year. The input of mercury is about 34 tons a year.
- In the North Sea, the input of sewage is about 7.3 million cubic meters a day and of industrial wastes about 4.9 million cubic meters a day.
- A preliminary assessment of the pollution of the Mediterranean showed that the annual input of phosphorous is about 360 tons, of nitrogen about 1,000 tons, of mercury 130 tons, of lead 4,800 tons, of chromium 2,800 tons, of zinc 2,500 tons, and of organochlorines about 90 tons.

These are only some examples; others could be cited from other regions. However, these and other data are far from complete, and this, coupled with our inadequate knowledge of marine environment processes and the fate of pollutants, etc., makes it difficult to establish quantitative trends on time scales on a global basis.

Marine oil transportation has greatly increased. In 1960, about 450 million tons of oil were transported from producing to consuming countries by sea. In 1977, the figure increased to 1,700 million tons.

Although the world tanker fleet generally has a good safety record, the fact that ships today are so much larger than they were 20 years ago means that the consequences of an accident are potentially much greater.

It should be noted that it is not tanker accidents which are the main source of oil pollution but transportation in general and run-off (urban, river, industries). Coastal areas and estuaries are the main receivers. Although the environmental consequences can be serious immediately after the spill, it appears that recovery occurs over time scales of months or years in most cases. The chronic oil pollution in many ports may be more important locally in the long term.

Off-shore oil and gas production accounts for about 90 percent of the value of mineral resources recovered from the seabed.

The presence of off-shore structures, such as platforms, wellheads, and pipelines will restrict fishing activities in the vicinity of the site and may also lead to local redistribution of fish resources. Present limited field evidence does not suggest any harmful effects of drilling processes and equipment. Studies on the blowouts in the North Sea in 1977 and the Gulf of Mexico in 1979 indicate that the acute environmental effects were rather brief and long-term effects were rather small.

Fisheries contribute about two percent of the food calories consumed globally by humans and directly supply about 14 percent of the world's animal protein consumed by humans. The coastal ecosystems produce some 99 percent of the total fish production. The trend in marine fish production has been downwards since the peak year of 1970.

The economic effects of pollution and other environmental changes introduced by man on the world fisheries are difficult to assess at the present time. However, the rejection of fish products because of high metal content, for example, can pose a hardship to fishermen, an economic burden on governments which may have to pay compensation to fishermen for their losses, and, of course, a loss of protein urgently needed in a hungry world.

The only recourse is mitigation with:

- Intensification of fish propagation by enhancement techniques.
- Transplanting of desirable species into waters suitable for their propagation.
- Aquaculture with protected water quality.
- Environmental improvement.

Another important area of concern to us is the need for a better understanding of the

role of oceans in the carbon cycle with the growing concern over the increasing concentration of carbon dioxide in the atmosphere.

In the light of all the above facts, which are normally put before UNEP's Governing Council, the Council decided that our overall objectives in the area of oceans should be:

- To assess the state of ocean pollution and its impact on marine ecosystems.
- To promote international and regional conventions leading to the conservation, management, and wise utilization of marine living resources and their habitats.
- To promote research into ocean ecosystems as a whole with increased attention to the interactions between terrestrial ecosystems influenced by man and marine ecosystems.
- To encourage the restoration of depleted marine populations.
- To encourage governments to take legislative and other measures to avoid mass killing of non-target mammals and birds in the course of fishing.

Again, we are supporting a number of activities to achieve these overall goals. However, it has always been the position of our Governing Council to give higher priority in our Oceans Program to enclosed or semi-enclosed seas or, what we call the Regional Seas Program. UNEP's work in regional seas is essentially that of establishing negotiating forums through which interested governments agree on plans of action to protect and improve the marine and coastal environments of their regions through proper management processes.

These exercises in the area of regional seas, which are really vast and complex—just touched upon in this presentation—are vivid evidence that governments are willing to cooperate and work together in protecting their common heritage in the environment, irrespective of their levels of development, social systems, or political differences. Environment has certainly proven to be a unifying factor in a world which is otherwise exhibiting wide differences over a whole host of other issues. This simple fact, in my view, is the main success of the United Nations Environment Program and is definitely a very bright spot in international cooperation, which should be always highlighted and pursued.

Dr. Tolba is Executive Director of the United Nations Environment Program. This article was excerpted from his remarks at the Conference on Environment: The Global Connection, at Meridian House, Washington, D.C.

The World's Wetlands

By Dr. Ruth Patrick

The importance of our fresh water and salt water wetlands looms even larger as we look into the future, with increased demand for food in our biosphere, and with the realization that land suitable for cultivation and water are very limited. These wetlands are on all continents and form a sizable part of the land surface. For example, in the conterminous United States there are approximately 70 million acres of wetlands of various sizes and formation. These areas have been regarded as waste lands or resources, depending on who is considering them.

The importance of wetlands to both shellfish and finfish has long been recognized. They are particularly valuable as spawning and breeding grounds. For example, in saltwater marshes, shrimp, crabs and the young-of-the-year fish come into these areas to feed and grow. Many fish spawn in these areas, and the small larvae

utilize the various protected channels that drain the marsh as their habitat until they are large enough to find their way into the main river channel. These areas also are the favorite habitat for oysters and mussels, for the rising and ebbing tides provide many microscopic organisms that are food for these filter feeders. These microscopic organisms are in part produced in the marsh and in part brought in from the open estuary.

Freshwater wetlands perform a similar role in the riverine systems. They are the spawning and nursery grounds of many fish and invertebrates. During floods, the wetlands are confluent with the main river channel and in the spring the fish come into this area to spawn, and during the summer and fall, the young-of-the-year migrate into the river. It is because these wetlands are

Mouth of the Shark River in Everglades National Park



Heron in marsh



so rich in invertebrate life as well as in algae that they form such an excellent feeding area.

Eugene Odum and others have pointed out that these wetlands are among the most productive areas of the world in terms of the fixation of the sun's energy in photosynthesis. These plants, when alive or as disintegrated material, form the basis of the food web in these areas. When one considers that the population of the biosphere is going to increase several fold in the next hundred years, it is quite evident that the source of animal protein will be fish life, *which is the least intensive source of animal protein*. Much of the fish will be produced in fresh and brackish water, i.e., in farm ponds and fish farms. Many of these will be located in fresh water wetlands or marshes because they are naturally such productive areas.

This productivity is dependent upon the utilization of the nutrients in the water carried in by the flooding tides or those that are absorbed in the sediments. The luxurious growth of plants in wetlands reduces the nutrient load in the riverine or estuary water, and this improves its quality. Many of our estuaries would be far less desirable areas for recreation if it were not for this cleansing ability of the wetlands. In a similar way the Flint River in Georgia, in passing through six miles of swamps, assimilates an organic load equivalent to a population load of about 50,000 people. Pesticides have been reduced by passing through swamp land.

These fresh and saltwater areas are sponges for excessive water during floods. The retention of this water helps to regenerate the ground water supply which is one of the largest water sources on our planet. For example the Alcovy aquifer in North Carolina is an area of 2,300 acres with a storage capacity of 300 million gallons. The groundwater reservoirs of the Raccoon River provide 90 percent of the water used by Des Moines, Iowa. Cities of

the West, such as Tucson and Phoenix, obtain almost all of their water for irrigation, industrial and domestic use from groundwater.

The importance of these wetlands to migrating birds and small mammals has been emphasized by C. J. Barstow. He estimates that the elimination of wetland habitats in the Obion-Forked River in Tennessee would result in a heavy loss of swamp woodland. This would result in a major loss of mammals and birds. The annual outdoor recreational loss, in mammals and birds, is estimated at approximately \$1 million.

The draining of 4,730 acres of wetlands in the Ten Mile Creek watershed in Minnesota has brought about annual wildlife losses estimated at 12,000 ducks and 900 muskrats.

One function of these wetlands that is often overlooked by the untrained scientist is their role in preserving a high diversity of species. These areas are often difficult for man to penetrate, and many species which otherwise would be destroyed form fairly sizable populations. This is true not only for large species but for microscopic organisms. More and more we are finding that these microscopic organisms have a very important role to play in solving man's medical problems and in the recycling of the wastes of civilization. Many unusual plants which exist in these areas are known to be of value to medicine and horticulture.

As we look at the environment in the year 2000 and beyond, the importance of these areas may increase greatly as the quantity of carbon dioxide in the atmosphere increases. This is because many wetlands form peat which removes carbon taken up as carbon dioxide from the atmosphere by the process known as photosynthesis. The dead plantlife which forms

peat is not immediately recycled but deposited where it is only recycled very slowly. This greatly reduces the amount of carbon being rapidly cycled.

It is the sinks of carbon dioxide such as our peat lands, forests and sections of our oceans that are very important in maintaining our climate. If the amount of carbon dioxide introduced into the atmosphere increases greatly, the sinks must function even more effectively if we are to maintain a livable climate.

Studies of the atmosphere indicate that the effects of increases in carbon dioxide *will be greatest at or near the poles*. The physiology and ecology of the organisms in the extensive wetlands of the Arctic and Subarctic regions are not well understood. These are areas that should be researched in order to determine the rate of peat formation and the role of peat and other plants in removing carbon dioxide. At the present time, these wetlands, rich in peat, are very extensive, but they will be more and more rapidly destroyed as civilization moves into the Arctic, and neighboring areas of the Antarctic and Arctic zones. Before this happens we must learn which are the most important areas for removing carbon dioxide, and how large these areas should be to mitigate the build-up of heat as a result of increased carbon dioxide. Even though this is not a problem at this time, such research must be done if we are to fully understand the perturbations caused by carbon dioxide.

Wetlands, either fresh or salt, have always been used by man, but this use is increasing and creating much greater disturbances. Research must be done to understand thoroughly what we are doing before we embark on a series of actions which may have a far more severe effect on our lives, on the environment and on the economy, than we can afford. □

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*U.N. Conference on the Human Environment
meeting in Stockholm, Sweden, June, 1972.*

A Global Conservation Strategy

By Dr. Lee Talbot

A new approach has been needed which recognizes the essential relationship between conservation and development, a strategy which could effectively serve to focus the efforts of all sectors of society onto basic conservation/development goals, rather than leaving the various sectors to pursue their separate, often conflicting courses.

In recognition of this need, the World Conservation Strategy has been prepared by the International Union for the Conservation of Nature, in collaboration with the United Nations Environment Program, World Wildlife Fund International, the U.N. Food and Agriculture Organization, and UNESCO.

The World Conservation Strategy is a document which presents a clear statement of conservation priorities and a broad plan for achieving them. It is a strategy in the military sense, in that it defines goals, assigns priorities, and lays out a framework for specified action to accomplish the goals.

The strategy was released in a coordinated "launch" on March 5, 1980, via simultaneous press conferences in capitals of 34 nations. This unique media event brought the strategy to the attention of many peoples throughout the world.

Launches were held in the capitals of nations covering the entire spectrum of political systems, levels of industrial development and geographical locations, including Peking, Moscow, New Delhi, Brasilia, Amman, Nairobi, London, Washington, Jakarta and Bangkok.

The U.N. Secretary General, Dr. Kurt Waldheim, described the strategy as a "remarkable pooling of international resources which has resulted in an unprecedented degree of agreement on what should be done to ensure the proper management and optimal use of the world's living resources, not only for ourselves, but also for future generations."

It is timely now, nearly a year after the launch with its high hopes, to review the results of the strategy.

First, consideration must go to the impact of the process of development of the strategy itself. Discussions about the need for a strategy were initiated within the International Union in 1969, and plans for the actual development of it were started in 1975. The drafting process was exhaustive. In all, there were four "official" drafts plus several intermediate efforts.

The final version of the strategy represents a consensus between the practitioners of conservation and development—a consensus which would not have been possible without the educational experience which the development of the various drafts provided on a truly international basis. It seems clear that the growing international recognition of the interdependence

between conservation and development is itself in part a result of the "educational process" involved in the development of the world conservation strategy.

Next, consideration of the results of the strategy must involve the launch itself. The publicity generated varied substantially from one country to another, but in international terms, the results were spectacular with widespread and continuing coverage in the press, radio and TV.

A further dimension was provided by the activity at national and international levels actually generated as a response to the launch. Several governments, among them India, the USSR, New Zealand, and Thailand, announced development of national conservation strategies, which is one of the key recommendations for national action under the strategy. The European Parliament announced a program for the creation of a European Environmental Fund. The Peoples Republic of China declared March as National Conservation Month, with intensive educational programs reaching all levels of their society.

Since the launch, a number of national and international actions in response to the strategy have been continued or initiated. Ten nations are now developing or are preparing to develop national conservation strategies. These are Egypt, India, New Zealand, Norway, Oman, Saudi Arabia, South Africa, Spain, USSR and Zambia. Such a strategy is under official consideration in Australia, Kenya, Madagascar, Senegal and Tanzania.

In several nations, citizens groups are either cooperating with government in the preparation of a national strategy or are preparing their own. The basis for the Norwegian strategy is a report entitled "Conservation in Norway" prepared by a committee of statesmen and environmentalists who used the strategy drafts as a model for their effort. In Malaysia, a strategy is being developed as a joint effort between governmental and non-governmental bodies. Non-governmental organizations in Italy and the United Kingdom are drawing up their own national strategies.

One of the objectives of the development of national conservation plans or strategies is to provide the basis for incorporating conservation within the national development plans, and to build conservation into the way governments do business. India, Senegal and Thailand have included conservation chapters in their latest development plans, and India is also revising its national forest policy in accordance with the strategy. The European Economic Community is preparing legislation to make environmental impact assessment obligatory for important investments.

Decisions are also being taken with regard to the protection of threatened plants and animals. And at the recent intergovernmental meeting in Sardinia, Italy, on the convention to conserve wetlands of international importance, many delegates quoted the strategy as the basis for moving toward strengthening the wetlands convention.

At Tufts University in the U.S., a course will be offered in 1981 specifically on the World Conservation Strategy. It is hoped that this initiative will become a pilot for similar activities, adapted to local conditions, in many other parts of the world.

Without continued effort, there is a danger that the World Conservation Strategy will slip off the international agenda, as have so many worthy initiatives in the past. This must not be allowed to happen. The stakes are too high, as the recent Global 2000 Report has so forcefully shown. Indeed, the Global 2000 Report and the World Conservation Strategy represent companion pieces, presenting respectively the problem, and the framework for its solution. And let's not mince words: the solution is of critical importance for mankind.

For its part, the International Union is now stepping up its efforts toward the strategy's implementation. The strategy represents the framework within which all International Union activities are now carried out. The Union is establishing an expanded strategy follow-up unit at its headquarters, in cooperation with the World Wildlife Fund and its U.N. collaborators, and it will be launching a conservation for development program early in 1981 to provide further assistance in the strategy implementation. A major review of progress on the strategy is planned for the Union's next triennial general assembly, to be held in Christchurch, New Zealand, in October 1981.

The strategy now exists, it has been introduced to the world, and it already has achieved significant results. In one sense, then, this represents the culmination of a major effort. In a broader sense, however, it represents the start of a new phase in conservation. For while the strategy is the most ambitious effort ever undertaken in international conservation, in a historical perspective it is simply a part of the continuing process. The challenge now is to make the strategy work, to see that its recommendations are implemented and most important, to see that it does serve as a focus for cooperation of all segments of world society to achieve common goals to maintain a world in which human welfare—and survival—is possible. □

Dr. Talbot is Director-General of the International Union for Conservation of Nature and Natural Resources.

Conservation Strategy: The Western Hemisphere

By Alejandro Orfila

Secretary General,
Organization of American States



Alpacas grazing in Peru at farm cooperative

A decade and more ago the world community witnessed a sudden upsurge in efforts designed to promote conservation and to protect the environment.

With the transformation of the world economy during the 1970's, however, these tides seemed to be overshadowed by other concerns: the breakdown of the post-war monetary arrangements; the historic shift in world energy prices; rampant global inflation interspersed with periodic recessions; and, the inability of nations everywhere to surmount protracted instability and insecurity in their economies.

In retrospect, it is transparent that these were and are serious and interrelated problems with worldwide dimensions. It is

evident, however, that had mankind paid equal attention to the parallel environmental and conservation challenges before it, the current world economic crisis might be less severe.

Rational use of natural resources is of vital and equal importance to both the advanced and the developing nations. Both are aware that international cooperation is not a luxury but an essential factor in preserving the global balance of nature and in reducing the damage to the world's ecosystems.

At present there is a resurgence of environmental and conservation efforts. These, however, must remain particularly sensitive



to the reality that the primary focus of public attention in Latin America and the Caribbean is increasingly on achieving integral human development: cultural, social, political, economic and technical. Organization of American States (OAS) member countries are not striving for development for the sake of growth alone. Rather they are determined to utilize their growing gross domestic products so as to directly benefit the poor, the unemployed, those suffering from prolonged injustice, and to give the younger generation widened horizons and opportunities.

Development must be grounded on a substantial resource base. Unwise destruction of the ecosystem and failure to use

natural resources efficiently frustrate efforts to raise standards of living and to create a hemisphere where basic human needs are met. It is for these reasons that a conservation strategy must be seen as an essential factor in helping the American family of nations to develop.

The nations of the Americas differ greatly in size, power, and economic potential. Their development experiences vary, as does their capacity for action and conservation. However, within the shifting global and regional priorities of growth, resource use, conservation and protection of the environment, the OAS members are nonetheless moving forward in the light of the following five integrated concepts of action:

- *In the American region the new name for peace is development.* Within the past 20 years Latin America has made enormous economic and social strides, in improvements in health, education, per capita income, and gross domestic product. It also possesses an immense potential in energy, natural resources, and food production. Even so, the region has a long way to go if it is to attain full development of its peoples, if it is to respond to the needs of the poor, the young, and those without jobs.

Development is the central focus of attention within Latin American public opinion at present and the economic and social transformation of the region will remain the most urgent priority of both national and international institutions. In 1981, the OAS will hold a Special General Assembly on Cooperation for Development—a new initiative designed to establish improved directions for the future of integral human development in the hemisphere.

- *A central factor in development between now and the year 2000 in the region will be the availability of energy supplies and other major natural resources.* As societies move from developing to fully industrial

levels, there is inevitably a close correlation between energy use, creation of jobs, and growth. Latin America recognizes this reality and will direct immense attention to seeing that it has the energy required to promote dynamic development. Notwithstanding this, it will also search for new processes to utilize its natural resources in such a way that damage to the environment does not prove counterproductive to the development process.

- *Every form of energy and natural resource use has an economic, social or an environmental cost.* But this cost must be minimized through rational use and exploitation of resources. This can be done by integrating efforts to protect the environment and to strengthen conservation as integral elements within the total development process.

- *The use of natural resources must be related to long-term development objectives.* Undermining the resource base and environmental standards for short-range economic reasons is counterproductive to overall economic and social well-being.

- *A major goal under a firmly-grounded conservation strategy for the Americas should be to help realize the region's human resources potential.* This will require a four-pronged effort designed to:

1. increase the levels of trained scientists, engineers and technicians considerably beyond existing levels;
2. improve prospects for utilizing the region's trained resources within the area itself so that it will forge a stronger capacity for accumulating technical know-how at an accelerating rate;
3. better adapt contemporary technology to the region's development and environmental objectives; and,
4. deepen public involvement in World Conservation Strategy as applied to the Western Hemisphere.

This seems to be the existing framework—*with five integrated concepts of action*—

within which we can seek to act upon the updated and recently launched World Conservation Strategy. It is evident that Latin America's general process of development would benefit considerably from effective policies which enable the region to more fully exploit its natural resources on a sustainable basis. We must pursue conservation so as to improve the lives of people. This will require serious studies and commitment of funding far beyond existing and projected levels if the World Conservation Strategy is to be broadly and seriously applied in the Western Hemisphere.

Conservation Strategy and the OAS

The Organization of American States supports this world conservation strategy not as something novel but as a deepening of its prolonged interest in the relationship which can and should exist between development and man's environment. Through acceptance of these principles we give testimony to our conviction that as society safeguards the bounty provided by nature, it serves the objectives of improving the condition of every human being.

Forty years ago member countries of the OAS adopted the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere. This convention urges the creation of national parks, protection of wilderness reserves, preservation of plants and animals, protection of migratory birds, and controls on importation of protected plants and animals. Twenty countries have signed and seventeen ratified the convention, and it is in effect. However, this would be an appropriate moment to urge all countries in the Western Hemisphere, whether OAS members or not, to ratify the convention and to work together in the defense of the environment of the entire region.

The convention was a landmark achievement. It serves today as a guide for a wide range of OAS actions in promoting the wise use of natural resources in the Western Hemisphere. With these extensive commitments and experiences, the Organization is

privileged to cooperate on the World Conservation Strategy. In 1976 the Sixth Session of the OAS General Assembly formally revitalized regional concerns with conservation and urged all OAS members to step up their commitments to this field—a resolution which has encouraged considerable new activity.

It should be stressed that OAS programs parallel and broadly respond to the specific priorities outlined in the current World Conservation Strategy. These priorities include the following:

Support of National Action

OAS programs routinely integrate environmental with development considerations. For example, OAS programs which provide millions of dollars of technical assistance annually in river basin development and regional development formulate self-sustaining natural resource development projects in agriculture, forestry, and hydroelectric power. These result in OAS member country investments of billions of dollars.

Other studies aid in the establishment of sound national resource management policies and legislation or design of environmental criteria for rational planning and development. Conservation-based rural development, as well as planning and development of national park systems, are among the many other areas in which the Organization supports national action through technical assistance. The OAS also undertakes activities related to scientific research of ecological processes and the possibilities of rational exploitation of renewable natural resources, including studies of fauna and flora in arid and semi-arid and humid tropical areas and problems associated with pollution control and environmental contamination.

OAS studies which characterize ecosystems of major importance in the Western Hemisphere likewise provide basic information useful to decision-makers in member states.

Support of International Action

The OAS cooperates extensively with the principal international institutions concerned with environmental issues. It has, for example, collaborated with the United Nations Environment Program in the execution of a pilot study to develop a methodology for systematically incorporating environmental considerations into river basin development planning. This study is a model available for world wide use. It also prepares technical reports on the conservation of resources shared by more than one country and it collaborates closely with other international agencies in major efforts of training of specialized personnel in environmental sciences. Environment, therefore, is a major focus of the development assistance offered by the Organization both to individual countries and to the Latin American region as a whole.

The OAS is pleased to cooperate in undertaking further concrete action on the commitment made by the international community to a world conservation strategy. This is more than simply an exercise in public information and public education. To reach its objectives, rather, will require a comprehensive assessment of both the complex challenges facing this strategy in the American Hemisphere and the means and instruments for responding to them.

Just as with growth, our basic objective is not conservation for its own sake alone, but for the protection and enrichment of man's environment as an integral component of the process of development in the Americas. We should seek to promote conservation and to use the resources of nature wisely. We must encourage all the peoples of the Americas to participate actively in realizing this World Conservation Strategy. Through rational exploitation now we will hand on to posterity a region where we have turned into reality our belief that man and nature are not in inflexible opposition but effectively interdependent. □

This article is from a speech by Secretary General Orfila to the World Conservation Forum March 5, 1980.



Newly-caught baby sharks about to be cut up at a northern port in Peru, while pelicans wait for the leftovers.

Citizen Groups: A Creative Force

By Tom Stoel



The Swiss Alps

Environmental impacts of human activities threaten our long-term welfare—and even our survival—on this planet. Tropical deforestation, soil erosion, acid rain, the buildup of carbon dioxide in the atmosphere, toxic chemicals, nuclear weapons proliferation: the list of problems is sobering, and we don't yet have the answers.

Non-governmental organizations have as important a role as governments in meeting these environmental challenges. This may seem improbable: environmental citizen's groups (excluding technical research establishments) spend only a fraction as much as government agencies in their efforts.

Yet the role of citizen's groups can hardly be overstated. Democratic governments usually follow, seldom lead. Major changes of direction often reflect alterations in public opinion, not the visions of governmental officials. A respected environmentalist and politician, Governor Richard Lamm of Colorado, has said:

"My observation is that most of the change that has occurred over the last 20 years has been made by leaders outside the political system. The civil rights movement, the women's movement, and the environmental movement were all initiated and led by people outside the political system. Public leaders merely confirmed into law changes which have their genesis in sweeping value changes elsewhere."

Environmental citizen groups are the cutting edge of the environmental movement. They must bear the most of this awesome responsibility.

History

Everywhere, environmentalism began with conservation. By the 1930's, nature protection groups were established in many countries. In 1948, scientists, governments, international bodies, and non-governmental organizations founded an influential, international conservation or-

ganization, the International Union for the Conservation of Nature, headquartered in Switzerland.

In the United States, the birth of the Environmental Movement was symbolized by Earth Day in April, 1970. That period saw the formation of environmental organizations with interests extending beyond nature protection to problems like air pollution and nuclear power. Older non-governmental organizations added new issues to their agendas. Citizen interest soared. The end of the 1970's saw most of these groups near their peak strength. Citizen concern continues, but polls indicate that environmental matters have dropped in rank on the list of issues about which there is the most concern.

The picture outside the United States is mixed. In proportion to their populations, Sweden and the Netherlands probably surpass the United States in citizen interest and membership in citizen groups. Elsewhere in Europe, the strength of environmental citizen groups has risen throughout the 1970's, but in most countries it is below that in the United States.

In developing countries, environmental citizen groups are a recent phenomenon. Most of these groups are small, but some are remarkably effective.

Methods

From the viewpoint of the rest of the world, U.S. politics consists of organized combat among the branches of government and the elements of society. Operating within this system, environmental citizen groups inevitably have used adversarial methods. Environmental lawsuits were a feature of the 1970's, and environmental citizen groups lobbied to produce pioneering environmental legislation. Other methods, more prominent during the quieter period at the end of the decade, include research and dialogue with those who im-

plement the laws. Physical demonstrations have occurred, but never have been a major factor. Some American citizen groups have been active in influencing elections, almost always on a nonpartisan basis. Others engage heavily in education.

American citizen groups were influential early in the decade in defeating the proposed U.S. supersonic transport. Their litigation and administrative proceedings delayed commercial nuclear fuel reprocessing and the commercial breeder reactor until President Carter was able to defer both indefinitely. Their lobbying helped to produce path-breaking legislation on strip-mine reclamation, control of toxic substances, nuclear nonproliferation, and protection of Alaskan lands. They have had many other successes.

Outside the United States, democratic governments tend to operate by consensus. Parliamentary systems lack a sharp separation between executive and legislative branches. Litigation possibilities usually are limited. The methods employed by foreign citizen groups necessarily have been different.

In the Netherlands, environmental groups have a unique relationship with their government. They receive government subsidies, and their officials occupy important advisory posts. Yet they remain free to attack government policies, and it is unacceptable for the government to restrict their advocacy. These groups have, for example, succeeded in blocking any Dutch commitment to nuclear power.

In Sweden, a much smaller nation in population, citizen groups participate strongly in decision-making processes, have good access to information, and possess considerable influence. The government has set up official bodies with the citizen group characteristics of flexibility and creativity, such as the Secretariat for Future Studies. Citizen groups have promoted Swedish regulation of toxic substances, probably the most advanced in the world, and have influenced the nuclear power controversy which has been a stumbling block for several Swedish governments.

In the rest of Europe, citizen groups tend to be smaller, less technically expert, and more on the outside with respect to governmental decision-making. Instead of freedom of information acts, they face laws making it illegal for government officials to reveal even routine information, such as pollution levels. Resort to litigation is difficult. Consequently, citizen groups in these nations have tended to rely on one or more of four techniques.

First, they have used physical demonstrations, especially in the nuclear power debate in Germany and France. Second, they rely on the media. Many European environmentalists react to a problem by calling a reporter or editor; in the United States we tend to call a government official. Third, environmentalists form working alliances with individual politicians. Members of parliament, prompted by citizen groups, can raise embarrassing questions or press the government for information.

Fourth, some European private groups, notably in Germany and France, have sponsored political parties. Commonly known as "green parties," they have succeeded in some local elections and have had a considerable effect on national policies, due to the fact that the major parties in those countries have governed by narrow margins, so that any threat from minority parties (which need to gain only a small percentage of the vote to gain some seats in Parliament under the system of proportional representation) must be taken seriously.

In the United Kingdom, environmental groups have influenced nuclear, land-use, and a variety of other decisions. In France, similar groups have had some impact on the government's pro-nuclear policies and have raised concern about toxic substances. In Germany, citizen groups have contributed to what is virtually a nuclear moratorium, and have raised concern about water pollution, toxic substances, urban planning, land use, and other matters.

In the developing world, methods tend to be different. Governments usually are one-party systems. Adversarial methods are rarely appropriate. Citizen organizations often concentrate on presenting their governments with the results of research, on publicizing obvious deficiencies, and on popular education. Although they are small and few in number, they have achieved successes in all of these areas.

International Dimensions

Most citizen groups are concerned chiefly with the problems of their own nations. Yet the 1972 Stockholm Conference on the Human Environment featured a remarkable display of concern by citizen organizations for the global environment, echoing the conference's theme: "Only One Earth." Subsequent U.N. conferences—on population, water, human settlements, desertification, and science and technology—have been accompanied by citizen forums which have publicized issues overlooked by the official conferences and prodded officials to produce meaningful results. The U.N. Environment Program, established as a result of the Stockholm Conference, has had an unusually receptive attitude toward citizen groups and has provided another focal point for citizen concern about the global environment.

The International Union for the Conservation of Nature, which has hundreds of citizen group members from all over the world, is a mechanism for citizen concern and cooperation on conservation issues. The Environment Liaison Centre in Nairobi has provided a citizen group liaison to the U.N. Environmental Program and a link among developing-world citizen organizations. On a regional level, the European Environmental Bureau in Brussels is an "umbrella group" which concentrates on the activities of the European Communities and has member citizen organizations from all the community nations.

These mechanisms, as well as more informal networks, make possible trans-

national cooperation among these groups. Although limitations of resources and differences of outlook are limiting factors, citizen groups have cooperated effectively to influence recent international meetings, such as those of the parties to the Convention on International Trade in Endangered Species, the International Whaling Commission, the Antarctic Treaty Powers, and the U.N. Conference on the Law of the Sea.

The Future

What can we expect in the 1980's? U.S. citizen groups are likely to continue their trend toward less adversarial methods and greater reliance on economic arguments. European organizations are likely to ask for more access to government decision-making, and to acquire the technical skills they need to participate. Developing-country organizations will grow in size and influence. These groups will engage more in international cooperation.

Finally, there is this question: Can environmental groups fulfill the enormous responsibility described by Governor Lamm? Based on size and other conventional indexes of power, one would have to say "no." But we would have been more emphatic in the late 1960's questioning whether these groups could accomplish what they did during the 1970's. Fortunately, the power of these organizations to shape society's values depends not on their size but on their diversity, creativity, and their ability to sense what the future holds. These qualities they possess in abundance. □

Tom Stoel is Senior Staff Attorney at the Natural Resources Defense Council in Washington, D.C.

Some Leading Organizations

There are thousands of environmental citizens groups. The following list of national, regional, and international organizations was submitted by Stoel to illustrate their diversity.

International

Environmental Liaison Centre, Nairobi, Kenya: "Umbrella" group with members which provides liaison to the U.N. Environment Program and services to developing-country citizen groups.

International Institute for Environment and Development, London, England: Conducts research on the relationships between environment and development, with emphasis on Western policy as it affects developing countries.

International Union for the Conservation of Nature (IUCN), Gland, Switzerland: Large conservation "umbrella" group with both non-government and governmental members; monitors world's living resources and promotes conservation.

Scientific Committee on Problems of the Environment (SCOPE), Paris, France: International, interdisciplinary committee of the International Council of Scientific Unions to deal with environmental problems.

World Wildlife Fund (International): In close cooperation with IUCN, raises money for conservation of living resources and funds conservation activities.

Regional

Caribbean Conservation Association, St. Michael, Barbados: "Umbrella" group of Caribbean non-governmental organizations.

European Environmental Bureau, Brussels, Belgium: "Umbrella" group of non-governmental organizations from the countries of the European Communities.

Australia

Australian Conservation Foundation, Hawthorn, Victoria: Encourages public participation in decisions affecting resource use.

Canada

Canadian Nature Federation, Ottawa: Citizen group which carries out research and otherwise acts to conserve wildlife and natural habitats.

Costa Rica

Costa Rican Association for the Protection of Nature (ASCONA), San Jose: Provides a forum for environmental awareness and education; acts to conserve natural resources.

Tropical Agronomic Center for Research and Training (CATIE), Turrialba: Carries out program of research and training in agriculture and forestry.

France

Les Amis de la Terre, Paris: Citizen advocacy group; interests include energy policy, control of toxic substances; has been involved in electoral politics through a "green party."

Germany (Federal Republic)

Bundesverband Bürgerinitiativen für Umweltschutz (BBU), Karlsruhe: "Umbrella" group of local citizen groups active on energy, water pollution, and a variety of other issues.

Kenya

Wildlife Clubs of Kenya, Nairobi: Involves young people in education and conservation activities concerning wildlife.

Malaysia

Environmental Protection Society of Malaysia, Jalan Sultan, Petaling Jaya Selangor: Monitors human impacts on the environment and promotes environmental protection.

Netherlands

Stichting Natuur en Milieu, 's Graveland: "Umbrella" group which influences individuals and governments in favor of environmental protection; addresses a wide variety of issues.

Sweden

Swedish Society for the Conservation of Nature, Stockholm: Citizen group which carries out an education program and influences government in favor of environmental protection.

United Kingdom

Friends of the Earth, Ltd., London: Citizen group which advocates in favor of environmental protection concerning energy and a variety of other issues.

Town and Country Planning Association, London: Monitors impacts of human activities on land and acts to influence land use decisions.

United States

Conservation Foundation, Washington, D.C.: Carries out research and issues publications concerning a variety of environmental issues.

League of Conservation Voters, Washington, D.C.: Monitors environmental performance of elected officials and promotes election of candidates who favor environmental protection.

National Audubon Society, New York: Citizen group which carries out program of environmental action and environmental education concerning all aspects of nature; maintains wildlife sanctuaries; sponsors research.

National Wildlife Federation, Washington, D.C.: Citizen group which carries out extensive activities to arouse public awareness of need to conserve natural resources; acts to influence governmental decisions.

Natural Resources Defense Council, New York: Citizen group which advocates for protection of the national and international environment and wise use of natural resources.

Sierra Club, San Francisco: Citizen group which uses network of members and other means to educate individuals and influence governmental decisions on national and international environmental issues.

World Wildlife Fund—U.S., Washington, D.C.: Raises money, funds projects, and takes other actions to conserve living resources.

Venezuela

World Wildlife Fund—Venezuela (FUDENA), Caracas: Educates citizens and influences governmental decisions in favor of conserving living resources.

1

REGION

Cleaner

Sixty-one percent of New England's major river mileage is now suitable for fishing and swimming, according to Region 1's annual report on environmental quality.

The report shows that 4,562 of the total 7,453 miles of major river main-stems and tributaries assessed in the region now meet the swimmable standard. The report projects that by 1983, 82 percent of the major river miles will have water quality suitable for swimming.

Drinking Water

An investigation into the effects of acid rain on drinking water has been launched by the New England Water Works Association. Money for the project was provided by EPA.

All six New England States and the north-eastern part of New York are involved in the project. Floyd B. Taylor, executive secretary of the Association, said New England's drinking water supplies are particularly susceptible to acid rain because about half of its water supply systems rely on surface water.

2

REGION

Hazardous Waste

Region 2 has just completed formal arrangements with New York, New Jersey and the Commonwealth of Puerto Rico for more effective regulation and control of hazardous waste activities

within their borders. The States and Puerto Rico have agreed to commit the resources needed to aid EPA in carrying out its responsibilities under the Federal Resource Conservation and Recovery Act (RCRA) regulations. EPA has pledged increased support and cooperation in the effort to insure that hazardous waste is handled properly in the future.

Congress has provided \$35 million in Fiscal Year 1981 funds under RCRA to finance development of State hazardous waste control programs. The signing of these cooperative agreements makes New York eligible for \$1.6 million, New Jersey for \$853,000 and Puerto Rico for \$344,000 this fiscal year for administration of their programs. EPA expects to complete a cooperative agreement with the U.S. Virgin Islands which will make the islands eligible for \$75,000 in funds this fiscal year.

Case Settled

The Region 2 Enforcement Division successfully intervened with the U.S. Department of Labor in a case involving Section 507 of the Clean Water Act which provides protection for "whistle-blowers." Dr. Morris H. Baslow, a scientist with Lawler, Matusky and Skelly Engineers, the firm hired by the utilities, was fired as a consultant after writing a letter to Judge Yost, the presiding officer of the Hudson River Power case, wherein he charged that the utilities were presenting evidence in the case that was not

valid and he wanted the record corrected. In the letter he charged that the engineering firm had constrained him for over a year in his attempts to set the record straight.

On June 10, 1980, EPA petitioned the Labor Department to intervene on behalf of Dr. Baslow in his attempts to gain redress from the engineering firm. Permission was granted EPA to intervene on July 28, setting a precedent. The case was settled on October 28 without a hearing, with monetary compensation to Dr. Baslow.

3

REGION

Air Standards

EPA recently approved final air emission limits for two West Virginia power plants that will protect human health in the area and allow continued use of locally mined coal.

The plants affected are the Mitchell Power Plant in Marshall County, operated by Ohio Power Company, and the Harrison Power Plant in Harrison County operated by Monongahela Power Company.

In announcing the action, Region 3 officials said that EPA's approval of West Virginia's emission limits for these two plants will ensure the attainment of health-based air quality standards.

Although these emission limits were approved strictly for their adequacy in protecting human health, a beneficial by-product of this action is that the Harrison and

Mitchell plants could continue purchasing coal from their traditional suppliers, thereby maintaining job stability at various West Virginia mines, Region 3 officials said.

Pollution Suit

The Department of Justice on behalf of the EPA has filed suit against three companies in Nitro, W. Va., for contaminating groundwater and the Kanawha River through improper disposal of hazardous waste. The companies are Fike, Coastal Tank Lines, and C.S.T.

EPA is seeking a court order to have the defendants cease actions contaminating the groundwater and river, determine the extent of the contamination, establish a monitoring program, decontaminate the groundwater, pay fines up to \$10,000 per day of violation and reimburse the government for expenditures.

4

REGION

Award

Atlanta, Ga., is the recipient of an EPA Region 4 award in recognition of recently adopted standards protecting citizens against excessive and unnecessary noise. The ordinance also outlaws improperly muffled motor vehicles.

The award, citing the city for "outstanding leadership in noise abatement and dedication to the preservation of a quality environment," was presented at the National League of Cities annual meeting in Atlanta.

5

REGION

Lake Michigan

Region 5 has announced plans to clean up a portion of the Lake Michigan harbor at Waukegan, Ill. The harbor contains sediment heavily polluted with PCB's and suffers the most significant toxic contamination known in the Great Lakes harbors. In some "hot spots," more than one-fifth of the sediment is composed of PCB's, making the harbor appear to be a major source of PCB contamination of Lake Michigan fish.

In the cleanup operation proposed by Region 5, decontamination will begin with the removal of 15,000 cubic yards of sediment from Slip No. 3, the most heavily polluted part of the harbor. The sediment, together with surrounding waters, will be removed to an adjoining, specially-constructed holding lagoon. Contaminated sediments will remain in the lagoon until a permanent disposal method has been arranged for them.

This first phase of the cleanup action is expected to be completed within the next 12 months and will cost approximately \$2.5 million. Part of the additional funding necessary for this first phase of the operation will be supplied by a \$1.5 million Congressional appropriation designed expressly for Waukegan Harbor cleanup, and through \$100,000 in funds authorized for waterway cleanup under Section 311 of the Clean Water Act. EPA will attempt to recover these monies through lawsuits pending against OMC, the out-board motor manufacturer which dumped the

PCB's into the harbor beginning in the 1950's, and against the Monsanto Company, the PCB manufacturer which supplied the chemical to OMC.

Region 5 had scheduled a public briefing in January to present the plan of action for removal of PCB's from Waukegan Harbor.

6

REGION

Disposal Sites

Region 6 has cleared a total of 108 sites from its list of potentially hazardous waste disposal sites since it began investigations early in 1980. Two hundred and eighty sites are in various stages of investigation.

There is a high level of awareness of this problem in the region, and people understand that it must be dealt with now, Region 6 officials said. This kind of understanding and support of clean-up efforts, coupled with cooperation from the States, will produce results, said Region 6 officials.

By the end of last year, the region had identified 1,346 sites; 173 of those are in Arkansas, 188 in Louisiana, 80 in New Mexico, 367 in Oklahoma, and 538 in Texas. These figures are subject to change, however, as sites are checked and legal actions taken.

Construction

The Region 6 municipal facilities branch will allocate \$332.2 million in total construction grant funds for Fiscal Year 1980. The funding breakdown is Arkansas—\$30.3 million, Louisiana—\$56 million, New Mexico—\$18.2 million, Oklahoma—\$32.7 million, and Texas—\$195 million.

New Mexico has a 12.5 percent grants program which means that communities need only come up with a 12.5 percent matching share.

7

REGION

Alcohol Fuel

The environmental effects of alcohol fuel production were discussed recently during a two-day national seminar in Kansas City, Mo. Federal officials and research consultants agreed that industrial alcohol fuel plants pose "significant environmental problems" if wastes are not handled and disposed of properly. Careless disposal or release of spent still solids and liquor and contaminated wastewater can pollute nearby ponds, streams, and agriculture lands and may endanger livestock which consume the acidic residues.

Seminar participants agreed that they are more concerned about thousands of small stills that are expected to proliferate in the Midwest in the near future. There are currently about 290 applications for farm still operations in Iowa, Kansas, Missouri, and Nebraska—90 more than a year ago.

8

REGION

States

Utah and North Dakota recently became two of the first States nationally to receive EPA approval to operate their own hazardous waste management.

According to Region 8 officials, both received "Phase I Interim Authorization" after demonstrating that their State programs provide substantially equal protection as the Federal hazardous waste management program. "Interim authorization" may be granted for a maximum of up to two years. During that period, the States will manage hazardous waste programs and will have time to upgrade their programs to meet new regulations and be granted full authorization.

State officials will now have the responsibility for overseeing hazardous waste activities, from hazardous waste generation through transportation to final storage, treatment or disposal.

9

REGION

Monitoring

In accordance with the nationwide Public Water Supply Supervision Program authorized by the Clean Water Act, the successful implementation of a drinking water monitoring program in all District Centers of the U.S. Trust Territory, a group of islands in the Pacific Ocean, has been announced by Region 9. For the first time, the residents of the Trust Terri-

tory will have a comprehensive program to monitor the quality of their drinking water.

Contaminated drinking water is a suspected cause of the high level of gastrointestinal disease in the Trust Territory administered by the U.S. The monitoring program is expected to materially improve drinking water quality in the Trust Territory, with a resultant improvement in public health.

Hawaii Workshops

EPA Region 9, in conjunction with the Hawaii Water Pollution Control Federation, recently sponsored a workshop on the Innovative/Alternative Technology Program. The two-day workshop was intended to promote the use of such technologies in the design of municipal wastewater treatment facilities in the Pacific Islands.

10

REGION

Pollution Survey

The latest Region 10 survey of contaminants in Commencement Bay, the body of water along the industrial area of Tacoma, Wash., has reaffirmed the presence of heavy metals and chemical substances that are suspected carcinogens. EPA began the surveys because of the discovery of liver lesions and other biological abnormalities in Commencement Bay fish. So far, not enough is known to link specific pollutants to the damage to the fish. Also, it is not known in all cases where the pollutants came from; it is presumed that in part they are the legacy of past disposal practices

that were once legal, but no longer are. Region 10 is consulting with other Federal agencies and the Washington State Department of Ecology to develop a coordinated approach to defining problems and developing solutions.

States Served by EPA Regions

Region 1 (Boston)

Connecticut Maine
Massachusetts New
Hampshire Rhode Island
Vermont
617-223 7210

Region 2 (New York City)

New Jersey New York
Puerto Rico Virgin
Islands
212-264-2525

Region 3 (Philadelphia)

Delaware Maryland,
Pennsylvania Virginia
West Virginia District of
Columbia
215-597-9814

Region 4 (Atlanta)

Alabama Georgia
Florida Mississippi,
North Carolina South
Carolina Tennessee
Kentucky
404-881-4727

Region 5 (Chicago)

Illinois Indiana Ohio
Michigan Wisconsin
Minnesota
312-353-2000

Region 6 (Dallas)

Arkansas Louisiana
Oklahoma Texas New
Mexico
214-767 2600

Region 7 (Kansas City)

Iowa Kansas Missouri,
Nebraska
816-374-5493

Region 8 (Denver)

Colorado Utah,
Wyoming Montana,
North Dakota South
Dakota
303-837 3895

Region 9 (San Francisco)

Arizona California
Nevada Hawaii
415-556 2320

Region 10 (Seattle)

Alaska Idaho Oregon,
Washington
206-442 1220

Peace at Storm King

By Truman Temple

Nearly two decades of controversy over a proposed pumped-storage plant near Storm King Mountain overlooking the Hudson River have ended in a peace treaty that officials hope will protect the river's fish and scenic beauty.

The project had been at the center of a conflict between energy and environmental interests so significant that it had been termed "the opening battle of what was to become the national environmental movement" of the 1960's and 1970's.

Although the struggle began in 1962 with concern by residents over the visual



impact of the project on the natural beauty and splendor of the Hudson Highlands, the issue later expanded into a fight involving environmental and conservation groups, fishing interests, and local, State, and Federal authorities over much broader implications. Before it was finished, extensive studies were made of the impact on aquatic life of several power plants along the river, and the Environmental Protection Agency held hearings dealing with the issue.

Russell E. Train, former EPA Administrator, who served as voluntary mediator in final negotiations leading to the settlement, hailed the agreement as an historic achievement.

"To my knowledge," he declared, "it comprises the largest and most complex set of environmental issues ever resolved through mediated negotiation. The settlement demonstrates dramatically that acceptable accommodations can be achieved which effectively balance the environmental and energy needs of the Nation."

Train, who now is President of the World Wildlife Fund-U.S., had separately approached the various parties nearly two years ago in seeking the settlement and chaired some 15 subsequent meetings to keep negotiations going. In an editorial on the final agreement, the New York Times commented, "All participants agree that no settlement would have been possible without the mediation of Russell Train. . . . He had the confidence of all parties and repeatedly kept them from stalking off in anger. . . ."

Under final terms of the pact, both sides made a number of concessions. In a formal ceremony, representatives of 11 environmental, governmental, and utility groups agreed to these points:

- Consolidated Edison will halt construction of the pumped-storage power plant at Storm King Mountain, surrender its license to build the facility, and donate the 500-acre site in Cornwall, N.Y. for park use.
- Utilities operating six major power generating units at three other sites on the river—Indian Point, the Bowline Point plant in Haverstraw, and the Roseton plant near Newburgh—will take measures to reduce destruction of fish and other aquatic life. These steps include partial plant closures during the May-to-August fish spawning and nursery season, when withdrawal of cooling water from the Hudson would suck fish and their eggs into the plants' pipelines. (These measures will not affect electric service to consumers.) The utilities also will install new pumps and use pumping rates that will minimize water withdrawals.
- The utilities will build a hatchery for stocking the Hudson with 600,000 striped bass fingerlings per year and will install angled screens at water intakes at the Indian Point units to divert fish from being drawn into the plants.
- Most of the utilities agree not to propose to build power generating units anywhere on the Hudson for the next 25 years unless they have closed-cycle cooling. Niagara Mohawk Corp. agrees not to build power generating units anywhere on the Hudson for approximately 150 miles north of the George Washington Bridge for the next 25 years unless they have closed-cycle cooling.
- The utilities will provide a \$12 million endowment for a new foundation to fund

independent research on ways to lessen the impact on fish by power plants. The companies also will spend \$2 million a year to monitor power plant impact.

- In exchange for these commitments, the utilities will not be required to build cooling towers, which are closed-cycle cooling systems, at Bowline, Indian Point, and Roseton sites. However, they have agreed to build one cooling tower at Indian Point if they are unable to meet the May-to-August partial plant closures. Also, all the lawsuits and administrative proceedings among the parties will be dropped.

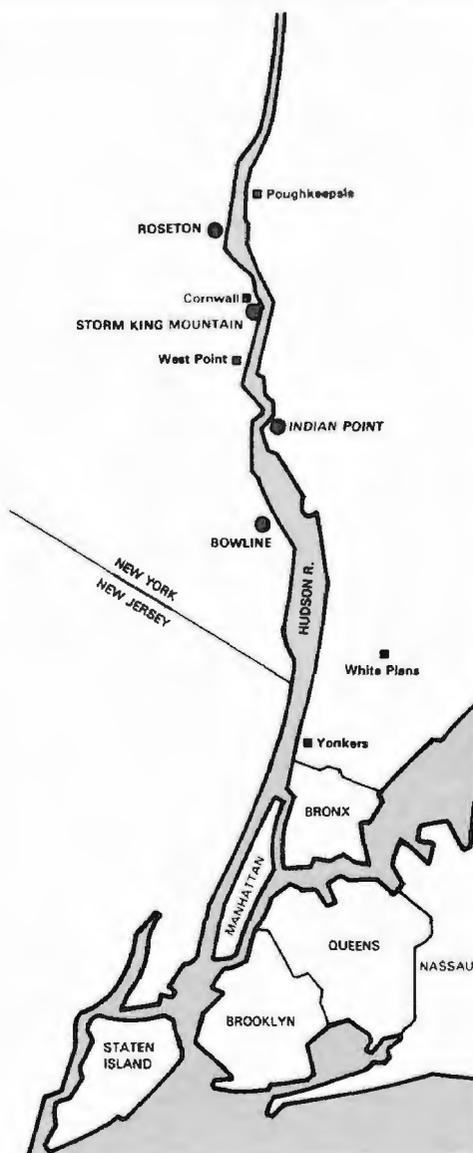
The trade-off actually will save the utilities—and ultimately their customers—approximately \$240 million in construction costs for the cooling towers plus \$90 million a year in operating and carrying charges, according to Charles F. Luce, Board Chairman of Con Ed. He added that the cost of the settlement will be about one tenth this total.

"We all gain from this landmark agreement," Train declared. "It protects the environment, conserves energy, protects consumers, fights inflation, while helping protect the unique scenic resources of the Hudson River." Train singled out for special praise the Hudson River Fishermen's Association, the Natural Resources Defense Council, Scenic Hudson, Inc., the New York Department of Environmental Conservation, EPA, the New York State Power Authority, and Luce for their efforts in reaching a settlement of the 18-year-old controversy. Jonathan Strong was lead counsel for EPA's Region 2 Enforcement Division in the case.

Train said, "The Storm King issue is a good example of the need in our society to find ways of bringing issues to a conclusion and getting decisions made. We have made the most progress of any people in the world in assuring full and effective public participation in decision making and that is as it should be. At the same time, our legal institutions provide almost endless opportunities for one or more parties to a dispute for delaying a final decision. In the normal case, as here, there are legitimate interests and concerns on both sides of the issue. Such a situation is made to order, it seems to me, for submission to mediation and the pursuit of a negotiated settlement.

"The settlement reached," Train stated, "represents a victory for the public interest. I congratulate all of the parties involved on their commitment to seek a negotiated settlement, despite a long history of often bitter controversy, on their patience and dedicated work over many months, and on the spirit of compromise and good will which finally made the settlement possible.

"It should not be thought that the mediation route is an easy or quick short-cut to



the resolution of such issues. It requires a great deal of hard work and is at times a good deal more demanding than traditional legal proceedings. The negotiations leading to today's settlement have been a real cliff-hanger all the way. It was in April 1979 that I separately approached the various parties to explore their attitude toward negotiation and possible settlement. It was not until August 28, 1979, that it was finally possible to bring all of the parties together around the same table for discussion. Since that first session, I personally chaired at least 15 subsequent meetings in New York and there have been almost continuous meetings of a technical nature. On more than one occasion, it appeared that the negotiations faced imminent collapse. However, we were always able to keep the parties talking and the negotiations alive. . . .

"It is not too much to say that, with this settlement, peace has been declared on the Hudson. Of course, there will continue to be environmental issues involving power generation from time to time. This settlement, for example, does not involve air quality or nuclear power issues. However, the major conflict involving protection of the aquatic resources of the Hudson has been resolved. Even more important, a long-term basis for a cooperative effort to safeguard those resources for the future has been established. Thus, it is my hope that we have laid the foundation here for a new spirit of cooperation among the utilities. Federal and State agencies and private citizen groups in working together to achieve the common goal of protecting the Hudson. Beyond this, I hope that what has been accomplished here against almost insuperable odds will serve as a dramatic demonstration to the Nation as a whole that negotiation and mediation can provide an effective alternative to excessive reliance on the uncertain outcome of prolonged and costly adversarial legal proceedings."

The dispute originally had begun with a proposal by Con Ed in 1962 to build a power plant using a relatively new type of reversible turbine that could serve as both pump and generator of electricity. The reason the utility favored pumped-storage lay in the nature of marketing power. Electricity must be used as it is generated. The only way to "store" it is to pump water to a reservoir during hours of low power consumption and release it during peak periods through turbines to hydroelectric power. Since conventional generators had an average load demand at that time of only some 55 percent of their capacity, the pumped power concept offered a way to help the system to generate electricity on a more efficient basis by leveling production. (Storm King would have used neither fossil nor nuclear fuel, but simply the system's

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Changes on the Hudson

By Chris Perham



Autumn on the Hudson River. Print of painting by Jasper Francis Cropsey. National Gallery of Art.

To some New York City residents and visitors who catch glimpses of the river only between buildings and under bridges, the Hudson looks like just another highway—a stretch of flat grey ribbon.

In a sense it was and is a roadway. The Indians traveled this river in longboats years before Henry Hudson tried to use it to reach the Orient. Flatboats, sloops, whalers and paddlewheelers have traversed its length over time, linking the scattered settlements that have since become a metropolis.

Today at the mouth of the Hudson, ocean liners loom over sailboats that dart from newly-revived marinas. Barges, pleasure cruisers, patrol-boats, and scattered shad and sturgeon fishing vessels can be found in the mid-stretches of the river, in proportion to the smaller towns and cities that dot the banks. Further up the Hudson where the towns become villages and the population thins, the river carries canoes, kayaks, and, occasionally, an adventurer in an inner-tube.

But the Hudson is much more than just an avenue of transportation. At its headwaters in the Adirondack mountains the river is a glacial trickle. The icy, sterile

waters of Lake Tear of the Clouds shelter no fish in their crystal depths. But at its mouth, even though the Hudson is a teeming, turgid broth, a notoriously filthy port, it nourishes a vast range of sea life.

Gravity pulls the headstream of the Hudson down from the slopes of Mt. Marcy, at 5,344 feet the tallest Adirondack peak. At the other end of the river twice daily ocean tides sweep upstream past Manhattan and a score of towns through a spectacular gap in the mountains, then on to Albany, almost 150 miles upriver.

Hikers climb for hours through near-wilderness to visit the source of the river, while millions who live within a stone's throw of the Hudson in New York City pass by and over it daily without even a glance.

Over the past four centuries the river has been idolized, abused, and ignored. Karl Baedeker, the 19th century travel writer, characterized the river as "grander and more inspiring than the Rhine."

The Hudson River is approximately 315 miles long. Most of the river basin, 95 percent, is contained in the State of New York. It drains an area that covers 13,500 square miles and draws water from Vermont,

Massachusetts, New Jersey, and Connecticut. The Adirondack, Catskill, and Taconic mountains form a cradle of sorts for this complex and variable water course.

Two-thirds of the people in New York State and a sizable number in New Jersey rely on the river for a myriad of reasons. It is a haven for ornamental carp that most of us know as goldfish; a source of cooling water for nuclear power plants; a spawning ground for sturgeon, behemoths of the fish world that look as though they should be extinct; the site of ferocious white-water canoe and kayak races, and a potential source of drinking water for 12 million people.

The issues on the Hudson River are water quality and supply. They encompass conventional and toxic pollutants, transportation needs, recreation, drinking water supply, and questions of land use and historic preservation.

EPA Region 2 Administrator Charles Warren notes several developments in the area of environmental protection that will have an effect on the future health of the Hudson River. Says Warren, "The Agreement of Water Quality signed last year with New York State outlines how the State agencies manage water quality programs and how they plan to spend State and Fed-

eral money during the next five years. The major considerations of the agreement are control of toxic wastes, pretreatment of industrial sewage wastes, managing solid wastes and controlling polluted runoff. Also, EPA has made \$47.5 million available to the State over a five-year period to manage its own wastewater treatment plant construction grants program. This will streamline management, speed up grants, and cut construction costs. Similar agreements have been signed with the State of New Jersey."

Conventional Water Pollution

The demise of the Hudson has been on the lips of doomsayers for several decades. The dwindling number of commercial fishermen on the river and the declining catch on the lower Hudson led many to believe that pollution was killing the fish and the river was damaged beyond repair. But biologists like William Dovel, estuarine expert with the Boyce Thompson Institute in Yonkers, N.Y., feel that the Hudson is one of the most productive breeding areas for fish in the Northeast. According to Dovel, the tidal action in the river is strong enough to dilute pollution so that even in the mid-1960's fish populations were only slightly reduced.

Further, the river got a jump on the rest of the environmental movement, thanks to the residents of New York State. As early as 1965, voters approved a \$1 billion Pure Waters Bond Act. The State helped finance the construction of sewage treatment facilities and advanced money to municipalities for the Federal share of the program.

In 1978, Ronald Maylath of the State Department of Environmental Conservation offered this assessment of the river's health in the *National Geographic*: "The Hudson is definitely cleaner, but . . ." he added, "When pollution was at its worst in the early sixties, the water level was low, and near-drought stage; now we've had plenty of rain, and the Hudson has a much higher flow. Such variables make comparison difficult."

EPA personnel in the New York region report that many of the communities along the Hudson either have sewers or are planning sewage treatment plants. "We are making progress," says EPA's Warren. He says most of the projects are on schedule, especially in the upper river valley.

Water quality surveys in the central and upper stretches of the river in the 1960's listed close to 400 known sources of waste from municipal and industrial sources. At that time, the oxygen-consuming demands of industrial wastes were twice as great as those from municipalities. The pulp and paper industry accounted for nearly half of

the industrial pollution, followed by tanning operations, textile products, food processing and manufacturing products. Domestic wastes were, in many cases, insufficiently treated or discharged raw.

Water quality has improved significantly in these areas, according to Warren. "We still have a few recalcitrants, both municipal and industrial. But in some cases, sewage treatment plant construction was delayed by building problems. In the hilly terrain of some upstate areas, they have to do a lot of pumping (of sewage). This raises costs and causes other difficulties."

Conservationists note the increased amount of dissolved oxygen now found in parts of the upper river and reduced levels of fecal coliform bacteria, an indicator of domestic sewage pollution. The improvements are especially noticeable in the area where the Hudson and Mohawk Rivers meet, called the Albany Pool, infamous in past decades for high concentration of pollution.

Water quality problems still exist in the Upper Mohawk River, which is a major tributary, and on the Hudson from Troy Dam to Saugerties.

At the mouth of the river, New York City is far behind on its planned construction of treatment facilities. The city took its first sanitary measures in 1886, when primitive screening devices were installed over sewer outfalls to keep floating material off the beaches of Coney Island. In the century since then, the city has spent hundreds of millions of dollars in an as yet unsuccessful effort to keep pace with its rapidly expanding sewage problem. Recent financial difficulties have contributed to the excruciating slowness of expansion in New York's sewage treatment capacity.

The city has 13 plants that provide modified secondary treatment, removing floating and settleable solids and substances that use up available oxygen in the water before disinfection with chlorine. This biological processing removes only 60 percent of the contaminants; Federal law requires 85 percent removal. In addition to the necessary upgrading of existing plants, the city has two plants, one at North River and the other at Red Hook, that have been in the planning stages since the 1930's and are still far from complete.

EPA took New York City to court in 1976 to force the city to abide by a schedule for construction of these plants. According to some estimates, 140 million gallons of raw sewage per day hit the Hudson River from the West Side of Manhattan, which will eventually be served by the North River plant. The Red Hook section of Brooklyn

generates about 90 million gallons daily. EPA officials now estimate that the plants may be completed in the late 1980's. In the meantime, 40 sewer outfalls continue to discharge some 75 billion gallons of untreated waste into the Hudson each year.

New York City has almost 6,000 miles of sewerline, 70 percent of which are combined sewers. Approximately 40 percent of the system is over 60 years old. The city government planned an accelerated sewer construction program in the early 1970's to improve service and correct defects, but the 1975 fiscal crisis intervened.

The largest sources of pollution to New York Harbor itself are treated wastewater effluent, raw sewage by-passes (due to repairs and construction), some industrial sources, sewer leaks and combined storm sewer discharges. In 1977, New York City sewage plants treated 1.16 billion gallons of waste per day and bypassed 142 million gallons of raw sewage. These figures do not include the large volume of water and pollutants that enter the Harbor from the combined sewer overflows during and after storms.

There are approximately 30 major industrial dischargers into New York Harbor. They are regulated by EPA's National Pollutant Discharge Elimination System program (NPDES), which is administered by the State of New York.

Toxic Pollution

In the mid-1970's, EPA undertook a study of industrial contaminants in surface waters. Scientists sampled water near heavily industrialized areas at 204 sites across the United States; 27 of those samples came from places in the Hudson River Basin. The research results read like alphabet soup: C₁₀H₁₀; 1,2 dichloroethane; diethyl hexyl phthalate, and so on. Some of the substances have more familiar, but no less frightening names. The samples turned up traces of chloroform, camphor, PCB's, dichlorobenzene and other synthetic chemicals that include suspected carcinogens. The discovery of these substances led to charges by environmentalists that the more troublesome aspects of water pollution were being ignored by regulatory agencies.

Some heavy metal pollutants, such as chromium, cadmium, and nickel, enter the river from New York City sewers. These pollutants wash off buildings and city streets; they are also discharged by industries that use the city's sewage treatment plants. Sewage treatment does not destroy metals so some of these pollutants remain in the treated water discharged from the plants. Most heavy metal pollution is

concentrated in the treatment process into sewage sludges which the plants must dispose of. A great deal of heavy metal pollution also comes from atmospheric fall-out. Half of the lead that enters waters around New York City can be traced to auto emissions in the air.

The ocean waters at the mouth of the Hudson accumulate pollution from river outflow and from the dumping of dredged materials, sewage sludges and industrial wastes, discharges from vessels and accidental oil spills. Water quality in the area varies based on freshwater flow from upriver and seasonal shifts in harbor water temperature.

Non-point source pollution, caused by diffuse sources rather than a specific pipe discharge, affects the entire Hudson River basin. The main river body absorbs from its tributaries contaminants such as agricultural runoff, erosion from land stripped bare of vegetation by natural causes or construction, oil from city streets, and pollution from salt used to melt ice on winter roads.

PCB's

No discussion of water quality in the Hudson River can omit the dilemma posed by polychlorinated biphenyls (PCB's). These chemical compounds are used in electrical generators and capacitors, among other things, to make them resistant to fire or explosion. PCB's were discovered in 1929,

and by the 1960's they were being manufactured in the U.S., Japan, Russia, and several European countries.

General Electric Co. purchased large quantities of PCB's for use at its two capacitor plants on the upper Hudson River. Wastewater from the manufacturing process was returned to the river, carrying vast quantities of PCB's with it. No fish kills resulted, and GE had discharge permits from both the Federal and State Government. However, as scientists became more aware of the toxic accumulation of PCB's worldwide, more attention focused on the Hudson.

The best-known incident involving PCB's occurred in Japan where a leak that contaminated rice oil made thousands of Japanese ill with yusho (rice-oil) syndrome. Victims suffered skin eruptions, discharges from the eyes, swollen and painful joints and numbness in their extremities. Women with fleeting exposure to PCB's had babies with pigment changes and other symptoms. Recent research indicates that liver cancer incidence may be as high as 15 times the normal rate in people who used the tainted oil in cooking.

Some scientists and government employees tried to call attention to the PCB problem they saw, but for many years their concerns went unheeded. In 1974, Royal Nadeau and Robert Davis, scientists with EPA's Region 2 office, discovered high concentrations of PCB's in the water, mud, and biota near the GE plants. Their report went to Gilman Veith at the Agency's National

Water Quality Lab in Duluth, Minn., who recognized the seriousness of the situation. He sent the report to the then-EPA Regional Administrator Gerald M. Hansler with a notation of the gravity of the problem. Hansler forwarded the report to New York State Department of Environmental Conservation Director Ogden Reid. A short time later, Reid issued warnings against eating striped bass from the Hudson. The warning later became a ban that eventually extended to include all commercial fish species in the Hudson except shad and sturgeon over four feet long.

In the meantime, the State ordered an end to PCB discharge and began working out an agreement with GE about who was responsible and what relief measures would be taken. GE and New York eventually decided on "joint culpability" for the PCB damages. In a \$7 million settlement, GE paid \$3 million to the State for PCB studies and agreed to conduct \$1 million of in-house research on PCB's and possible substitutes. The company stopped using PCB's and built a \$3.5 million treatment facility. Research firms studied the location and levels of PCB's in the river; the U.S. Geological Survey noted how PCB's moved in sediment, and GE looked for ways to remove the chemical from bottom sediments.

More than 400,000 pounds of PCB's had accumulated in the Upper Hudson. Studies found that levels of the chemical were high in samples of organic debris from old pulp mill discharges that settled in parts of the river channel. Other 'hot spots' included bends in the river where suspended sediments containing PCB's slowed and settled. A lot of wood chips and debris had been held back by a dam at Ft. Edward. When the dam came down in 1973, it loosed pollution into more of the river. Many conservationists cite this example as a cause for urgency, noting that a single major flood could wash PCB's into the Hudson's productive estuary.

According to EPA Regional Administrator Warren the contamination also has had an adverse effect on the State's fishing industry. He said, "In the early 1970's, the Environmental Protection Agency together with the U.S. Fish and Wildlife Service analyzed samples of fish from the Hudson, and discovered that PCB concentrations exceeded U.S. Food and Drug Administration limits of 5 parts per million. Therefore, strong restrictions were placed on commercial fishing and interstate sales."

The State has developed a plan to dredge 340,000 pounds of PCB-contaminated material from the 'hot spots.' Maintenance dredging of the shipping channel removes part of this total, the rest would be done on as-needed basis. Dredged material would



The Hudson entering New York Harbor

be placed in clay-lined landfill areas. The State estimates the cost of this operation at \$35 million and estimates that complete removal of PCB's from the Upper Hudson would cost \$204 million. Some fear that the dredging operation could imperil other areas downstream by stirring up PCB's and spreading the contamination.

Regional Administrator Warren notes that the dredging would have other benefits besides PCB removal: it would also take out of the river other residues from municipal and industrial wastes. Says Warren, "The proposed dredging program is an innovative approach to dealing with toxic industrial wastes. Surely the knowledge gained from this program will be of value in the future."

Drinking Water

The question of toxic substances in drinking water strikes especially close to home for the people who have treated river water running from their kitchen faucets. "The existence of PCB's in the Hudson River threatens the health of communities which take their drinking water from the river," says Warren. A monastery and three towns draw drinking water from the Hudson. It has been estimated that more than 150,000 people may be getting carcinogens in their tapwater. In 1977, Robert Harris, an Environmental Defense Fund staffer, said this about Poughkeepsie's water supply: "I would filter my drinking water and the water I use for cooking through activated carbon."

Granulated activated carbon technology is used in a number of cities, both here and abroad, to remove organic chemical contaminants from water.

As water needs rise, especially in the populous lower reaches of the valley, the drain on the Hudson will increase. As part of the Northeastern Water Supply Study, the Army Corps of Engineers recommended using the river to quench New York City's thirst. The proposal suggests that up to 950 million gallons per day could be added to the City's water supply through an existing intake above Poughkeepsie.

Uproar over the Hudson River Project has been no less fierce than for many other Corps projects that have received publicity in recent years. Environmentalists point to

PCB and toxic contamination in the river water, the cost/benefit analysis has been attacked, and some people question the reliability of Corps data on water demand. The project may need to be reevaluated. A new \$10 million feasibility study has been recommended by the Corps.

Transportation

Large segments of the Hudson traditionally have been dredged on a regular basis to allow the river to continue as a main line for navigation. A recent estimate put dredge removals at over 10 million cubic yards per year. Because the stretch from the Battery in lower New York City to Waterford, N.Y. is a Federal navigation project, responsibility for maintaining this channel falls to the Army Corps of Engineers. The N.Y. State Department of Transportation maintains the Erie and Champlain canals that connect the Hudson to the Great Lakes and Lake Champlain. In the past, dredged materials have been deposited in dumps, often located in wetlands, or in other parts of the river. Dredged materials from the New York City area have been dumped in the ocean 12 miles outside of the Harbor entrance.

Environmental concerns about the effects of dredging New York Harbor nearly kept the ocean liner Queen Elizabeth II and other large passenger ships from docking in New York last spring. Dredging is necessary to keep the channel deep enough to accommodate these large ships. The applications for permission to dredge accumulated



sediment from the berths were kept pending for months while EPA and other officials resolved a dispute over allowable levels of PCB's in dredged materials to be dumped at sea.

In early March, Regional Administrator Warren approved the dredging applications under certain conditions. The Port Authority of New York and New Jersey and other permittees are required to cover PCB-contaminated dredged materials with two feet or more of uncontaminated material. However, Warren stressed the need for more permanent alternatives. He urged the development of regulated disposal of contaminated materials in upland sites or containment islands.

The draft plan of the Hudson River Basin Study group, a consortium of Federal and State representatives, suggests another alternative—prevention. Their report notes that because the need for dredging is a result of sedimentation, the need for such activities can be reduced by better control of erosion. Cropland is targeted as the most susceptible and biggest category of erodible soil. Policies supporting land conservation practices are outlined in the draft plan.

Thermal Pollution

Power plants along the Hudson use up to five billion gallons of water each day for cooling purposes. River water cools the reactors of several nuclear power plants and the generators of numerous coal and oil-fired plants at various points along the river.

Discharges from power plants enter the river at a higher temperature than surrounding waters, sometimes up to a 16° F difference. Conservationists and fishermen are concerned about the effects that heat pollution could have on the Hudson River ecosystem and the impact on the fish population.

Many species of fish can survive only in a narrow range of water temperature and may be weakened if exposed to warmer waters for extended periods of time. Heat can decrease the dissolved oxygen content of the water and affect the impact of certain pollutants. The life cycles of smaller marine organisms and plants can be disrupted by changes in temperature. Heat can also attract fish to a given area that cannot support large numbers and this can lead to major fish kills.

The most infamous fish kill on the Hudson occurred in 1963, when tons of dead fish were hauled away from a power plant at Indian Point, N.Y. The fish swam under a pier, drawn to a stream of warm water from the plant. Many were trapped in an enclosed area and vast numbers of fish died from overcrowding or impingement on the intake pipe screens.

In addition to the problem posed by changing temperatures, the power plants also pose the threat of 'entrainment and impingement' to river life. When an intake pipe sucks up huge quantities of water, it is inevitable that fish, fish eggs, larvae, and other organisms will be pulled along with the flow. Nets or screens placed over the pipes can prevent damage to the machinery inside the plant from such foreign objects as fish, but the fate of the creature sucked into the protective covering is already sealed. Any organisms small enough to pass through the net are killed in the heated interior.

EPA issued discharge permits in 1972 to a number of power plants, which restricted the discharge of heated cooling water. The goal was to persuade power companies to convert the plants from 'once through' cooling to closed-cycle cooling systems that reuse the same water and store it in cooling towers in the interim. Power companies objected to the conditions of the permits.

EPA began holding hearings on the problems of thermal pollution and 'entrainment and impingement' in December, 1977. The recent settlement of this case is described in the accompanying article entitled "Peace At Storm King."

Conservation

The disposition of property and the question of private rights versus the common good has been a subject for controversy in the Hudson Valley for nearly as long as people have lived along the river.

The beauty of the Hudson was renowned in the 19th Century, luring travelers from all over the world and inspiring the famous Hudson River school of painters to portray its grandeur. Millionaires flocked upriver from Wall Street, laying out estates and building copies of European architecture that towered near the water. Yet even then questions of land use arose. In the mid-1800's, writer Washington Irving was livid with rage when new train tracks separated his home from the river and spoiled his view.

But citizens are reclaiming their right to enjoy the river. Groups like the Center for the Hudson River Valley and the Scenic Hudson Preservation Conference are working to protect the integrity of the valley landscape while supporting the economic needs of the community.

The support of local people is essential to assure the continuing use and protection of existing river resources, both natural and man-made. A group named Hudson River Sloop Restoration, Inc. has been educating people through a variety of activities. Local affiliates or sloop clubs hold Clearwater festivals along the river, featuring celebrities like Pete Seeger and Arlo Guthrie to entice people to the waterfront. Clearwater's Great Hudson River Revival at Croton Point last year drew 10,000 people.

The sloop Clearwater itself is a magnet for the curious; the sight of its sails over the water and the sound of river songs from its decks have drawn many who would not otherwise come to know the Hudson. But the main purpose of the Clearwater is educational. Some 7,000 people, most of them schoolchildren in small groups, have taken day cruises on the Clearwater, during which they absorb lessons in history, ecology, and sailing, and perhaps learn an allegiance to the river.

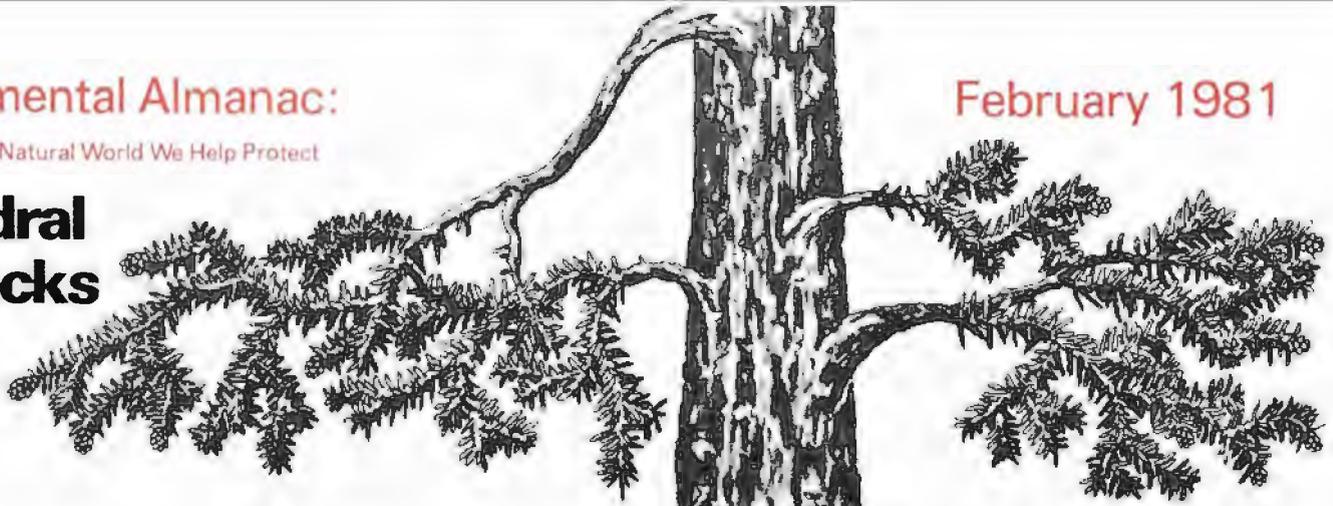
The Hudson's problems are far from resolved, but signs of progress outlined above encourage the many who care about the Hudson River Valley. □

Chris Perham is former Assistant Editor of EPA Journal.



Sailboat on the Hudson

Cathedral Hemlocks



The snow had fallen all night long in the forest and when dawn arrived the majestic and towering hemlocks, wearing new white mantles, sparkled and gleamed in the sun in West Virginia's Cathedral State Park.

Gradually the snow and ice on the church spire tree tops began to melt and icy water dribbled down and ran in rivulets along the trunks and branches.

Soon the plopping of melting snow and ice broke the hush of the woods with a sort of musical tune as the melt splashed onto the ice-encrusted snow blanket on the ground.

The slow dripping from needle to needle helped reduce the impact of the water so that, instead of rushing off to erode the land when it finally reached bottom, it could gradually soak into the ground. Once stored, the moisture could help these trees, some of them as much as 400 years old, to live through the drought of summers to come.

These hemlocks are part of a virgin stand so rare that in 1966 it was recognized by the U.S. Department of the Interior as a National Natural Landmark.

When the pilgrims landed at Plymouth Rock in 1620 on a rocky Massachusetts shore, many of these hemlock monarchs were young trees with four-inch diameter trunks.

At the time of the American revolution in 1775, some of these trees were approaching their full height of some 90 feet.

When the guns of World War I sounded in 1914, these giants were already mature trees.

While the actual rate of growth for each hemlock has varied somewhat depending on its particular site, the largest hemlock at this 130-acre park now has a circumference of 21 feet.

These eastern hemlocks (*Tsuga canadensis*) generally begin their lives in the shadows in some sheltered forest setting, often near a stream. Yet, if one of the large neighboring trees falls and lets more sun pour in, the growth rate of the young hemlock will suddenly spurt.

Like all cone-bearing trees, the hemlocks are primitive plants which started on earth some 300 million years ago. They have separate male cones that produce vast quantities of yellow pollen which are carried by the winds to female cones where new seeds are formed.

The flowering plants such as the grasses and trees like the oaks, magnolias, and elms are much younger than the conifers, appearing on earth only 150 million years ago.

Although primitive, the cone bearers, which include pines, spruces, and firs as well as the hemlocks, have been among the most successful plants ever since they emerged from the mists of the past.

Their relatively hardy needle leaves help them to survive on the borders of deserts and high in the mountains where life for plants is harsh.

While cone-bearing trees do not lose their needles abruptly in the fall as do broad-leaved trees, needles are shed by the

conifers more or less continually throughout the year. However, the shedding is often not noticeable because these trees retain enough needles to maintain a green canopy.

At Cathedral State Park, which is an approximately four-hour drive west from Washington on U.S. Highway 50, the great uncut hemlocks are the predominant species of trees. But many different kinds of hardwoods such as sugar maple, northern red oak, and yellow birch also grow in this setting.

Where the hemlocks with their interlocking branches predominate little light can reach the forest floor and few ground plants grow. But under the more open canopy of mixed hemlocks and hardwoods which allows dappled sunlight below, thickets of rhododendrons and patches of ferns thrive.

Dr. Kenneth L. Carvell of West Virginia University has noted that the park, one of the last legacies of the vast virgin hemlock forest which once flourished in the Appalachian highlands, remains "a treasured remnant and reminder of the primeval forests that once dominated the mountain regions of the . . . State."

—C. D. P.



electricity to pump water uphill to a reservoir.)

However, opponents charged that the new facility would have required a huge power house some 800 feet long at the base of the mountain, a reservoir nearly a mile wide behind Storm King, and 15 miles of transmission line across Putnam and Westchester Counties. They warned that the project would make significant cuts in the mountainside, marring the natural beauty of the area.

The esthetic aspects of the case were an important factor since the facility would have been built in the midst of the Hudson Highlands, a 15-mile stretch that has remained largely untouched since Colonial days. It is characterized by mountains

rising straight from the water's edge, a majestic and impressive panorama that has been admired by generations of residents. In addition, the City of New York entered the case, warning that the blasting of stone would endanger the nearby Catskill Aqueduct. Subsequently, other organizations broadened the case by citing the damage to aquatic life by Storm King and other power plants, and a number of other utilities became involved in other proceedings. These included Central Hudson Gas and Electric Corp.; Consolidated Edison Co. of New York; Orange and Rockland Utilities, Inc.; Niagara Mohawk; and the Power Authority of the State of New York.

EPA held hearings because of questions raised about possible thermal effects on aquatic life in the river and the intake problems of the plants. The Agency had been pressing for construction of cooling towers to make sure that increased river temperatures caused by the discharge of heated water from three generating sites did not damage fish. Under the agreement that demand is being dropped.

Con Ed has agreed to convey its river frontage and the reservoir area on Storm King Mountain as a gift to the Palisades Interstate Park Commission and the nearby Village of Cornwall for park purposes.

During the history of the legal and procedural battle, estimated costs of constructing the two-million-megawatt plant at the base of the mountain soared from \$165 million to more than \$1 billion. Had the hearings continued, they would have lasted until 1985, according to authorities.

The agreement by Con Ed to avoid building cooling systems at the Indian Point nuclear units must now be approved by the Nuclear Regulatory Commission. The New York State Public Service Commission must also concur that this settlement was a prudent decision by the private utilities. Neither of these points is expected to be a major problem. □

Truman Temple is Associate Editor of EPA Journal.

People



Frank T. Princiotta

He has been named Director of EPA's Industrial Environmental Research Laboratory in Research Triangle Park, N.C. He was most recently Director of the Energy Processes Division for the Office of Research and Development at headquarters.

Princiotta is an internationally-recognized expert on technology for controlling air pollution from industrial sources. He will use that experience at

the laboratory, which evaluates and develops technology for controlling air and water pollution from electric power generating plants, fuel processing facilities and a wide variety of other industrial processes.

He joined the Agency in 1971 from Hittman Associates of Columbia, Md., where he was a senior project engineer. From 1962 to 1966 he was a project engineer with the New York Operations Office of the U.S. Atomic Energy Commission.

He received his B.A. in chemical engineering from the City College of New York in 1962. He also holds a certificate in nuclear engineering graduate studies from the Oak Ridge School of Reactor Technology at Oak Ridge, Tenn.



Eduardo Terrones

He has been named Director of the Office of Civil Rights at EPA Headquarters. He was most recently with the U.S. Commission on Civil Rights where he served as an equal opportunity specialist in the Rocky Mountain Regional Office in Denver.

In his new role, he will serve as the principal advisor to the Administrator on the Agency's equal opportunity and civil

rights programs, Fair Housing Officer, and liaison with the Departments of Justice, Commerce, Labor, Housing and Urban Development, Health and Human Services and other agencies concerned with these activities.

Terrones has spent the last 25 years working in the field of civil rights, both in government, including the Office of Economic Opportunity, and with national minority groups such as the National Council of La Raza, a leading Hispanic organization.

He received his bachelor's degree in International Relations from the University of Denver in 1955.

A review of recent major EPA activities and developments in the pollution control program areas.

AGENCYWIDE

Agreement

The Netherlands and the United States are about to embark on a new course of scientific and technical cooperation in the field of environmental affairs. EPA representatives and the Netherlands Minister of Health and Environmental Protection, Dr. Leendert Ginjaar, recently signed a Memorandum of Understanding in the Netherlands which creates a framework for cooperation between the environmental protection organizations of the two industrialized countries.

The two groups will provide each other with information on economic issues and on significant research and regulatory activities concerning water and air pollution, hazardous waste disposal, solid waste treatment and recycling. Other forms of cooperation may include exchange of personnel and joint projects in research and development.

AIR

Bicycling

Senator Strom Thurmond (R-S.C.), recently demonstrated his cycling ability by circling the Capitol reflecting pool in Washington, D.C., and urged Americans to write to their legislators to push for bicycle routes alongside highways across the country.

The 78-year-old Senator called for mayors and city councils to set up bicycle routes along every street in every city in the U.S. "If they can

provide highways for cars, why can't they provide bicycleways for bikes? If more people rode bicycles instead of just driving motorcycles and cars, we'd be a lot better off—it saves energy, and makes people healthier and live longer," Thurmond said.

He said on a recent trip to Denmark he saw bikers commuting 15 miles to work. He added that expanding bicycleways in this country would encourage American workers to do the same.

Smog Reduction

Air pollution standards proposed recently by the EPA would cut smog-forming emissions from new rotogravure printing presses by 13 percent. These New Source Performance Standards (NSPS) are issued under authority of Section 3 of the Clean Air Act.

Publication rotogravure printing presses are a significant source of volatile organic compounds (VOC), which react with nitrogen dioxide in the atmosphere to form smog, a complex pollutant that can impair breathing, irritate eyes and damage plant tissue. The compounds (which are mainly hydrocarbons, the only air pollutants emitted from rotogravure presses), result from the vaporization of organic solvents in printing inks and cleaning fluids.

Funding Limits

The EPA recently announced final action restricting future awards of Federal highway and sewage treatment funds to six major urban areas in California, and to two counties in northern Kentucky because of the failure of the two States to provide for automobile inspection/maintenance.

Inspection/maintenance programs provided for in the Clean Air Act require motorists to have their cars tested periodically to ensure that exhaust emissions of carbon monoxide and hydrocarbons do not exceed certain limits.

ENFORCEMENT

Gasoline

The EPA has filed an administrative civil complaint against PPG Industries, Inc. seeking more than \$2 million in penalties for the repeated use of leaded gasoline in company vehicles designed for unleaded fuel only.

The penalty is the largest sought to date in the Agency's program to discourage fuel switching and tampering with emission control devices. The action by EPA was taken under the Federal Clean Air Act to reduce harmful exhaust emissions from vehicles. The violations occurred at the firm's Lake Charles, La., and Natrium, W. Va., organic chemical plants.

Waste Cleanup

EPA and the Gulf Coast Lead Company of Tampa, Fla., have reached an agreement assuring the cleanup of hazardous wastes at the company's Tampa site and preventing the future migration of chemical contaminants from the site, the Agency recently reported.

Under the terms of the consent decree, this cleanup will be financed by Gulf Coast Lead, subject to EPA review and approval.

Car Recall

EPA recently ordered the General Motors Corporation to recall approximately 570,000 1979 model year passenger cars which fail to meet the Federal exhaust emission standard for oxides of nitrogen.

Vehicles affected by the order are Pontiac LeMans, Grand Am, Grand Prix, Catalina, Bonneville, Firebird and Firebird's Esprit and Formula models. Buick models involved are Century, Regal, and LaSabre. The Oldsmobile Ninety-Eight is also included in the recall.

All of the models are equipped with a 301-cubic-inch displacement, V-8 engine with a two-barrel carburetor and automatic transmission. Vehicles built for sale in California are not included.

HAZARDOUS WASTE

Rules

Hazardous waste handlers are now subject to stringent new EPA regulations designed to ensure safe management of their wastes. Under the new regulations authorized by the Resource Conservation and Recovery Act (RCRA), hazardous waste producers are responsible for the ultimate disposal of their wastes, and for transporting and disposing of them according to EPA standards. Hazardous waste transporters and treatment, storage and disposal facility operators are also subject to the new regulations.

Shipment of the wastes to the facilities must follow new Federal transportation standards for hazardous waste. A new tracking system (called the "manifest" system) is

designed to ensure that the waste actually arrives at the predetermined facility.

The new nationwide tracking system aims at putting an end to the "midnight dumper"—that person who has been in the business of disposing of dangerous wastes as cheaply as possible into sewers, fields, or along roadsides with no thought to the long-term public health or environmental effects.

PESTICIDES

Limits Proposed

EPA recently proposed to ban the use of the pesticide ethylene dibromide (EDB) as a fumigant of stored grain, grain milling machinery and felled logs. The Agency also proposed to phase out the use of EDB to control the spread of certain fruit flies on citrus, tropical fruits and vegetables by July 1, 1983.

EPA said these actions are necessary because of the adverse health risks both to consumers who eat food containing EDB residues and to workers who handle or apply it. An Agency position document concluded that "... the public health risks of cancer, heritable genetic damage and reproductive disorders outweigh the economic benefits (of EDB)."

RESEARCH

Coal Wastes

EPA along with other government agencies and industry is sponsoring a \$2.9 million, six-year project to determine if coal waste products can safely be used to make fishing reefs.

The Coal Combustion Waste Artificial Reef

Program is helping to answer the question of how to dispose of thousands of tons of flyash and scrubber wastes produced by coal-burning power plants.

The site for the project is the Atlantic Ocean south of Long Island, New York. Heavily populated areas such as Long Island and New York City have a critical problem disposing of flyash and scrubber wastes. Space for landfill disposal is limited and the cost of land is high.

Chesapeake Bay

EPA's Office of Research and Development has completed a research summary that describes research undertaken as part of the Chesapeake Bay Program. This research will provide information on which to make decisions for abating deterioration of estuaries in the Chesapeake Bay.

For copies of the Chesapeake Bay Research Summary (EPA 600/8-80-019) contact the Center for Environmental Research Information, USEPA, Cincinnati, OH 45268 or, call (513) 684-7562.

Sulfur Oxides

EPA recently published a Research Summary, "Controlling Sulfur Oxides," which describes the Agency's program for developing new and improving existing technologies for sulfur oxides control.

EPA's Office of Research and Development is developing improved technologies for such control in four major areas: fuel cleaning, flue gas desulfurization, combustion of coal-limestone mixtures, and coal liquefaction and gasification. The Research Summary outlines these programs in detail.

Sulfur oxides are gases that come from burning of sulfur-containing fuel, mainly coal and oil, and also from the smelting of metals and certain industrial processes.

For copies of the Research Summary, "Controlling Sulfur Oxides," EPA 600/8-80-029, write to ORD Publications, USEPA, CERL, Cincinnati, OH 45268, or call (513) 684-7562.

TOXICS

Industrial Chemicals

EPA and the Treasury Department's Customs Service have proposed a program to ensure that imported industrial chemicals meet the same health and environmental requirements as U.S.-produced chemicals.

Under the proposals, firms or agents importing chemicals into the United States would have to certify that each shipment complies with all requirements of the Toxic Substances Control Act (TSCA).

Certification of a shipment under the proposed plan would ensure that the chemical in question meets any current requirements affecting its distribution and use, as defined by EPA rules.

Chemical Review

EPA has proposed a rule that would permit the Agency to review any planned new uses of a specific existing chemical so that possible health problems caused by these uses could be avoided.

The chemical covered is N-methanesulfonyl-p-toluenesulfonamide. The Toxic Substances Control Act (TSCA) specifically authorizes EPA to issue such rules to protect public health.

The proposed rule would allow the Agency to assess the risks involved if a producer intended either to make more than 1,000 pounds per year, or to use the substance for a new purpose which might increase human exposure.

EPA is concerned about the potential danger associated with any new use or increased production of the chemical because either could cause much higher human exposure than now occurs. Any added exposure potentially can increase the risk to human health.

WATER

Groundwater

The EPA has begun a new effort to create a State-Federal partnership to control pollution in the Nation's groundwater supplies.

The Agency recently proposed a groundwater protection strategy that would use existing laws and programs in a better coordinated, more effective manner to protect the quality of U.S. groundwater. This water, in the form of underground aquifers, provides half the country's drinking water and is indispensable for agricultural irrigation.

The proposed strategy was produced by EPA after more than a year of discussions and workshops with State officials, business and industry representatives, public interest groups and other parties. EPA's strategy is concerned with the purity of groundwater.

Toxic Pollutants

EPA has issued new "criteria" for use by the States in controlling wastewater discharges of 64 toxic pollutants, including cadmium,

cyanide, mercury, lead, and certain pesticides.

The criteria are not rules or standards that the States must apply to industries or other sources that discharge any of the 64 compounds. Rather, they are recommendations upon which the States may base water quality standards. The States would enforce these standards through permits issued to wastewater dischargers.

The new criteria cover toxic pollutants linked to cancer, birth defects, nerve damage, and other long-term health effects. These criteria were derived using revised methods to determine pollutant concentrations that, when not exceeded, will protect human health and aquatic life.

Ocean Dumping

The amount of industrial waste, sewage sludge, and construction debris dumped into the seas surrounding the U.S. generally has been declining since enactment in 1972 of the Marine Protection, Research, and Sanctuaries Act, according to a new report from EPA.

The Agency's eighth annual report to Congress on ocean dumping shows that the practice declined in most years since 1973, when 10,934,440 tons of waste were discarded into the Atlantic and Pacific Oceans and the Gulf of Mexico. During 1974 through 1977, this figure dropped steadily to a low of 7,401,600 tons due primarily to a decrease in industrial waste dumping.

However, in 1978 and 1979 waste dumping into the oceans increased due mainly to the disposal of more sewage sludge. This greater sludge load resulted from the operation of more sewage treatment

plants and tougher sewage clean-up levels. The 1979 ocean dumping figure was 8,652,998 tons—still below the 1973 amount. The report does not include figures for 1980.

Copies of the 1979 ocean dumping report are available in the EPA Public Information Center (PM-215), 401 M Street, S.W., Washington, D.C., phone (202) 755-0707.

MISC.

Small Firms

The National Science Foundation is expanding its program supporting research in small science and high technology firms. The recently announced 1981 Small Business Innovation Research program solicitation includes many new areas of research and increased funding in the three-phase program. Eighty phase I awards of \$30,000 each are planned followed by phase II awards averaging \$200,000 for those projects most promising after the first phase. Patent rights will be made available to awardees.

Research proposals sought include the following areas: Conservation of Materials Resources, Bio-Sources of Materials, Genetic Technology, Advanced Chemical Processes, Scientific and Industrial Measurements, Radiation Processing and Control, Marine Resources, Mineral Resources, Environmental Technology, and Appropriate Technology.

Copies of the program solicitation (NSF 80-85) can be obtained from the Forms and Publications Unit, National Science Foundation, 1800 G St., NW, Wash., D.C. 20550. The deadline for receipt of phase I proposals, which are restricted to 20 pages, is April 1, 1981.



Starving Indian child in search of food in drought-stricken area. (Article on p. 2)



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