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Protecting the Earth: Are Our Institutions Up to It?

Protecting the Earth: Are Our Institutions Up to It?

As the 1980s draw to a close, environmental problems are taking on new dimensions. Stratospheric ozone depletion and the Greenhouse Effect, for example, transcend national boundaries and threaten the long-term health of our planet. Are existing institutions up to the task of dealing with the unprecedented challenges that confront us? This issue of *EPA Journal* explores this question.

An article surveying the condition of environmental clean-up efforts nationally and around the world sets the stage for this issue. It is by Gladwin Hill, former environmental correspondent for *The New York Times*. A piece by William K. Reilly, EPA's Administrator, follows, suggesting changes to help the Agency perform more effectively.

A feature by Jessica Tuchman Mathews, Vice President of the World Resources Institute, specifies how some institutional, social, and political barriers to global environmental protection might be overcome. The piece is adapted from a recent Mathews article in *Foreign Affairs* magazine.

Environmentalist Barry Commoner spells out how pollution prevention—a widely acknowledged need—might really be accomplished.

Arthur Koines of EPA's Regulatory Integration Division depicts the dilemma of the average person trying to be a good citizen in the face of the increasing layers of environmental regulation at various government levels. Frances H. Irwin of The Conservation Foundation explains a model "Environmental Protection Act" developed as a working draft by the Foundation in order to stimulate discussion on ways to streamline, integrate, and simplify the current mass of environmental laws.

Ideas for enhancing EPA's role as a lead environmental institution on the world scene are presented in a piece by James Gustave Speth, President of the World Resources Institute.

An industry view of some necessary environmental actions is discussed by John W. Rowe, head of the New England Electric System. Steps the states can take are suggested in an article by Robert Bendick, Rhode Island's Director of Environment Management. And the question whether pollution clean-up agencies must be a Big Brother is addressed in a piece by James M. Lents, Executive Officer with the South Coast Air Quality Management District in Los Angeles.

Two long-time figures on the environmental scene—former U.S. Senator Gaylord Nelson and former Deputy EPA Administrator John Quarles—speak out on the question: Is it possible to apply the crisis-oriented approach of the past in dealing with the environmental problems of today and tomorrow?

The need for consumers to make some basic changes in lifestyles and mindsets is argued by Jay D. Hair, President of the National Wildlife Federation. Retired Senator Robert T. Stafford, a long-time environmentalist in a key institution, the U.S. Congress, writes about changes in approach which that legislative body may need to take as it faces the crowded agenda of environmental problems. And Thomas E. Lovejoy, Assistant Secretary for External Affairs at the Smithsonian Institution, focuses on changes needed in the thinking of well-off nations toward the Third World if the global challenge of a decent environment is to be met.

Michael Gruber, an EPA staffer detailed to the state of Washington's Department of Natural Resources, writes about the most fundamental question—now that there is growing agreement that major steps need to be taken if the planet is to be saved, how do we get there?

This issue of the magazine concludes with a regular feature—Appointments. □

Patrick Marrin, Topeka Capital-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, 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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Front Cover: Earth as seen from the moon. Photo taken on the voyage of Apollo 10. From the photo files of the National Aeronautics and Space Administration.

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A Management Job for the Human Race

by Gladwin Hill

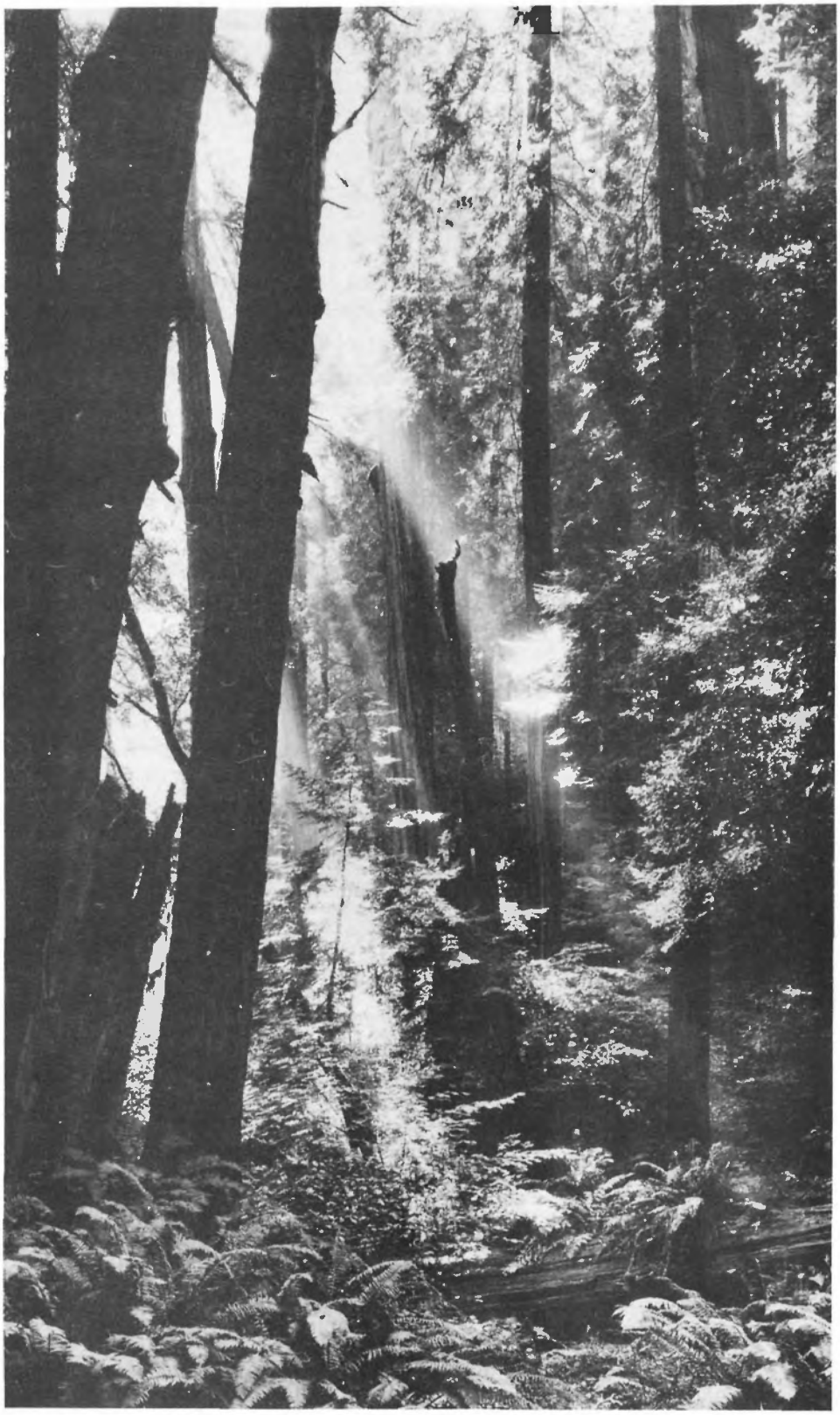
After a century, the message first enunciated by John Muir is sinking in: "When you dip your hand into nature, you find that everything is connected to everything else." But until recently, few comprehended the implications of the naturalist's words.

Muir's message was graphically illustrated just 20 years ago, when the astronauts landed on the moon and pointed their television camera back at earth. There it was: a pathetically small ball of rock, spinning solitarily in vast space, with 5 billion people clinging to its surface—5 billion people completely dependent for survival on the planet's thin veneer of fragile, interdependent resources.

It was three years more before the message first found institutional expression on a global scale in the 1972 United Nations Conference on the Human Environment at Stockholm. There 130 nations solemnly acknowledged a mutual obligation in maintaining a livable global environment. They promulgated a host of recommendations for steps that should be taken. But they created no comprehensive mechanism or procedure for realizing the measures recommended.

Some important measures have been implemented. But meanwhile new environmental problems with global ramifications have surfaced faster than problems have been resolved.

It has taken an ominously accelerating succession of calamities, accidents, and incipient crises—the diminishing stratospheric ozone layer and the Greenhouse Effect, Chernobyl and Bhopal, desertification and deforestation, famines and oil spills—to remind us forcefully that the implications of Muir's words as reinforced by the astronauts' television camera and the good intentions of Stockholm have not been effectively heeded.



National Park Service photo.

Muir Woods National Monument is graced by 200-foot tall redwoods.

An outer-space observer with wondrous vision, scrutinizing the earth in environmental terms, might see something like the scattered pieces of a jigsaw puzzle: myriad clusters of people of assorted races, creeds, and colors, frantically scrambling—in slow motion—to put out environmental brushfires (and, in the confusion, igniting others).

We flatter ourselves on having recognized, if belatedly, the stratospheric ozone danger and having taken collective steps to mitigate it; and on having at least awakened to the greenhouse threat. But we are still in a reactive mode, avoiding collective action until it is forced upon us. Despite the repeated eruption of problems we didn't anticipate, there is a palpable chronic complacency—a delusion that each exigency will be the last one, a tacit assumption that there are no more environmental shoes to drop.

A little reflection will suggest how wrong this may be, for there is much evidence that so far we have seen only the tip of the iceberg of possible global environmental problems:

- Before us lie large areas of ignorance. We have no certainty of the degree of ongoing contamination of the planet's oceans; if ignored, it could suddenly develop that their function of revitalizing the air and supporting vital food chains had been critically impaired.
- We have no precise knowledge of the impacts of the constant discharge of hundreds of industrial and agricultural chemicals on the earth's air, land, and water.
- Nor do we know just how far we have gone in upsetting, through extinctions, the earth's primal balance of animal and plant species.
- Through the use of pesticides and antibiotics, we have engendered scores of resistant species whose potential for spreading disease and blight remains unassessed.
- And we have maintained a cavalier, there's-no-tomorrow outlook regarding the depletion of minerals and other natural resources.

These are just a few of the more obvious facets of the environmental iceberg. They point to a scarcely arguable need for concerted international steps to envision, and avert, major global environmental perturbations.

A global organization to coordinate international action against global threats would seem to be an imperative . . . .

Increasingly, one hears advanced the view that environmental imperatives are rapidly transcending armaments as the pivotal element in security among nations.

Looking in the Mirror

Although Americans tend to bask in the notion that we are environmentally progressive, in truth the United States is in many ways a mirror of global environmental problems—a story of too little and too late, of disarray and confusion, of human welfare treated as a shuttlecock or left to the problematical mercies of "the marketplace."

The United States did move quickly, as the Environmental Revolution dawned in the late 1960s, to enact constructive measures: the epochal National Environmental Policy Act, laws to abate air and water pollution and even noise, laws to deal with solid waste, to protect wildlife, to save coasts from degradation, and more. But the ensuing years have painfully demonstrated that environmental quality is much easier sought than achieved. Although we have been spending roughly $85 billion a year—$340 per capita—on pollution controls, we are far short of our goals of clean air and water. Disposal of everyday solid waste has become a nightmare. Raw sewage and worse despoil our shores.

Meanwhile new problems have continued to erupt—acid rain, the discovery of thousands of toxic dumps, radon, pesticide scares . . . .

Even while harboring pretensions to leadership in international environmental progress, the United States has been contributing heavily to environmental problems. For instance, we exceed most nations in production of chlorofluorocarbons, in per-capita energy consumption, and in consequent emissions of carbon dioxide (five tons per capita compared to a worldwide average of less than one ton).

The United States exemplifies the worldwide conflict of interests standing in the way of environmental reforms: the conflict between professed desires for environmental quality versus an addiction to lifestyles that are environmentally destructive in every aspect from industrial activity to forest destruction and the reckless use of chemicals.

The recent controversy over the pesticide Alar was a poor testimonial concerning our regulation of chemicals. Not only did the dispute raise problematic questions about chemical testing and risk assessment, but as regulations presently are entangled, it seems that a chemical that might be summarily banned if newly developed may be well-nigh impossible to dislodge once it gets on the market.

While we are chiding other nations for destroying forests, in the United States we are stripping large expanses of federal land for wood to sell to Japan. Mining on public lands is governed by the diaphanous provisions of a 117-year-old law—an exercise in antiquity it would be hard to match in Europe.

Lack of a coherent national energy policy has contributed to problems

extending from the Alaska oil spill to Detroit auto manufacturing, and from acid rain in the Adirondacks to a stymied nuclear power industry from coast to coast.

For 20 years, ever since the Santa Barbara oil spill, the oil industry and federal authorities have been trumpeting about technological and strategic progress in oil spill control measures and mechanisms. Yet when the crunch came in Alaska, we didn't even have the proverbial seven maids with seven mops.

Last November a group of leading organizations presented then President-elect Bush with a list of no fewer than 700 environmental matters they said needed Executive attention. One observer asked if such a list would be any longer in Zaire.

The Nations Act

To date, the 1972 Stockholm conference has been the world's closest approach to collective action in dealing with environmental problems. The 10-day assemblage far exceeded the expectations of many, while disappointing the wistful hopes of some.

Under the masterful helmsmanship of Canada's Maurice Strong, the 130 participating nations formally assumed responsibility for the earth's environmental welfare and endorsed an "Action Plan" of some 109 items to be pursued. The Action Plan was long on scope, but short on commitments. In deference to national sovereignties, the 109 items largely were couched in terms of "recommendations to governments," and many called simply for "studies" or research.

Yet the concrete results were many. They included programs for worldwide monitoring of critical environmental factors—the impetus for the current apprehensions concerning the stratospheric ozone layer and global warming. Other Action Plan items set in motion unprecedented scientific collaboration, such as the teamwork between American and Russian specialists, which has grown steadily without regard to diplomatic vicissitudes. A "heritage" program was initiated for preserving—on behalf of all nations—sites and areas of unique environmental significance. The conference laid the groundwork for a number of regional pacts for ameliorating pollution of the Mediterranean, Baltic, and Caribbean seas and other ocean areas.

With environmental populism gathering such momentum, it seems only a matter of time, and not too long a time, until it brings significant changes in national lifestyles . . . .

The conference stopped short of creating a permanent international organization with authority to oversee global environmental developments, formulate collective policies, and exert telling influence on implementation of, and adherence to, such policies.

Yet conference organizers considered it a signal achievement that delegates—and later the United Nations General Assembly—were persuaded to create an ongoing agency to be some sort of focus of international environmental activities: the United Nations Environment Programme (UNEP).

Conspicuously deprived of muscle, UNEP was placed under a 58-member governing board bound to reflect the tensions and schisms within the United Nations itself. It was situated inaccessibly in Nairobi, Kenya, and given minuscule financing. (Its budget recently has been around $30 million a year—amounting to less than one cent for each of the world's citizens whose interests the agency is expected to further.)

Given these limitations, UNEP has functioned impressively. It has served as an information clearing-house; instigated progressive environmental programs in selected areas; organized multi-national collaboration on specific problems; and strived to elicit cooperation from the array of U.N. affiliates such as the World Health Organization and the Food and Agriculture Organization that have environmental overlaps.

Yet UNEP comes nowhere near encompassing the collective concerns and aims embodied in the Stockholm conference itself. In addition, UNEP is not in a position to achieve vigorous implementation of the Action Plan.

What Next?

A global organization to coordinate international action against global threats would seem to be an imperative—an idea whose time has long since come, albeit whose realization has so far eluded us.

On the eve of the Stockholm conference, the eminent Indiana University environmental scholar, Dr. Lynton Caldwell, foresaw a need for a compact international council of no more than 25 members, empowered to delineate global environmental priorities and policies. He suggested that such an agency might well be under the aegis of the United Nations. But Stockholm and the ensuing years have indicated that such an arrangement would simply subject international environmental initiatives to another layer of politicking and to the United Nations' procedural ponderousness.

Apart from the United Nations, it seems most unlikely that the world's nations will be disposed to cede sovereignties to the degree necessary to create any sort of global environmental "super-agency" with definitive authority.

But such a quantum leap may not be necessary.

The problem of galvanizing, coordinating, and integrating international activities to cope with global environmental threats suggests, in

About half of the earth's rainforests, which provide habitat for ocelots and many other species, have been destroyed by cutting and burning. Such habitat losses, together with illegal poaching for fur, threaten the ocelot with extinction.

Carl Hansen photo, SITES, Smithsonian Institution

massiveness and complexity, nothing as much as the international effort mounted in prosecuting World War II.

It may seem the height of irrelevance or impracticality to suggest that the war effort offers guidelines for the environmental realm. But there are common elements.

The war was pursued by the free world in a classic autocratic pattern, with policies dictated by national leaders—principally Roosevelt, Churchill, and Stalin—and the reins of implementation extending mainly from the desk of General George C. Marshall in the Pentagon. That hardly is a model that can be emulated in peacetime affairs.

But let us look a little deeper. The essential task in World War II was harnessing and coordinating the efforts of a wide assortment of Allied nations and peoples, with widely disparate parochial interests and capabilities. There was no way these participants could be geared into a united force simply by military edict. It required many forms of suasion, and the most important ingredient of all: *consensus* on the common goal of defeating the Axis.

A consensus regarding environmental protection and progress survived a test flight at Stockholm. Since then, that consensus has been gathering mass and momentum at the grass-roots level virtually every day.

The Green Light

In the last decade, a wave of environmental populism has swept across western Europe. Under the loose generic appellation, "the Greens," the movement has become an important political force in a score of nations, drawing support from both the left and the right.

The Green Wave that is changing the face of politics in Europe has the potential to do the same thing in other parts of the world . . . .

Greens have been elected to legislative bodies in West Germany, France, Italy, Austria, Luxembourg, Switzerland, Belgium, Finland, and Portugal. Some 3,000 Greens have been counted in the federal, state, and local legislative bodies in West Germany alone. "Environmentalists have become Europe's most formidable and best-organized pressure group," a correspondent wrote in June.

In recent months both Prime Minister Margaret Thatcher in Britain and France's President Francois Mitterand have been impelled to make conspicuous leaps onto the environmental bandwagon, convoking conferences on global problems and making other genuflections to the cause.

"The environment has been rising pretty steadily as one of the most important issues facing Britain today," a leading English pollster, Robert Worcester, commented recently.

And Raymond Von Ermen, Secretary General of the European Environmental Bureau in Brussels, has said: "In every one of the European Community countries, the environment is a major issue, and in every one it is growing."

Despite the long prevalence in America of old-line organizations like the Sierra Club and the Audubon Society, the Green movement is getting a portentous foothold in the United States. Its original spawning ground in New England is reported to have expanded to 200 chapters throughout the country. There is even a chapter in the San Fernando Valley of Los Angeles, often considered a bastion of bourgeois materialism.

Currently the American movement is eschewing the hard-ball political activism of Europe in favor of educational activities, promoting "grass-roots consciousness." But meanwhile some of the Green ideals are being furthered in this country by organizations such as the Los Angeles area's "Tree People," recently honored by UNEP for its overseas forestation program, and Kansas City's "Trees for Life," which has been planting fruit trees in India.

"The nation once again is undergoing the national soul-searching that

accompanied the first Earth Day in 1970," Russell Train said recently. Train, former head of EPA and the Council on Environmental Quality, is chairman of the Conservation Foundation and the World Wildlife Fund. "Public concern," he continued, "is so strong that we can be said to be experiencing a fresh wave of environmentalism. There is a sense that pollution is inadequately controlled, that natural systems are being degraded, that we are generating more waste than we can handle, that chemicals are creating dangers we can hardly imagine."

In the United States, we have the machinery for implementing the mounting sentiment for environmental progression. But some of it is creaky, some obsolescent, and some rusty.

U.S. Army photo.

In recent public opinion surveys, two Americans out of three said they believed that "protecting the environment is so important that requirements and standards cannot be too high, and continued environmental improvements must be made regardless of cost."

With environmental populism gathering such momentum, it seems only a matter of time, and not too long a time, until it brings significant changes in national lifestyles that are conspicuously inimical to environmental quality. Such conspicuous habits include demands for gas-guzzling cars, a voracious pattern of energy consumption, throwaway consumerism, recreational vehicles designed to ravage deserts, the equation of growth with good, and all the rest.

The Green Wave that is changing the face of politics in Europe has the potential to do the same thing in other parts of the world—knitting the political muscle and consolidating the all-important consensus.

The pollster Louis Harris has ventured, on the basis of his evolving opinion-sounding over the years, that by 1992 or 1996 the United States may have a president "chosen and elected with a pro-environment stance as his primary identification."

Meanwhile, Squeaky Wheels

In the United States, we have the machinery for implementing the mounting sentiment for environmental progress. But some of it is creaky, some obsolescent, and some rusty.

The compartmentalized approach to dealing with air and water pollution and dealing with wastes which seemed so logical in the 1970s is now widely recognized as technically and administratively a blind alley. Radical revisions are needed to permit an integrated attack on these problems.

In addition to its fragmented legislative mandate, EPA is handicapped by its implicitly subordinate status in the federal structure. The scope of its responsibilities and concerns has inexorably broadened to involve critical dealings with all the principal federal departments, and it needs equal, cabinet-level rank with them.

Congress—the source of environmental statutes and financing—is a patchwork of contradictions. In the mold of such figures as Gaylord Nelson, Edmund

The Normandy invasion. During World War II, Allied nations mounted a massive, coordinated effort to win against a shared threat. An international mobilization of another kind may be required to protect the world environment.

Muskie, and the late Scoop Jackson, its membership includes paragons of environmental enlightenment. Two decades ago, Congress acted with dispatch to meet perceived environmental imperatives. But since then, in terms of collective action, Congress has lapsed into a 19th-century pace, dawdling for years in unproductive wrangling over updating environmental legislation, seemingly having lost its sense of the pace of national and international developments and the pitch of public sentiment.

A legislative body that has foot-dragged for seven years amending the Clean Air Act will not recover its due role in environmental progress until it takes to heart the recent words of Thomas E. Lovejoy, Assistant Secretary at the Smithsonian Institution. Referring to conditions worldwide, he said: "Massive intervention in society is required over a very short time span—perhaps *less than 10 years.*" (See article on page 42.)

Finally, there is the Council on Environmental Quality. Conceived as an elite advisory body for the President and Congress, it produced much of the substance of the nation's initial burst of environmental reform. But it has been relegated to unheeded, faceless obscurity, from which the national interest demands that it be reactivated as soon as possible.

A Test of Statecraft

If life on earth survives its current travail, people will look back on the present as the horse-and-buggy days of environmental management, with global activities ridiculously fragmented and crises met with a succession of *ad hoc*, panic-button, transitory coalescences of effort.

"The recent quickening of international environmental conferences, treaties, and protocols and of environmental speeches by world leaders is an encouraging sign," Russell Peterson, former head of the Council on Environmental Quality and of the National Audubon Society, said recently. "But these are only words. We need action. What needs to be done worldwide is already known—use energy more efficiently, develop alternate sources of energy, plant trees, recycle materials, further family planning, practice more sustainable agriculture, establish and support more restrictive environment laws, presume new chemicals guilty until proven innocent. The resources to do the job are available. What is required is the political will to allocate the resources."

If life on earth survives its current travail, people will look back on the present as the horse-and-buggy days of environmental management....

In the 1988 *State of the World* report of the Worldwatch Institute, Lester Brown, a leading eco-economist, estimated that the earth's current environmental decline could be halted with an international expenditure of $150 billion a year—a fraction of the world's $900 billion annual military expenditures. But to do it, he added, would call for "a wholesale reordering of priorities, a basic restructuring of the global economy, and a quantum leap in international cooperation."

None of these requisites seems near to realization. But to make a start, as Russell Peterson noted, requires "political will." And that is steadily crystallizing under the pressures of environmental populism and rapidly broadening public comprehension of the non-military threats to the earth's security.

The New York Times reported from Washington on May 15 that "the world's deteriorating environment has become a top economic concern of the United States and other industrial nations, along with Third World debt and trade."

William Nitze, the State Department's top environmental official, says environment "is now an issue of consequence that has risen to the top of the international agenda."

And Tennessee's Senator Albert Gore, Jr., told a recent Washington conference: "In the not-too-distant future, there will be a new 'sacred agenda' in international affairs: policies that enable rescue of the global environment. The task will one day join with, and even supplant, preventing the world's incineration through nuclear war as the principal test of statecraft."

An encouraging sense of urgency is reflected in the United Nations' decision not to wait for a traditional 25th anniversary of the Stockholm conference, but to convene a 20th anniversary sequel in 1992 to take stock of global problems and consider new steps to deal with them.

Who can say that, considering the recent upsurge in international environmental concern, the world will not be ready to consider a stronger structure for international collaboration than was envisioned in 1972? For each year that passes brings added evidence that the earth's thin mantle of resources is not divisible into manageable bits and pieces but must be dealt with as a unity in which "everything is connected to everything else." □

(Hill is the former national environmental correspondent of The New York Times. *Copyright Gladwin Hill.)*

The Greening of EPA

by William K. Reilly

National Park Service photo

Point Reyes National Seashore in California—symbolic of our natural treasure. New thinking and new attitudes are needed to protect our resources from environmental threats, many of which are heedless of national boundaries.

"Future historians," predicts former National Security Advisor Zbigniew Brzezinski, a careful observer of international events, "will almost certainly hail the last years of this century . . . as a watershed in world affairs."

As events in China, Russia, Eastern and Western Europe, and Latin America suggest, change—rapid, even revolutionary change—has clearly become the watchword for the closing years of the 20th Century.

What do political changes of global magnitude have to do with the environment? Just this: as Dr. Brzezinski points out, the breathtaking upheavals in the world today present the United States with an unprecedented array of "challenges begging to be exploited as opportunities."

And nowhere are these challenges—and opportunities—greater than in the area of environmental protection. People everywhere are expressing concern over a deteriorating global environment. The term "national security" is being redefined to include security from environmental, as well as military, threats. Environmental issues were highlighted at the recent Western economic summit in Paris as never before in the 15-year history of the event. The environment, in other words, has moved from the margins to the mainstream.

What's more, our understanding of environmental problems is changing. No longer are our concerns over pollution defined by geographic boundaries or specific environmental media. Global problems like the Greenhouse Effect, deforestation, stratospheric ozone depletion, and acid rain already are beginning to usher in a new era of cooperative international action.

What must we do, as individuals and as a society, to meet the challenge of political and environmental change in the 1990s? Above all, *we* must be willing to change—to adjust to the new realities of our age, to think about the environment from a fresh perspective, to give up outmoded assumptions and "black-hat, white-hat" preconceptions of the past in favor of cooperative, innovative approaches to environmental protection. New ways of thinking about the environment can lead to significantly more effective ways of protecting it.

A good place to start fostering these new attitudes and approaches is right here at EPA and at other institutions and organizations responsible for protecting the global commons. Government and private institutions alike must begin to move beyond traditional environmental protection programs, which—despite past successes—no longer offer solutions to today's problems.

New approaches to environmental protection—like market incentives and pollution prevention—mean that EPA, too, must change.

One example of a new approach that shows great promise for enhanced environmental protection is market incentives, incorporated in President Bush's recent proposal to amend the Clean Air Act. The President's proposal establishes tough standards and deadlines for reducing emissions of toxic chemicals and other pollutants. It also contains a number of market incentives that should encourage industries to participate much more willingly—and effectively—in pollution control efforts.

Under the President's plan, the private sector will have much of the responsibility for defining how and when harmful air emissions are cut. As long as overall targets are hit, industry is given considerable flexibility in deciding, for example, if greater emissions reductions should be made at one plant in exchange for lesser reductions at another.

This approach—combining traditional "command-and-control" regulation and vigorous enforcement with a flexible, market-based system of incentives and tradeoffs—can be applied to many other issues besides clean air. Senators John Heinz and Tim Wirth outlined many of them last year in their comprehensive "Project 88" report on market-based environmental initiatives.

I find the market-incentive approach especially appealing for two reasons: it makes the private sector a partner, rather than an adversary, in controlling pollution and reducing environmental risk; and it leverages the government's limited resources by exploiting market forces to achieve environmental goals.

Incentives also can be used to advance another much-needed approach: pollution prevention. Programs to control pollution at its source—*before* it enters the environment and becomes subject to traditional end-of-pipe controls and cleanup—are now a top priority at EPA. Pollution-preventing ideas are beginning to take hold throughout the environmental and business communities as their advantages in reducing environmental and health risks become more and more obvious.

Like the market-incentive approach, pollution prevention offers both direct and indirect benefits to participating industries. Not only can it save a company money by promoting production efficiencies and reducing the costs of hazardous waste disposal, but it also can contribute to community goodwill. What better message could a plant send its neighbors than that it has been able to reduce greatly the amount

of hazardous substances it uses and releases into the community?

The movement toward pollution prevention is complicated by the fact that current environmental law tends to require media-specific, if not pollutant-specific, controls. Make no mistake—laws like the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, and the Resource Conservation and Recovery Act were landmark achievements that have made remarkable progress cleaning up the environment over the past two decades.

But nearly 20 years' experience has shown us that single-medium laws based on containment and treatment of individual pollutants have limitations. They usually don't remove pollutants from the environment, but merely shift them from one environmental medium—air, water, land—to another. And current laws provide little or no incentive for industries to develop creative, cost-effective methods of eliminating or reducing pollution at its source, or to adopt environmentally safe methods of recycling those pollutants which cannot be eliminated.

The time has come to consider applying market incentive/pollution prevention approaches to environmental programs across the board. With that in mind, we are considering asking Congress for limited authority to use an integrated, multi-media approach to reducing health and environmental risk—one that would give EPA the flexibility to look at a facility's *total* emissions to all environmental media, and then impose controls that would result in the greatest risk reduction at the least cost.

I know this is a controversial proposal. Some environmentalists and members of Congress may be uncomfortable with the idea of giving EPA the authority to waive pollution controls set by law. Yet if EPA can show that such an approach can reduce risks and costs at the same time, then I believe it is a proposal well worth pursuing—especially if we see results that would transform our understanding of what will be needed to fight pollution in the years ahead.

New approaches to environmental protection—like market incentives and pollution prevention—mean that EPA, too, must change. We will have to develop new skills, and broaden our use of old ones, as we work in a climate that emphasizes regulatory flexibility, multi-media pollution prevention, and decentralized decision-making.

For example, the ability to listen to the public's concerns and to communicate effectively with citizens on issues related to environmental risks and tradeoffs will become an increasingly valuable attribute in the EPA of the 1990s. Communication skills also will be important as we increase our emphasis on consumer education—making individuals and families aware of the environmental risks of life in an industrial society. EPA must improve its efforts to help people understand how we all contribute to pollution and what we can do to eliminate it from our daily lives.

In this, we at EPA must serve as examples as well as advocates. As we urge citizens and communities to separate and recycle their wastes in order to relieve the pressure on our nation's overburdened landfills, EPA itself has to practice what it preaches. Each of us has to participate in Agency-wide efforts to recycle paper, purchase recycled supplies, cut back on the use of non-degradable products and products with excessive packaging, and so forth. What better place to begin changing this country's "throw-away" mentality than right here at EPA?

In short, my vision of EPA in the closing years of the 20th Century consists of two related images—a clenched fist, representing our continued emphasis on controlling pollution and vigorously enforcing our nation's environmental laws; and an open hand, symbolizing our receptivity to new ideas, our desire to work with the public and other organizations to develop new and better ways of reducing environmental risk, and our willingness to help citizens get the information they need to protect themselves and their families from environmental risks in their homes and communities.

A new EPA—an EPA that is equally proficient at employing an open hand as well as a clenched fist—will be well prepared to respond to the momentous changes taking place in the world around us. And we will be well prepared to exploit all the opportunities those changes will bring. □

(Reilly is Administrator of EPA.)

Tackling the Institutional Barriers

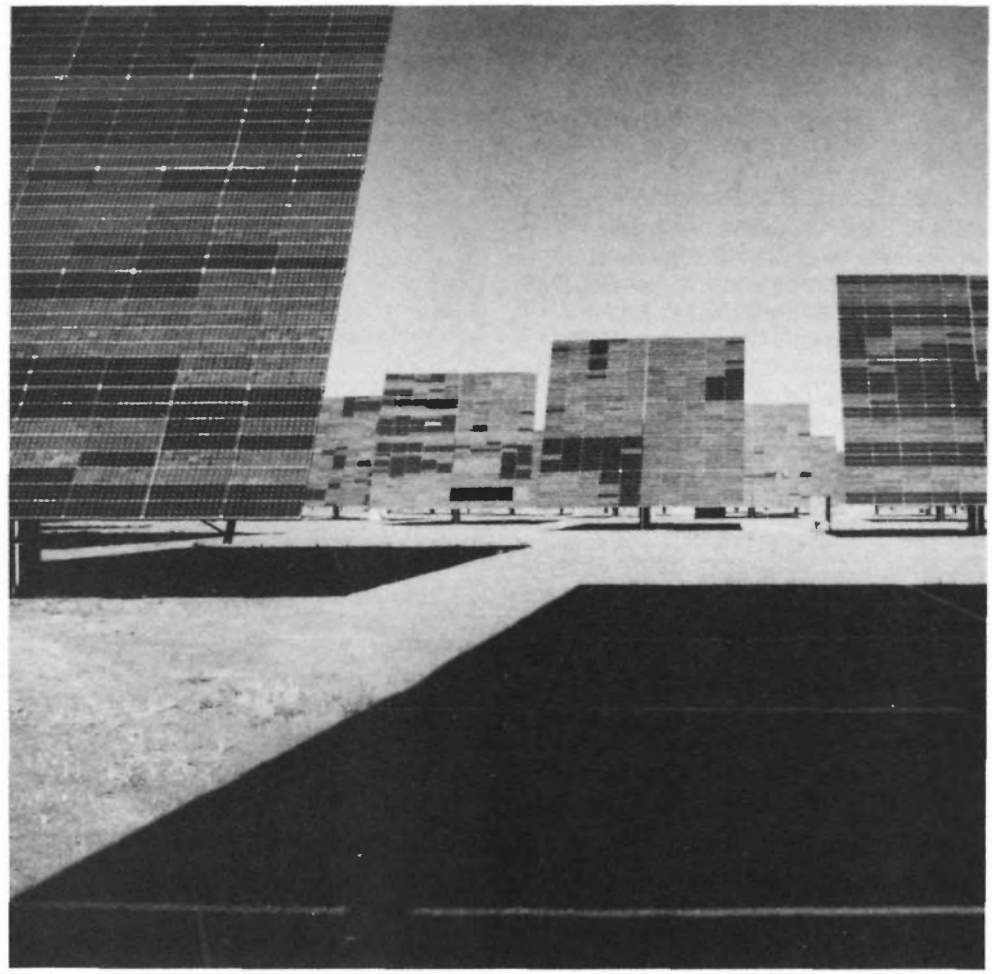
by Jessica Tuchman Mathews

The following article is adapted from Mathews' essay entitled "Redefining Security," which appeared in the Spring 1989 issue of Foreign Affairs.

The 1990s will demand a redefinition of what constitutes national security. In the 1970s, the concept was expanded to include international economics . . . . Global developments now suggest the need for another analogous, broadening definition of national security to include resource, environmental, and demographic issues . . . .

Environmental strains that transcend national borders are already beginning to break down the sacred boundaries of national sovereignty, previously rendered porous by the information and communication revolutions and the instantaneous global movement of financial capital. The once sharp dividing line between foreign and domestic policy is blurred, forcing governments to grapple in international forums with issues that were contentious enough in the domestic arena . . . .

The majority of environmental problems demand regional solutions which encroach upon what we now think of as the prerogatives of national governments.



EPRI Journal *photo.*

Arco Solar's Carissa Plains site, near San Luis Obispo, California, is connected to the Pacific Gas and Electric system. The author calls for a 10-year U.S. energy policy aimed at more efficient energy production with less damage to the environment.

Individuals and governments alike are beginning to feel the cost of substituting for (or doing without) the goods and services once freely provided by healthy ecosystems. Nature's bill is presented in many different forms: the cost of commercial fertilizer needed to replenish once naturally fertile soils; the expense of dredging rivers that flood their banks because of soil erosion hundreds of miles upstream; the loss in crop failures due to the indiscriminate use of pesticides that inadvertently kill insect pollinators; or the price of worsening pollution, once filtered from the air by vegetation . . . .

Moreover, for the first time in history mankind is rapidly—if inadvertently—altering the basic physiology of the planet. Global changes currently taking place are unprecedented in both their pace and scale. If left unchecked, the consequences will be profound and, unlike familiar types of local damage, irreversible . . . .

Moreover, environmental decline occasionally leads directly to conflict, especially when scarce water resources must be shared. Generally, however, its impact on nations' security is felt in the downward pull on economic performance and, therefore, on political stability. The underlying environmental cause of turmoil is often ignored; instead governments address the poverty and instability that are its results . . . .

Millions have been forced to leave their homes in part because of the loss of tree cover, the disappearance of soil, and other environmental ills that have made it impossible to grow food. Wherever refugees settle, they flood the labor market, add to the local demand for food, and put new burdens on the land, thus spreading the environmental stress that originally forced them from their homes. Resource mismanagement

is not the only cause of these mass movements, of course. Religious and ethnic conflicts, political repression, and other forces are at work. But the environmental causes are an essential factor.

A different kind of environmental concern has arisen from mankind's new ability to alter the environment on a planetary scale. The earth's physiology is shaped by the characteristics of four elements (carbon, nitrogen, phosphorous, and sulfur); by its living inhabitants (the biosphere); and by the interactions of the atmosphere and the oceans, which produce our climate.

Mankind is altering both the carbon and nitrogen cycles, having increased the natural carbon dioxide concentration in the atmosphere by 25 percent. This has occurred largely in the last three decades through fossil-fuel use and deforestation. The production of commercial fertilizer has doubled the amount of nitrogen nature makes available to living things. The use of a single, minor class of chemicals, chlorofluorocarbons (CFCs), has punched a continent-sized "hole" in the ozone layer over Antarctica, and caused a smaller, but growing loss of stratospheric ozone around all the planet. Species loss is destroying the work of three billion years of evolution . . . .

Serious enough in itself, stratospheric ozone depletion illustrates a worrisome feature of man's newfound ability to cause global change. It is almost impossible to predict accurately the long-term impact of new chemicals or processes on the environment. CFCs were thoroughly tested when first introduced, and found to be benign. Their effect on the remote atmosphere was never considered.

The lesson is this: current knowledge of planetary mechanisms is so scanty that the possibility of surprise, perhaps quite nasty surprise, must be rated

Louis J. Metz photo, U.S. Forest Service

rather high. The greatest risk may well come from a completely unanticipated direction.

Absent profound change in man's relationship to his environment, the future does not look bright. Consider the planet without such change in the year 2050. Economic growth is projected to have quintupled by then. Energy use could also quintuple, or if post-1973 trends continue, it may grow more slowly, perhaps only doubling or tripling. The human species already consumes or destroys 40 percent of all the energy produced by terrestrial photosynthesis, that is, 40 percent of the food energy potentially available to living things on land.

The United States, in particular, will have to assign a far greater prominence than it has heretofore to the practice of multilateral diplomacy.

While that fraction may be sustainable, it is doubtful that it could keep pace with the expected doubling of the world's population. Human use of 80 percent of the planet's potential productivity does not seem compatible with the continued functioning of the biosphere as we know it. The expected rate of species loss would have risen from perhaps a few each day to several hundred a day. The pollution and toxic waste burden would likely prove unmanageable. Tropical forests would have largely disappeared, and arable land, a vital resource in a world of 10 billion people, would be rapidly decreasing due to soil degradation . . . .

Happily, this grim sketch of conditions in 2050 is not a prediction, but a projection, based on current trends. Like all projections, it says more about the present and the recent past than it does about the future. The planet is not destined to a slow and painful decline into environmental chaos. There are technical, scientific, and economical solutions that are feasible to many current trends, and enough is known

Erosion in South Carolina. Soil erosion and other kinds of resource depletion are not taken into account in Gross National Product calculations for the United States or most other countries.

about promising new approaches to be confident that the right kinds of research will produce huge payoffs.

Embedded in current practices are vast costs in lost opportunities and waste, which, if corrected, would bring massive benefits. Some such steps will require only a reallocation of money, while others will require sizable capital investments. None of the needed steps, however, requires globally unaffordable sums of money. What they do demand is a sizeable shift in priorities ....

But if the technological opportunities are boundless, the social, political, and institutional barriers are huge. Subsidies, pricing policies, and economic discount rates encourage resource depletion in the name of economic growth, while delivering only the illusion of sustainable growth. Population control remains a controversial subject in much of the world. The traditional prerogatives of nation states are poorly matched with the needs for regional cooperation and global decision-making. And ignorance of the biological underpinning of human society blocks a clear view of where the long-term threats to global security lie.

Overcoming these economic and political barriers will require social and institutional inventions comparable in scale and vision to the new arrangements conceived in the decade following World War II. Without the sharp political turning point of a major war, and with threats that are diffuse and long-term, the task will be more difficult. But if we are to avoid irreversible damage to the planet and a heavy toll in human suffering, nothing less is likely to suffice. A partial list of the specific changes suggests how demanding a task it will be.

Achieving sustainable economic growth will require the remodeling of agriculture, energy use, and industrial production after nature's example—their reinvention, in fact. These economic systems must become circular rather than linear. Industry and manufacturing will need processes that use materials and energy with high efficiency, recycle byproducts, and produce little waste. Energy demand will have to be met with the highest efficiency consistent with full economic growth. Agriculture will rely heavily upon free ecosystem services instead of nearly exclusive reliance on man-made substitutes. And all systems will have to price goods and services to reflect the environmental costs of their provision.

A vital first step, one that can and should be taken in the very near term, would be to reinvent the national income accounts by which gross national product (GNP) is measured. GNP is the foundation on which national economic policies are built, yet its calculation does not take into account resource depletion. A country can consume its forests, wildlife, and fisheries, and its minerals, clean water and topsoil, without seeing a reflection of the loss in its GNP. Nor are ecosystem services—sustaining soil fertility, moderating and storing rainfall, filtering air, and regulating the climate—valued, though their loss may entail great expense. The result is that economic policymakers are profoundly misled by their chief guide.

A second step would be to invent a set of indicators by which global environmental health could be measured. Economic planning would be adrift without GNP, unemployment rates, and the like, and social planning without demographic indicators ...

Among these new approaches, perhaps the most difficult to achieve will be ways to negotiate successfully in the presence of substantial scientific uncertainty.

would be impossible. Yet this is precisely where environmental policymaking stands today ....

On the political front, the need for a new diplomacy and for new institutions and regulatory regimes to cope with the world's growing environmental interdependence is even more compelling. Put bluntly, our accepted definition of the limits of national sovereignty as coinciding with national boundaries is obsolete ....

The majority of environmental problems demand regional solutions which encroach upon what we now think of as the prerogatives of national governments. This is because the phenomena themselves are defined by the limits of watershed, ecosystem, or atmospheric transport, not by national borders. Indeed, the costs and benefits of alternative policies cannot often be accurately judged without considering the region rather than the nation ....

Dealing with global change will be more difficult. No one nation or even group of nations can meet these challenges, and no nation can protect

itself from the actions—or inaction—of others. No existing institution matches these criteria ....

The United States, in particular, will have to assign a far greater prominence than it has heretofore to the practice of multilateral diplomacy. This would mean changes that range from the organization of the State Department and the language proficiency of the Foreign Service, to the definition of an international role that allows leadership without primacy, both in the slogging work of negotiation and in adherence to final outcomes.

Above all, ways must be found to step around the deeply entrenched North-South cleavage and to replace it with a planetary sense of shared destiny. Perhaps the successes of the U.N. specialized agencies can be built upon for this purpose. But certainly the task of forging a global energy policy in order to control the Greenhouse Effect, for example, is a very long way from eradicating smallpox or sharing weather information ....

Today's negotiating models—the Law of the Sea Treaty, the Nuclear Nonproliferation Treaty, even the promising Convention to Protect the Ozone Layer—are inadequate. Typically, such agreements take about 15 years to negotiate and enter in force, and perhaps another 10 before substantial changes in behavior are actually achieved .... Far better approaches will be needed.

Among these new approaches, perhaps the most difficult to achieve will be ways to negotiate successfully in the presence of substantial scientific uncertainty. The present model is static: years of negotiation leading to a final product. The new model will have to be fluid, allowing a rolling process of intermediate or self-adjusting agreements that respond quickly to growing scientific understanding. The recent Montreal agreement on the stratospheric ozone layer supplies a useful precedent by providing that one-third of the parties can reconvene a scientific experts group to consider new evidence as it becomes available.

The new model will require new economic methods for assessing risk, especially where the possible outcomes are irreversible. It will depend on a more active political role for biologists and chemists than they have been accustomed to, and far greater technical competence in the natural and planetary sciences among policymakers. Finally, the new model may need to forge a more involved and constructive role for the private sector ....

Einstein's verdict that "we shall require a substantially new manner of thinking if mankind is to survive" still seems apt.

International law, broadly speaking, has declined in influence in recent years. With leadership and commitment from the major powers it might regain its lost status. But that will not be sufficient. To be effective, future arrangements will require provisions for monitoring, enforcement, and compensation, even when damage cannot be assigned a precise monetary value. These are all areas where international law has traditionally been weak.

This is only a partial agenda for the needed decade of invention. Meanwhile, much can and must be done with existing means. Four steps are most important: prompt revision of the Montreal Treaty, to eliminate completely the production of chlorofluorocarbons no later than the year 2000; full support for and implementation of the global Tropical Forestry Action Plan developed by the World Bank, the United Nations Development Programme, the Food and Agricultural Organization, and the World Resources Institute; sufficient support for family planning programs to ensure that all who want contraceptives have affordable access to them at least by the end of the decade; and, for the United States, a 10-year energy policy with the goal of increasing the energy productivity of our economy (i.e., reducing the amount of energy required to produce a dollar of GNP) by about three percent each year.

While choosing four priorities from dozens of needed initiatives is highly arbitrary, these four stand out as ambitious yet achievable goals on which a broad consensus could be developed, and whose success would bring multiple, long-term global benefits touching every major international environmental concern.

Reflecting on the discovery of atomic energy, Albert Einstein noted, "everything changed." And indeed, nuclear fission became the dominant force—military, geopolitical, and even psychological and social—of the ensuing decades. In the same sense, the driving force of the coming decades may well be environmental change. Man is still utterly dependent on the natural world but now has for the first time the ability to alter it, rapidly and on a global scale. Because of that difference, Einstein's verdict that "we shall require a substantially new manner of thinking if mankind is to survive" still seems apt. □

(Dr. Mathews is Vice President of the World Resources Institute.)

Let's Get Serious about Pollution Prevention

by Barry Commoner

On January 19, 1989, a moment in history marked by the end of the Reagan Administration, then EPA Administrator Lee M. Thomas published a statement in the *Federal Register* that, in future histories, is likely to overshadow even Mr. Reagan's departure. The *Pollution Prevention Policy Statement* acknowledged that much of EPA's past effort "has been on pollution control rather than pollution prevention" and that "EPA realizes that there are limits as to how much environmental improvement can be achieved under these [control] programs, which emphasize management after pollutants have been generated."

Mild as it sounds, this statement actually calls for a major reorientation of the nation's environmental programs, for until now they have been based on laws that trigger regulation only after pollutants are produced. Prevention has occurred rarely and only in response to very special circumstances. It is important, therefore, to examine the justification for such a sweeping change in policy, to understand how it relates to the present regulatory program, and to consider the actions required to implement it.

The evidence concerning the ineffectiveness of the present pollution control program not only justifies the new preventive policy, but demands it. I presented a good deal of that evidence in a speech given at EPA Headquarters on January 12, 1988, entitled "The Environmental Failure" as a means of encapsulating the overall outcome of the present control-oriented program. Consider the existing data on the degree to which the emissions of various pollutants had been reduced over the last 10-15 years. In nearly every case, the improvement has been at best modest—on the order of 10-20 percent—and, at worst (for example, nitrate in ground water) negative. The environmental levels of only a handful of pollutants have been reduced 70-90 percent—the kind of improvement in environmental quality envisioned in environmental legislation.

Every pollutant on the very short list of real improvements—airborne lead, DDT and related pesticides, PCB, mercury in the Great Lakes' fish, and strontium 90—reflects the same remedial action: production of the pollutant has been prevented. Lead has been largely removed from gasoline; DDT and PCB have been banned; chloralkali plants responsible for mercury pollution have eliminated that metal from their processing; atmospheric nuclear bomb tests that produce strontium 90 have been halted.

In each case, the production process that originally generated the pollutant has been changed. In the production of gasoline, lead has been replaced by new unleaded octane boosters; in cotton production, where most DDT was used, DDT has been replaced by other insecticides; in transformer manufacturing, PCB has been replaced by new insulating fluids; in chloralkali plants, semipermeable diaphragms are now used in the electrolytic cells instead of mercury. In sum, the prevention strategy recognizes that pollutants originate in production processes and that these must be changed in order to eliminate the pollutant.

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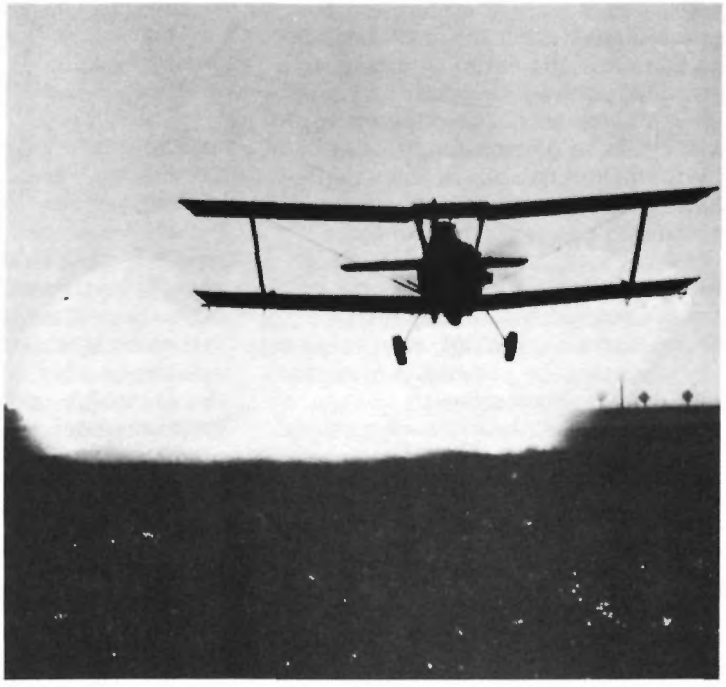
Alar, the treatment for enhancing the marketability of apples, provides a recent, particularly instructive example of what prevention means. Like many other petrochemical products, Alar presents a health risk; it induces cancer in test animals. As in many other cases, there has been controversy about the resultant hazard to people, especially children, and about what standards should be applied to limit exposure to "acceptable" levels.

Alar broke out of this pattern when the manufacturer, Uniroyal, decided that regardless of the toxicological and regulatory uncertainties, Alar would be taken off the market simply because parents were unhappy about raising their children on apple juice that represented *any* threat to their health. Food, after all, is supposed to be good for you.

This illustrates the advantages of prevention; banishing Alar from apple production reduces the cancer risk to zero and puts an end to the technical

Kenneth Garrett, Woodfin Camp, Inc.



Plane spraying pesticides. The ban of DDT in 1972 is cited by the author as an example of pollution prevention. DDT was once widely used in spray applications.

and administrative controversies. The Alar story also illustrates the role that public opinion can play in preventing environmental hazards. Parents were not inclined to argue about how much Alar was tolerable; they wanted *none* of it in apples, and Uniroyal responded by an action to ensure exactly that.

Pollution prevention means less environmental bureaucracy and more environmental democracy. Pollution prevention means identifying the source of the pollution in a production process, eliminating it from that process, and substituting a more environmentally benign method of production. Once a pollutant is eliminated, the elaborate system of risk assessment and standard setting—and the inevitable debates and litigation inherent in control-based environmental regulation—becomes irrelevant.

How can current environmental programs, which, as EPA Administrator Reilly has pointed out in recent Congressional testimony, "stress treatment and disposal after pollution has been generated" relate to a program of pollution prevention?

To the individual polluter, there is an unavoidable conflict between prevention and control; one course or the other must be chosen. For example, organic farming—agricultural production without the use of petrochemical pesticides and chemical fertilizer—is a very effective way of preventing the serious environmental effects of these agricultural chemicals. To the farmer, the choice between prevention and control is unavoidable: either the farm uses the chemicals, subject to the present system of regulation and controls, or it does not use them and the entire administrative control structure becomes irrelevant.

In the same way, a printing company that wishes to prevent the environmental hazards of the volatile chlorinated hydrocarbon solvents used to clean its presses can do so by switching to water-based inks and detergent cleansers. The company must choose between controlling emissions of the chlorinated pollutant, or eliminating it by changing the printing process. Yet, detergents are themselves pollutants—albeit less hazardous than chlorinated hydrocarbon solvents—and they too must be controlled. The next preventive step might be to eliminate the entire press-cleaning problem by switching to a new, perhaps laser-based, method of printing. Prevention is clearly the preferable means of achieving environmental quality; assiduously applied, it can progressively reduce the need for controls in the national environmental program.

Mr. Thomas' statement and Mr. Reilly's testimony emphasize recycling as an important aspect of prevention. The issue of trash disposal is an illuminating example. In a sense, a trash-burning incinerator is a control device; it is a means of treating trash *after this pollutant has been generated* in an effort to reduce its environmental impact.

Incineration itself involves a series of controls: on incinerator stack emissions, on the landfill to which the residual ash is consigned, and on the landfill leachate. By converting components that would otherwise become trash into useful materials, recycling prevents all

Used aluminum cans at this Newark, New Jersey, center will be crushed and reprocessed. Recycling is an important aspect of pollution prevention.

ALCOA photo.

these pollution problems and eliminates the need for such controls. And again, it is necessary to choose between the control strategy and the preventive one. Some 80 percent of the trash components can be either burned or recycled, but obviously not both. Moreover, as a recent pilot test done by the Center for the Biology of Natural Systems showed, 84 percent of the household trash stream can be recycled—a disposal capacity even greater than that of the incinerator, which is about 70 percent.

EPA has recently confronted the choice between prevention and control in trash disposal. This choice arose in connection with a proposed trash-burning incinerator in Spokane, Washington. Opponents argued that according to the Clean Air Act, the facility must employ "best available control technology" (BACT), which the Act defines to include existing means for the removal of potential pollutants from fuel. In practice, this would mean, for example, removing and recycling nearly all of the trash components, for most of them contribute to the pollutants generated by incineration. Citing the Thomas statement, EPA Region 10 agreed with this position and referred it to the Administrator for decision. He had a momentous opportunity to signal EPA's turn toward prevention by supporting the Region 10 position. Unfortunately, the decision has given us the wrong signal.

Apart from legalisms, the decision to disagree with Region 10 and deny the petition makes only one substantive argument: that the experimental evidence does not support the conclusion that separating potentially polluting materials from trash will in fact reduce toxic air emissions. The experiment cited showed that removal of metals and glass from trash clearly reduced the toxic metal content of flue gas *before* it entered the emissions control system. But the decision concludes that the study does not show "that there would be a reduction in pollutant emissions had conventional pollution control devices been in operation."

This conclusion is unwarranted; simple logic tells us that when the amount of toxic metal entering a control device is reduced, if it works, even less will leave it. More serious is the decision's failure to recognize a major point in the Thomas statement: that prevention avoids a serious fault in the control strategy—the problem of shifting pollutants from one medium to another. This is precisely what an incinerator emissions control system does: it shifts heavy metals and other toxic materials from emissions to the deposited fly ash. Clearly this problem is avoided when separation reduces the toxic metal entering the incinerator. I am afraid that this decision misconstrues the facts and seriously weakens the role of prevention in EPA policy.

Evidently, the entry of the prevention strategy into the nation's environmental program is not likely to be particularly smooth or uncontroversial.

Evidently, the entry of the prevention strategy into the nation's environmental program is not likely to be particularly smooth or uncontroversial. Another example is President Bush's Clean Air bill. Just before announcing the bill, Mr. Bush proclaimed himself not only an environmentalist but also a preventionist. In reporting the President's June 9 address, the *Washington Post* said that "his goal will be prevention, not just cleaning up, environmental problems."

Yet a few days later Mr. Bush announced that polluters will be encouraged to buy and sell the right to pollute. This is of course a perverse parody of the "free market," in which instead of goods—useful things that people want—being exchanged, "bads" that nobody wants are traded. Clearly a market in pollutants cannot operate unless the market is provided with what it is supposed to exchange—pollutants. This proposal not only fails to prevent pollution but actually requires it. But there are ways to prevent air pollution. Smog was created when high-compression engines were introduced to power the large post-World War II cars; running hot, the engines generate nitrogen oxides which trigger the photochemical smog reaction. Preventing smog calls for new engines that produce little or no nitrogen oxides—for example, the stratified charge engine or electric motors. Applied to the acid rain problem, prevention calls for energy conservation and non-burn power sources such as photovoltaic cells.

The most serious hindrance to the prevention strategy is implementation; it will be much more difficult to persuade farmers and manufacturers to change the way they grow corn or construct automobiles than to attach controls to their tractors or smokestacks. Current methods of production are the presumably profit-maximizing responses to economic forces, and there will be a good deal of resistance to changing them.

This is a hurdle that can be surmounted only by government action. The federal government could overcome the auto industry's resistance to producing new kinds of cars and trucks by specifying smog-free engines in the $5 billion of vehicles it buys annually. With that large an incentive, the engines will surely be built and take over the private market. Similarly, if the federal government placed an order for some $0.5 billion of photovoltaic cells to be installed in government facilities, their price would drop by more than 90 percent and open up a vast new market for these pollution-free sources of electricity.

As we approach the 20th anniversary of the birth of environmentalism in 1970, it is fitting that we should review what has been done and from it learn how to improve the nation's thus-far failing environmental record. Reorienting the environmental program toward prevention can assure that in the next 20 years we can at last accomplish the purpose set forth 20 years ago in the National Environmental Policy Act:

> "to promote the efforts that will prevent or eliminate damage to the environment and biosphere." □

(Dr. Commoner is Director of the Center for the Biology of Natural Systems at Queens College, City University of New York.)

Editor's Note: Dr. Commoner's speech, "The Environmental Failure," given at EPA headquarters on January 12, 1988, as part of the Office of Radiation Programs' Environmental Seminar Series, will be one of eight speeches by guest speakers included in a forthcoming EPA publication.

Under the Environmental Regulation Layer Cake

by Arthur Koines

The distant traffic light turns a pale green against the hazy afternoon sky. A young attendant clad in a grey jump suit waves the next car into the testing area. The endless line of cars behind it creeps forward like a lazy, summer caterpillar. As I release the brakes, my own car inches over the hot pavement to close the space between it and the car directly in front. Waves of heat rise from the roadway, obscuring my view of the instruction sign: "Put car in neutral. Turn off air conditioning. Depress gas pedal . . . ."

Rehearsing the test procedure helps to pass the time momentarily, but after a few practice runs, my mind wanders in search of relief from the growing boredom. Absent-mindedly, I tune in the car radio to the news:

And in the national news today, Environmental Protection Agency Administrator William Reilly expressed optimism about the possibility this year of reauthorizing the Clean Air Act . . .

The Clean Air Act. Those words revive me with memories of simpler times. I remember Earth Day 1970. We stood in the warm, April sunshine to celebrate the dawn of a new era of environmental responsibility. The Clean Air Act, enacted by Congress later that same year, promised to improve some of the nation's most visible environmental problems.

. . . with tough, new requirements for coal-fueled electric utilities . . .

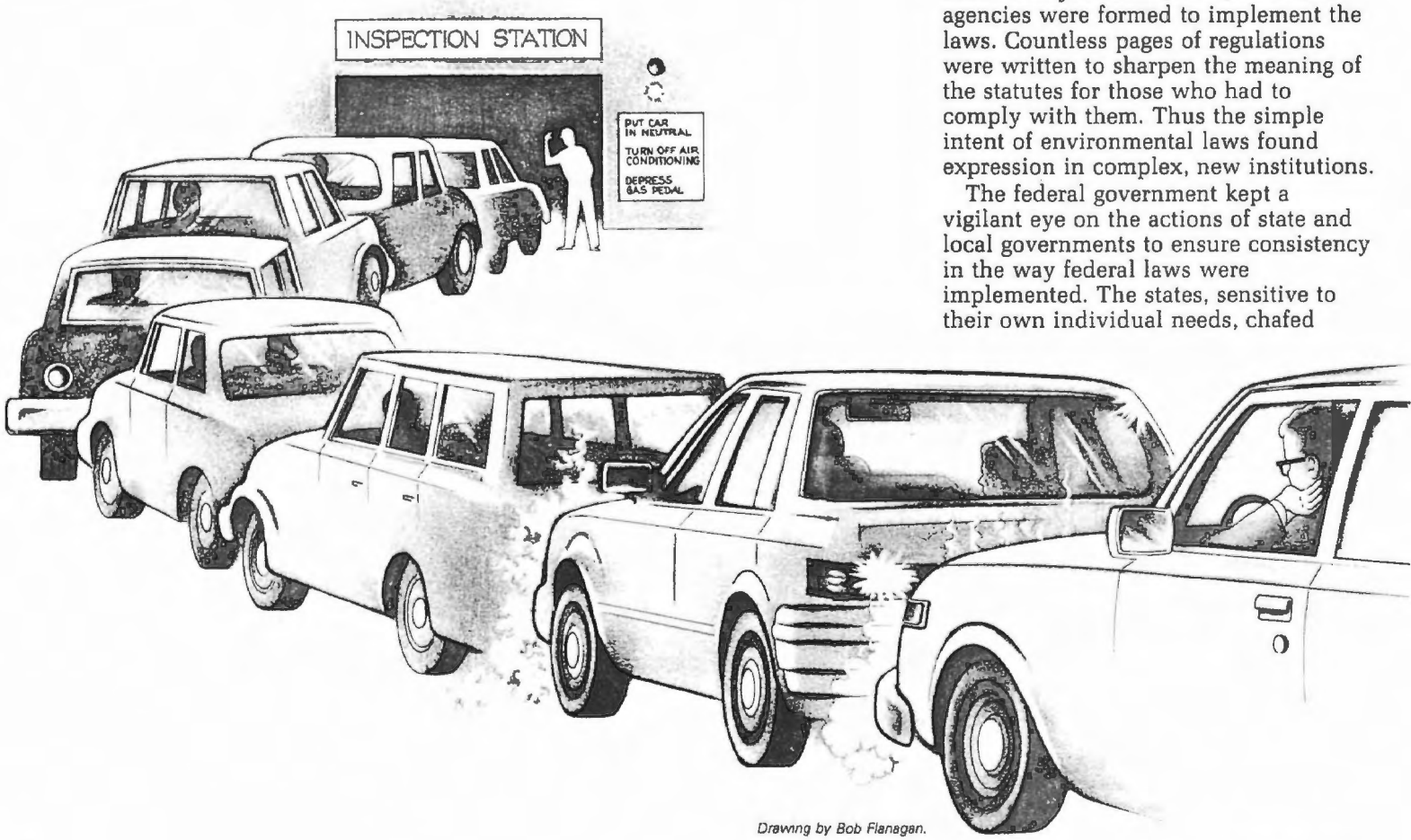
Then, in 1972, Congress passed the Clean Water Act to rescue the nation's rivers and lakes from decades of neglect. In 1974, the Safe Drinking Water Act was enacted, and in 1976, the Resource Conservation and Recovery Act.

In all, Congress enacted 10 major environmental laws in the 1970s. State legislatures throughout the country followed quickly by passing their own environmental laws empowering state governments to manage the major new environmental programs created by federal legislation.

. . . and new technology standards for industries emitting toxic chemicals into the air . . .

The laws sought to protect our air, water, and land from the excesses of a modern society. But the administration of those laws has fostered another modern illness: a large, redundant bureaucracy. Federal, state, and local agencies were formed to implement the laws. Countless pages of regulations were written to sharpen the meaning of the statutes for those who had to comply with them. Thus the simple intent of environmental laws found expression in complex, new institutions.

The federal government kept a vigilant eye on the actions of state and local governments to ensure consistency in the way federal laws were implemented. The states, sensitive to their own individual needs, chafed



Drawing by Bob Flanagan.

under the federal yoke. Efforts at defining and redefining the federal-state relationship took precious energy away from the common task of protecting the environment.

. . . and construction sanctions for cities unable to attain national standards for ozone . . . .

Today's environmental bureaucracy is something of a Rube Goldberg organization. It is most imposing when viewed from the local level, where three layers of law, regulation, and bureaucracy vie for jurisdiction. For example, here the individual person or business discovers how a simple permit request can involve red tape from several government agencies.

The emissions testing area is now in plain view. Succumbing to the heat, a car in line ahead stalls out, bringing the slow procession to a temporary halt. After a couple of awkward minutes, doors on two nearby cars swing open as their drivers step out to help move the disabled vehicle out of line.

The news continues:

And in local news, city officials have expressed concern over the limited capacity of the city's aging municipal wastewater treatment plant . . . .

Local economic growth has placed increasing demands on environmental services in some places; local economic decline has eroded tax bases, causing a shortage of funding for such services in others. Local governments everywhere are straining against the competing social goals of economic development and sustained environmental quality to find the right balance for their own communities.

With the planned phaseout of EPA's construction grants program, city officials must look to local sources, such as tax increases, to finance the future facility.

Environmental protection is costly. Much of the money for it comes out of local government budgets and is used to construct basic infrastructure for providing environmental services. A municipal waste incinerator can easily cost a city $500 million to construct. A public drinking water system for a medium-sized city adds up to construction costs of $100 million. Even a small municipal sewage treatment plant costs an average of $15 to $20 million.

Decisions concerning how to fund these facilities and where to site them are nearly always politically unpopular and thus are avoided, if possible, by elected officials. But delay has its own costs. Today, it is common to find municipal governments confronting several such costly, politically sensitive decisions. Twenty years of close federal and state oversight has made local governments reluctant environmental decision-makers.

Only three cars are now ahead of me in line. I can see the state insignia on the sleeve of the jump suit worn by the young, female attendant. I need be patient only another few minutes.

The news continues:

And on the international scene, President Bush today announced plans for a conference of world leaders to discuss deepening concern over the apparent warming of the earth's atmosphere . . .

The changing global climate has robbed us of our optimism about the future. Public confidence has been shaken by revelations of environmental problems not even imagined by the organizers of Earth Day 1970.

. . . which could cause a melting of the polar ice cap and result in future flooding of some major coastal cities.

Who will find the wherewithal to meet these new challenges? How can we do a better job of addressing the old ones? In a world of limited financial resources, a decision to address one environmental problem generally implies a decision not to address another. We can't do everything, yet we try. We've stretched the fabric of environmental protection in this country so thin that it seems as if it must soon come apart. Holes are beginning to appear at the local level, where bureaucracy, budget shortfalls, and competing social goals have combined to frustrate our efforts toward improved environmental quality.

The traffic light turns a bright green. I lift my foot from the brake pedal one last time, allowing my care to drift into the testing area. Settling back in my seat, I turn off the radio to enjoy the crystal clarity of one final thought:

The system for providing environmental protection is on overload, and it isn't going to improve on its own. Our episodic efforts as a society to respond to environmental threats have led to institutions lacking in unified direction and efficient organization. To improve them, we must establish common environmental goals and set realistic priorities.

It's time to get it together, and the local level is a good place to start. After all, here businesses live and die on the implications of words printed in environmental regulations; the average American pays his water, sewer, trash collection, and utility bills; and here I sit in line at the automobile emissions testing station. □

(Koines is a Branch Chief in the Regulatory Integration Division of EPA's Office of Policy Analysis.)

Could There Be a Better Law?

by Frances H. Irwin

What if, instead of multiple environmental statutes, there were a single, comprehensive pollution control law governing environmental protection in the United States? Would the institutional capacity of this country to protect the environment be significantly improved? To explore these kinds of questions, and generally to stimulate debate concerning more integrated approaches to environmental problems, The Conservation Foundation has drafted a "model" law called The Environmental Protection Act.

Let me make clear at the outset that the model environmental statute is not intended as a bill for proposal as such to Congress. Rather, it is a working draft document intended as a research tool for exploring possibilities for restructuring environmental law. Partly funded by EPA, the preparation of the model statute is part of The Conservation Foundation's New Environmental Policy Project, which concerns the nature and extent of cross-media environmental problems and how to deal with them.

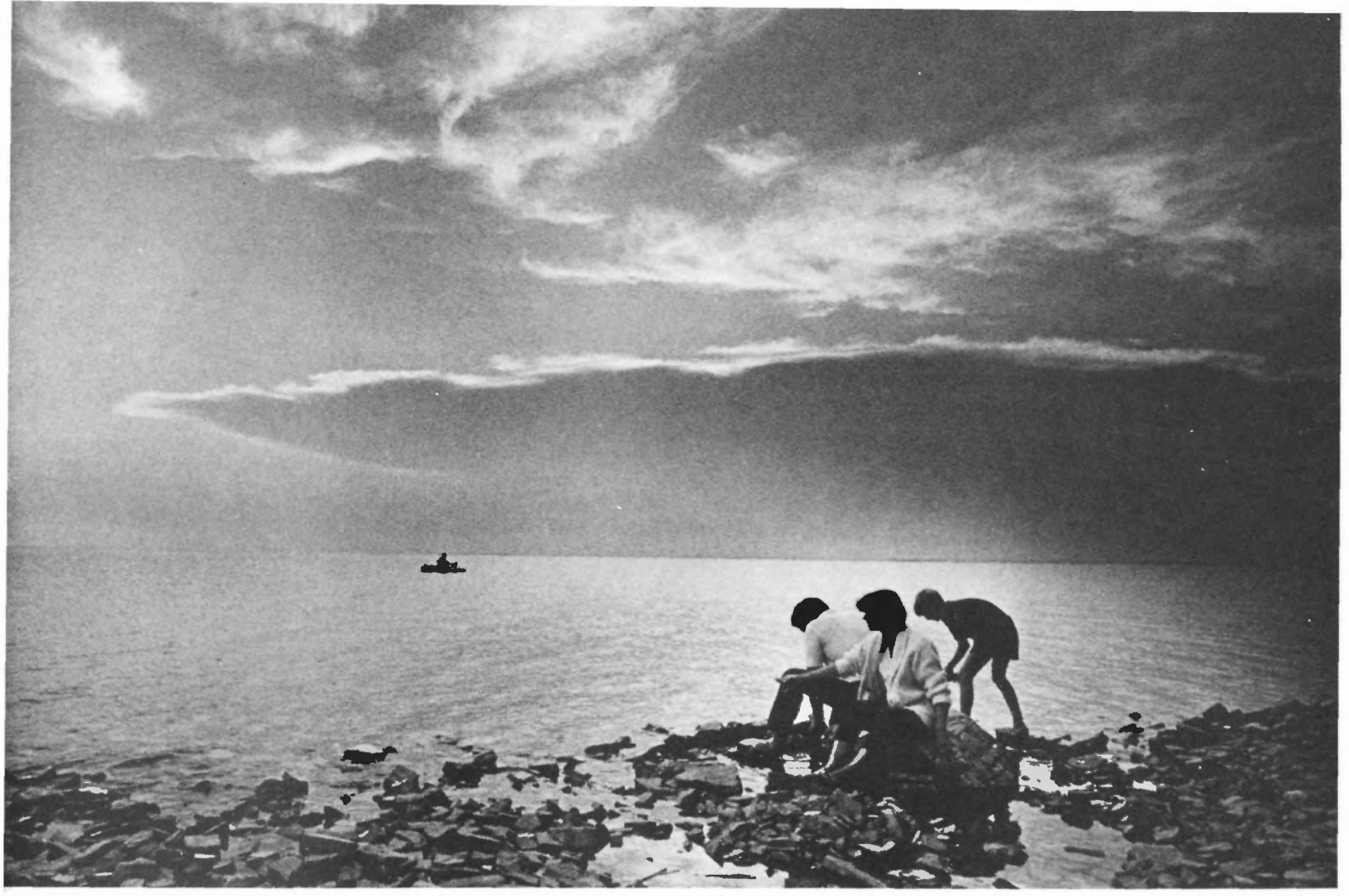
As the 200-page Act shows, it is indeed conceptually possible to deal with all forms of pollution within the framework of a single law.

Currently, separate laws govern EPA's efforts to protect air, water, oceans, and drinking water; to clean up waste sites; and to regulate waste management practices, pesticides and other toxic substances, and noise. All of these environmental responsibilities are interrelated, as stressed in the reorganization plan that first established EPA in 1970; however, in the intervening 20 years, the Agency's separate program areas have each been strengthened under separate new laws. Progress has in fact been made using this approach. However, the compartmentalization of environmental programs has demonstrated drawbacks:

- There is a tendency, under separately mandated programs, to transfer pollutants from one part of the environment to another, as opposed to finding long-term solutions to environmental problems or curtailing pollution in the first place. Existing laws frequently apply differing standards to control the same pollutants in different environmental media. In other cases, a pollutant may be controlled in some media but not others. As a result, pollutants may be "removed" to the least protected part of the environment. For example, water may be cleaned up by encouraging volatile pollutants to evaporate into the air; this practice has turned some wastewater treatment plants into major air polluters.
- New environmental problems are generally not recognized and acted on promptly because no one is responsible for asking, for instance, what ultimately happens to pollutants such as chlorofluorocarbons, which we now know deplete the ozone layer, or the sulfur and nitrogen oxides that are damaging forests and fisheries. Moreover, existing problems may not be adequately controlled because the sources are not identified. For example, deposition of pollutants from the air is a significant source of pollution in many bodies of water. Efforts to clean up surface water pollution will inevitably be unsuccessful unless this source is taken into account.
- It is difficult to set priorities and make budget decisions concerning separate programs without a common goal and common denominator for comparing the potential of program initiatives for protecting health and the environment.
- Some existing research shows that pollution controls for facilities, such as a new coal-fired power plant, would cost significantly less to construct and operate if designed as part of a system, rather than added on as an afterthought to meet the separate requirements of air, water, and waste control standards.
- The basic goal of protecting the environment is sometimes lost in the extraordinary complexities and technicalities of the existing legal structure. Each law establishes its own procedures for collecting information, granting permits, and taking enforcement actions, for example.

The working draft of the Environmental Protection Act proposes ways to cut through the current fragmentation of environmental statutes in order to overcome basic obstacles to protecting the environment. As the 200-page Act shows, it is indeed conceptually possible to deal with all forms of pollution within the framework of a single law.

The Environmental Protection Act is set up in terms of functions that include research, information-collection and monitoring, permitting, standard-setting, and enforcement, for instance. These are, of course, familiar components of existing environmental laws, and to some extent, the model law can be considered a codification of existing



Lake Michigan. The Great Lakes are threatened not only by point- and nonpoint-source water pollution, but also by the deposition of airborne pollutants originating hundreds of miles away. A "cross-media" approach is therefore needed to solve the Great Lakes' water quality problems.

Mike Bnsson photo.

laws. However, the model law combines these provisions from different statutes and, in the process, standardizes the procedures governing, for example, the gathering of information, the granting of permits, and enforcement actions for environmental violations.

In addition to standardizing regulatory procedures, the model statute includes provisions that would encourage or require consideration of the environment as a whole in all decisions—regardless of how local or media-specific the problem seems—in an effort to alleviate compartmentalized decision-making. To begin with, the model law would establish a Cabinet-level Department of Environmental Protection, likewise organized by pollution-control function. EPA's current mission is a combination of the goals of the disparate laws it administers (which means that functions such as research, for example, are driven largely by the individual, separately mandated programs). The proposed Department of Environmental Protection would have a single mission to improve the overall quality of the environment as effectively and efficiently as possible.

The Environmental Protection Act proposes a single standard for all environmental decisions, regardless of the source or location of the pollutant—making it less likely that pollution would be simply shifted among different parts of the environment. The standard proposed is "prevention of unreasonable risk," with six factors to be considered when applying this criterion to specific cases:

- Risk to humans and the environment
- Economic costs to society and the distribution of those costs within society
- Effects on technological innovation
- Existence of substitute products or methods
- Feasibility of implementing proposed actions
- Potential effects on other nations.

While this overall standard calls for consideration of costs and benefits, the model makes it clear that quantitative cost-benefit analysis would not be a fixed formula for decision-making:

> Nothing in this section shall be construed as requiring the Secretary [of the proposed Department of Environmental Protection] to perform quantitative cost-benefit analysis. In exercising the judgment necessary to decide whether an action under this Act should be taken, the Secretary shall give the greatest weight to the benefits of the proposed action.

To avoid "paralysis by analysis," the proposal also gives the Secretary the discretion to determine the amount and type of analysis to be conducted for a particular decision, in proportion to the importance of the decision.

Consider, for example, how the overall standard might apply to decisions concerning *point sources*. Limits on releases would be set for various categories of point sources based on the best technology to prevent unreasonable risk from total releases from the source. The factors considered

Netherlands Board of Tourism photo.

in determining these limits would include the best technology available, the environmental impacts of applying it, and the efficiencies that could be achieved by considering the relationships among all forms of pollution.

The limits on releases from point sources might be expressed in terms of *total* amount of a substance released (for instance, the total number of pounds of toluene released from a facility by all pathways); alternatively, the limits might be expressed as amounts or concentrations discharged into particular pathways (pounds released to air). A combination of these approaches might also be used. In any case, the limits would be applied to a facility through a single permit, rather than by separate permits for air, water, and waste releases.

There is also a provision in the model law that would give some force to pollution reduction. This proposal would make the issuance of a permit for environmental releases contingent on a finding that the applicant was using, or would use to the maximum extent practical, the available pollution reduction methods.

In another significant change, the model act would make it illegal to discharge *any* pollutants without a permit unless the pollutants or source have been explicitly exempted from regulation.

Under the model law, *nonpoint sources* would be controlled through management programs developed by the states. The nonpoint source pollution control programs called for by the Environmental Protection Act are somewhat similar to the programs mandated by the 1987 amendments to the Clean Water Act, except that *all* media are covered, not just water. The

Highlights of "The Environmental Protection Act"

- A Cabinet-level Department of Environmental Protection, organized by function and with a single mission: to improve the overall quality of the environment as effectively and efficiently as possible
- One primary standard (prevention of unreasonable risk) for taking environmental action, regardless of the source of the pollutant or the location into which it is discharged
- A shift from media-specific concerns (e.g., air, water, solid waste) to a broader focus on releases to all media from the four types of sources: mobile sources, point sources, nonpoint sources, and substances and articles
- A comprehensive, integrated system for regulating substances including new and existing pesticides and other chemicals
- A single-permit system governing permissible releases of pollutants to all parts of the environment for major facilities
- No permit issued unless the applicant uses, to the maximum extent practical, available methods for reducing total releases to the environment
- Integrated grant assistance to state and local governments to help deal with cross-media environmental problems.

The Netherlands and other European countries are developing and experimenting with integrated approaches to environmental problems. Rather than focusing separately on air, water, and waste, the Netherlands has adopted an integrated planning process focusing on the sources of pollution in all environmental media.

management programs would identify types or categories of nonpoint sources, best management practices for dealing with them, and means for achieving these practices—such as enforcement and technical assistance.

Under the model law's provision concerning *high-risk or persistent pollutants*, standards could be set limiting the *total* amount of a particular substance, such as a metal, permitted to enter the environment. The limit could be zero or background level; it might be set on a geographical basis or made to apply to particular sources; limits could also be set in terms of allowable concentration in a particular environmental medium.

It is important to point out that the Environmental Protection Act does not exist in a vacuum. For the immediate prospect, certain initiatives take steps toward achieving a more integrated approach to environmental issues in the United States. For example, legislation has been introduced in Congress which would mandate waste reduction defined in terms of *all media*. Also, EPA is looking at options for improving its enforcement by developing more consistent procedures across program lines. And following the recommendation of a recent report, a significant amount of research is likely to be targeted to overall risk-reduction across media.

Obviously, fundamental change in U.S. environmental law will not occur overnight; rather the prospects for such change are longer-term. In 1969, concerns about the inability of the existing system to solve pressing environmental problems led The Conservation Foundation to sponsor the Law and Environment Conference that helped give impetus to the development of environmental law. One indication of the need for rethinking the field 20 years later comes from a recent survey of environmental law professors. Those who teach environmental law believe that efforts enmeshed in the details of the present laws, such as the Resource Conservation and Recovery Act and the Superfund law, are failing to address the fundamental causes and cures of environmental problems.

Moreover, in rethinking existing systems, we need to think globally, not just nationally. The World Commission on Environment and Development and the Organization for Economic Cooperation and Development have both identified the fragmentation of institutions as an obstacle to effective environmental protection worldwide. The European Community noted the same problem in its fourth Environmental Action Programme.

Changes are now occurring in Europe. For instance, the United Kingdom is introducing legislation that would apply "best available technology not entailing excessive cost" for pollutants released from major facilities to all media. The Netherlands has developed an integrated planning process that focuses on the sources of environmental problems and their effects, rather than separately on air, water, and waste. The Netherlands is also experimenting further with integrated permitting. Under the Swedish Environmental Protection Act, the Swedes already control pollutants at major facilities through single permits, rather than multiple permits governing allowable releases into specific media.

In the Federal Republic of Germany, some lawyers are exploring the longer-term possibility of an environmental code based on *Vorsorgeprinzip*, the principle of foresight or precaution.

In closing, let me emphasize again that the Environmental Protection Act is a working draft, intended to propose a framework for restructuring and integrating pollution control laws. As such, it helps in overcoming the first obstacle to the *status quo:* the conception of alternatives to the present fragmented system. Pilot projects implementing some of the model statute's proposals on an experimental basis, such as single permits instead of multiple permits governing environmental releases, could help overcome a second obstacle: a lack of data on the application of integrated environmental programs in the real world. □

(Irwin is a Senior Associate with The Conservation Foundation's Environmental Quality Program.)

Consolidating Environmental Laws

The integrated statute drafted as a research tool by The Conservation Foundation consolidates provisions from the following laws:

- The Clean Air Act
- The Clean Water Act
- The Safe Drinking Water Act
- The Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund"), as amended by the Superfund Amendments and Reauthorization Act of 1986
- The Resource Conservation and Recovery Act
- The Federal Insecticide, Fungicide, and Rodenticide Act
- The Toxic Substances Control Act
- The Marine Protection, Research, and Sanctuaries Act
- The Noise Control Act.

EPA and the World Clean-up Puzzle

by James Gustave Speth

Twenty years ago, the U.S. government responded vigorously to a rapidly growing public concern about the environment. New national policies were declared; EPA and other agencies were created; and major pollution clean-up and resource management initiatives were launched.

It is customary to think of that fertile period as giving birth to modern environmentalism in America, but that is only partly true. The period from the mid-1960s to the mid-1970s also represented something else: a shift in environmental initiative from the state and local level to the national level. The focus of leadership changed because the environmental challenges of the day could only be tackled successfully on a national basis.

Today, we are seeing a remarkably similar surge in environmental interest. Once again, the media are full of stories, and environmentalists are full of proposals. But there is a basic difference. Today the shift in attention is from the national level to the international.

The environmental concerns now gaining prominence encompass the life-supporting systems of the planet's biosphere. They include the alteration of climate and biogeochemical cycles, the destruction of earth's ozone shield, the loss of tropical forests and biodiversity, the spread of traditional pollutants beyond urban-industrial areas and across national borders, and the erosion of the natural resource base in developing countries. Increasingly, environmental concerns are transcending national laws and are intersecting international economic and security interests in powerful ways.

The emergence of environmentalism in recent decades—first local, then national, and now international—has much to do with the successes and failures of economic activity. The 20th Century has witnessed explosive growth. World population has tripled to five billion, and today's world economy is 20 times larger than in 1900. One result is that pollution and waste generation are occurring on a vast and unprecedented scale. Global fossil fuel use, for example, has increased ten-fold in this century, and the resulting emissions have likewise grown: sulfur dioxide, six-fold; nitrogen oxides, ten-fold; carbon dioxide, ten-fold.

Meanwhile, human demands on biological systems have grown to the point that we consume about 40 percent of the world's total terrestrial photosynthetic productivity, and much of this is occurring in a way that is not biologically sustainable. For the first time, human impacts have grown to approximate those of the natural processes that control the global life-support system.

The future could hold more of the same—a lot more. The scale and momentum of economic activity on the planet today are difficult to comprehend. It took all of human history to grow to the $600-billion world economy of 1900. Today the world economy grows by more than this amount every two years. By the middle of the next century, a scant lifetime away, our human world of five billion people will likely double to 10 billion, and our global economy of $12 trillion likely will be five times as large as today.

Societies near and far have set two long-term goals for themselves—improving environmental quality and achieving large increases in economic activity. Reconciling these two goals will be one of the dominant

USDA photo.

challenges facing political leaders on all continents in the 1990s and beyond. The United States should be a leader in meeting this challenge, but whether we lead or follow, we will have to respond. For EPA, this new reality will require major changes in two areas: international activities and technology transformation.

International Activities

Several factors are pushing environmental concerns increasingly into the international arena. More and more, pollution is transboundary and even global in scope. Pressures on shared resources, such as river basins and coastal fisheries, are mounting. Resource deterioration in many nations is so extensive that other countries are affected, for example, when ecological refugees flee across borders. As international trade increases, commodities and merchandise become the carriers of domestic environmental policies that must be rationalized.

It is not just that there are more environmental problems like ozone depletion that must be dealt with at the international level; it is also that the line between national and international environmental problems is fast disappearing.

Nitrogen oxide emissions, for example, must be regulated locally because of ground-level ozone formation, regionally because of acid rain, and globally because ground-level ozone is an infra-red trapping "greenhouse" gas. Methane and, indirectly, carbon monoxide also contribute to the Greenhouse Effect.

In these instances, domestic and global environmental concerns push in the same direction. On the other hand, a major move to methanol as a substitute for gasoline could increase the global warming risk. A car burning methanol made from coal would result in perhaps twice the carbon dioxide emissions per mile as one burning gasoline.

Environmental diplomacy is the logical outgrowth of the desire to protect one's own national environment, to minimize environment-related conflicts with other countries, and to realize mutual benefits, including economic progress and the protection of the common natural heritage of mankind. As such, it is not entirely new. The register of international conventions and protocols in the field of the environment has grown steadily in this century; the main multilateral treaties today number about 100, many of them having to do with the protection of the marine environment and wildlife.

What is new is the prospect that environmental issues will move from a secondary to a primary international concern and increasingly crowd the diplomatic agendas of nations. And these diplomatic agendas in turn will increasingly affect domestic environmental policy. U.S. environmental policy will more and more be set in concert with other nations.

It is not fully discernible what the challenge of "internationalization" means for EPA in practical terms. Eventually, major policy and institutional innovations will be required. Certain preliminary initiatives seem highly desirable, though.

Elevating the head of EPA's Office of International Activities to Assistant Administrator status was a commendable step in the right direction. Efforts to give international dimensions a higher priority within the Agency should continue. Even more important is ensuring that domestic and international activities are actually coordinated internally.

EPA also needs a world-class capacity to follow relevant developments in other countries and in international institutions, to understand and analyze the various approaches to environmental protection being taken abroad, and to anticipate future needs and developments at the international level.

Beyond EPA's internal workings, new patterns of relating to other federal agencies seem desirable. Neither global nor local atmospheric issues are likely to be solved unless energy and environmental policy are made together in the future. As environmental diplomacy increases, finding appropriate patterns of interaction with the Department of State will become imperative.

Moreover, the future is likely to bring increasing efforts to link environmental objectives and trade policy. For example, should the United States restrict imports of products that are manufactured by processes that harm the environment, much as we restrict imports of endangered species and harmful products? Should we import copper from countries where smelters operate without serious pollution control?

Much of EPA's international activity in the past has focused on the Organization of Economic Cooperation and Development and other trans-Atlantic matters. In the future, the North-South and East-West dimensions will rival the North-North ones in importance. It already seems clear that solutions to the most serious global environmental challenges will require a series of vital understandings between the industrial and the developing countries.

For example, the developing countries will expect the industrial countries to take the first and strongest actions on global warming. They will want to see the seriousness of the threat validated, and they will conclude, quite correctly, that the industrial countries are largely responsible for the problem and have the most resources to do something about it.

But a tragic stalemate will occur if this argument is carried too far. Developing countries already account for about a fourth of all "greenhouse" gas emissions, and their share could double by the middle of the next century. Increasingly, all countries will be pressed to adopt energy and forestry strategies that are consistent with containing the Greenhouse Effect within tolerable limits.

The United States and EPA need to build a new set of relationships with developing country officials so that confidence and trust are built for the challenging times ahead. One major step in this direction would be for the United States to initiate a new program of international environmental cooperation with developing countries.

Such a program would not be limited to AID-eligible countries but would extend to countries like Brazil and Mexico. It would provide technical assistance, training, access to information and expertise, and planning grants all aimed at increasing the capacity of developing countries to manage their environmental challenges.

EPA should also begin to think creatively about how international environmental regulation should be done in the future. The *ad hoc* processes that have led to the

Erosion control on an Iowa farm: When corn is planted in the residue of last year's soybean crop, no tilling is required. The author proposes a special panel to recommend ways in which major sectors of the economy, such as agriculture, might be redesigned to meet economic needs without degrading the environment.

stratospheric ozone layer convention and other agreements will need eventually to be replaced by a more expeditious, permanent mechanism that can function across a broad range of issues.

It is interesting to ask whether the evolution of environmental decision-making in the European Community offers lessons for other contexts. What happened in Europe, where both economic integration and transboundary pollution led to coordinated environmental policies, is actually happening more slowly on a world scale as the world economy expands and becomes more integrated.

Technology Transformation

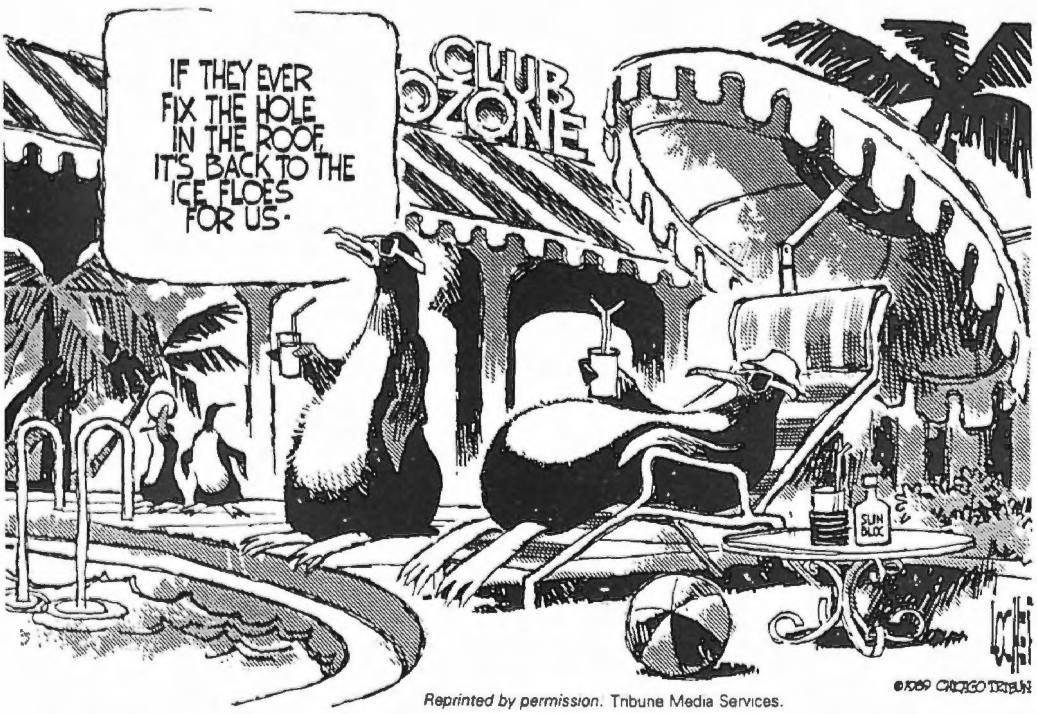
A second major challenge is for EPA to organize to promote rapid and far-reaching technological change. Imagine, just as a simple thought experiment, what would happen if "greenhouse" gases, industrial waste, and other pollutants increased proportionately with the five-fold expansion in world economic activity projected for the middle of the next century. That would indeed happen if this growth merely replicates over and over today's prevailing technologies, broadly conceived.

Seen this way, reconciling the economic and environmental goals societies have set for themselves will occur only if there is a transformation in technology: a shift, unprecedented in scope and pace, to technologies—high and low, soft and hard—that facilitates economic growth while sharply reducing the pressures on the natural environment.

We need the technology for a new agriculture, one redesigned to be sustainable both economically and ecologically, which stresses low input of commercial fertilizers, pesticides, and energy. And we need new technology to transform industry and transportation from an era of materials-intensive, "high-throughput" processes to an era that uses fuel and material with great efficiency, generates little or no waste, recycles residuals, releases only benign products to the environment, and is, hence, more "closed."

Guiding and speeding the application of solution-oriented technologies will also require institutional innovation at EPA. What if EPA were organized not strictly by air pollution, water pollution, pesticides, and so on, but by transportation, manufacturing, agriculture, energy, and housing? These great sectors of economic services are technology-based and technology-driven. In the past EPA has tended to stand "outside," imposing external pollution control standards.

In the future, EPA must come "inside," and environmental factors must be integrated into the basic design of our transportation, energy, and other systems. A new type of cooperation among the private sector, EPA, traditional Cabinet agencies, and environmental advocates must be formed. Together, we must work upstream to change the products, processes, policies, and pressures that give rise to pollution.



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To start this process, the President and EPA could establish a distinguished panel from within and outside government to recommend long-term goals for meeting the following challenge: how can the major sectors of the U.S. economy—manufacturing, agriculture, transportation, housing, and energy—be redesigned in the years ahead so that they fulfill economic needs without destroying our national and global environments?

What are the critical technologies in each sector, and how can they be further developed and promoted? The panel would examine what America's longer term goals should be in these areas, and it would explore how "seeing the future" can be used to enhance American exports and promote other national goals.

A new federal center associated with EPA could be created to work as a catalyst within the federal system and between government and the private sector. The center would have a policy research budget and would carry out a variety of research, convening, coordinating, and educating functions. It would try to define a series of win-win options and stimulate public and private action to promote these options.

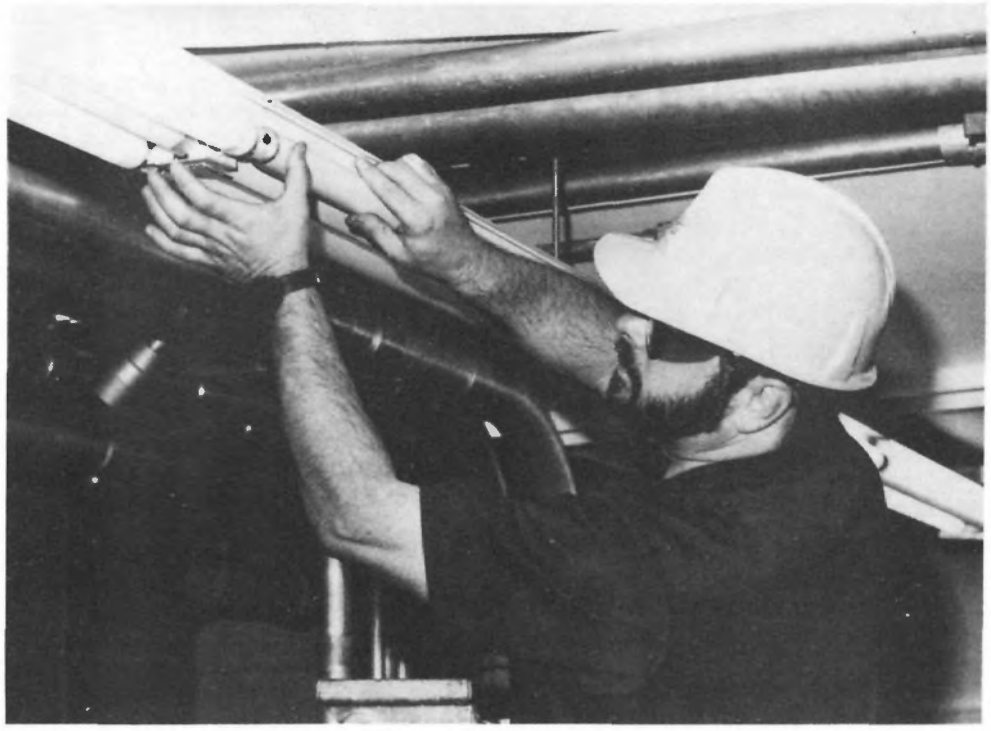
Alternatively, EPA could create an Assistant Administrator for Technology and Strategy with a staff of scientists, engineers, business managers, economists, and others organized by economic sectors. Similar offices should be established in other federal agencies and given mandates to cooperate with EPA in promoting patterns of environmentally sustainable development.

Environmental protection began as a local and national concern, but the challenges ahead are such that it must become a major international concern as well. It began on the periphery of the economy, bottling up some pollution here, saving a bit of landscape there, but it must spread a creed and code to the core of economic activity. By moving ahead to address these new realities, EPA can perform an immense public service. □

(Gus Speth is President of the World Resources Institute, an environmental research and policy institute in Washington, DC.)

From a "Polluter's" View

by John W. Rowe



New England Electric photo.

The New England Electric System has designed energy conservation programs to provide customers with the same electric service while using fewer kilowatt-hours. One method includes installing energy-efficient lighting in customer buildings, a practice pictured here.

Few industries have been more directly affected by environmental laws and regulations than the electric utility industry. The industry's power plants and generating units burn large quantities of fuel and produce significant amounts of pollutants, but they deliver a particularly useful form of energy to homes and businesses across their service areas.

A natural target for pollution control strategies and environmental regulations, utilities have been called upon to make and have, in fact, achieved a significant contribution to improving the environment since major environmental legislation was first enacted 20 years ago. Our experience at New England Electric indicates that the integration of energy-conservation programs with the more traditional, technological approaches to emissions reduction can be an important means for achieving President George Bush's recently enunciated clean air goals.

If we are not careful, we may find ourselves spending more and more on environmental controls for less and less benefit, without fully addressing the key environmental issues of the day.

Over the past 20 years, the record of New England Electric illustrates the kind of commitments required to achieve environmental goals. Before 1970, we burned coal at several generating stations. When the Clean Air Act was passed, we switched to oil to achieve lower costs and compliance with air emissions regulations. But after the oil price shocks of the 1970s, we converted the units back to coal and spent more than half of the $300 million investment involved on new pollution control equipment. As a result, we are burning coal with significantly lower particulate and sulfur emissions than we emitted with oil.

Our experience was an economic and environmental success, but it also illustrates a flaw in the current approach to environmental regulation. Under this approach, the primary regulatory objective has been to minimize emissions levels at individual point sources by using costly technology to capture emissions "at the end of the pipe."

In general, environmental costs have been factored into project decisions by utility companies only insofar as the company's compliance strategy required additional investments or operating expense outlays. Moreover, the regulatory standards in existing environmental laws tend to result in increased investment or expense associated with each emissions source—to the point where any economic benefits of an individual proposal are sharply limited, even if the proposal would reduce emissions over existing facilities.

But the environmental focus is now beginning to shift away from point-source controls to the total impact of emissions on the atmosphere. At the same time, technological, point-source solutions are running headlong into the law of diminishing returns. If we are not careful, we may find ourselves spending more and more on environmental controls for less and less benefit, without fully addressing the key environmental issues of the day.

A new approach to today's environmental issues may be necessary. We need to move from the present solution of minimizing emissions from specific sources to minimizing emissions from the *mix* of sources used to provide electric service.

President Bush's approach to acid rain appears to move in the right direction with its focus on a least-cost concept that maximizes flexibility in the way emissions reductions are achieved and expressly rejects a "command and control," end-of-the-pipe approach to the acid rain issue. Moreover, the

Since 1979, the New England Electric System has employed load management and conservation programs in its three-state service area. Here, a representative of the company's "Partners in Energy Planning" program wraps a home water heater.

New England Electric photo.

President's program acknowledges the impact that conservation and load-management programs can have in meeting our national acid rain goals and other environmental objectives.

Over the past several years, New England Electric has implemented major conservation and load-management programs to provide our customers the same electric service with fewer kilowatt-hours. Under these programs, we pay the costs of new conservation measures in the homes, factories, schools, and businesses across our service territory. This year alone, we are spending about $40 million to install energy-efficient lights, insulate water heaters, improve industrial efficiency, and weatherize electrically heated and cooled buildings.

By 1991, we expect our programs to save 300 megawatts of power required to meet peak demands. Over the next 20 years, conservation should save over 1,000 megawatts of capacity and meet one-third of the load growth projected in our service territory.

These programs will provide our customers the same electric service they now receive, but with fewer kilowatt-hours. And, they will provide the same electric service with reduced emissions into the environment.

The emissions savings are impressive. For example, one energy-efficient light bulb saves about 400 pounds of coal or one barrel of oil over its lifetime. By introducing such conservation measures to our customers, we will produce significant environmental benefits throughout New England.

These conservation-related emissions savings have not been taken into account under the traditional approach to environmental regulation. These emissions reductions have not been credited by the regulatory process, so their environmental benefits would not be seen as creating economic savings in an emissions control compliance strategy. Thus, the true economic and environmental value of such programs has been understated. To achieve our environmental goals more efficiently, the new regulatory approach should provide the incentives and flexibility necessary to encourage reduction of *total* emissions in the overall plan, not just at specific point sources.

This kind of approach is now being tried in Massachusetts. Under the state's acid rain law and recently issued regulations, utilities are allowed emissions credits for conservation-related reductions as we work to achieve state-imposed acid rain compliance targets. We understand that the Bush administration is considering allowing meaningful credits for demand-side programs that may provide real economic benefits to utilities for conservation programs in their compliance plans. Such credits will provide the power industry with the direct economic incentives necessary to achieve the nation's environmental objectives most efficiently.

The President also has correctly rejected the fee approach suggested by some in the ongoing acid rain debate. Customers of the New England Electric system companies, for example, should not have to pay to clean up other utilities' emissions, particularly when they have already supported our company's environmental investments.

Moreover, those evaluating future expenditures on control projects should include *all* costs of control in their attainment strategies. Subsidies for certain environmental investments, but not others, tends to encourage bias toward expensive end-of-the-pipe solutions. By reflecting the full value of demand-side conservation and load-management programs and by avoiding subsidization of costly controls, we can assure that all parties have the flexibility and incentive to accomplish emissions targets efficiently and effectively. This is especially important when investment in conservation efforts may well avert a much greater investment in high-priced technology.

In sum, we must do a better job of integrating economic and environmental objectives in our overall resource planning. This can be achieved by establishing overall emissions targets and allowing flexibility in resource decisions to achieve these targets, rather than simply adding more capital investment at the end of the pipe.

By creating a system of credits for energy conservation programs, we can assure that the economic and environmental values of such efforts are reflected in our resource plans. This strategy will allow utilities to achieve environmental targets through investments in conservation that provide better service to our customers rather than end-of-the-pipe controls that only add costs to our products. □

(Rowe is President and Chief Executive Officer of the New England Electric System.)

Next Steps the States Could Take

by Robert Bendick

During the medical waste scare of the summer of 1988, a prescription bottle that had washed up on a Rhode Island beach was turned in to the State Health Department. The bottle was one of few such items of medical refuse that displayed legible printed information, and criminal investigators from Rhode Island's Department of Environmental Management were able to trace it to a woman in the Borough of Queens in New York City. The investigators hoped that the woman would remember where she had disposed of the bottle and that this information would lead them to a waste hauling firm, hospital, clinic, or other culpable entity that had dumped medical waste in the Atlantic Ocean.

The woman from Queens must have been astonished when detectives confronted her with questions about a seemingly ordinary item of garbage. To everyone's dismay, however, she was unable to shed light on how the pill bottle had ended up in the Atlantic.

In retrospect, the investigation of the pill bottle from Queens seems excessive, but like other, similar cases it illustrates the pressure on government to find someone or some evil conspiracy to blame for environmental problems. Toward the end of last summer, when the evidence strongly indicated that the plastic medical refuse reaching shorelines east and west of New York City probably came from New York's storm sewers, its littered shorelines, and its major landfill, there was a sense of public frustration. People were skeptical and disappointed when a bad guy couldn't be found and strung up for spoiling summer at the beach.

In state government, where most front-line environmental regulation and permitting takes place, this syndrome is all too familiar. Citizens, outraged by continuing environmental problems, demand that public officials "do something." In response, each person elected or appointed to office reaffirms the crusade against polluters and dumpers of toxic waste.

It is not surprising that the public envisions bad guys behind environmental problems. Environmental action in this country has been driven by a series of discoveries of terrible wrongs done to our land, air, and water by people who knew or should have known better. However, I believe we are reaching a point of diminishing returns in pursuing new and more detailed environmental regulatory programs. I say this despite the fact that I have directed a state environmental regulatory agency for seven years, personally supervising a successful team of criminal investigators of environmental crimes.

I believe we are reaching a point of diminishing returns in pursuing new and more detailed environmental regulatory programs.

A great deal of environmental damage comes from many small, individual actions of families and businesses. This damage will not be alleviated through regulatory enforcement alone. People must become voluntary stewards of the environment. They must better understand that not all environmental problems are "someone else's fault." Only changes in the way we live, spend our time, use our land, spend our money, and cooperate with and sacrifice for each other will preserve acceptable

Environmental policy-making at the local level. New York City Councilwoman Susan Molinari proposes stringent tracking of medical waste from medical and dental practices too small to be covered by the state's medical waste tracking law. At this Midland Beach press conference, she presents a chart of combined sewer and storm water outfalls, which, she declares, deposit medical waste on local beaches.

Rob Sollett photo, Staten Island Register

environmental conditions.

To bring about such changes, state government must begin by changing the way it manages the environment by adding new approaches to the environmental programs which have been successful so far. In particular, the following deserve consideration:

- *We should use economic incentives to modify individual and corporate behavior at levels that are not amenable to regulation.*

This will mean new roles for state regulators of public utilities. It will require, among other things, new programs to make recycling mandatory (and to sustain markets for recycled material). Deposit-and-return requirements for environmentally harmful products also warrant consideration.

Public utility regulators have traditionally set water, sewer, and electric rates to ensure that the public is protected from excessive rate increases by utility monopolies. Utility commissions are generally not considered environmental agencies. However, since water, sewer, and energy use are effectively influenced by rate structures, environmental goals should be given weight in rate decisions. This would require new formal channels of communication between utility regulators and environmental agencies and collaboration on decisions such as the disposition of any windfall revenue derived from environmentally driven rate setting.

As the first state to implement a mandatory statewide solid-waste recycling program, Rhode Island has found that, while citizens are remarkably cooperative, economically successful recycling does not happen by itself. It is necessary to restructure manufacturing in several industries to accept vast quantities of recycled material in order to achieve the often-stated goal of recycling 25 percent of the nation's solid waste stream.

This goal can be accomplished only if recyclables are collected and marketed in a standardized way. State agencies must move to organize collection, ensure quality control, and work with other states to develop reliable markets.

Deposit-and-return legislation may be an effective economic means for achieving safe disposal or reuse of certain environmentally harmful products. With deposit systems, unless an item (say a car battery or tire) is returned to the dealer and then to the manufacturer, the deposit required at the time of purchase is lost.

Many state transportation departments still see environmental concerns as secondary to the goal of achieving desired levels of transportation service.

Deposit-and-return systems encourage manufacturers to develop ways of reusing or reprocessing returned materials. Given the questionable success of hazardous waste tracking laws, a deposit-and-return system might even make sense for industrial chemicals.

- *State transportation and public lands policies as well as local land-use planning should be integrated with environmental goals.*

Automobile use has profound, direct impacts on air and water quality. Public investment in roads and mass transit alternatives is crucial in influencing land development decisions. However, many state transportation departments still see environmental concerns as secondary to the goal of achieving desired levels of transportation service.

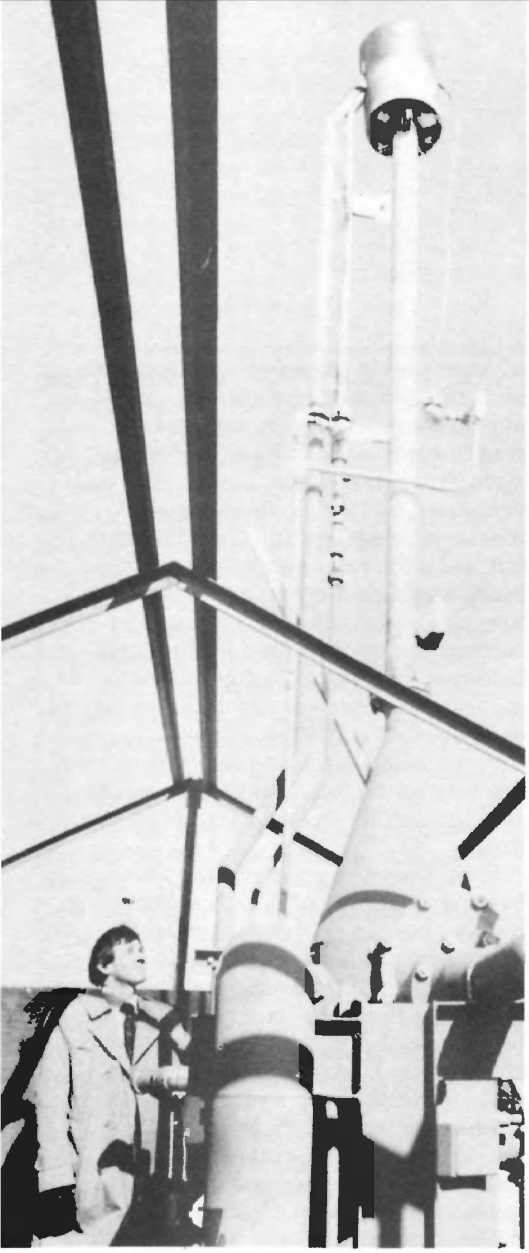
The basic approach to state transportation planning must be changed within the nation's urban corridors so that environmental improvement becomes an explicit purpose of transportation investment that makes use of state and federal funds. This would require governors to restructure transportation decision-making in most states to give environmental agencies much more say in transportation policy at every level.

We have learned that natural systems such as forests and wetlands can help preserve the quality of air and water. Wetlands process pollutants; vegetated buffer zones protect water from nonpoint sources of pollution. Green areas can reduce air pollution and separate conflicting land uses. While many states have wetlands protection laws, few use the acquisition and management of park and forest land as part of pollution-control strategies. As with transportation, progress in integrating public lands policies with environmental goals will require new kinds of cooperative action among state agencies.

Most land-use regulation remains in local hands. This is unlikely to change, but local decision-makers could become much more informed about the environmental implications of land-use decisions. States could use tools such as Rhode Island's statewide computerized Geographic Information System to provide local officials with information on ground water, surface water, wetlands, and other environmental concerns, in order to improve the quality of local land-use actions.

- *Environmental data-gathering within regulatory programs needs to be simplified and integrated in a way that allows regulated industries and public officials to better understand the nature and impacts of industrial wastes.*

Despite all the discussion of the need to address environmental problems in a unified way, states are required by federal legislation and EPA regulations to collect and analyze data from industry in accordance with each separate air, water, and hazardous waste program. Businesses are thus confronted with a dizzying variety of forms to document their compliance with pollution-control legislation. All of this helps perpetuate the problem of pollutants being moved from water to air to land, without sufficient thought being given to overall pollution reduction.



Rhode Island Solid Waste Management Corporation photo.

Saving the environment requires innovation and ingenuity. Here, Thomas E. Wright, Executive Director, Rhode Island Solid Waste Management Corporation, stands next to a flare that burns methane gas to control odors at New England's largest landfill, thus reducing the amount of landfill gases released to the atmosphere. Beginning in the spring of 1990, the methane gas will be converted into enough electricity for 20,000 homes.

If states were given more freedom by federal legislation, they could develop single standardized reporting forms for industry. Such standardized forms might then be used by reorganized state monitoring agencies and by the businesses themselves to aid real reductions in overall environmental impacts.

- *New regional relationships among states are needed to deal with the environmental problems of large natural systems.*

Physical and natural boundaries (rather than political jurisdictions) must be used as the basis for environmental programs; this means far more regional cooperation among states. The ozone problem in the northeast corridor, the continuing water quality problems of Chesapeake Bay, and efforts to clean up and protect the Connecticut River all demonstrate that states can better address problems facing a natural resource by banding together to take action appropriate to that resource.

Regional efforts can no longer be vague, ceremonial expressions of good will. For example, the northeast air directors, through an organization called Northeast States for Coordinated Air Use Management, have brought eight states together in lowering gas volatility regulations to reduce ozone formation in the Northeast. Similarly, the Chesapeake Bay states are working together to solve the bay's problems. A whole new series of interstate compacts is needed to achieve regional ends.

- *States must take an active role in restructuring municipal sewer and water districts to ensure that they have the fiscal and technical resources to meet increasing environmental demands.*

In general, citizens have shown a willingness to pay more for environmental protection. However, recent studies by EPA reveal that the costs of upgraded wastewater and drinking-water treatment fall disproportionately on smaller communities and those with a high proportion of low-income people. Small districts also often lack the technical expertise to operate sophisticated treatment plants and supporting environmental programs such as industrial pretreatment. In addition, as water consumption and use behavior have become recognized as important factors in waste treatment, there are more reasons to integrate water and sewer management within watershed areas.

These trends suggest a need for state governments to take an active role in examining the established patterns of water, sewer, and other environmental districts, with the objective of combining jurisdictions to balance costs to individuals and businesses and to improve environmental performance. Each citizen and industry might then feel treated fairly and be willing to pay more and do more for environmental protection.

Recently I stopped by the home of a young engineer, one of my brightest and most conscientious colleagues, to try to convince him not to leave state government. He said he was tired of being an environmental regulator, of always being in the middle, of being distrusted and abused by both citizens and representatives of industry. He was, I believe, tired of trying to resolve issues and conflicts, through narrow regulatory procedures, which the society as a whole has not resolved.

Local decision-makers could become much more informed about the environmental implications of land-use decisions.

If we are to continue to make environmental progress in the 1990s, Americans must move beyond the idea that only a few individuals or corporations are to blame for environmental problems and that the way to solve these problems is for government to apportion blame and then extract retribution.

At the state level, strict regulation will always be a necessary part of environmental protection; however, through new strategies such as those described in this article, we can broaden the base of environmental responsibility so that concerns about the future of the air, water, and land of our planet become an integral part of the decisions we make in every aspect of our lives. □

(Bendick is Director of Environmental Management for the State of Rhode Island.)

Making the Smog Cleanup Happen in L.A.

by James M. Lents

It's daybreak in Southern California, and millions of people rise to begin a daily routine of unconscious polluting amidst forecasts of another smoggy day.

Each household cooks breakfast on a gas stove that has an ever-burning pilot light, after spraying aerosol cooking oil into an egg-poaching pan. In the bathroom, people shower and reach for the aerosol deodorant.

Then they each hit the road for a solo car commute in bumper-to-bumper traffic. At lunchtime, everyone hops in the car again, visits a drive-up automated banking machine, then lines up and idles at a drive-through restaurant.

In the evening, they all fill their lawnmowers with gasoline, cut the grass, and drench the barbecue charcoal briquets with lighter fluid.

While each person adds a only tiny bit to the area's air pollution, the result adds up to make the South Coast Air Basin the Super Bowl of smog.

The basin is home to 12 million residents (more than the individual populations of all the states except California, New York, and Texas), 8 million motor vehicles (three times as many as in all of India), and the world's largest gasoline market. It includes Los Angeles, Orange, and Riverside counties and the metropolitan portion of San Bernardino County. And it has the worst air quality in the nation, exceeding one or more federal health standards on 232 days in 1988.

In the South Coast Air Basin, the federal ozone standard was violated 178 days in 1988, and the carbon monoxide standard 61 days. The basin exceeds the fine particulate matter standard by 100 percent in some areas and is the only place in the nation that still fails to meet the federal nitrogen dioxide standard.

Emissions controls on the largest industries and motor vehicles over the years have helped cut pollution, with peak ozone levels steadily declining from .68 parts per million (ppm) in 1955 to .35 ppm in 1988. The nation's strictest tailpipe emissions standards have resulted in today's cars emitting 10 percent or less of the pollutants emitted by the typical mid-1960s car.

This progress, however, is being slowed. And if present trends continue unchecked, the gains we have made will soon be reversed by population growth, more motor vehicles and more driving,

Smaller cars, microwave ovens, and water-based house paints have been widely accepted without revolutionary lifestyle changes. What the AQMD is advocating is much along the same lines.

a proliferation of small businesses, such as dry cleaners, and lifestyle habits that promote dirty air.

Residential and commercial sources account for 280 tons, or 22 percent of the 1,246 tons of reactive organic gases emitted daily, and 142 tons, or 14 percent of the 1,040 tons of nitrogen oxides, both prime contributors to ozone. Use of domestic aerosols and other consumer products alone accounts for more than 93 tons a day of reactive organic gas emissions, or 8 percent of the total.

Mobile sources emit 52 percent of the basin's reactive organic gases and 72 percent of the nitrogen oxides. The South Coast Air Quality Management District (AQMD) projects that the number of vehicles in the basin will increase by 35 percent and that miles traveled will increase 68 percent by 2010, if nothing is done.

Therefore, to continue down the path to clean air, the South Coast AQMD must not only tighten industrial controls but also change some of the behavior patterns of millions of Southern Californians.

On March 17, 1989, the AQMD board of directors adopted a three-tiered plan to achieve the nitrogen dioxide and carbon monoxide standards by 1997 and those for ozone and fine particulates by 2007.

During Tier I, the first five-year phase, 127 measures will be considered: 15 on oil companies, 24 on other businesses and industries, 23 concerning paints and solvents, 52 traffic and mobile source measures, and 13 residential and agricultural measures. Tier II, five to 10 years out, further tightens these measures, and Tier III, 10 to 20 years out, calls for total conversion of the basin's vehicle fleet to extremely low-polluting technologies, such as electric motors powered by fuel cells or batteries, highly controlled methanol or natural gas vehicles, and industry use of light-curable surface coatings.

Some complain this plan will require Big Brother tactics. But the Orwellian analogy could not be further from the truth.

First, rather than alienating the basin's citizenry, AQMD is seeking to involve people in the debate over cleaning up the air.

Second, AQMD is working to educate people so they can help clean up the basin's air through informed personal choices, such as carpooling. Recent polls indicate these educational efforts are having results, with the overwhelming majority of basin residents saying they are willing to make such personal changes.

Third, many changes will be largely invisible to consumers as long as the zero- or low-polluting alternatives perform up to the consumer's expectations, whether this be cars, lawnmowers, deodorants, or barbecues. As long as we get where we want to go, mow the lawn, cook the steaks, and have deodorized armpits, most consumers will not mind. Big Brother will not be watching. In fact, only zero- and low-polluting products will be sold in the basin.

Smaller cars, microwave ovens, and water-based house paints have been widely accepted without revolutionary

Find polluting vehicles. Stop them. Issue citations and advise drivers how to "clean up their act." That sums up the mission of the eight-member California Highway Patrol's smog enforcement team, which operates throughout Southern California. The white patrol cars bear the South Coast Air Quality Management District logo.

lifestyle changes. What the AQMD is advocating is much along the same lines.

Cleaning up the air involves an incremental, multi-pronged effort. All sectors of our society contribute to the air pollution problem, and all must contribute to the solution.

AQMD must continue to tighten pollution control requirements for major industries as better technologies become available. Moreover, controls must be extended to smaller businesses, such as the 4,000 auto body paint shops in the basin, and crafted in a way that will not cause undue economic hardships.

We must join with leading engineers and scientists, both here and abroad, to develop cleaner fuels for cars and industry, cleaner industrial process technology, and ultimately non-polluting materials. To push technology, AQMD's technology advancement office is funding research and demonstration projects through its five-year, $30.4-million matching grant program.

To reduce emissions generated by indirect sources of pollution, such as shopping centers, AQMD must encourage development and use of alternate means of transportation.

AQMD is already far along in implementing its ridesharing program requirements. By mid-1991, some 8,500 major employers will be required to provide strong incentives for their employees to car pool or use alternate modes of transportation, such as public transit or vanpools. This regulatory program is coupled with an aggressive public information campaign to promote the clean air benefits of ridesharing and other congestion relief measures.

In the evening, cut the lawn with an electric mower and start the patio barbecue with parafin-treated briquets while gazing in the fading sunlight at the purple mountains 60 miles away.

In other educational areas, AQMD is developing a model curriculum on air pollution for local schools and an exhibit on the causes of pollution for the Los Angeles Museum of Science and Industry.

As AQMD proceeds with its plan, it is writing a new chapter in the history of clean air in this basin—and a slightly different routine as millions of southern Californians arise at daybreak to radio forecasts of another clear day. That routine will be roughly as follows.

Brew coffee on an electronic-ignition gas stove, and spray a light mist of cooking oil onto the pan from a pump-spray bottle.

Take a shower drawn from a solar-assisted water heater, and reach for the stick deodorant.

Carpool in a methanol-powered car or catch the vanpool group in its electric van, thereby saving fuel and auto insurance. Walk to a nearby eatery in the office park for lunch.

In the evening, cut the lawn with an electric mower and start the patio barbecue with parafin-treated briquets while gazing in the fading sunlight at the purple mountains 60 miles away. □

(Dr. Lents is an Executive Officer with the South Coast Air Quality Management District.)

California Highway Patrol photo, Ontario, California.

Can We Win with the Crisis-Oriented Approach? Two Observers Speak

New environmental laws and policies have typically come about in the wake of crises and disasters—the Donora, Pennsylvania, air pollution episode; the gross pollution of Lake Erie; the gas leak at Union Carbide's plant in Bhopal, India. However, environmental problems of another kind are now emerging, threatening disastrous global consequences for the long-term future, such as the ramifications of the Greenhouse Effect. Will the "reactive" environmental approach work in dealing with the new generation of environmental problems confronting us? EPA Journal asked two respected observers on the environmental scene—former U.S. Senator Gaylord Nelson, the founder of Earth Day, and John Quarles, former Deputy Administrator of EPA—to comment. Here are their answers:

Can we continue to wait until the wolf is at the door in dealing with environmental problems, especially when we face serious new challenges to our global ecology? Pragmatically speaking, perhaps a better question would be: Do we have any choice?

The answer to either question may ultimately depend on which problem we are talking about. It depends on how serious they turn out to be. It depends on what consequences we are willing to accept.

Before jumping to conclusions on either side of these questions, we should reflect on what results we have achieved in this country during the past two decades since the environmental awakening of the late 1960s. We have recorded some impressive successes. Our air and our water are cleaner, despite continuing growth in population, industrial activity, and auto usage. Lake Erie is no longer dead, and the Cuyahoga River will not again catch fire.

We have achieved progress on a broader front as well. As one indicator, the alligators, for example, have come back. The threat of resource constraints hobbling our future also seems less imminent today than when the Club of Rome Report was issued [*The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (Washington, DC: Potomac Associates, 1972)], and the risks of drastic shortages in energy supply, for now at least, seem more remote.

There are many reasons for this progress, all relevant to our capacity to respond to crises in the future. American ingenuity and resourcefulness deserve much of the credit: we have found new ways to gauge the risks and control them. Our economic prowess also serves us in good stead. The same industrial engine which caused so many environmental problems has also provided the resources to redress them. Our institutions have demonstrated a similar capacity to respond: the regulatory apparatus which EPA implements, and indeed the existence of EPA itself, reflect on our capacity to meet new challenges.

There are definite limits to our successes. Where problems persist, we should examine the reasons. Often the fault lies not in a failure to address the problem soon enough but rather in the fact that once we began, we did not try hard enough. The "intractable" problem of ground-level ozone provides an example. Though the ozone problem is complex and many factors intertwine, the simplest explanation for continuing conditions of nonattainment is that the public has been unwilling to

Greater Cleveland Growth Association photo

Cleveland's Cuyahoga River, which once won notoriety by catching fire, is now clean enough to be called an environmental success story.

support the measures required for success. The traumas of auto inspection and maintenance, the resistance to many other methods of control, and the continuing love affair of Americans with their cars—all testify to the fact that we have missed opportunities to reduce levels of ozone, even after that problem was clearly recognized.

But environmental abuse often does leave a permanent scar. Despite the massive investments in water pollution control, and the noteworthy progress those efforts have brought to our rivers and lakes, the sediments are still loaded with nasty compounds. At many sites the soils and ground water are contaminated beyond a likelihood of rehabilitation. Vast areas of wetlands are gone forever, and, for miles along our coastlines, beautiful natural sand dunes have been permanently replaced with concrete bulkheads.

In fact, it is in the use of land (and the establishment of our transportation systems) that many of our most irrevocable mistakes cast a long shadow into our future. When one flies the course of the "megalopolis" from Washington to Boston, the landscape that unfolds is packed with such dense development that many a child will seldom stroll in a meadow.

From this quick review, it is possible to conclude that nature has a great redemptive capacity, and that human progress has made it possible for us to lend a helping hand. Even so, we pay a price for those practices of civilization which disregard its ecological underpinnings. Part of that price can be redeemed through special efforts, but certain wounds cannot be easily healed.

Obviously, it helps to get on the right course at the start. It helps to see the serious problems coming. But even more important is the strength of our response. As a general rule, even where problems have become serious, we have been able to overcome them if we have been committed to that result.

The regulatory apparatus which EPA implements, and indeed the existence of EPA itself, reflect on our capacity to meet new challenges.

When the focus shifts to global concerns, the difficulty of the problems increases, and the limitations on our ability to act are more severe. But whether it be stratospheric ozone depletion, deforestation, global warming, or some other emerging trend that threatens the future of "spaceship earth," many of the same factors that have affected American response to ecological danger will operate similarly in the international sphere. The democracy among nations, like the democratic character of our own political system, will require that world opinion be mobilized to bring sufficient pressure for change in established practice.

This dynamic means that we will have little alternative than to wait until environmental problems assume proportions of reality before major efforts can be launched to bring relief. Doubtless we will incur permanent damage to certain attractive and important features of our world-wide environmental and resource base. Let's hope we can nonetheless react in sufficient time and with sufficient intensity to avert catastrophic effects.

For those who feel that this prognosis does not provide sufficient satisfaction, let me reiterate the fundamental point that we are operating in a democracy. In placing liberty and equality at the top of our priority list, we may forego a theoretical capability to anticipate every problem and achieve ideal protection.

What our system does provide, however, is an adaptive capacity to correct our past mistakes. By giving effective force to the power of public opinion, we can enjoy the benefit of a dynamic corrective process. But the success of that process requires first that we as citizens see the need and second that we unite to respond to it. In America, the security of our future depends on all of us.

(Quarles, currently a partner in the Washington Office of Morgan, Lewis and Bockius, served as EPA's first General Counsel and was Deputy Administrator of EPA from 1973 to 1977.)

The 20th anniversary of Earth Day 1970 is just 10 months away. Twenty million people participated in that dramatic event.

The main purpose of Earth Day was to organize a nationwide, grassroots demonstration of public concern for the environment that would get the attention of the politicians and force the environment issue into the mainstream of political dialogue. The politicians got the message, and they responded with major legislative initiatives at the national, state, and local levels.

While we have made some significant progress here and there since Earth Day, a continuance of efforts at current levels will fall far short of what is needed and will not prevent continued steady environmental decline.

The resiliency of the living planet has already been dangerously compromised. It is rapidly losing its capacity to renew itself. The insults to the land, water, and air are too many and too massive.

In short, threads of the net that hold the world ecosystem together are breaking and unravelling. Only a massive, coordinated worldwide effort will save what is left of the natural world and give nature a chance to repair some of the damage we have caused.

If this sounds like alarmist talk, it is, because the situation is nothing short of alarming.

Plans for a worldwide Earth Day in 1990 are well underway. Indications are that this will be the largest grassroots demonstration in history.

The single most important objective of this 20th anniversary celebration is a worldwide public demonstration so overwhelming that it literally shakes the political leadership of the world out of its lethargy and galvanizes

it into a monumental, cooperative effort to stop the deterioration of the planet and begin its restoration.

It is time our leaders recognize that the state of our environment is far more important than the threat of nuclear war, missile gaps, star wars, crime on the streets, communism in Nicaragua, world hunger, national economies, or any of a dozen other issues that occupy the front pages of our daily newspapers.

It is time for our political leaders to recognize an important truth: the fate of the living planet is the most important issue facing mankind. No other issue, now and for all centuries to come, is more relevant to our way of life than the status of our resources—air, water, soil, minerals, scenic beauty, wildlife habitat, forests, rivers, lakes, and oceans. It is the resource base that determines how we live and defines our habitat and the limitations for survival of all species: plants, animals, and man.

What is needed right now is strong, vigorous, imaginative leadership from President Bush and President Gorbachev. They have it in their power to alter dramatically the course of history, if they will but grasp the opportunity.

The cause is right. The time is ripe. The world is ready. Mr. Bush and Mr. Gorbachev should begin by formally declaring an end to the cold war and the beginning of a new era.

It is time for our political leaders to recognize an important truth: the fate of the living planet is the most important issue facing mankind.

The Soviet economy is a shambles. It desperately needs relief from the burden of unproductive military expenditures. So does the United States. The national debt overhangs the economy, saps the vitality of our whole economic and social system, weakens our competitiveness, and distorts national priorities. Both nations would benefit from a drastic reduction in military expenditures and a reallocation of resources to the environment and other socially productive enterprises.

President Bush would inspire the world and give it the dramatic leadership it yearns for if he would propose that the United States and the Soviet Union mutually reduce military expenditures by 50 percent in the next 10 years and another 50 percent in the following decade, with half the annual savings allocated to husbanding the ecosystem of the planet. Under this proposal, everyone is a winner—there are no losers.

This not unilateral disarmament; it is not idealism run amok; it is, plainly and simply, hard-nosed realism. How much longer are we and the Soviet Union going to expend a total of $600 billion a year on weapon systems that put us both in greater jeopardy while degrading and destroying the very resource base that sustains us?

Once Mr. Bush and Mr. Gorbachev reach an agreement in principle, the iron curtain countries, western Europe, and most other countries could be persuaded to follow because it would also serve their own best interests.

Very few Presidents are afforded the opportunity to achieve greatness. Those who did, achieved it because they successfully met a major threat to the security of the nation: war, social turmoil, economic chaos. These were the challenges faced by Washington, Lincoln, and FDR.

Now, for the first time in history, the nation is confronted with a challenge far more serious than any war or economic depression.

Mr. Bush is the first president in contemporary times to define himself as a conservation president. He has a golden opportunity to grasp this issue and lead the world. The United States is the largest industrial power—and the world's greatest polluter. This nation has an obligation to set an example.

Whatever else President Bush does in his presidency will fade into distant memories, but if he successfully initiates the battle to preserve the integrity of the planet, he will be remembered as long as history is written. □

(Nelson, a former U.S. Senator, is Senior Counselor for the Wilderness Society.)

As part of the 10th anniversary celebration of Earth Day in 1980, enthusiasts carried a "Save the Humans" whale around the Mall near the Washington Monument.

Bernie Boston photo, The Washington Star *Copyright* Washington Post, *reprinted by permission of the DC Public Library*

Changing from "Consumers" to Citizens

by Jay D. Hair

Steve Delaney photo.

Currently there are over 121 million cars in the United States. Collectively, they emit about 600 million tons of carbon dioxide each year. Are you carpooling?

Everything we do has an effect on the environment. Was your morning orange juice in a plastic container? It will probably become one of the 640,000 plastic containers dumped carelessly into the ocean every day. Last Sunday, did you read the morning newspaper? If you simply tossed it out without recycling it, you contributed to the demise of more than 500,000 trees used to produce 88 percent of the Sunday newspapers that are *never* recycled. Did you use your auto air conditioner this week? If so, its emissions of chlorofluorocarbons are helping to destroy the earth's protective ozone layer.

Clearly, our thoughtless environmental choices are affecting the environment. We, as consumers, are turning America the Beautiful into America the Polluted. Moreover, as other articles in this issue of *EPA Journal* make clear, the environmental consequences of our actions reach beyond our national boundaries to the global ecology. We are surely and not so slowly destroying the conditions needed for life to thrive on earth. And all of us, as consumers of products that contribute to this destruction, must instead become part of the solution.

There is some good news, and evidence that a change in attitude is occurring, albeit slowly. A 1986 Louis Harris poll found that when given a choice, the American public would *not* opt for jobs over a clean environment. When asked if they would pay $75 more in taxes in order to achieve tougher enforcement of anti-pollution laws, they said yes—by a margin of more than two to one. Most recently, a Media General-Associated Press poll found that 75 percent of the 1,084 adults polled said laws against pollution are too weak, and 87 percent said they would favor measures requiring them to sort their garbage for recycling.

It seems puzzling that despite this powerful evidence of public concern about environmental problems, reckless habits continue destroying the environment.

Poll after poll has come up with similar results. Whenever the public is asked about environmental issues, the returns almost always and nearly unanimously point in one direction: deep concern and worry about the country's environment.

It seems puzzling that despite this powerful evidence of public concern about environmental problems, reckless habits continue destroying the environment. It may be that people feel the job is just too large—that one person can hardly make a difference.

Don't believe it. There are people who know from experience how important personal, individual sacrifice is and just how much of a difference each of us can make.

In Illinois, 39-year-old Jerry Paulson has made a career of changing laws and regulations to solve environmental problems. For more than a decade, he has actively organized volunteers to participate in the regulatory process, and his efforts have led to the protection of a number of important wetlands in Illinois.

In Bethesda, Maryland, Marjorie Smigel has become one of the state's most tenacious conservation activists—a major force behind the passage of the first state law in the country mandating health and environmental safeguards by commercial lawn services—and all from the modest beginnings of the Springfield Garden Club.

Jim Murray in Detroit has made clean water his business. The 45-year-old conservationist grew up on the banks of the Rouge River in Detroit, and he has made a career of pursuing cleaner water for the region through hard work and sacrifice. Of all his efforts, Murray is perhaps most pleased with his success at organizing a Rouge River monitoring program made up of high school science classes. Students sample the river's water, rate its quality based on a

Gardeners can improve their crops by using compost made from leaves, grass, and vegetable waste to enrich the soil. This also saves valuable space in landfills.

National Science Foundation index, and then share the results through a computer network.

Jan Garton is keeping the wetlands in Kansas alive; Art Aylesworth in western Montana is working to save the bluebird; and New York's Hudson River is cleaner, thanks to determined conservationist Robert Boyle, who for 20 years has made protection of the Hudson an obsession by founding the Hudson River Fishermen's Association. Acting as river watchdogs, their first victory, in 1969, stopped a railroad company from piping its waste oil directly into the Hudson.

The situation now is just as urgent as it was during World War II.

These stories of environmental activism provide inspiring examples. They illustrate the kind of deep-seated commitment and awareness of the environmental consequences of our individual actions that are so desperately needed. There are no easy answers and there is no magic—just good, old-fashioned hard work and individual sacrifices.

Not everyone can be an environmental leader, but everyone can make individual lifestyle changes to help preserve the environment from further degradation.

Where to begin? There must be a realization that the job *isn't* too large. A good example would be the sacrifices of those during World War II who saved string, metal, and tin foil while going without so many "extras." The situation now is just as urgent as it was during World War II. We must work just as selflessly for peace, only this time the goal must be peace with the environment.

There is so much each of us *can* do and it *will* make a difference. Here are just a few of the most obvious steps to take:

- Cut down on your trash. Reuse and repair. Americans produce 150,000 tons of solid waste per year. The average U.S. household discards 1,800 plastic items; 13,000 individual paper items; 500 aluminum cans; and 500 glass bottles yearly. New York alone produces 26,000 tons of waste each day.

- Use household chemicals completely before tossing their containers. Solvents and cleaners in landfills seep into the ground water. Never throw chemicals down the drain; take them to a hazardous waste center.

- Use cloth diapers instead of disposables. Each year we are throwing away 18 billion disposable diapers, which are filling up our landfills at an alarming rate. Did you know that diaper services are much less expensive than buying disposables?

- Put grass clippings, leaves, and vegetable waste into a compost heap. Every year we dispose of 24 million tons of leaves and grass clippings, which could be composted to conserve landfill space. Did you know that 10 years ago, there were over 18,000 municipal landfills across the country? Now, because they're filling up, we're down to 9,000, and more are closing daily.

- Don't leave water running needlessly. It has been shown that up to 50 percent of the water wasted in the home is attributable to taps that run unnecessarily. Also, install a water-saving device in your toilet or, better yet, have a low-flush or air-assisted toilet installed. These toilets can save 60 to 90 percent of your water.

- Reuse grocery bags and ask for paper, not plastic. Use mugs instead of paper cups; rags, not paper towels; cloth, not paper napkins. Just remember to choose products that will last. If it's disposable and convenient, it is filling our landfills. And if it is made from a petroleum-based material (plastics, foam), it is creating "greenhouse" gases and other pollutants.

- Use public transportation or car pools. There are now more than 121 million cars on the nation's roads—over 4 million more than in 1986. Each of those cars emits an average of nearly 5 tons of carbon dioxide into the atmosphere, which is the major "greenhouse" gas. That means we're putting about 600 million tons of carbon dioxide into the atmosphere annually just by driving.

- Plant a tree. Trees are the primary absorbers of carbon dioxide, and tragically, the rate of deforestation in this country has exceeded one acre every five seconds since 1967. Every tree in your yard saves in heating, cooling, and soil erosion costs. Besides looking nice, they also absorb pollutants.

- Don't buy endangered plants, animals, or products such as furs, ivory, reptile skin, or tortoise shell, which are made from over-exploited or endangered species.

And let's not forget our role as voters. We must elect government leaders who espouse an environmental ethic. Consider what happens when we do.

Last March, the Suffolk County, New York, legislature, in an effort to reduce solid waste, approved a plan to outlaw the use of plastic grocery bags and plastic food containers. The bill, one of the most comprehensive of its kind,

USDA photo.

comes just in time: by 1990, all Long Island townships must close their overburdened landfills to safeguard their threatened ground-water supplies.

In Nebraska, the legislature passed a bill that will outlaw the sale of nondegradable diapers by 1993, realizing that these throwaway, single-use products cannot be recycled, devour landfill space, and threaten ground water with chemicals and disease.

Over the next four years, the state governments of Wisconsin, Illinois, Florida, and Minnesota will enforce statewide bans prohibiting landfills from accepting leaves, brush, and grass clippings, which make up about a fifth of the garbage in most municipal landfills. New Jersey has already banned leaves but not grass clippings from its landfills, and Pennsylvania and Connecticut are preparing to do the same. In addition, cities and towns in a number of states, including New York and California, have begun programs to keep leaves and grass out of local landfills.

Finally, in Los Angeles, voters are seeing their taxpayer dollars at work. Members of the California Highway Patrol have turned into "Smog Busters," ticketing anyone who is contributing to the country's filthiest air—namely in Los Angeles, Orange, Riverside, and San Bernardino counties. In order to meet federal clean air standards, the South Coast Air Quality Management District also plans to require cleaner-burning fuels, such as methane and compressed natural gas; expand current incentives for car pooling; outlaw free parking; and use part of parking fees to encourage the use of mass transit and limit the number of vehicles per household. Inconvenient, you say? Remember the consequences of inaction and apathy.

As the environment becomes one of the hottest political issues of the 1990s, let's guard against those who suddenly have an "election-year conversion" to environmentalism in order to capture the green vote. In the polling booths, we must be more active in electing environmentalists to public office and put forth candidates from the environmentalist community.

My message is quite simple. It is time to harden the edge. It cannot be business as usual. Our mission is urgent. Time is running out. As Adlai Stevenson said, "We travel together, passengers on a little spaceship, dependent on its vulnerable resources of air and soil; all committed for our safety to its security and peace; preserved from annihilation only by the care, the work and—I will say—the love we give our fragile craft."

If you would like a more complete list of personal changes you can make to preserve the environment, write to the National Wildlife Federation, 1400 16th St., NW, Washington, DC 20036. □

(Dr. Hair is President of the National Wildlife Federation, the nation's largest conservation organization, with more than 5.8 million members and supporters and 51 affiliate organizations nationwide. A private, non-profit organization, the Federation was founded in 1936.)

Lessons about Environmentalism in Congress

by Robert T. Stafford

For more than two decades, Congress has set the course for our nation's quest for clean and healthy air, water, and land. The House and Senate have enacted an extraordinary number and variety of laws that have helped to keep our environment safer than it would otherwise have been.

But if we are to help mankind achieve its eternal and universal goals of happiness and prosperity, we shall have to change our approach in the future. We shall have to put more emphasis on anticipation than on response. We shall have to concentrate more on prevention than on cleanup. And we shall have to extend our environmental concerns beyond the boundaries of our nation.

To those ends, we shall have to guarantee that environmental considerations be a major part of all significant policy decisions, in and out of government. If we are to continue to encourage the kind of orderly growth and development that bring prosperity, we must recognize that our efforts to provide at the same time a safe environment will require new ways. Needed will be legislation that anticipates the use of a variety of processes, ranging from regulation to conservation, to changes in lifestyles, to forcing the development and use of technology.

The twin pressures of global population growth and the ambition for a better life by struggling billions in developing countries call out for the United States to assume a position of world leadership in the necessary effort to secure a safe environment. Congress must play a critical role in this effort.

In the early 1960s, we spent much of our time trying to learn as much as possible about our environment and about ways to deal with threats to that environment. As we learned those things, we quickly became aware of how important it was—and still is—to get the public involved in environmental issues. We found very quickly that the public demanded margins of environmental safety far stricter than industry thought was reasonable and politicians thought practicable.

Emboldened by this public support, Congress moved slowly to engage an ill-defined adversary. We authorized development of the expertise needed to understand the scope of environmental problems. We established programs to measure the development of state and local regulatory programs. We set up modest federal enforcement capability to deal with environmental problems that crossed jurisdictional lines.

Our knowledge expanded. The public became more aware of environmental problems. As a result, Congress attempted to respond to public demand for a higher level of performance dealing with pollution control. The landmark Clean Air Amendments came in 1970, followed by the 1972 Clean Water Act.

It seemed then like such an ambitious effort. But, in reality, it was a limited environmental agenda.

These laws had—and still have—two basic objectives: first, to establish specific regulatory requirements and precise timetables to achieve those requirements and, second, to establish long-term policy goals for environmental programs.

To justify this federal intrusion into the environmental process, we focused on protection of human health in our efforts to control air pollution. That concern for health has become the hallmark of most of the environmental legislation that followed, and the Clean Air Act and Clean Water Act have evolved as among the most important public health laws of this nation. Public health standards became the scientific basis for pollution controls, and a body of law based on health protection has developed in the United States. These laws continue to enjoy overwhelming and increasing public and, thus, political support.

It seemed then like such an ambitious effort. But, in reality, it was a limited environmental agenda. It has been said we asked for too little in the 1960s and too much in the 1970s. The truth is, of course, that we have not done enough.

Our early environmental concerns did not include toxics, hazardous wastes, acid rain, or ground-water contamination, each of which has generated massive problems in our country. Nor did we spend much time thinking about the Greenhouse Effect and resulting climate changes, depletion of the ozone layer, desertification, deforestation, or species extinction, all of which affect not only our nation, but our entire planet.

Our early efforts came in response to dramatic events—a smog that killed, water pollution that closed beaches, chemical dumps that leaked into water supplies, and toxic releases from factories.

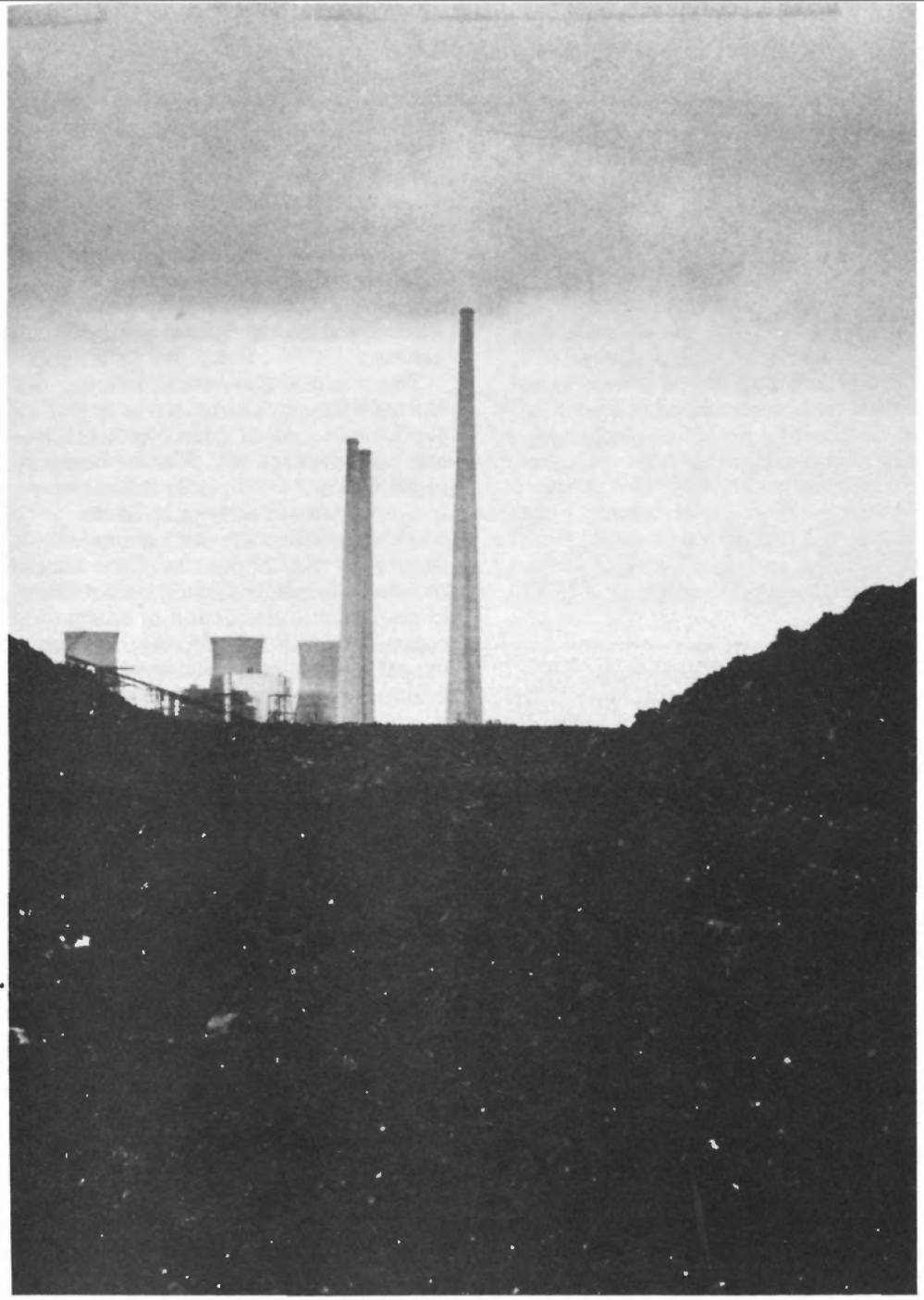
The laws we wrote in those responses were imperfect, but they were superior to the enforcement and support they received from the regulators at both the state and federal levels. Too many waivers were issued, and too many deadlines were allowed to pass.

But we have learned that we do not have unlimited time to meet the environmental problems of the future. We have also learned that we are all inhabitants of a single ecosystem of a fragile planet and that we had better pay more attention to each other's habits, policies, and ambitions.

It is in our own national interest to assume world leadership of the effort to prevent environmental catastrophe. This decade has seen the four hottest years in recorded history. The planet's ozone shield is three percent thinner because it has been weakened by manmade chemicals. Levels of ozone closer to the earth's surface have doubled.

There is a growing consensus among scientists and more and more policymakers that these and other circumstances pose a potential threat to human survival that must be addressed now. Humanity has moved closer to the edge of an environmental abyss, and we will surely plunge over it unless we change our ways.

To permit and encourage our nation to assume the world leadership required to prevent environmental disaster, the federal government will have to develop a new spirit and system of cooperation that will make environmental concerns an integral part of all national—and even international—planning.



National Coal Association photo.

Central Pennsylvania's Homer City electric generating plant burns coal from a nearby mine. The environmental impact of emissions from electric utilities continues to be a national concern.

Congress can take the lead by ending its competing interests and jurisdictions among its various committees dealing with the environment, energy, commerce, agriculture, development, and finance. Improved cooperation will have to be forged among the private sector, environmental and industry advocates, and EPA and other agencies of the government. We no longer have the luxury of taking the time to impose environmental regulation after the fact of contamination; environmental concerns must be made a part of all basic processes. It is time to recognize that the true costs to human society are the costs of pollution—not the costs of pollution control.

Laws and regulations—and even international treaties—will have to force technological development and changes in lifestyles. The Montreal Protocol on reducing the use of chlorofluorocarbons (CFCs) is a good start. We may have to provide incentives to the economy as we seek to control—even to end—pollution. We cannot require developing nations to forego the benefits of technology because the industrialized nations have fouled the environment through the enjoyment of those benefits. Likewise we can no longer permit the investment of American funds in developing nations without regard for the environmental consequences of that investment. We will also have to attack pollution through source reduction, waste minimization, improved energy efficiency, and methods to be developed in a new spirit of cooperative effort.

We will not have to reinvent the wheel to accomplish these goals. The technology already exists to build a power plant that converts nearly one-half of its energy to electricity while putting nearly two-thirds of the rest of the heat to a useful purpose. It is possible to build refrigerators and to make electronic chips without using CFCs. Our country has developed very highly efficient gas turbines, and other countries have built functional automobiles that travel between 80 and 100 miles per gallon of gasoline. The challenge is to find the way to extend these limited successes throughout the world.

New reports from virtually every corner of the globe tell us that the inhabitants of this planet increasingly are demanding protection for their environment. These same news reports tell us that more and more politicians are responding to those demands. The challenge is great, but the opportunity is even greater if only we dare to learn from the past and to change our ways in the future. □

(Stafford, a former Republican Senator from Vermont, was the Chairman of the Senate Environment and Public Works Committee from 1980 to 1986 and ranking minority member of the Committee for the remainder of his service. He retired from Congress in early 1989. Stafford is a long-time leader on environmental issues.)

The Third World's Environment: A Global Dilemma

by Thomas E. Lovejoy

By any measure, the planetary environmental crisis is at hand—whether in our accelerating loss of biological diversity or the changes in the chemistry of our atmosphere, altering the physics of the earth. These indicators say very clearly that the way human society as a whole is living, we are exceeding the carrying capacity of the planet.

To these problems must be added the likelihood of a doubling in population by the middle of the next century, mostly in the developing world. Nonetheless, the nations of the developing world understandably aspire to achieve the living standards of industrialized nations.

We clearly face a challenge of a scale and immediacy unlike any we have had before. With so many exponential adverse trends, I personally believe we have less than 10 years to effectively address the situation. The problems cannot be dealt with by nibbling at their edges. Business-as-usual will not work. Nothing short of massive intervention into the forces causing environmental deterioration will be adequate. Humanity as a whole must develop a wartime mentality to mobilize society to make the necessary changes. We are in fact at war with ourselves and our future, and only a similarly strong counter-response can save the day.

The socio-economic problems of poverty and population pressures are inextricably interrelated to the environmental problems of our planet. The population issue is so emotionally charged and so delicate that people and politicians often are reluctant to address it. Yet it is utterly obvious that any set of measurements drawn up to address the environmental problems is bound to fail if it does not include consideration of human population growth.

Even a modest increase of energy consumption per-capita in China could produce CO_2 emissions that would put the Greenhouse Effect beyond reach of a solution.

The problem of Third World development is an integral part of any solution to the impending environmental crisis. The aspirations for economic development of those nations cannot be overlooked or denied. Yet at the same time, if every person in the world were to rise to the same per-capita level of energy consumption as the United States, environmental disaster would be inevitable.

The answer then must lie in improving the economies of Third World nations *and* making the industrialized nations, particularly our own, far less wasteful and energy-greedy in the future. The challenge is for developing nations to find ways to move toward development that can bypass the environmentally destructive ways of the industrialized northern nations.

The role of the wealthier nations, the United States in particular, is critical. We certainly are in a position to help other countries, but it must be borne in mind that our example is at least as important as our assistance. If the wealthiest nation on earth, alone responsible for 20 percent of the annual increase of carbon dioxide, is not seen to grapple with reduction of energy consumption, it will be very hard to expect nations of far less wealth to undertake vital environmental measures. If we fail on that front, we give credence to accusations of ecological imperialism and the notion of a conspiracy to prevent the poorer nations from their rightful development. On the other hand, if we develop an effective national biological survey, for example, and protect our biological diversity through effective land use policies and programs, the United States could set a style and example for other nations.

The ultimate challenge is that the nature and the magnitude of the environmental crisis require a solution that is inherently international. Consider the emissions that exacerbate the Greenhouse Effect, for example. Chlorofluorocarbons (CFCs) can be replaced by other products that are environmentally benign, but the participation of all nations is required

Bangladesh. A crowded country on an increasingly crowded planet.

World Bank photo

(whether big consumers like ourselves or aspiring manufacturers like some developing countries) to effectively phase out the CFCs.

The situation with respect to carbon dioxide (CO_2) emissions is more complex and difficult. Just keeping CO_2 emissions in the atmosphere from growing beyond the current level of 3.5 billion tons per annum, directly affects the fossil fuel dependence of a large part of industry and transportation. For a nation like China, there seems little alternative but to use its massive coal reserves for energy. At the same time, even a modest increase of energy consumption per-capita in China could produce CO_2 emissions that would put the Greenhouse Effect beyond reach of a solution.

As a temporary, remedial measure, the world's forests offer a means for partially counterbalancing CO_2 emissions because growing forests convert CO_2 into wood, whereas burning forests produce CO_2. A conservative estimate puts the annual contribution from human-caused forest burning at about 20 percent of the annual net increment of CO_2 in the atmosphere. Reforestation on the order of a million square kilometers or so, spread around the world in countries north and south, could achieve about a one-third reduction in the annual net increment of CO_2. Moreover, if unnecessary forest burning were stopped concurrent with reforestation initiatives on this scale, the annual CO_2 addition to the Greenhouse Effect could be reduced by about half. Vigorous energy conservation and energy efficiency measures could go a long way toward reducing the rest of the current net increment.

What about the needs and aspirations for increases in fossil fuel use by developing nations? If China presses forward with its coal-fired utility plants, it could help balance the equation with massive tree planting. Moreover, a nation like ours could help by taking a new, relaxed attitude toward technology transfer where environmental issues are concerned. This approach to balancing the annual sources and sinks (storage mechanisms) of CO_2 is not a permanent solution because growing forests store carbon at significant annual rates for only about 30 years. However, it does buy time to work out a better energy scenario.

The cost of addressing these huge problems, and addressing them promptly, is nothing short of staggering. Essentially, this is because we have treated the environment as a free commodity and have not paid the full price for our ways of life. Now the bill has arrived and it is huge, although less than it will be if we do not right our course. As a practical matter, we must look for the most efficient way to pay this bill by harnessing market forces under the right set of rules.

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We need to look for resources that are commensurate with the environmental problems the planet faces. In many cases, there is nowhere to turn but the international debt, at least for the environmental problems of many developing nations. Debt restructuring, including debt-for-nature swaps (which involve purchasing dollars at great discount and subsequently redeeming the money at much higher value in local currency), offers special opportunities. Debt swaps for commercial purposes (debt-for-equity swaps) have occurred in considerable volume in many countries. Debt-for-nature swaps have occurred in only a few countries, but there seems to be growing interest.

Brazil is in a position through Amazonian deforestation to pull an ecological rug out from beneath itself, the region, the continent, and perhaps the world.

Curiously, an objection frequently raised is that debt-for-nature swaps are inflationary because they dump large amounts of local currency into an economy, thus "cheapening" the currency. Ironically, such objections are rarely raised about commercial debt swaps, suggesting few people yet realize how seriously environmental impacts can affect an economy.

One approach to avoid inflation is to convert debt into interest-bearing instruments such as bonds. This has the added benefit of providing stability to programs and institutions just as endowments do. The debt, in any case, is the only resource available on the scale needed and may represent our only fiscal chance to address these huge problems. It would be folly to let this opportunity escape our grasp.

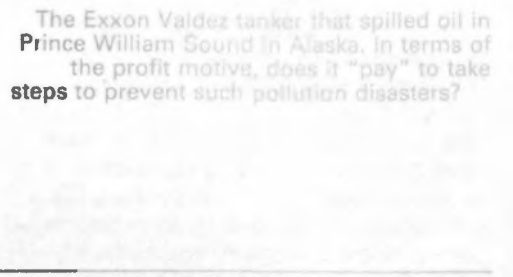
The global environmental crisis requires both international and national solutions. There clearly is no place for a planetary Big Brother, and no nation is environmentally perfect in its behavior. Yet some nations have a bigger responsibility than others—none more than ourselves, for with our 20 percent annual contribution to global CO_2 emissions, our action will significantly influence whether the ecological rug is pulled out from under the world through climate change.

Brazil is in a position through Amazonian deforestation to pull an ecological rug out from beneath itself, the region, the continent, and perhaps the world. Other nations are astride other ecological levers. Those very same nations are the ones that can contribute important environmental leadership at the time it is needed most. The opportunity and challenge are clear. □

(Dr. Lovejoy, a tropical ecologist, is Assistant Secretary for External Affairs at the Smithsonian Institution.)

How Do We Get There?

by Michael Gruber



The Exxon Valdez tanker that spilled oil in Prince William Sound in Alaska. In terms of the profit motive, does it "pay" to take steps to prevent such pollution disasters?

Solutions to the environmental problems we face for the remainder of this century require not primarily technique, but political will and, perhaps, important changes in our national culture. The vexing question is not "what is to be done?" but "can we do what is required?"

For it is now clear that the kind of regulatory program that EPA has traditionally fostered, a regulatory program based largely on "pollution control," is, by itself, inadequate to deal with these problems. Regulation alone is not going to clean the air or the waters in this country, nor will it stop the destruction of major ecosystems or deal with global warming.

If we wish to do these things (without first enduring catastrophic loss, that is), then environmental protection in its broadest sense must become a more important part of our national life. The first step in making it so is to admit how relatively insignificant and peripheral a role it now plays. The environment is more often than not an afterthought in both business and politics, like the tip one leaves for the waiter after a hearty meal. In public life, the important things are national security, in the sense of military and international relations, and economics. These are what make and break administrations; environmental issues do not, and political leaders understand this very well.

In the private sector, with few exceptions, firms regard environmental concerns as a cost to be minimized by lobbying and legal maneuver. In general, industry does not get rich on environmental protection.

But still we have those poll results. What can it mean when *The New York Times* says that around 80 percent of Americans want a cleaner environment *no matter what it costs*? When we observe how our citizens act, rather than what they report to pollsters, we must conclude that our pattern of desires and our motivations are out of touch with what we say our values are.

In other words, while we want clean air, *in principle*, we also want to drive to work in large fast cars burning cheap gas, and we want lots of cheap electricity to run our appliances and heat and cool our houses. We want an end to hazardous waste dumps, *in principle*, but we don't want the infrastructure necessary to run an effective hazardous waste recycling program built anywhere near where we live. We abhor toxic chemicals, *in principle*, but we buy great quantities of the paints, plastics, wrappings, and consumer chemicals that use such substances, and we demand flawless, cheap fruits and produce.

Regulation alone is not going to clean the air or the waters in this country, nor will it stop the destruction of major ecosystems or deal with global warming.

Our efforts at cleaning our environment have not, as yet, cut very deeply into this lifestyle. Our concentration on the control of pollution by the manufacturing sector has meant that pollution control costs were passed on to the public in small doses. Although the total cost to society has been substantial, the impact on most individuals is barely noticeable. This will no longer be the case if environmental protection becomes a more important part of national life. It is going to pinch.

This is because really protecting the environment means preventing pollution, and preventing pollution does not mean merely setting up an office with that name at EPA. It means making significant changes in production, in types of products, and in daily habits. It means paying the true environmental cost of everything we use or buy.

This is already starting to happen. The cost of solid waste disposal, which a decade ago was only $5 to $10 a ton, is $125 per ton in some places and rising. The people of Boston have started to put money instead of just sewage into their harbor; sewage utility rates have risen fourfold as a result. When costs go up like this, one result is to focus the mind wonderfully on preventing waste in the first place, using less, and making products that are recyclable or reusable.

This process must be made to continue at an accelerating rate. The way to do this is to build environmental protection into the heart of the market economy itself, to make it an inherent part of the great advantage that market economies have over all their rivals: the enormous flux of information they can bring to bear on resource decisions, information generally expressed in the form of prices. Unlike polls, prices tell the truth about what people really value.

Here is an example. Because of the *Valdez* spill in the Gulf of Alaska and the subsequent mismanagement of the initial cleanup, the Exxon Corporation is now the great environmental villain. Imagine that Exxon now says: "We've reformed. From now on we're committed never to spill another drop of oil on the sea. Our tankers will all be retrofitted to have triple hulls and double crews. Each one will travel in convoy with empty tankers and special ships full of containment gear and teams drilled to the peak of efficiency. This will be very expensive. For this reason, we will cut salaries and skip a few dividends, and we will have to sell our gas for $3 dollars a gallon. But we're not worried. We know the American people are for environmental protection regardless of cost. That's why we don't

NYT Pictures

think skilled people will leave our employ, and institutional investors won't dump our stock, and all those Americans who are environment-lovers regardless of cost (that 80 percent!) will flock to buy our gas."

The extreme improbability of this scenario is evidence that those who run corporations regard the environment-cost tradeoff more realistically than do environmentalists or the media. They understand that to get anything serious done in a market economy, the government must make it possible for people to become rich by doing it. This is how we built the railroads and the military-industrial complex, and this is how we can build a clean environment. But it isn't happening yet, and the way you can tell is that nobody is trying to compete in business on the basis of environmental quality.

Think of the ads on television. Most compete on image, many on price and quality. Nobody, however, says (yet) "Our product costs a little more, but that's because we have the environmentally cleanest plant in the industry."

Regulation has not helped to move the day of frank environmental reckoning closer. The theory behind current environmental law is that industries will be held to standards, usually expressed in terms of the installation of particular technologies. Plants can pollute up to a certain point, but no more, and that level is the subject of elaborate negotiations and, generally, the result of much legal action.

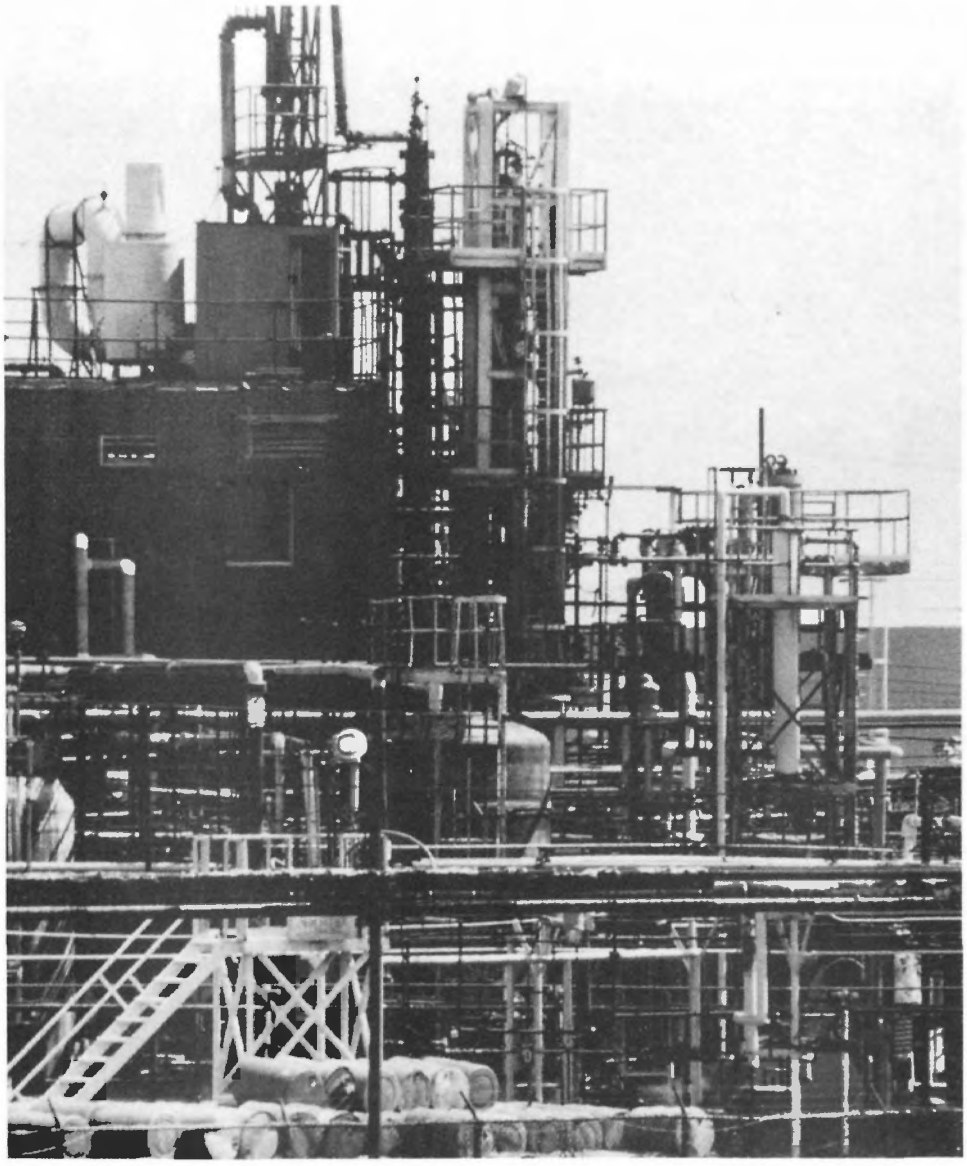
The theory assumes further that as new technology is developed, the standards will be made more stringent. And to a limited degree, this has been true; a new plant is cleaner than the one it replaces. But industrial manufacturing pollution makes up a smaller percentage of American pollution than it once did. Right now the real problems are in transport, land use, energy, and waste—the *lifestyle* quartet. There is thus little incentive for industry to develop new means of pollution control, since everybody must march in lockstep to the current technology-based standards.

Environmental protection should therefore be massively refocused to mobilize rather than suppress the ingenuity and creativity of industry. This means that we should seek additional gains in pollution control (and that includes reductions in carbon-dioxide emissions) not by increasing the stringency or technical specificity of command-and-control regulation, but by implementing incentive-based systems. With such systems, scarce public sector resources are magnified by tens of thousands of decisions by individuals and firms.

For example, market-based approaches will be a necessary part of any attempt to reduce "greenhouse" gas emissions. Here the most attractive options involve improving energy efficiency. If the world were to improve energy efficiency by two percent a year, global average temperature could be kept to within one degree Celsius of present levels. Many industrialized nations have maintained this level of improvement during the past 15 years.

Efficiency gains may still have to be promoted by market incentives when, as now, energy prices lag behind increases in income. A "climate protection" tax of $1 per million BTUs on coal and 60 cents per million BTUs on oil is an example of such an incentive. It would raise gasoline prices by 11 cents per gallon and the cost of electricity an average of 10 percent and yield $53 billion annually, part of which could be used to fund environmental protection efforts on a scale that would give serious, rather than rhetorical, attention to the goal of our clean air and water legislation.

Some form of emissions trading program will be necessary, and on a much larger scale than has been the case so far. Emissions trading is a natural predicate for reductions in greenhouse gas emissions on a



Steve Delaney photo.

While protesting toxic pollution from chemical manufacturing, people continue to demand the products of these processes.

national level and even more so on a global scale.

In such a program, all major sources of pollutants (including greenhouse gases, of course) would be issued permits specifying allowable emissions. Sources that could reduce their emissions below the specified level—for example by investing in efficiency—could sell their excess emissions allowance to other sources. Firms for whom it might be prohibitively costly to retrofit or build new plants could meet their permitted levels through purchases, or could close down their least efficient plants and sell the vacated permits to ongoing firms. Environmental protection will have really arrived in this country when such permits are the subject of frenzied trading in the Chicago Pit—when, in other words, environment has become a central concern of business, like finance and marketing.

Market-based systems are, of course, not a panacea. There are some environmental problems for which they are clearly inappropriate, such as the use of unacceptably dangerous chemicals, or where irretrievable environmental damage is likely to take place. Once again, we must lock into the wealth-producing mainspring of our enterprise system. This means applying the major sanctions that are built into our environmental laws, sanctions that say, in effect, if people are getting rich in a way that adds unacceptably to pollution, we must act to cut off their opportunity.

The big sanctions have never been applied. We have not frozen the road building or the construction permits or the sewer hookups. EPA's veto power over Corps of Engineer-supported projects has rarely been used. This is why the recent EPA decision halting the proposed Twin Forks Dam project in Colorado was so startling. A dam project that would have supplied the water necessary for continued growth in the Denver metropolitan area was suspended.

This is virtually the first time the federal government has acted to place environmental values above what was seen by its promoters as a major area-wide economic expansion. There now is a movement in Congress to remove this power from EPA. The sanctions are "politically unacceptable," which is a way of saying that when push comes to shove, the jobs of construction workers and the fortunes of mortgage bankers are more important than environmental values.

As long as such attitudes do not change, as long as the real motivators of daily life (like prices and business opportunities) do not support environmental values, then all the command-and-control regulation in the world will not stop America from continuing its highly polluting and wasteful style of life. And, as a result, our efforts to get the less developed nations to protect their environment will be considered mere cant and hypocrisy, the frightening changes in global systems will continue, and the environment will return the favor by becoming ever more hostile to human society.

But Americans are capable of radically redefining what is politically and economically feasible in the light of obvious and compelling crises. Pearl Harbor and Sputnik are the famous examples. Whether we can accomplish such a redefinition in response to a crisis that is more tentative and diffuse, and where our own desires and material values are the "enemy," remains to be seen. □

(Gruber is an EPA staffer on temporary assignment to the Department of Natural Resources in the state of Washington under an Intergovernmental Personnel Act program.)

Appointments

F. Henry ("Hank") Habicht II is the new Deputy Administrator of EPA.

From 1984 to 1987, Habicht was Assistant Attorney General in the U.S. Department of Justice, a period in which the number of civil and criminal environmental enforcement prosecutions more than doubled. He first joined the Department of Justice in 1981 as special assistant to Attorney General William French Smith and served as Deputy Assistant Attorney General from 1982 to 1983.

At the Department of Justice, Habicht directed the Land and Natural Resources Division, which handles all federal government litigation concerning environmental, energy, and land and resources management matters. He also formed and chaired the National Environmental Enforcement Council, which promotes coordination of federal and state environmental enforcement actions.

Since 1987, he has been counsel to the Seattle law firm, Perkins Coie, and was Vice President of William D. Ruckelshaus Associates, Washington, DC, with responsibility for counseling on environmental, natural resources, and energy issues.

He is an alumnus of the Woodrow Wilson School of Public and International Affairs at Princeton University, where he was president of the rugby club. He holds a law degree from the University of Virginia.

Timothy B. Atkeson has been nominated by President Bush to be Assistant Administrator for International Affairs of EPA, a new position that replaces the Associate Administrator.

When the Council on Environmental Quality was created in 1970, Atkeson was appointed General Counsel and served there until 1973. He has been a partner with the Washington, DC, law firm of Steptoe and Johnson since 1975.

Atkeson was co-author of "Superfund Deskbook," published in 1986, and "Superfund: Litigation and Cleanup," published in 1985. He has taught environmental law at Georgetown Law School, Dartmouth College, and Catholic University Law School.

In 1958, he began a three-year term as Deputy General Counsel with the U.S. Development Loan Fund, followed by a year as Regional Legal Advisor for Latin America with the Agency for International Development. He was an associate and partner at Steptoe and Johnson from 1962 to 1967.

From 1967 to 1969, Atkeson was the first General Counsel of the Asian Development Bank in Manila. Most recently, he served as Special Counsel to the High Level Review Committee at the Inter-American Development Bank, in 1988. He graduated from Haverford College in 1947, attended Oxford University as a Rhodes Scholar from 1947 to 1949, and earned a law degree from Yale University in 1952.

Charles L. Grizzle was reappointed as Assistant Administrator for Administration and Resources Management. He has served in the same position since February 22, 1988.

Before joining EPA, Grizzle had been Deputy Assistant Secretary for Administration at the U.S. Department of Agriculture (USDA) since 1983. He joined USDA in 1982 as a special assistant to the Secretary, and also served as a staff assistant to the director of the Office of Operations and Finance.

From 1974 to 1981, Grizzle was an officer of First National Bank of Louisville, Kentucky. He also served briefly in 1981 as executive director of the Republican Party of Kentucky.

He earned his bachelor's degree in English and political science from the University of Kentucky in Lexington. In 1987, he successfully completed the Senior Managers in Government program at the Kennedy School of Government at Harvard University.

Robert G. Heiss is the new Associate Enforcement Counsel for Water, in the Office of Enforcement and Compliance Monitoring.

Heiss had been the Deputy Chief Counsel for Operations in the Economic Regulatory Administration at the Department of Energy before joining EPA in February of this year. From 1985 to 1988, he served as Deputy Special Counsel in the same agency.

A 1971 graduate of Harvard Law School, Heiss joined the Department of Energy in 1975 as an attorney-advisor in the Office of the General Counsel. In 1978, he was appointed Assistant General Counsel for Enforcement.

Heiss earned his bachelor's degree in history from Williams College. After graduating from law school, he worked for the Washington, DC, law firm of Brownstein, Zeidman, & Schomer specializing in franchising law.

Dr. Ralph H. Hazel was appointed as Senior Office of Research and Development Official for EPA's Environmental Research Center. The center is located in Research Triangle Park, North Carolina.

As Senior Official, Hazel will be the principal spokesman for the center and will direct the Research and Development Services Staff, with special emphasis on enhancing community outreach programs.

Hazel had been the Senior Science Advisor to the Regional Administrator of EPA's Region 7 in Kansas City, since 1983. From 1979 to 1983, he was Director of the Johnson County Environmental Department in Kansas.

Hazel earned his bachelor's degree in chemistry from the University of Central Arkansas, his master's degree in chemistry from the University of Arkansas, and his doctorate in environmental engineering from the University of Kansas. He has taught environmental science at both the high school and college levels.

He has also been awarded two EPA Silver Medals for Superior Service and a Bronze Medal for Commendable Service.

Tidwell

Adamkus

Layton

Kay

Scherer

McGovern

Russell

EPA Administrator William K. Reilly recently announced the retention of the Regional Administrators for EPA Regions 4 through 10. Their names and brief biographical sketches follow:

Greer C. Tidwell has been Regional Administrator for Region 4, headquartered in Atlanta, since March 1988. Previously, he operated his own environmental engineering firm. He earned his bachelor's and master's degrees in engineering from Vanderbilt University.

Valdas V. Adamkus has been Regional Administrator of Region 5, headquartered in Chicago, since 1981. He served as a director of the Ohio River Basin Regional Office in Cincinnati before joining EPA. Born in Lithuania, he attended the University of Munich and holds a bachelor's degree in engineering from the Illinois Institute of Technology.

Robert E. Layton has been Regional Administrator of Region 6, headquartered in Dallas, since February 1987. A Texas native, Layton earned a bachelor's degree from Texas A & M University in engineering and ran his own engineering firm before joining EPA.

Morris Kay has been Regional Administrator for Region 7, headquartered in Kansas City, Kansas, since 1982. Kay spent three terms in the Kansas House of Representatives, where he was majority floor leader. A Kansas native, he earned his bachelor's degree from the University of Kansas.

James J. Scherer has been Regional Administrator for Region 8, headquartered in Denver, since April 1987. He operated his own car rental and leasing business in Denver and served two terms in the Colorado legislature before joining EPA. An Indiana native, Scherer earned his bachelor's degree from the University of Notre Dame.

Daniel McGovern has been Regional Administrator for Region 9, headquartered in San Francisco, since February 1988. Previously, he served as General Counsel of the National Oceanic and Atmospheric Administration and as principal deputy legal advisor to the U.S. State Department. He earned a law degree from UCLA School of Law.

Robie Russell has been Regional Administrator of Region 10, headquartered in Seattle, since 1986. He served as Senior Deputy Attorney General and Deputy Attorney General for the state of Idaho before joining EPA. A native of Idaho, Russell earned a bachelor's and a law degree from the University of Idaho.

As *EPA Journal* reported last issue, **Ted Erickson** was named the Regional Administrator for Region 3, which is headquartered in Philadelphia. A new Regional Administrator for Region 2, headquartered in New York, has not yet been selected.

Recently, President Bush announced his intention to nominate **Michael Deland,** currently Regional Administrator for Region 1, headquartered in Boston, to be Chairman of the White House Council on Environmental Quality. Until he is confirmed by the Senate, Deland will continue to serve as Regional Administrator. □

Sea oats guard the dunes on South Carolina's coast.

Ray Muzika photo, Coastal Photo Service

Back Cover: Rio de Janeiro, Brazil. As human development spreads across the globe, existing institutions face unprecedented challenges.

Photo by Stephanie Maze for Woodfin Camp, Inc.