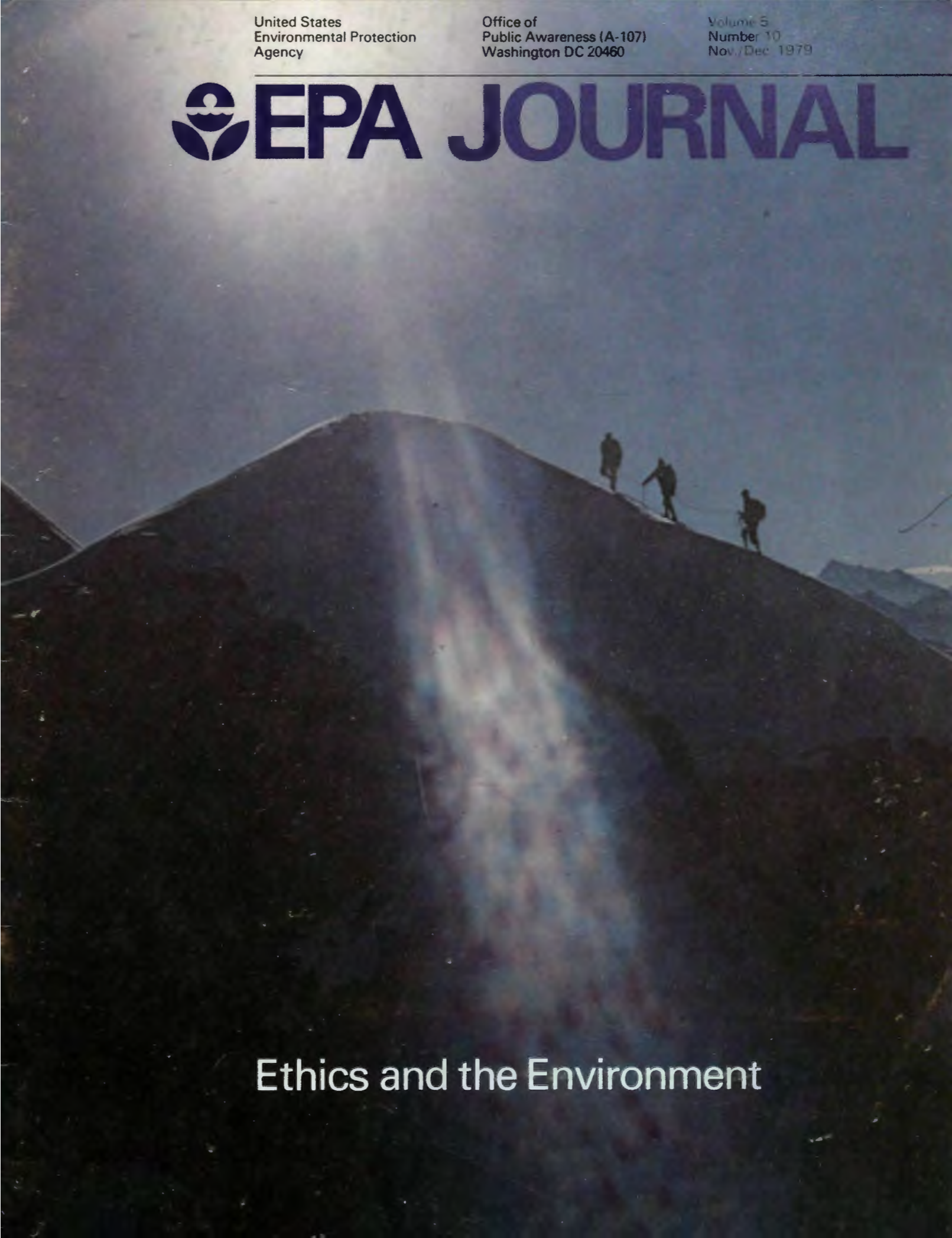
United States
Environmental Protection
Agency

Office of
Public Awareness (A-107)
Washington DC 20460

Volume 5
Number 10
Nov./Dec. 1979

EPA JOURNAL



Ethics and the Environment

Ethics and the Environment

In this issue EPA Journal has called upon a distinguished panel of contributors to talk about the emergence of an environmental ethic in our society and its impact in such areas as energy, the economy, and human health.

Lester Brown, President of Worldwatch and an internationally recognized authority on food and population problems, says in an interview that an environmental ethic has come to the fore in the '70s because our long-term survival depends on it. Such an ethic, he explains, requires a stable relationship between ourselves and the natural systems that support us.

R. Buckminster Fuller, the celebrated inventor of the geodesic dome, declares in another interview that Nature gave us a safety cushion, a time factor to make mistakes and learn how to adjust to the environment—but time is running out. "It's absolutely touch and go whether we're going to make it," he says.

Interestingly, both Brown and Fuller note that of all nations in the world, China has one of the strongest environmental ethics today.

Barbara Ward, world-famous economist and environmentalist, warns that organic life on Earth is vulnerable and delicate, and that both scientists and philosophers are emphasizing that we must be a "conserving and caring society" if mankind is to survive.

Long before environmental issues had widespread popular support, Supreme Court Justice William O. Douglas was expressing an environmental ethic in his judicial opinions. Monty J. Podva, who has worked closely with Justice Douglas, describes in an article the many cases where, in pungent and forceful language, this renowned jurist has defended the environment against despoilation.

Is the golden era over for environmental improvement? Administrator Douglas M. Costle thinks the obituaries are a bit premature. What has changed, he notes, is the *nature* of the battle against pollution. He declares that we have seen a change in troops, "from the ragged squad of citizens' militia to the disciplined platoons of lawyers, scientists, and civil servants who know how to translate passion into the tedious but essential minutiae of the statute-books."

Joan Martin Nicholson, Director of EPA's Office of Public Awareness, discusses in an interview the need for a well-informed citizenry in dealing with environmental problems. A world authority on conservation, S. Dillon Ripley, Secretary of the Smithsonian Institution, writes eloquently about this problem.

Other notable articles include a description by Pulitzer-Prize-winning author Robert Cahn of the search for an environmental ethic in America.

Joan Z. Bernstein, former EPA General Counsel, recounts the development of mediation to offer flexible, creative solutions to costly environmental disputes. □

United States
Environmental Protection
Agency

Office of
Public Awareness (A-107)
Washington DC 20460

Volume 5
Number 10
November/December 1979

EPA JOURNAL

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

Articles

A Premature Requiem for the Environment 2
EPA Administrator Costle emphasizes that the environmental movement remains strong, but the nature of the battle has changed.

Conservation—A Moral Responsibility 4
S. Dillon Ripley, Secretary of the Smithsonian Institution, describes the need to study and record for future generations the many subtle changes occurring in our environment.

A Search for an Environmental Ethic 6
Pulitzer-Prize-winning journalist Robert Cahn notes that environmental citizenship is essential if we are to preserve the quality of life.

The Environmental Ethic of Justice William O. Douglas 9
An insight by a close associate into the many judicial opinions by this celebrated jurist on environmental and conservation issues.

Environment and Energy Futures 12
Robert O. Anderson, Chairman of the Board of Directors, Atlantic Richfield Co., discusses the need to balance environmental and economic issues.

Threats To Biological Systems 14
Lester Brown, President of Worldwatch Institute, discusses food and population problems, environmental degradation, and resource exhaustion.

Spaceship Earth—Is It In Trouble? 18
R. Buckminster Fuller, inventor of the geodesic dome, warns in an interview of the hazards in our trial-and-error approach to solving environmental problems.

Science and Values on a Small Planet 21
Barbara Ward, President of the International Institute for Environment and Development, suggests that Western civilization still can use its accumulated wisdom to head off environmental destruction.

Where Are We Growing? 24
Maurice Strong, former Executive Director of the U.N. Environment Program, stresses the need for society to shift to a type of growth less demanding of energy and raw materials.

The Energy-Environment Dilemma 28
The "new scarcity" in resources and the deterioration of the environment require new social choices, according to Willis W. Harman, Associate Director of Stanford Research Institute International.

Environmental Mediation 30
Joan Z. Bernstein, former EPA General Counsel, describes how mediation can offer a different approach.

The Need for a Well-Informed Citizenry 33
An interview with Joan Martin Nicholson, Director of EPA's Office of Public Awareness, concerning the philosophical basis for helping the public to understand environmental problems.

Departments

News Briefs 11
People 32
Around the Nation 36
Update 38
Almanac 40

Cover: This photo of mountaineers, climbing toward a peak in the French Alps, symbolizes humanity's quest for a better and more beautiful world.

Opposite: Sunset over a winter landscape.

Photo credits: Richard Kenrway/Black Star, Inge Morath/Magnum, Hans Mann, M. Woodbridge Williams/NPS, Camera Trix/Black Star, Claus Meyer/Black Star, Emil Schulthess/Black Star, George Legg, Gaston Rebuffat/Photo Researchers Inc., Population Crisis Committee

Design Credits: Robert Hanagan, Donna Kazanowsky and Ron Farmer

The EPA Journal is published monthly with combined issues July/August and November/December, by the U.S. Environmental Protection Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget.

Text printed on recycled paper.

A Premature Requiem for the Environment

By Douglas M. Costle
EPA Administrator

A few months ago the President talked to the Nation about our energy problem, and told us what he proposed to do about it. A majority of us—72 percent, according to an ABC-Lou Harris poll—were impressed by his note of resolve, and approved of his program.

Among the environmental community, however, the President's speech got a decidedly mixed reception. "It is clear," Dr. Barry Commoner told the *Chicago Tribune*, that the President and his advisers "have decided to attempt to override environmental legislation." Any effort to cut "red tape" on energy facilities, Amory Lovins wrote in the *Washington Post*, is likely to be a disguised end-run around environmental law. A headline in the *New York Times* read, "Environmentalists See End to a Golden Era." The "golden era," of course, is the last decade—a period that saw passage of the National Environmental Policy Act, and of the

Clean Air, Clean Water, and Toxic Substances Acts.

But such gloom was not universal. Brock Evans, Washington director of the Sierra Club, pointed out that the basic environmental laws are on the books. "From now on," he said, "our movement will need fewer rabble-rousers like me, and more technicians. The coming struggles will be within the bowels of the Environmental Protection Agency—and in the courts."

I think Mr. Evans is much nearer to the mark than those who believe that the President's energy proposals sound a death-knell for environmental improvement and the environmental ethic.

The "golden era" may indeed be over for those who regard rabble-rousing and hell-raising as the ecological equivalents of the Boston Tea Party and the essence of environmental protection.

Once upon a time they were—but not any more. The hell-raisers have done their work—and important work it was. We would never have gotten the environmental movement launched without the spontaneous outrage of hundreds, then thousands, and finally millions of American who just plain got fed up, watching inadequate economics turn our country into a garbage dump. Perhaps we will need their outrage again.

In the meantime, however, their anger has been expressed in law. That is the essence of environmental protection. Anti-climactic as the shift may seem, the burden of environmental improvement has passed—as Mr. Evans suggests—from the rebels to the technicians; from the ragged squad of citizens' militia to the disciplined platoons of lawyers, scientists, and civil servants who know how to translate passion into the tedious but essential minutiae of the statute-books.

This transition—from the zest of guerrilla warfare to the hum-drum of walking a beat—inevitably entails a drop in emotional temperature. Yet such a cooling-off is part of the natural maturing process of any successful public movement, from our own Revolution through labor-unionism and civil rights. As in the case of these earlier social changes, the feisty, raucous youth of the environmental movement must give way to a sober, rational adulthood.

One characteristic of the maturing process for any social movement is a transition from outright, all-or-nothing conflict in its early days, to a competitive sort of bargaining in its later days.

This latter process will operate as the Nation marshals its resources to achieve the goals of the President's energy plan. Ambitious as it is, that plan need not mean any substantial retreat on environmental policy. Nor do I see any reason or need to alter or abandon the environmental ethic that has served us so well in the past decade as a foundation for all our legislative achievements in controlling pollution.

For one reason, the President has put himself on public record as rejecting any such retreat. To choose one of several quotes that might be cited, he said this on July 31—after his energy speech on television:

"We will also protect our environment. I will not permit America to be forced to choose between breathing foul air and having our waters filthy on the one hand, or mortgaging our future to the OPEC oil cartel. We don't need to do either one. . . . With commitment, with imagination, with courage, with America's technological genius and with our vast resources given to us by God, we can meet our energy goals while we preserve the quality of our precious land, air, and water."

That is a strong statement—one made so forcefully that it would be politically impossible for the President to withdraw it. But there will be no need for him to do so—for the fact is that there is room for plenty of innovation in the competition between energy and environment.

Regulatory innovation offers real promise for speeding achievement of our energy goals without compromising environmental quality. But a much more important factor in our successful pursuit of these equally important goods will be technological innovation.

I am not a believer in what is known as the "technical fix." That concept—well-illustrated in the case of nuclear wastes—typically leads people to proceed with a troublesome action now, out of a conviction that somebody else will figure out a way to deal with its harmful side-effects before a difficulty becomes a disaster. By refusing to take this intellectually anemic way out, however—by accepting the need to build energy facilities right in the *first* place—we will accelerate the development of true, environmentally benign innovation.

Some executives have been candid in admitting that environmental regulations led them to discover profits that they would not have found otherwise. Through process-innovation, one glass manufacturer reduced his energy bill by 10 percent, simultaneously boosting production to an all-time high. He later testified, "If EPA hadn't put the squeeze on us, none of this would have happened."

Well . . . our American honeymoon with cheap energy, brought to such an abrupt halt by foreign oil-producers, has put the squeeze on all of us. But that pressure will not force us to abandon our environmental goals. On the contrary, it will force us to use our brains as well as our billfolds in the imaginative pursuit of a self-reliant, environmentally sensible energy future.

Far from compelling us to abandon environmental objectives, our energy situation—and President Carter's response to it—will stimulate a host of innovations that would otherwise languish in an economic limbo. The need for energy conservation—the cheapest, most readily accessible "supply" of energy—has already stimulated efficiencies in business, new building codes, new courses for architects, and a flurry of attic-insulating by homeowners; it will become a way of life for all of us. The development of solar energy will pick up in pace, as will our exploration of unconventional gas and heavy oils. Oil shale poses real environmental problems—principally the competition for water between shale-development and agriculture; our perception of those problems, coupled with adequate financial resources and the determination to safeguard our water and food supply, will force us to solve those problems *before* any national damage is done.

We have known for years that the oil-wells would start pumping dry one of these days, and that we would have to find new ways to fuel our lives. But we have limped along from crisis to crisis, shouting for action when the gasoline-lines appeared, and lapsing back into apathy as soon as energy supplies resumed.

The President's new energy plan signals his determination that we will postpone action no longer; we will come to terms with our needs now. But he has also pledged that our quest for energy will not be carried out at the expense of the natural biological systems that support our very existence.

Those who believe the President's energy proposals signal an end to the "golden era" of environmental progress are wrong. The requiem they hear—whether with delight or dismay—is quite premature. Our national push for new energy supplies will undoubtedly lead, as the President has said, to "trade-offs." Those of us whose principal concern is environmental protection can expect to lose a few battles. Those whose sole concern is energy production without environmental controls can expect to lose even more.

But this is as it should be. An insistence on winning every fight, on getting one's way all the time, is a characteristic of children. Environmental protection has passed out of its childhood, and entered upon its social, political, and legal maturity. And though childhood is fun, anyone over the age of 21 knows that maturity is the real golden era. □

Conservation: A Moral Responsibility

By S. Dillon Ripley

Secretary, The Smithsonian Institution

S. Dillon Ripley holds a Bald Eagle chick.

The problem of speaking about conservation in almost any rational terms is that the subject is one that people always want to put off—next year, the year after. Museums have traditionally tended to neglect conservation, so busily have their curators been acquiring things. It is far more exciting to collect than it is to conserve what we already have. Most museums of an older day have a farcical amount of space devoted to conservation care or laboratories. Conservation seems unglamorous, like housekeeping. The need for it only comes home to us slowly. It creeps up on one, over the years. It cannot be measured easily in terms of time.

Year by year, textiles fragment, paper crumbles, glass decomposes chemically, bronze becomes "sick" with its own strange disease, metals rust, and wood crumbles into dust. It all happens gradually, but not number by number in an arithmetic sense. Materials decline by the power, in an exponential sense, doubling instead of merely adding. And yet the time involved stretches ahead in an unfathomable way, a limitless horizon of trying to make up, to put things right. These objects we possess are all we have of history, the history of ourselves, the history of the planet. When they are gone we will have lost the evidence. In our own case the poor fragments of history, like the bundle of a man's possessions gathered up after his death, a suitcase full, are the merest remnants of all the power and the creations of mankind. And yet every fragment is precious to us as a testament to creativity, to the impress of culture and civilization on our history, and its example for ourselves.

And so we have planned for ten years, and for a number of these have pressed our case with the Congress. At last it appears that our urgency has been repaid, for we have had hearings, planning money has been awarded for a new support facility to house our overflow, provide area space for research as well, and, what is perhaps most important, provide additional space for work in conservation.

If long-distance time is so difficult to care about, how much more so is environmental conservation. Just as the Smithsonian is concerned with the preservation of artifacts, objects made by the hand of man, so we must be concerned with natural objects and the evidence that they represent. Ecology is the study of the environment. For years ecologists have rather placidly been tabulating natural phenomena in order to develop principles for understanding the gradual changes in that environment under whatever conditions of climate, of terrestrial or aquatic setting in which this may occur. A whole dramatic field has developed in which the interplay between the living organisms, animals and plants, and the chemical and physical setting in which they play out their roles can be measured. History is involved, and evolution, as well as adaptations caused by external pressures leading to rapid expansion, or to extinction.

Today the measurements taken by ecologists seem to have been so speeded up by the changes wrought by mankind, the proliferation of chemical compounds, the release of oil, nuclear activities, the destruction of forests, especially in the tropical zones of the world, that time, which is essential in ecology, is being abandoned. Ecologists thus seem to be driven to measuring changes brought about by people, rather than by nature. This is not the way the science began, nor is it the healthiest way of proceeding. Unfortunately we are witnessing today the aftereffects at short range of our own ability to change the environment in a monumental sense. For the first time people have the technological means to create mega-changes in the environment. Ecologists have been nearly caught short in this race against time, before their science has fully matured, and before public understanding and appreciation of the time involved in ecological research has had a chance to evolve.

Environmental impact studies are largely fruitless unless performed over a period of years. But we are too impatient for results to be able to afford the extra time. Such studies cannot be rigorous in an ecological sense for the most part.

Where then to turn? There is no such thing as a quick fix in an environmental impact study except in the very simplest or more direct form such as a known single chemical measured already over years for its effect in a limited environment. But even here the ramifications and side effects may be unmeasured, the mosaic of interactions uninterpreted. How then can we possibly develop answers, for the long haul, to reactions in nature which will satisfy American impatience and lack of a real sense of time? It is part and parcel of our instinct in regard to government policy to put out the brush fires which were developing last year rather than attempt to plan for where the next ones may break out three or four years from now.

In such an atmosphere government activity occurs by inertia. Only a shock of

some sort will produce a response, often a twitch as if the body were asleep. Collectively perhaps this is a wise maneuver, for over-reaction sometimes exacerbates the cause of the trouble in the first place. Meanwhile, however, conservation itself is overlooked. The influences which affect conservation adversely continue to grow and develop. Human population pressure increases relentlessly, and at the same time human expectations continue to rise as education and the spread of communications develop.

In this climate there is perhaps one final moral responsibility left for us collectively as human beings. Aside from any personal ethical responsibilities which we may have as individuals, kindness to others, a faith, self-discipline as we occupy smaller and smaller niches of space, is there a single aspiration to which we should subscribe? For while we delve and span, the planet spins, time passes, each day there is change, and in all there is the pressure of life itself, the heartbeat of self in us all.

I believe there is one ethic, one principle left out of our consciousness. It is conservation. It is perhaps the last larger responsibility, bigger than us all. Museum people are singularly reminded of mortality, like priests and doctors, by the deterioration of objects created by the hand of man. Is it possible to transfer this reminder to the rest of our known space, the Earth itself? Conservation of that in which we ourselves had no part in creating is an even greater moral charge. It is a harder task for it is all the more impersonal. We can care for our own possessions, our house, our cave, and we can fight for our allotment, our quarter acre, but can we bring ourselves to feel responsible for all of nature in the context of time? It is an impersonal, larger responsibility, but it is incumbent on us all, now that we know for the first time we have tipped the scales, changing it all inexorably in a time frame which is not apparent to our generation.

The planet may spin but we are not aware of it. In the slow turning of the Earth the ineffably minute changes that collectively make a difference become meaningless to us. So what if we read that fifty acres of tropical forest are being destroyed each minute, or each hour, or each day? What does that have to do with us? Someone else will notice it eventually. It seems as inconceivable that such a statistic could ever affect us as that some day we would be issued the last gallon of gas that we would use—ever.

A museum keeps a roster and a tally of extinction. The Smithsonian maintains the National Herbarium. Five years ago we were charged with developing and maintaining a list of the endangered plants of the United States. We can also tell how many plants have gone extinct in the last hundred years, and of those how many have disappeared in the last twenty-five compared to the preceding seventy-five. We can do the same for a number of animals as well. Abroad we can support some evidence of the numbers of species that are probably going extinct before we have even discovered that they exist. The rate of extinction is a matter of the deepest concern. It means that our environment is becoming impoverished, even as there are more of us humans with our expectations to coexist with it. But the diversity of species is a measure of the tolerableness of the environment. Impoverishment means a harsher and harsher atmosphere and space in which to live. And so at the same moment that humans are doubling and trebling, the world is being robbed of some of those very expectations on which our future may depend. Cannot conservation then be described as the ultimate responsibility for us all? Museums have it in their power to act as long-range environmental impact advisors, monitoring the rates at which species may be expected to tell us of the survival value of our allotted space on Earth. □

A Search for an Environmental Ethic

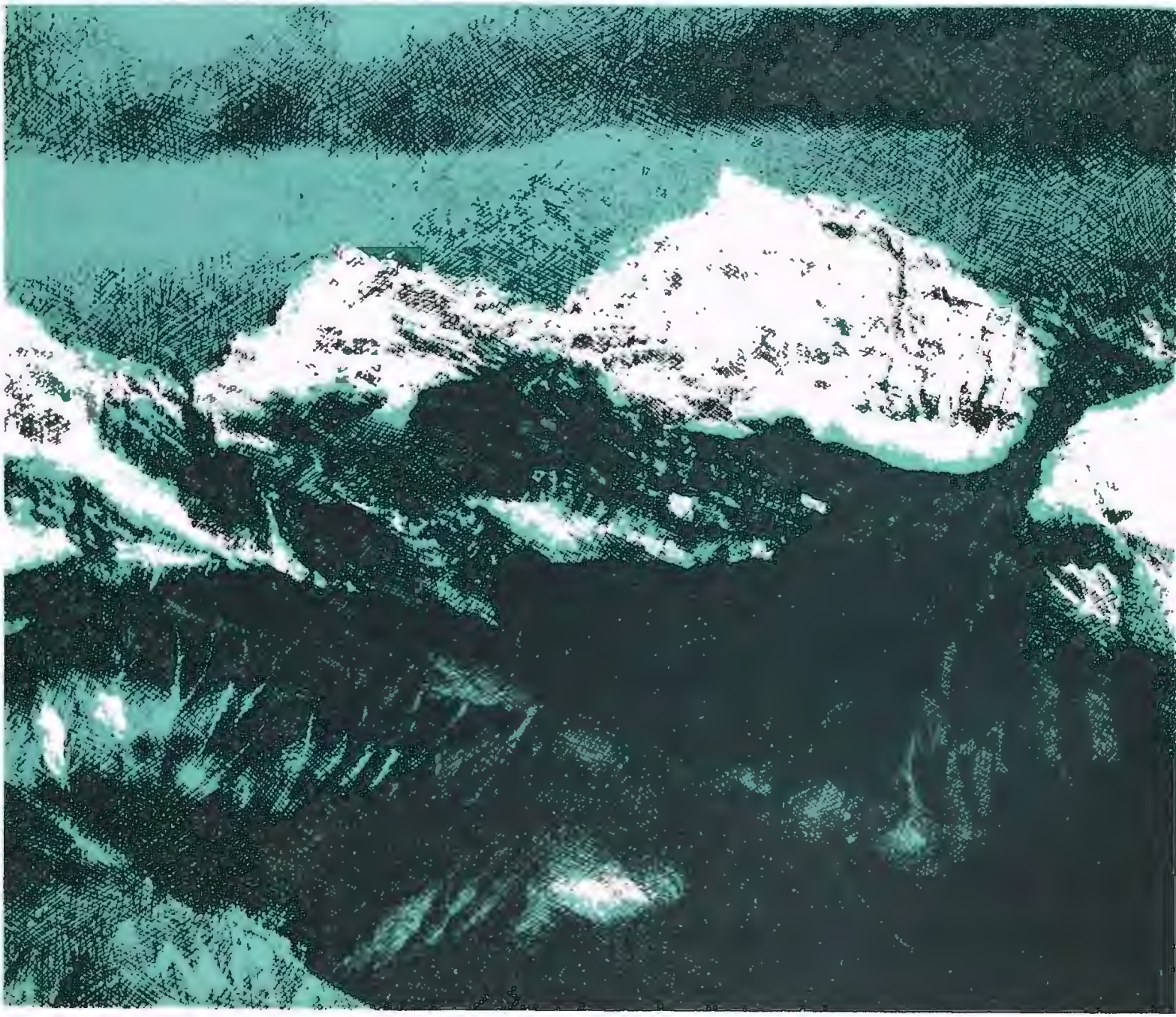
By Robert Cahn

Walking up a gentle hill away from the fog-shrouded lake where we had camped on the North Slope of the Brooks Range, I stepped into clear, mistless beauty. The incredible green vastness of Alaska's wilderness enveloped me. The sun cast a golden glow that failed to warm the early morning chill. An Arctic tern circled overhead.

The breeze ruffling the foot-high willows, alders, birches, and berry bushes that emerge in summer from the heavy snows of fall, winter, and spring was the only sound that broke the great silence. I felt awe tinged with uneasiness at the sense of total aloneness in this untamed region hundreds of miles from civilization.

I could almost imagine I was the first white man to set foot on this particular spot, except for the team of scientists back at the base camp. I picked my way through the thick tundra toward the crest of the little hill. What new view would unfold from there?

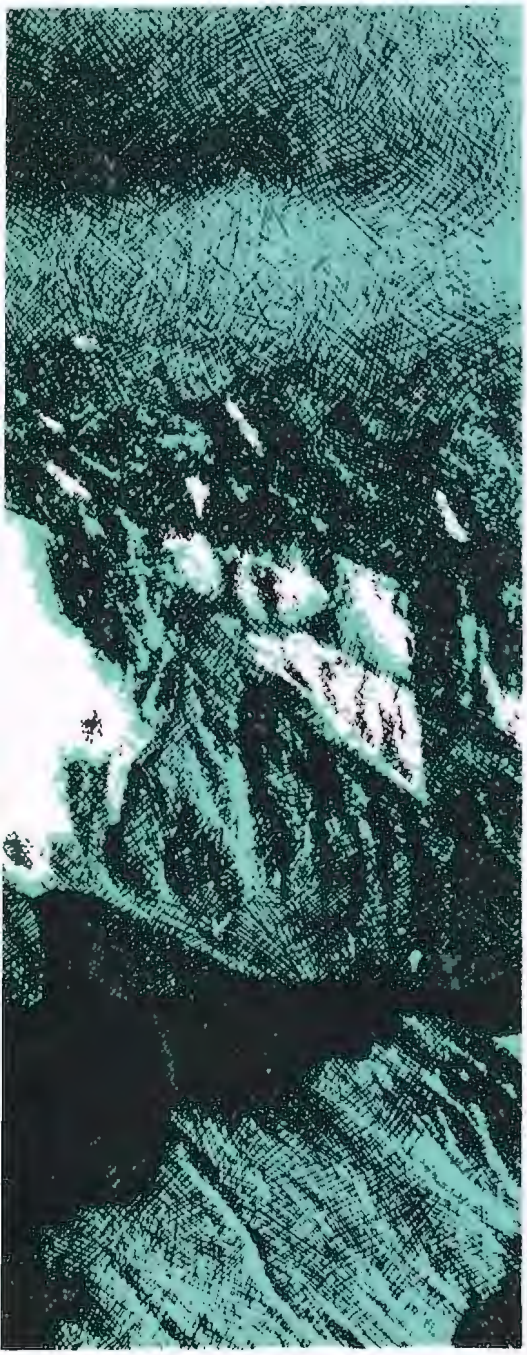
From the top I looked down on a stark reminder of civilization . . . a jumble of oil drums, gasoline cans, wooden crates, piles of tin cans and other trash, and a number of bare, ugly gashes cutting across the tundra leading to and from this deserted campsite. The gashes, two-to-three-foot deep gullies running parallel to each other, had been



started years ago by the wheels of a vehicle. Little did the driver know—or care—that his tire tracks would erode into gullies, leaving deepening and damaging imprints on this fragile ground.

Looking at the trash lying just where some oil exploration crew had left it years before in this deep freeze, where things do not readily decay, I could imagine the crew thinking: "What's the harm of some litter in the midst of millions of desolate acres of land? Probably no one will ever come by here again."

For me the trip was part of the research for a series of articles I was writing for The Christian Science Monitor on the proposed oil pipeline across Alaska. I had hitched a ride with David Hickock on one of his inspection runs as senior resource scientist coordinating Federal planning activities in Alaska. We had landed in a small float plane on one of Alaska's three million lakes, this one known only as Lake 2900, denoting its elevation. Hickock had come to check on the work of a team of scientists hired by oil companies to conduct ecological studies on soil and wildlife conditions.



My Alaska experiences impressed upon me as never before that new laws and environmental agitation, while needed and encouraging, would not be sufficient to offset the difficulties ahead. As a Nation and as individuals we were finding that our decisions and the steps being taken by leaders in government and business and by average citizens were making footprints on our planet that would scar it, perhaps for centuries. And what was being called the advent of the environmental era was really the dawning realization by millions of Americans that we need to consider the impacts of our decisions in our daily activities and try to determine whether we can choose alternative actions that will have less, little, or no harmful effects. It was my first glimmer of an ethical approach to mankind's relation to the Earth and its creatures and resources.

In an essay, "The Land Ethic," from "A Sand County Almanac and Sketches Here and There" (1949), Aldo Leopold noted the need for an ethic dealing with man's relation to land and to the animals and plants which grow upon it.

> The land ethic simply enlarges the boundaries of the community to include soils, water , plants, and animals, or collectively: the land . . . changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.

Reading Leopold's essays in the "Almanac" and his "Round River," I realized for the first time the urgent necessity for every citizen to have a feeling and awareness that the Earth is not here for humans to manipulate but that we exist as part of an interrelated world. "We abuse land because we regard it as a commodity belonging to us," he wrote. "When we see land as a community to which we belong, we may begin to use it with love and respect."

It became clear to me that an *environmental* ethic based on a knowledge about our relationship with and impact on nature and natural systems is vital to our everyday life. Ethics do not suddenly bring about a new vision of right and wrong that we did not have before. They help us to understand more clearly what we already sensed or felt but had not yet molded into a clear basis for actions. Ethics are composed of "oughts." They remind us how we ought to think about things, what values we ought to have, what kind of actions we ought to take, and the kind of life we ought to live.

Aldo Leopold once wrote that citizens must "examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of the whole biotic community. It is wrong when it tends otherwise."

I wondered when first reading Leopold, and have wondered many times since, how much damage I myself am doing to the environment inadvertently by my daily decisions and actions. What impact are the actions of all citizens having? And what responsibility do we have—whether as writer or banker or government official or corporate president or secretary or homemaker or student or mechanic or architect or scientist—to tread lightly wherever we go and not leave footprints that mar our planet?

Reviewing the impressions collected over the 10 years since I became aware of the environmental ethic and started looking for it in places where decisions are made, I find some conclusions forming as to how the ethic is faring, especially in the business sector, where I feel that its presence can have the greatest effect on the quality of life.

Some of the examples I found would indicate that the seeds of an environmental ethic are at work. But they may be a long time sprouting. For the predominant ethic of business, centered around short-term results and a narrow identification of its interests, largely overlooks environmental concerns. The cases where some corporations are making efforts to include the environmental impacts in decision-making are greatly in the minority, and even those few examples were difficult to find.

Some economists may argue that it is wrong to expect business to include environmental concerns other than those required by law, because to do so would eat into profits. That would be altruism, which is not legitimately a part of the business ethic, the argument runs. Some go so far as to argue that it is morally unethical for a business executive, entrusted with the funds of stockholders who expect the maximum profit, to practice any form of altruism.

Other economists argue that corporations have a responsibility to serve the social good of the community, that historically charters under which early American corporations were formed encouraged pri-

vate capital to promote ends regarded as serving the public interest.

My biggest disappointment, however, was to find so few companies with an adequate institutional structure for environmental decisions, other than a unit charged with pollution control matters. In most large corporations today the chief executive officer's personal conviction for—or bias against—environmental responsibility sets the policy for the company. Rare is the company that includes in its corporate structure a system that allows for the environmental impacts of all major decisions to be brought to the attention of top management where options can be presented for less environmentally harmful alternative solutions.

This review of an environmental ethic in government, business, labor, education, and religion indicates that although there are scattered instances of an ethic being accepted and applied, they are rare. The many good State and Federal laws are not fully effective. Most business, industry, and government agency decision-makers seem to feel they have done enough if they simply stay within the letter of the law, and some of them even evade, resist, or seek to delay compliance with environmental laws. Understaffed State and Federal Government pollution control agencies are unable to enforce their own laws adequately. Some government officials, under the pressure of re-election and changes in administration, or corporate managers, believing that their own careers may depend on short-term gains, avoid accepting responsibility for the long-term environmental consequences of their products or processes. As for the general public, polls continue to show that the majority of Americans give a high priority to environmental values. When confronted with choices that affect their immediate self-interest, however, many of these same people opt for environmentally harmful courses of action. The evidence indicates that although an environmental ethic does exist, it hasn't enough strength at present to produce a real difference in the choices of most people, especially those who make the big decisions that affect much of the Nation.

I did find in government, as well as in corporations and other entities of the private sector, a few organizational structures through which environmental effects could be factored into decisions before actions were taken. But those structures proved effective only when some individual in the organization was sufficiently imbued with an environmental ethic to give force to environmental concerns—an individual business leader, a lawmaker, a public official, or a local citizen activist who cared enough to lead the way.

Wherever I encountered these environmentally caring decision-makers I found that their actions resulted from a kind of *enlightened* self-interest. Instead of acting only for "me" (their own restricted, personal interests), they were considering "us" (their neighbors, their community, and the natural world) in their decisions. And they had widened their span of interest from a preoccupation with "now" to consideration of a "now that includes the future." They were practicing what might be called "environmental citizenship." Considering the impact of their decisions and living as responsible members of nature's system amounts to environmental citizenship much the way abiding by the law, voting, paying taxes, and acting responsibly toward the community constitute political citizenship.

Relatively few decisionmakers, however, are practicing environmental citizenship. Those who are doing so have a personal sense of values that is essentially different from the prevailing value system. This sense of values makes them willing to go against the power structure of their community or town or company or legislative body or government agency. Environmental citizenship will not be widespread, therefore, until a major shift in values takes place.

An environmental ethic is essential in decision-making. But it certainly should not interfere with a social ethic—our social responsibility or obligations toward fellow humans and their needs and rights. An environmental ethic must be integrated into our overall systems of beliefs and coordinated with our economic system; it should not displace or override these beliefs and systems. The environmentalist who becomes so single-minded about defending the community as to act with a tyrannical puritanism that ignores social values such as justice, compassion, and equity is bound to fail. Environmental advocates need to consider the full consequences of their objectives just as they demand of others the consideration of the environmental consequences of *their* objectives. Those concerned primarily with ecological justice must be certain that they do not gain it at the expense of social justice. And those seeking human justice should avoid gaining it at the expense of harm to the ecosystem. It makes no sense to preserve the environment at the cost of national economic collapse. Nor does it make sense to maintain stable industrial productivity at the cost of clean air, clean water, parks, and wilderness.

Our society harbors a belief that technology can solve all of our problems. This belief is incompatible with both an environmental ethic and a social ethic. Technology that does not provide adequate protection against environmental and social impacts may bring more problems than solutions. We have seen time and again in recent years that what looked like technological panaceas have brought with them unforeseen and undesirable side effects and as yet unknown future consequences. Uncertainty about the effects of humanity's activities is one of the reasons for treading lightly on the planet.

In the face of this uncertainty we need above all to act with a sense of humility. This applies equally to those of us for whom the environment is of prime concern. What we may believe is the environmentally correct way of acting may itself bring unforeseen consequences in the future. There is no more excuse for arrogance on the part of environmentalists than among technocrats. Thus the several key values and beliefs need to be given their due weight and woven together into a balanced whole.

The sense of values leading to environmental citizenship will be increasingly important as population pressures, material growth, resource depletion, and the effects of technology carry the threat of ever more destructive impacts on the planet. The presence of an environmental ethic in our everyday decisions could be more important than we realize. Our decisions as individuals—at home and at work, as citizens, workers, professionals, or corporate or public officials—taken together, determine the hopes and quality of life for everyone.

With the predominant values in society weighted toward narrow self-interest, the role of those who seek the environmentally ethical route is difficult and often unpopular. Yet if we do not make our choices on the side of the environment now, our options will narrow rapidly as the pressures of population growth, resource depletion, and pollution irreversibly alter the quality of living on the planet. Each of us, individually, can look for ways of making fewer demands on nonrenewable resources. We can seek to live in harmony with the natural order. We can replace a self-only, short-range outlook with universal, long-term values. And we can bring environmental considerations into our decisions, from the smallest to the greatest. Our enlightened self-interest can evolve into an environmental ethic that will work toward protecting and enhancing the quality of life for all of us, as we seek to share John Muir's vision:

"We all dwell in a house of one room—the world with the firmament for its roof—and are sailing the celestial spaces without leaving any track." □

Robert Cahn, a Pulitzer Prize-winning journalist and Washington editor of Audubon Magazine, is the author of Footprints on the Planet: A Search for An Environmental Ethic. *(Universe Books, 1978, $5.95 paperback.) The above article excerpted from this book appeared in the Christian Science Monitor.*

The Environmental Ethic of Justice William O. Douglas

By Monty J. Podva

In 1960, long before environmental issues were popular concerns, Justice Douglas began expressing an environmental ethic in his judicial opinions. From that time forward he refined and often reiterated his concern for the ecology in his judicial writings. His views on the interpretation of the law invariably favor the preservation of the rapidly dwindling natural environment.

The ethic he espouses calls for tighter controls over the use of our air, water, and land resources. He suggests that all persons living within a watershed should be allowed to vote on a proposed dam before it permanently changes the landscape. He suggests that inanimate objects should be allowed their day in court when they are threatened with destruction. He strongly urges society to take heed of the price of "progress." He challenges the desirability of more river-ruining dams, more land-leveling highways, and more air and water polluting poisons in the form of insecticides or radiation from nuclear power plants. Although the basis for his environmental philosophy grew from his own appreciation of the outdoors, he is very much concerned that the needs of future generations will not be met unless we launch a conscious effort to insure a safe and healthy environment for them.

Prior to the adoption by Congress of a formal policy respecting the environment, Justice Douglas relied heavily upon the long-standing "public interest" doctrine when confronted with a case involving the damming of a free flowing river which would have a devastating effect on migratory fish.

"The test is whether the project will be in the public interest, and that determination can be made only after an exploration of all issues relevant to the 'public interest', including future power demand and supply, alternate sources of power, the public interest in preserving reaches of wild rivers and wilderness areas, the preservation of anadromous fish for commercial and recreational purposes, and the protection of wildlife."

The Justice was always cognizant that the ecology of a river varied considerably from that of a reservoir created by a dam. Armed with this information he consistently emphasized,

"The importance of salmon and steelhead in our outdoor life as well as in commerce is so great that there certainly comes a time when their destruction might necessitate a halt in so-called 'improvement' or 'development of waterways'."

Justice Douglas' concern for the salmon was not restricted to the impact of dams on their migratory pathways but against other perils as well. In 1962 the Court decided against the use of fish traps by native Alaskan Indians, but allowed them to be used until the end of the fishing season. Justice Douglas agreed that such "nefarious and destructive devices" should be banned, but urged that the ban be ordered immediately to prevent any further unnecessary demise in the salmon spawning population.

In cases where the Nation's waterways were being threatened by pollution the Justice often referred in his opinions to the teaching of Mr. Justice Holmes that "a river is more than an amenity, it is a treasure."

It was in one such case that an oil company had allowed gasoline to flow into the

St. Johns River. The company's contention was that such commercially valuable gasoline was not "refuse matter" and thus did not fall under the jurisdiction of the Rivers and Harbors Act. Justice Douglas, writing for the Court, quickly pointed out:

"Oil is oil and whether useable or not by industrial standards it has the same deleterious effect on waterways. In either case, its presence in our rivers and harbors is both a menace to navigation and a pollutant."

He consistently applied this straightforward approach when handling specious arguments where the sanctity of the environment was in jeopardy.

In another instance a lower court held that a State statute providing for strict liability for any oil spill damage was preempted by Federal laws relating to oil spills. The lower court was unanimously overruled and Justice Douglas made a special effort to point out that oil spills were

"an insidious form of pollution of vast concern to every coastal city or port and to all the estuaries on which the life of the ocean and the lives of the coastal people are greatly dependent."

He firmly upheld the right of the States to protect their coastlines and waterways independently of any Federal sanctions against pollution.

Perhaps the clearest expression of his environmental philosophy appears in his ringing dissent to an order issued by the Court in 1974. The air and water of Lake Superior were receiving dangerous discharges of asbestos fibers from mining operations. The lower court had issued an injunction halting the discharge and effectively closing down the operations. The appeals court stayed the action of the lower court and the Supreme Court refused to vacate the stay. Justice Douglas vividly describes the reasons for his opposition to the Court's inaction:

"If equal Justice is the Federal standard we should be as alert to protect people and their rights as the Court of Appeals is to protect 'maximizing profits'. If as the Court of Appeals indicates, there is a doubt, it should be resolved in favor of humanity, lest in the end our judicial system be part and parcel of a regime that makes people, the sovereign power in this Nation, the victims of the great god Progress which is behind the stay permitting this vast pollution of Lake Superior and its environs. I am not aware of a constitutional principle that allows either private or public enterprises to despoil any part of the domain that belongs to all of the people. Our guiding principle should be Mr. Justice Holmes' dictum that our waterways, great and small, are treasures, not garbage dumps or cesspools."

The depth of Justice Douglas' concern for the Nation's waterways was again expressed when the court refused to grant original jurisdiction to decide whether or not a public nuisance was created by dumping toxic mercury into Lake Erie. He was dismayed when the Court refused to accept the responsibility for making an important decision respecting the purity of interstate waterways. His exasperation was reflected in his dissent when he wrote, "I can think of no case of more transcending importance than this one." Later when the Court held that the franchise could be limited to property owners in the creation and maintenance of a watershed improvement district, Justice Douglas spoke out in dissent on behalf of the lessees and tenants within the district who would have no vote on future water projects:

"The enormity of the violation of our environmental ethics is only increased when the ballot is restricted to or heavily weighted on behalf of the few who are important only because they are wealthy."

Justice Douglas first expressed his environmental concern in a judicial opinion in 1960 in a dissent from a denial of certiorari. The case arose over DDT being dropped from airplanes in an effort to control the gypsy moth infestation of trees.

When it came to highway construction that would invade inner-city parklands, Justice Douglas used the same arguments he had dramatically presented a decade or so earlier when he led the drive to save the C & O Canal from becoming a freeway. He pointed out:

"One need not be an expert to realize how awful the consequences are when urban sanctuaries are filled with structures, paved with concrete or asphalt, and converted into thoroughfares of high speed modern traffic."

On the question of litter, Justice Douglas saw an opportunity to implement his environmental ethic. He would have eased the freight rate structure for recyclable material. He explained it this way:

"Rates affecting litter, like rates affecting other commodities, obviously are relevant to the ease and expedition with which it will be transported. To get the litter to appropriate recycling plants in the quantities needed to protect our fast depleting forests and our non-renewable resources and to relieve our landscape of the litter that plagues us may need special incentive rates."

As in other areas, in his discussion of nuclear power plants Justice Douglas had an eye on the future. He knew that once a power plant was built, economic factors would compel its usage despite potential flaws in its safe operation. He was adamant in his dissenting opinion that the safety issue had to be resolved *before* a construction permit was granted and not merely before the completed plant was licensed to operate. He condemned the Court for going along with the Atomic Energy Commission's decision which he witnessed as being "a light-hearted approach to the most awesome, the most deadly, the most dangerous process that man has ever conceived."

Clearly there is one opinion issued by Justice Douglas that epitomizes his environmental ethic, and that dissenting opinion came when the Court ruled that the Sierra Club failed to show why it should be allowed to bring suit to prevent the commercial development of the pristine Mineral King area in the Sierra Nevadas. Douglas would have none of this and suggested that the "standing" requirements be changed to fit the needs of the times:

"Contemporary public concern for protecting nature's ecological equilibrium should lead to the conferral of standing upon environmental objects to sue for their own preservation."

He did not stop there. He went on to fashion such a rule that would allow those who possessed intimate knowledge of an inanimate object to be its spokesman. He decreed:

"The river as plaintiff speaks for the ecological unit of life that is part of it. Those people who have a meaningful relation to that body of water—whether it be a fisherman, a canoeist, a zoologist, or a logger—must be able to speak for the values which the river represents and which are threatened with destruction."

Not only does Justice Douglas reveal an environmental ethic in his judicial opinions, he also calls for a renaissance in legal thinking when the environment is at stake. He warns against the longstanding policy of listening solely to the manufacturing-industrial complex as they call for "progress" by urging us to strip our land and use "our rivers, lakes, and atmosphere as technological sewers." He calls for a greater sensitivity to our ecology that would enhance our own lives as well as the lives of successive generations. "Ecology," he wrote in the Mineral King case, "reflects the land ethic." The land ethic he referred to was Aldo Leopold's notion that the community of mankind must be expanded "to include soils, water, plants, and animals, or collectively: the land." □

Monty Podva has served as Law Clerk to retired Justice Douglas since 1977. He previously served as emergency planning analyst with the California Energy Commission.

Radiation Control

President Carter has approved the establishment of a Radiation Policy Council to advise on broad radiation policy, coordinate Federal activities that use or control the use of radiation, resolve problems of jurisdiction, recommend legislation, ensure effective liaison with the States and Congress, and provide a forum for public comment. The council will be chaired by EPA Administrator Douglas M. Costle and made up of high-level officials from other agencies. EPA Administrator Costle said the new council would be a "forum for discussing vital radiation policies, and we will ensure that it operates in such a way that vital decisions will not be delayed."

Fire Retardants

Companies intending to manufacture or import two well-known fire-retardants, PBB's (polybrominated biphenyls) or TRIS (tris (2,3-dibromopropyl) phosphate), would be required to give advance notice to the EPA under proposed regulations. The Agency then would determine whether manufacturing or importation of the toxic compounds threaten human health or the environment and, if necessary, could take action to prevent serious risks. At the moment EPA has no information that anyone is manufacturing or intending to resume production of PBB's or TRIS. One company is importing plastic pellets containing PBB's and will be required to notify EPA under this rule. Manufacturers of PBB's and TRIS stopped producing the chemicals in 1977 because of increasing evidence that both chemicals were health and environmental hazards.

Publisher Honored by EPA

EPA recently honored Sherman Briscoe, Executive Director of the National Newspaper Publishers Association. Briscoe received a plaque in recognition of his work on a series of four workshops sponsored by EPA and conducted by the NNPA on the effects of environmental pollution on minorities. (Briscoe died as this issue of EPA Journal was going to press.)

States Served by EPA Regions

Region 1 (Boston)
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
617-223-7210

Region 2 (New York City)
New Jersey, New York, Puerto Rico, Virgin Islands
212-264-2525

Region 3 (Philadelphia)
Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia
215-597-9814

Region 4 (Atlanta)
Alabama, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Kentucky
404-881-4727

Region 5 (Chicago)
Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota
312-353-2000

Region 6 (Dallas)
Arkansas, Louisiana, Oklahoma, Texas, New Mexico
214-767-2600

Region 7 (Kansas City)
Iowa, Kansas, Missouri, Nebraska
816-374-5493

Region 8 (Denver)
Colorado, Utah, Wyoming, Montana, North Dakota, South Dakota
303-837-3895

Region 9 (San Francisco)
Arizona, California, Nevada, Hawaii
415-556-2320

Region 10 (Seattle)
Alaska, Idaho, Oregon, Washington
206-442-1220

EPA Journal Subscriptions

Name-First, Last — Please Print

Company Name or Additional Address Line

Street Address

City | State | Zip Code

☐ Payment enclosed
☐ Charge to my Deposit Account No. . . . . .

Do you know someone in industry or in a civic group who wants to keep up with national environmental developments involving EPA? Let them know about EPA Journal. If they want to subscribe, give them this form. The subscription price is $12 per year and $15.00 if mailed to a foreign address. A single copy sells for $1.20. (Agency employees receive this publication without charge.) Anyone wishing to subscribe should fill in the form below and enclose a check or money order payable to the Superintendent of Documents.

Mail order form to:
(Superintendent of Documents)
Government Printing Office
Washington, D.C. 20402

Environment and Energy Futures

By Robert O. Anderson

In spite of the future shock we have experienced in the past two decades, this country remains committed to the democratic process. Before new ideologies can percolate into law, they must command popular consent.

Environmentalism is no exception. The National Environmental Policy Act, the Clean Air Act, sundry other acts, and the agencies that administer them express an environmental ethic secured by years of fact-gathering and public debate.

To my way of thinking, that is as it should be. By raising fundamental questions about industrial development, the environmental movement has performed an invaluable service. Businessmen and consumers alike can no longer act with unconcern for environmental consequences. For example, I believe that while the debate that occurred over the Trans-Alaska Pipeline resulted in unnecessary delay, the finished project has design and construction that will preserve Alaska's physical beauty and unique ecology.

Unfortunately, however, this Nation faces a very shaky energy future. Has the legal edifice we've raised to protect our air, water, and land become too draconian? Does it bar development of badly needed domestic energy resources? Certainly, current environmental legislation and regulation severely restrict our ability to bring the new energy projects onstream that will be vital if we are to protect our existing standards of living.

Recognizing this dilemma, President Carter has proposed that Congress create an Energy Mobilization Board to cut through some of the legal and procedural obstacles to critical energy projects. Environmentalists see the Board as a threat to years of hard-won progress, and their concern is understandable. Before the argument escalates out of hand, it seems worthwhile to examine the situation to decide what remedies, including the Energy Mobilization Board, might be useful.

The Cost of Delays

To begin with, the fact is industry can live reasonably well with most environmental laws. But it is also true that delays in administrative decision-making, lengthy judicial review, and retroactive application of standards have severely distorted the economics of a number of energy projects. A recent Business Roundtable study, for example, concluded that regulatory delays on the Trans-Alaska Pipeline System resulted in a production loss of 1.8 billion barrels of oil over four years. This "lost oil" worsened the U.S. balance of trade deficit by $20 billion—money that could have been well spent at home. Low-sulfur coal development in Wyoming and other Plains States was delayed for years by redundant environmental challenges. Sohio tried for five years for the 700-odd permits, many environmental in nature, needed for its PAC-TEX line from Long Beach, Calif. to Midland, Tex.—and finally gave up. Can the country afford these energy delays when we're spending $50-60 billion a year for foreign oil? I think not, unless we are willing to accept continued erosion in the value of the dollar.

I do not mean to imply that we should retreat from the environmental gains made in the past decade in order to solve our

energy problems. We must not destroy the country to save it. But such an ethical absurdity remains possible so long as we continue to pursue Byzantine regulatory procedures with little regard for their economic and social consequences.

Today, 90 Federal agencies issue and interpret about 7,000 regulations annually —at astounding cost to the regulated industries and, of course, their customers who ultimately must bear those costs. The Business Roundtable also examined the 1977 costs to 48 firms caused by just six Federal regulatory agencies and programs. Such costs totaled $2.6 billion—16 percent of the companies' net profits, 10 percent of their capital expenditures, and 40 percent of their research and development budgets—not including costs attributable to delays, misdirection of capital, and so forth. We simply have to rethink and reform the regulatory system so that environmental protection is more compatible with rational economic growth. The pastoral romance inherent in "hands off" or "no growth" policies is a luxury this Nation cannot afford. We must be able to offer job opportunities as well as vertical advancement to our young and minority groups if our very system is to survive.

Streamlining Regulations

Rulemaking should proceed from what is technically feasible, not from goals concocted under laboratory conditions. Regulation should be coordinated among agencies and levels of government. It should encompass due process within reasonable time frames. Its principal methodology should be analysis of costs and benefits for society, as both are likely to result from rule and decision making. I am convinced such basic reforms would strengthen our national commitment to environmental care.

The Energy Mobilization Board should be an important first step in streamlining the environmental permitting process and pinpointing regulations that are contrary, redundant, ambiguous, economically or technically infeasible, open to punitive retroactive application, or motivated by other than environmental concerns. The Board will not in all likelihood become the agent of overall regulatory review, but it could function as a catalyst for such a review.

The Need for Mediation

Reform of the regulatory process is a long-term matter. Meanwhile, the courts will be jammed with expensive, time-consuming environmental litigation, some of which, perhaps, could be avoided by means of a very simple expedient: talking to one another. It seems worth the effort, if only because extended litigation can inflate the cost of a needed energy project past the point of economic viability.

Clearly, industrial and environmental interests need arbitration procedures. Organizations like John Busterud's RESOLVE, an environmental mediation group in Menlo Park, Calif., substitute mediation for litigation and can provide valuable assistance in developing reasonable assurances of finality. Given full and speedy disclosure of information about a project, mediation models could achieve a real credibility. In that case, "loyal oppositions" might look at general reform of the regulatory process with enthusiasm—and find themselves making real contributions to one another's stated interests.

The Oil Superfund

Finally, what can business do to help clear away the obstacles to needed development without harming the environment in the process? Corporate managers, it seems to me, must commit themselves to environmental responsibility and be held accountable for the environmental consequences of their operations. For that reason my company supports the Comprehensive Oil Pollution Liability and Compensation Act, introduced by Congressman Mario Biaggi of New York. This legislation would consolidate all current oil spill funds into a federally administered oil "superfund" to assure prompt cleanup of, and compensation for, oil spills. The fund would be supported by a fee on crude oil refined in the U.S. and would cover events such as the recent oil spill from the Mexican well in the Gulf. The oil superfund is a good example of ordering environmental responsibilities in the interests of efficiency and equity.

In the area of energy development, industry has to balance the attractiveness of conventional energy resources with unconventional possibilities, emphasizing conservation technology, cogeneration, gas from biomass conversion, the array of incipient solar energy systems, radically redesigned automobiles, and mass transit —even when the economic payoff remains open to serious doubt. Social responsibility has to become a significant factor in bottom line considerations.

The future will not wait while we fritter away opportunities to balance environmental and economic issues. Whatever our differences, to remain unchanged in the face of the future is to risk that we shall not survive it. □

Robert O. Anderson is Chairman of the Board of Directors and Chief Executive Officer of Atlantic Richfield Co. He also is a nationally known civic leader, co-chairman of the International Institute for Environment and Development, and has served as Chairman of the Aspen Institute for Humanistic Studies since 1960.

Threats to Biological Systems

Interview with Lester Brown, President of Worldwatch

Lester R. Brown is President of the Worldwatch Institute, a non-profit organization dealing with analysis of global problems. He is author of numerous books on food, resources, and population, and has degrees in agriculture, economics, and public administration. In the 1960's he coordinated U.S. Department of Agriculture programs to increase food production in 40 countries. The Washington Post has described him as "one of the world's most influential thinkers."

A few decades ago, the question of an environment ethic was almost nonexistent. Why has it come to the fore in the 1970's?

The reason for it is fairly fundamental. The values that a society has must be consistent with its well-being and long-term survival. If we fail to evolve an environmental ethic, which is simply a behavior pattern that's consistent with a stable relationship between ourselves and the natural systems and the sources that support us, then society as we know it may not survive.

What's the number one environmental problem in the world today?

That's not an easy question to answer, but I would be inclined to put at the top of the list the progressive deterioration of the basic biological systems on which we depend, namely fisheries, forests, grasslands, and croplands. These four systems provide not only all our food but also all the raw materials for industry with the important exception of minerals and petrochemicals. We are now in a situation where the growth in world population, the increase in human demand for products of these systems, is beginning to exceed the sustainable yield. The result is overfishing, deforestation, over-grazing, and soil erosion. The bottom line is what's happening to per capita production of the principal commodities of biological origin. What we're now beginning to see, as world population has gone from 3 billion to 4 billion, is a decline in the per capita production of almost all the commodities of biological origin including fish, wood, leather, beef, mutton, wool, and most importantly, cereals. This is obviously not a situation that can continue indefinitely. At some point the stress will become economic in the form of inflation, or perhaps physiological in the form of malnutrition.

Would you say these things are declining absolutely or on a per capita basis?

Most of these commodities are declining in per capita terms though some of them, at least in some situations, are declining in absolute terms. The production of wood in some countries is declining in both per capita terms and in absolute terms, because the rate of deforestation means the amount of forest land is shrinking rapidly. With fish, the overall production has been essentially static since 1970. That is, the world fish catch over the last eight years has been fluctuating rather narrowly around 70 million tons a year. But the per capita catch has been declining.

Are we solving any aspects of this problem?

There are occasional encouraging signs around the world. The Chinese, for example, are probably far ahead of other densely populated areas of the world in recognizing the need to stabilize population growth. They are now talking about stabilizing population growth sometime between 1985 and 2000. They're talking about all sorts of incentives and disincentives to reduce family size, such as providing economic bonuses to families who have only one child. They think this is going to be essential for getting the brakes on the population growth. It's interesting because the Chinese apparently have begun to see very clearly that continued population growth will undermine and erode the hard-earned gains of the past quarter-century in raising their living standards.

Are there some nations that you would single out as having a stronger environmental ethic than the United States?

China is probably one of those. I would say some of the European countries—the Netherlands, Denmark, Sweden, and Norway—probably all have a stronger environmental ethic in the sense of a much better developed sense of the relationship between people and nature and the extent to which humanity depends on natural systems.

One of the countries with the poorest sense of the nature of the relationship with the environment is Brazil.

What are they doing wrong?

Almost everything. I was in Brasilia a few weeks ago talking about population with the chairman of the Department of Economics of a Brazilian university. He seemed to think the population growth was not much of a problem for Brazil. I asked him a couple of questions. What's Brazil's population now? He said 110 million. How fast is it growing? He said nearly three per cent per year. I said, if it grows at that rate for the next century, how many people will Brazil have? He thought it would be two or three times what it currently is. But if Brazil's current population of 110 million continues to expand at 3 percent per year for the next century, it will have about two billion people, more than India and China combined today.

Exponential growth

Yes. A three percent rate of growth doubles every 24 years. So over a century that's a nineteenfold increase. One doubles in 24 years making two; then by 48 years, it doubles again, so that's four. By 72 years it doubles a third time, making eight. And then by 96 years, when it doubles again, you've got 16. When most people see that calculation they think it's a typographical error, but it's not, it's the basic nature of exponential growth. The population in Brazil is today growing exponentially at nearly 3 percent per year, or about 2 billion people in a century.

There is an effort in some quarters to impose criminal penalties and to jail polluters, particularly those who dump toxics that cause cancer and birth defects. How do you feel about this?

I've not thought a great deal about it, but one point that comes to mind is that we have

a system of law that deals rather forthrightly with personal assaults of one sort or another. If someone is walking down the street and throws acid in someone else's face, that's viewed as a rather serious crime and is penalized accordingly. If, on the other hand, someone dumps something carcinogenic in the river from which most of our drinking water comes and some of the people who drink the water develop cancer from it, chances are that those responsible will get little more than a reprimand. I think that simply points out a fault in a legal system that has not developed fast enough to keep up with some of our new legal problems.

How do you feel about U.S. Federal incentives to stabilize population growth, such as Senator Packwood's proposal to limit tax deductions to two children? Are there other measures government could take?

What I have said a number of times is that we've got to figure out ways of getting the brakes on the population growth, and sooner rather than later. As you look around the world, you discover that a great many countries have policies that are designed to encourage large families. Under the U.S. income tax policy, for example, individuals can claim deductions for as many children as they can have, whether it's two or seventeen. It seems to me that's a pro-natalist policy. Some governments are already beginning to impose limits on the number of children for which income tax deductions can be claimed. Nepal is one. You can claim tax deductions for no more than two children in Nepal today. The Philippines, I think, have also imposed limits on the number of children for whom tax exemptions can be claimed. I think in that case it's four children. These are only a few examples. Poland, on the other hand, has very strong pro-natalist policies with all sorts of baby bonuses and benefits for having children, and at the same time it's faced with potentially unmanageable inflation. One gets the impression that the Polish public officials and political leaders simply have not recognized that Poland has one of the fastest-growing populations of any industrial country in the world today, and that such pressures on resources contribute to inflation. I think we've got a lot of work to do in reshaping economic and social policies in all countries, affluent as well as Third World ones, so that we can discourage large families, encourage small ones, and thereby improve the quality of human existence.

Fertility levels are dropping drastically in 41 countries, according to a recent news report. Should the U.S. encourage the trend?

The decline of fertility in the 41 countries is something that has been under way for some time. What it means is that in a country like Mexico, for example, the population growth rate that was three and a half percent is now down to three percent per year. That still means that at the current growth rate Mexico would multiply by nineteen times during the next century. That's certainly an improvement over multiplying by 24 times in the next century but it's not exactly a stable population yet. So, about all we can say is that fertility levels at last have begun to move in the right direction but have a long, long way to go. The role of the U.S. is many-fold. First of all, we ought to have a national population policy ourselves—not only a policy, but as an explicit goal: the stabilization of the U.S. population.

Secondly, we have more information than any government in the world on what's happening in the balance between people and resources, food, energy, and so forth, and I think we have an obligation

Natural habitat is destroyed for coffee plantations in Brazil

to share that information and analysis. One of the encouraging U.S. Government initiatives in this area is the Global 2000 study jointly sponsored by the Council on Environmental Quality and the State Department and scheduled for completion by the end of this year. It sketches out the global trends in the relationship between people and natural systems and resources in a way that has not been done before. It's going to be a very important contribution to global public education about the need for population policy.

In terms of contraceptive technology, we're probably as far advanced as any country in the world. Two of the important modern contraceptives, the pill and the IUD, were both developed in this country, and we should have some information to share in that sense. We do have in this country a reasonably good nationwide family planning program. Probably not the best in the world, unfortunately, but one of the better ones.

Does our Christian Judaic heritage teach us about protecting the environment?

We certainly find throughout the Bible instructions on being good stewards of the resources of the Earth and the living things on it that we have inherited. I expect that before very long we're going to see the churches become much more involved in looking at the relationship between people and nature. We have for some time been hearing from the pulpit about the military situation, about the person-to-person relationship and the abhorrence of war. I expect that particularly with the younger generation of theologians, we will hear more and more concern in the churches about the deteriorating relationship between people and nature.

Do you sense any change or slackening in the environmental movement since the early 1970's?

There's been a tendency of late to say that there's a strong backlash against the environmental movement or that people are losing interest, or that it's a matter of environment or jobs. There are obvious situations where sometimes it's a matter of two steps forward and one step backward. But in looking at the relationships between ourselves and the natural systems and resources on which we depend, the question is not whether we protect them or have jobs. If we don't protect those systems, there won't be any jobs. In fact there won't be any people needing jobs, so that problem will take care of itself. I think we've lost sight of what environmental concerns and the movement are all about if we start talking about a trade-off between environment and jobs. It's sheer nonsense.

Your writings warn that environmental degradation along with energy shortages and inflation pose a greater threat to the security of nations in the future than military power. Would you explain why?

We've been saying for some time here at the Institute that the real danger to national security in the U.S. and many other countries is much less the threat of military attack than it is ecological deterioration and resource exhaustion. There are a great many other countries in North Africa and the Middle East, for example, where encroaching deserts pose a far greater threat to long-term national survival and viability than any foreseeable military invasion. I would go so far as to say that new energy systems in this country are far more essential to our long-term survival as a Nation than new weapons systems. It seems to me that inflation could become one of the most destabilizing forces of the late 20th century if we don't begin to understand its origin better and what needs to be done about it. Economists still seem to think that if we could just adjust monetary and fiscal policies and get them just right, we somehow could effectively manage inflation. I would say very straightforwardly that if we don't get the brakes on world population growth, I don't think inflation will be manageable under any foreseeable circumstances. We delude ourselves if we think that we can do it with monetary and fiscal policies.

Fiscal policy is a great way of coping with inflation if you're running huge budgetary deficits, and monetary policy is useful for fine tuning of the economic system through the size of the money supply. But neither of them are of any use at all in trying to preserve a fishery where stocks are being depleted because of excessive demand and overfishing. Fiscal policy isn't very helpful in trying to arrest deforestation if the level of population pressure and the demand for forest products greatly exceeds the sustainable yield of the forest. When we eventually begin to understand this, then I think we have a chance effectively managing inflation, but until those who are formulating policy do, not only will inflation continue to be a problem but I think it will get progressively worse.

Is it possible to shift emphasis in the next decade or two to using the quality of life as a measure of success rather than the Gross National Product? Are there any segments of our society that are already making that shift?

We certainly have found in recent years that the traditional ways of measuring human well-being in the form of national income accounts, that is per capita income and GNP, have become less and less satisfactory. We now find ourselves in a situation where if you create a serious pollution problem and contribute to the GNP in the process, you can then contribute further to the GNP in efforts to clean it up. Or if we think of energy, for example, as long as the energy that heats the water in that office building across the street comes through the electric meter, it's part of the GNP and it gets counted. But if it comes from the sun and lands on those collectors, it doesn't get measured at all and it doesn't enter into the accounting. If we switch all the hot water heating in the country from electricity to solar collectors, the GNP would drop sharply but the water would be as hot as it was before. So I can see a lot of difficulties developing with GNP and eventually we'll devise some new measurement techniques.

I would point out that the Overseas Development Council has developed an alternative measuring device to per capita income: something called the PQLI, or Physical Quality of Life Index. It's an aggregate of several different indicators like life expectancy, infant mortality, literacy, and nutrition level. And what they find with these basic social indicators of human well-being is that some countries have very high incomes but very low levels of well-being. Brazil, Mexico,

Continued on page 27

Population, Environment and Lily Ponds

Lester R. Brown has been warning for a long time that the global population is fast outstripping our food supply and degrading our environment. But many people don't understand the speed at which population grows.

Brown recounts this anecdote in his book, *The 29th Day*, to explain the problem:

"The French use a riddle to teach schoolchildren the nature of exponential growth. A lily pond, so the riddle goes, contains a single leaf. Each day the number of leaves doubles—two leaves the second day, four the third, eight the fourth, and so on. 'If the pond is full on the 30th day,' the question goes, 'at what point is it half full?' Answer: 'On the 29th day.'

"The global lily pond in which four billion of us live may already be at least half full. Within the next generation, it could fill up entirely."

Spaceship Earth: Is It In Trouble?

An Interview with R. Buckminster Fuller

R. Buckminster ("Bucky") Fuller is perhaps best known as the inventor of the geodesic dome, a lightweight structure of honeycombed triangles. Author of numerous books on environment, energy, education, mathematics, and world planning, he is currently a World Fellow in residence at the University City Science Center in Philadelphia.

In your book, *Approaching the Benign Environment*, you emphasize that not only is man altering his environment, but the environment is altering man too. Do you believe we are being altered for the worse by this process?

I don't believe anything. The word "believe" means to me accepting explanations of physical phenomena without any experimental evidence.

I am a hard realist. I am a ship's captain. I was a regular United States Naval Officer. I was an air pilot. I'm a navigator. I'm a mechanic, an engineer. I will not tell people I'm going to get across the ocean if I didn't know how to do it, and so I talk always in terms of evidence. The fact that we have options—and I'm often able to make clear to humanity that we have options they didn't know we have—should not make us optimistic. When I'm making them understand that humanity has a chance to make it on this planet, when they've become so dismayed and assume things are really going to pieces, I don't ask them to believe a thing, I explain exactly how I arrived at those results, and they feel better and say "Your optimism brushed off on me," but I'm anything but optimistic. To know that we have the option doesn't tell me that we're going to make it at all. I know all the reasons why we may not make it.

It seems very touch-and-go whether we're going to make it on this planet. So, I'm anything but an optimist.

Do you see any hopeful signs at all?

Human beings are born deliberately by design. A universe that can design 92 chemical elements is utterly unique, a universe that can design the eternal principles such as mass interaction of celestial bodies, such principles as leverage, optical refraction, such a universe deliberately designs human beings with incredible equipment. Our eyes could not be more incredible, our brain could not be, but humans are also designed to be born naked, absolutely helpless for months—with no experience, absolutely ignorant, but hungry, thirsty, and curious, and we are designed to learn only by trial and error. Humanity after millions of years of finally developing words to communicate with one another, is able to compound experiences by written words, where the dead can speak to the living, so we have made enormous advances.

Nature put humans on this planet but let people make some very bad mistakes such as environmental pollution. People are now becoming very excited by pollution, and probably nature gave them enough margin to really get things under control. But we don't make moves until things get absolutely horrendously bad. Humanity doesn't move unless it can see things moving. And when you don't see something moving, you don't know you're going to be run over. So it's only when they push us that we begin to really holler. Humanity is going through that right now, so I'm delighted. The worse news I get about environment and so forth, the better I feel because I knew those things were going on all the time 50 years ago. I said then, how can we get humanity to move? Now we're getting to the point where everybody is terribly excited, and the kids are getting even more excited, which is the most important thing.

In your book, *Operating Manual for Spaceship Earth*, you mention that there was a big safety factor designed into this planet when man came on the Earth that gave him time to learn how to operate this spaceship and adjust to his environment.

Nature gave him an enormous cushion—a life support system with time to learn by trial and error.

Are we running out of time on this now, as far as this cushion is concerned?

As I've said, it's absolutely touch and go whether we're going to make it. I do know we have the option to make it.

You write and speak a great deal about problems in the cities—particularly their pollution problems. What remedies would you suggest that we do that we're not doing now?

I'd like to review the city and pollution problem. Of course a very famous one was the London fog. That was because people had been burning coal in their grates and mixing it up with the fog. But today there's no London fog anymore. All those chimneys are there, but no smoke is coming out of any of the chimneys in London anymore.

Then we come to Los Angeles, which has had this very famous smog problem.

On the Pacific Coast along the mountain coast range, mists are made by the temperature differential of the sea and the mountains. When industry began to come in, particularly the oil refineries of Los Angeles, the fume got impounded in that mist and made it heavy as it came down. So, it made more and more of a curtain impounding that industrial fume.

The people of Los Angeles before World War II complained a great deal about this to their city government. The government said they were going to do something about it. The city management was pretty sure that this fume from the industry was causing the trouble so they said the corporations were going to have to stop this pollution.

The industries replied there are ways of precipitating all right, but it costs a lot of money, and if we put it in, we couldn't compete with the companies that are not operating under controlled conditions. We are going to have to move out of Los Angeles. The city said, don't go, we need you very much for the taxes, so people it's your fault, all of your backyards are incinerating and making smoke. So, they passed a law against it and Los Angeles had no more incineration. But just about the time that was working well, an enormous influx of new people came in after World War II. The city began to look at that and said, "People, it's your fault, it's the fumes from your cars."

Now, what I'll simply say, and this holds true for every city in one way or another, industry won't pay any attention to this industrial fume. The air doesn't stay local to any place, the wind just simply moves around the country, the air belongs to everybody, and the only way we're going to lick this is the following. I have observed, for instance, that the amount of sulfur coming out of all the chimneys around the world annually matches the amount of sulfur we take out of the ground to keep industry going.

So government may have to say to every corporation, you are going to have to put in fume precipitation.

All this waste is recoverable. I was asked to give the annual dinner talk to the Edison Electric Generating Management. They have precipitation for all the fumes coming out of the electrical generating plants, and the company engineers said it would cost the generating companies only 25 percent more to precipitate. But the industry would not cooperate. From now on government is going to have to say to every corporation, "Well, here's equipment, you must put it in and precipitate. No matter what it costs you, we'll rebate that as taxes at the end of the year—your income tax.

"But you must turn over all the metals and all the valuable chemical products to us which are recovered this way and we in government, then, will see that the sulphur gets where the sulphur is needed."

You first coined the metaphor that the Earth is a spaceship, did you not?

Yes. I'm the one who gave you the name "Spaceship Earth."

The late anthropologist, Margaret Mead, once questioned this phrase. She thought of the Earth as kind of a living organism, not a spaceship. She felt that if it were a spaceship you could just push a button and solve things, but instead she liked to think of it as a living, breathing, organism that has to be nurtured. Would you quarrel with that?

If she wanted to, she could call it an organism. But it is an entity, going around the sun at 60,000 miles an hour and I think a very good name for it is Spaceship Earth.

Margaret and I were very dear friends. I knew her very, very well and she liked to get up little arguments with me.

You have warned often about over-specialization both in man's activities and in nature where very often when an organism gets overspecialized, it becomes extinct. Do you think over-specialization by man is part of our environmental problem today?

Definitely, yes. I find every child is born an inherent comprehensivist. He asks the most beautiful questions about microcosms, and macrocosms—and the parents say, "No I can't answer, wait till you go to school, they'll answer you." The child gets to school and they say "Never mind, we're going to give you one, two and three. You handle that and we'll give you four, five and six, and give you the ABC's." Children are put into what's called elementary school where they're given the parts instead of the whole.

I find that the only difference between humans and other organisms is that every other living organism has some built-in special equipment that gives it special advantage in some special environment.

Whether it's a little dog that's cut very close to the ground so he can follow a trail or whether it's the special vine that only grows in the Amazon because it does it beautifully there, or a bird in the sky using wings, but then, when it's not flying, it cannot disembarrass itself of its wings and it finds that its walking is very greatly hampered.

Humans have, however, phenomenal brains and they are able to discover a relationship existing between special cases. We have eternal principles which only human minds have the capability to discover.

What is different is we understand principles and are able to be objective to the principle rather than having built-in special equipment. If Nature wanted humans to be specialists, she'd have them born with a microscope on their eyes as she does with many other creatures.

Here in Philadelphia about 25 years ago, the American Association of Advancement of Sciences had its annual congress and there were two reports turned in, one in anthropology, the other in biology. There had been a team of biologists for years that had been studying all the known cases of the biological species that became extinct.

The anthropologists had been reviewing all the case histories of human tribes that have become extinct. Both teams found completely independently that extinction was a consequence of overspecialization. For instance we can inbreed by marrying two fast running horses. With the concentration of these fast running genes, you're liable to get a fast running horse as an offspring, but as you do, you outbreed adaptability. You have to look out for that horse more and more. You find inbreeding and specialization always have their price: the loss of general adaptability.

You have today all of humanity so over-specialized that no one in the end will know what to do about anything. Man knows he's in trouble, so he leaves it to a politician and the politician can't do a thing about it. It turns out the politician as an individual is absolutely stymied by this.

So, we're at a point where we're that close to becoming extinct by virtue of overspecialization rather than the general capability of humanity.

You have made a great contribution to architecture in the use of lightweight materials in your geodesic dome and other structures. When you were creating these buildings, using your philosophy of "doing more with less," did you consider yourself an environmentalist in the sense that you were using fewer resources?

I set out deliberately in 1927 to pay attention to ecology, to see the complete interrelatedness of everything. That is, instead of being a specialist, to look at the total planet Earth, never look at a local country. I wanted to look at the total resources, the total tools of know how, and to use them for the total success of the generation of life on our planet.

I saw something going on in our technology that society did not appreciate or understand. When I was born, reality was everything you see, smell, touch and hear which is the same reality the newspapers deal with today. But we had come into a new era of electronics where you couldn't see things. We came into the era of chemistry and metallurgy, where no one could see the difference between two pieces of metal weighing exactly the same but this one was exactly twice as strong as that one.

World War I had been a war of alloys, doing more with less. Suddenly there's a ship coming, same tonnage as yours, same number of guns, same size guns, but what you don't know is he has a kind of steel in his guns so that his guns will fire accurately one mile further than yours. And your ship goes to the bottom.

Nobody tells it. So, the most guarded secret of World War I was this "doing more with less." When I hear architects talk aesthetically that "less is

more," I'm not interested. I am talking about physically doing greater performance with less volume of material and ergs of energy for each function.

I saw that it was only going into the military. We were putting it in the airplane, into ships, we had all this priority in light weight metals and alloys going to the military.

In 1927 I found that the building of the home, what I call "livingry," was many years behind the arts of designing military equipment for the sea or control for the sky. In 1927 there was an article about a single family dwelling published by the American Institute of Architects in their Journal—a house in Illinois which they considered optimum for that year.

I took the total floor area and volume, the number of windows, all the plumbing it had, and so on, and I found its total weight including the pipes was 150 tons. I took the problem then of producing equal environment controls to a new floor area, same cubage, same number of functions, equally performed and using the most advanced aircraft technology. I came up with three tons against 150. I saw then, by immediately applying the most advanced science and technology to the home front, there was a good possibility we might do so much with so little and it might be able to take care of everybody.

Russia and the United States for the last 30 years have been spending over $200 billion a year focusing on how to destroy humanity most expertly. But I knew when I came to my studies of environment control, I could take care of the living.

Between 1948 and 1950 I was giving a general lecture series at MIT. They had a department of architecture and it was considered by the other departments there as sort of a department of liaison with idiots.

Now, what are you going to do with this technology? I said I think right now we ought to change the name of the architectural department to Department of Environmental Design. Bill Wurster was head of the MIT architectural school at that time and later moved out to the University of California at Berkeley.

I got a letter from Bill about five years after that. He said, "Bucky, I'm changing the name of our department here to Department of Environmental Design." That's how the word "environmental" got going so much in architecture, really out of my suggestion, because I've been at it 52 years.

Many years ago you wrote an article in Fortune about the world energy resources.

Yes, in their tenth anniversary issue, in February 1940.

Did you anticipate at that time the mess we would be in now in energy?

Excuse me, but I can show you that in 1927 it was absolutely clear to me that we were in trouble. Automobiles were just getting to be popular. The cars were proliferating, and quite clearly, you were using up a savings account in energy and obviously your savings account was going to run out some day.

But over the years I have found that neither big government nor big business was interested in anything for you to get energy directly from nature; only what comes through a pipe and a wire, so they put a meter on it and tax you for it and make a profit out of it. So, there's no earnest attention being paid, really, to wind power—to cleaner water power, tidal power. Big business is so powerful today, and it keeps saying, "We're not interested."

At the time of World War II, the grand strategy against Hitler was to cut off his energy. We succeeded in cutting off all his petroleum. Meanwhile, the German scientists went to work and found they were able then to develop four kinds of alcohols. They made a high octane gas from the alcohol.

Continued on page 27

Workers pick tea leaves in China.

Science and Values on a Small Planet

By Barbara Ward

We have just lived through the most triumphant period of scientific and historical discovery known to the human record. We have never—not even in comparison with those supremely inventive creatures, Neolithic men and women—learned so much so quickly and in such depth about the material aspects of the universe and about the particular historical development of man in the midst of his small planetary post in that universe. The time since Bacon and Descartes has been a sort of sunburst of discovery. Bacon first caught the glimpse of science's potential role as tool and instrument for "the use and betterment of man's estate." Descartes saw that if the continuum of reality could be broken up into "discrete particulars," they could be grasped and repeated and by experiment we could come to understand the nature and working of all natural objects—from ants to elephants, from atoms to galaxies. And once understood and mastered, they could fulfil the Baconian dream of being useful to mankind

The degree to which these visions did in fact lead to new mastery led to a second profound conviction or shaping idea—that our life on Earth would be, if not improperly interfered with, one of steadily evolving material progress in which each generation would build and improve on the efforts of the past. The digging up all around the world of past civilizations (some of them of considerable material sophistication) did not dampen this optimism. Their rise and fall seemed less important than what was seen to be later giant strides forward in discovery and material innovation; their collapse even enhanced the 18th and 19th century conviction of certain "progress". By the 19th century, whole philosophies—the "why's" of life—began to be built on the "how's." Marx saw inevitable progress to Utopia in the abolition of property which, passing from slavery to feudalism to capitalism to socialism, would end in perfect justice and equality. He of course placed all evil on property; forgetting power, that most potent agent of what I would call, for its sheer banality, "unoriginal sin." Also, by one of history's cosmic ironies, he took his ideas of the incorruptibility of the dispossessed straight from the Bible: "He has put down the mighty from their seat and exalted them of low degree". But then for all the "progressive" form of his thought—the preconceived idea again—he was in fact the last of the great Jewish prophets.

At the same time, Darwin's incredible synthesis of his own and others' geological and naturalist discoveries led to the vision of evolution by natural selection, the "fittest" surviving and this too validated the profound conviction of irreversible progress—and also a lot of extremely unattractive ideas about the necessity of force and competitive violence in order to survive at all.

And from this whole mood grew a third master idea. This is less easy to define and has been less generally held in a rigorous way. Yet it has dominated the subconscious thinking of millions. If science explains all phenomena, and if material evolution guarantees progress, then in a sense the two "hows" add up to the "why"—humanity exists to experience a full material utopia on this evolving planet and all other older "whys" are simply the wish-fulfilments of a less knowledgeable and affluent age. Why worry about future paradise when you can get to Bermuda tomorrow?

'A Sense of Unease'

So there we have three major ideas of the centuries between the Renaissance and our own day—science as the tool of betterment, material progress as the certain outcome of evolution, and non-material aims, values and aspirations as simply the expressions or hangovers of pious hopes from pre-scientific and pre-technological societies.

But there is not one of these preconceptions that can any longer be easily and comfortably accepted. We are beginning to look at our planet and universe from new angles of vision and since, as Walter Bagehot once said, "Nothing is more painful to change than an idea," we are caught in a sense of unease and apprehension unequalled perhaps since the Reformation. Science as the certain instrument of betterment? We think of the fast breeder reactor powered by a fuel that is a lethal carcinogen and can with little difficulty be used to make a nuclear bomb. We think of the creation of compounds unknown in nature—for instance some of those with carbon-chlorine bonds which, concentrating up the food chains, can disrupt ecosystems, turn the eggshells of osprey to paper, end up in the fat of antarctic penguins, and conceivably help to explain the pandemic growth of cancer in industrialized societies. We think of recombining the basic building blocks of life, DNA, and feel a certain sympathy with the Mayor of Cambridge, Mass. who said: "You can produce Frankensteins if you must, but not in my city".

The Perils of Population

Then take the belief in inevitable material progress. We are suddenly confronted with the fact that world population which reached only half a billion by 1600 A.D. is now over four billion and may well be six in twenty years time. Such a vast growth of people, consuming, wasting, polluting, demanding, and moving about like, say, the Atlantic peoples, could extinguish a large range of resources forever, and put food supplies at general risk. Nor does the fact that 80 percent of material wealth today remains obstinately with 25 percent of the people—mainly us—give one a very secure feeling about the social stability of the next decades.

And this of course raises the third point—the ability of the material "hows" to produce the answer to the "why." The socialist Utopias become Gulag Archipelagos. Adam Smith's "hidden hand" ends in capitalist struggles which, in two world wars, decimated "the sons of Europe one by one." Only the extraordinary post-war bonanza of material growth based upon fossil fuel consumption with oil at little more than a dollar a barrel has

allowed us to keep the illusion going a little longer—with our cars, our convenience foods, and that holiday in Bermuda. But now these material joys become precarious. The day turns cold. Is it dusk approaching? And what gives light when science, material resources, and the assured achievement of Earthly Utopia all begin to fade away? Are we caught—between the renunciation of the rational hopes born of fantastic scientific discovery and historical research on the one hand and the blind sense of none of our "hows" giving us the faintest clue to a "why" on the other? Are four hundred years of superb intellectual achievement of no value when, now at the bleak end of an aging century, we turn to "reality" and find the answers all stained with risk and blood? Is this the dilemma of all who think or seek or try to teach?

But I believe, on the contrary, in spite of the new uncertainty and pain of our questionings, that not only do the last four hundred years of search and experiment and scholarship *not* point to an inescapable collision between our "hows" and our "why," but something much more stirring and even exhilarating is coming within our range of vision. It is that the painful divorce between how and why, between facts and values, between science and religion, between secular aims and ethical systems may in part be ending precisely because of the scholarship and scientific research of which we are the heirs. I see this possibility in two great strands of knowledge which have only been fully unfolded to us in the last hundred years. The first is historical—the vast new understanding we have gained of the civilizations which have risen and fallen on the wheel of human history. The second is the extension of science to grasp more and more of the exact nature of material things and their evolution, their interdependence, their diversity and fragility. Two great fields of human knowledge, of the "how" of our development, appear to me to be pointing to the same kind of "why" and in doing so restoring to our society what no civilization in the past has ever lacked, its values, its ethical purpose or to use Erik Erikson's moving phrase, its sense of "the Sacred Order."

Take first the cultural history of our attempts at civilization. From the first days of Sumeria and the invention of the city, the need to bring together men and women of different clans, tribes, and races in new large mixed communities led, internally, to the glorification of kingship as a centre of loyalty and the multiplication of power-wielding bureaucracies as a means of imposing order. And this combination, in its external relations, turned out to be the recipe for competitive struggle and war, first between cities, then between states and empires. It is difficult to exaggerate the horrors of this cycle of aggression unleashed by man—a still unfinished cycle. Perhaps my unfavourite vignette is that of Assurbanipal, King of the Assyrians, having a picnic with his wife under a tree from which hangs the severed head of the defeated King of Elam.

Unchanging Ethics

But then comes the paradox. It was precisely in the midst of the rise and fall of these violent systems that, all around the "civilized" world, the voices of sages, saints, and prophets were raised to say, in essence, that these ways of violence, aggression, personal aggrandizement, and frenetic greed always would lead to disaster. Such excesses contradicted the fundamental laws and needs of human living—which are community, restraint, modest claims on life, and the ability to see in other human beings other "selves" with the same needs that we feel within our own minds and hearts. "Do as you would be done by" is only a homely version of the sublime "Love your neighbour as yourself" and these insights into the basic nature of our existence—the fundamental values of social order, the "why" of our human condition—were not "pie in the sky" nor even commandments of stone. They could almost be said to be "scientific" in that they represented humanity's whole concrete experience of the consequences of aggression, self-assertion, greed, and butchery and the equal experience that these horrors of human behavior do not work and have within them what we should no doubt call a "self-destruct mechanism."

Whether it is Lao Tzu, Confucius and Mencius in China's long and terrible civil wars, or the Upanishads and the Lord Buddha during the invasions and wars of Northern India, or the Jewish prophets among a people tossed from imperialism to imperialism or Greek philosophers caught in the rivalry of Athens and Sparta or Christ killed like a slave in the "high and palmy state" of Roman power, with disgraceful imperial decline not more than two or three centuries distant—the ethics they teach us do not change. They cannot change. Aggression and greed do not work. The Sacred Order is not an abstraction but lived to the utmost in the historical experience of every civilization. And where it is most lacking—as with, say, the Assyrians or Ghengis Khan—the whole historical episode sinks into nothingness, for it is chiefly by their "sacred works" that any traces of civilization survive.

Our insights have been equally enriched by the development of our scientific research. On the one hand, it is true, we

The urban poor crowd into slums on the outskirts of Rio de Janeiro, Brazil.

have the vision of overwhelming power—the primal explosion some ten billion years ago scattering 1,000 billion stars round 100 million galaxies, some of them many thousand times more powerful than our own sun by which all life on this planet in our small corner of the Milky Way is sustained. For the explosion itself set in motion the fusion of hydrogen nuclei which now fling off—since energy *is* matter's mass multiplied by the speed of light squared—the four million tons of "energy" from the sun which every second pervades our solar system and powers every living thing.

New Insights Into Nature

All this seems to be on what you might call the "Ghenghis Khan" side of material reality, the flood of almost incomprehensible and seemingly destructive energy upon which nonetheless, by a paradox, our delicate life depends. But what modern science has deciphered—rather like the archeologists and historians deciphering the evidence of records and ruins—is on the contrary—particularly in the biological sciences, that this power is only a part of the equation.

Only when the oceans filled up and provided a shield from the sun's searing radiation could organic life begin to form from infinitely minute and complex molecules. Then photosynthesis, in minute phytoplankton, helped build up the concentration of atmospheric oxygen and the ozone layer which, by excluding the sun's lethal wavelengths of ultra-violet rays, mediated the sun's energy in such a way that it could support the further development of organic life, first in the seas and estuaries and then on land, with the movement of animal and vegetable life to the once bare rock. The power that sustains life may be overwhelming. But organic life itself is a thing of the utmost vulnerability and delicacy. Life first developing within the protection of the oceans, plants increasing the atmospheric shield through photosynthesis, animals protected by the care of parents and pack, the newborn child—wherever we look, life itself, in scientific terms, is based upon the infinitely small and vulnerable. For all its toughness, it demands care, restraint, respect, and—yes, love—if it is to survive. From the first desert created by careless farming to the last accidental nuclear explosion the lesson is the same. Only with the utmost care and understanding and modesty of purpose can the experiment of organic life continue. The "how" and the "why" in science, as in history, are coming together and both teach the same lesson. Thrift, conservation, ungreediness, the acceptance and care of other life-systems and other selves are the precondition of survival itself. The "Sacred Order" cannot be mocked. It is the very nature of reality.

There are thus new guides to survival in our own day and perhaps a truce to the sterile debate between the scientific and ethical systems. An end to aggression between states; controlled disarmament; a sharing of planetary resources with greater justice for all those billions of "other selves" who live in desperate poverty; care and conservation instead of the "throw-away economy;" the personal dedication of citizens, particularly affluent citizens, to a philosophy of restraint, conservation, and sharing; the utmost vigilance in all the big bang technologies—nuclear power, chemical transformations—banning the totally unacceptable experiments such as basing power systems on plutonium with both it and its wastes remaining dangerous for hundreds of thousands of years—all these things follow from our new insights into the nature—the *how*—of reality. All reinforce our new understanding that the "hows" re-echo the saints' and sages' vision of the fundamental "why."

It is for this reason that in one sense there is nothing very new to say about the "why." We have always known that humanity cannot live without the Good, the Beautiful, and the True. What we have learned in our own day is that the supposedly rationalistic and materialistic systems and experiments of the last 400 years end by saying exactly the same thing. Today from both our scientists and from our philosophers our new society—which must be a conserving and caring society—receives a common lesson. In the words of W. H. Auden, "We must love each other or we must die". □

Barbara Ward (Baroness Jackson of Lodsworth) is President of the International Institute for Environment and Development. The author of numerous books on world economics and environment, she was decorated with the Order of the British Empire and created Baroness in 1976. The above article is excerpted from an address at the Oxford Conference on Education.

Where Are We Growing?

By Maurice F. Strong

The environment issue has, more than any other, made us aware that the planet Earth is a single system in the physical sense, that the future survival and well-being of the whole human family depends upon the continued health of this physical system, and that technological man now has the capacity to make changes in this system which could be decisive for the human future.

The United Nations Conference on the Human Environment held in Stockholm in June, 1972, was the first major step in recognizing that these realities require a response at the political level which is beyond the capacity of any individual nation-state or group of states and require, in fact, co-operation on a global scale.

But, what has happened since Stockholm can give us little cause for confidence that these new perceptions of the need for a global approach to the human future are influencing to any significant degree the attitudes and policies of the leaders of nation-states.

It is true that the United Nations Environment Program, the expansion of environmental activities by other international agencies and scientific organizations together with the establishment of environmental organizations and policies by most national governments have provided the basis for a significant increase in national action and international co-operation on specific environmental issues.

It has also been demonstrated that many environment problems—for example, various kinds of air and water pollution—will respond to technological solutions if we are prepared to spend the money. And most industrialized societies have shown a good deal of willingness to accept these additional costs.

This is encouraging. But it is not nearly enough. Indeed, there is a danger that because of this activity, people will be lulled into feeling that protection and improvement of the environment are now well in hand. Nothing could be further from the truth.

Although the political force of the environmental movement has remained encouragingly strong as evidenced by the successful efforts in many countries to slow down the development of nuclear energy, environmental considerations are still viewed largely as an added cost to the economy and an irritation to governments rather than a central element in their national objectives. The truth is that the environment issue cannot be dealt with as separate and distinct from others, any more than we can deal in isolation with such issues as inflation, unemployment, energy, and rich/poor disparities.

The Problems of Growth

I am convinced that the heart of our dilemma is the growth process itself. It is through the growth process that we create the economic means for meeting so many of our social needs, that we impact on the environment, that we use energy and natural resources, that we create employment, and make possible leisure. The inflation, unemployment, environmental degradation, social conflicts, and economic disparities which now bear in upon us with increasing intensity are not isolated phenomena. They are manifestations of fundamental deficiencies within the growth process which are central to our present economic, social, and political systems. It is based on the premise that growth in the purely material sense, in the production and availability of material goods and services, will bring about a corresponding increase in human satisfaction and well-being.

Of course, that has been true up to a point. The explosion of our capacity to produce a multitude of material goods and services which accompanied the Industrial Revolution has brought unprecedented benefits to the peoples of the industrialized world. It has also made it technically possible to make vastly improved conditions of life available to the entire human population.

Despite this, economic and political barriers continue to prevent the two-thirds of the world's people who live in the developing countries from realizing these benefits. But the response of our industrial machine is to expand its markets by creating new wants and new appetites among the people who can afford them. We are thus caught in a paradox in which we have created an industrial system capable of meeting the basic needs of all the world's people but are in fact using it largely to foster further growth in the demand by the wealthy minority for goods and services well beyond what we need or is good for us.

We are now in a transitional period which is almost bound to be more turbulent and difficult than what we have experienced in the past several decades. The pressures on our present economic, social, and political systems are bound to escalate. It could well be a period of degeneration for western industrial civilization.

Societies and Sewers

In 17th and 18th century France, the decline of the monarchy and its society was first marked by apparent obsession with quality under Louis XIV. However, this was a false and superficial obsession which was merely the decoration or facade which surrounded the court and everything it stood for. There was a very real decline in the actual quality of life during that period as exemplified by the disappearance of adequate sanitation and water supply systems, even in the palaces.

Interestingly enough, the decline of efficient sanitation and water systems has symbolized the decline of societies since before the Greeks. One of the effects of our society's concentration on linear production has been the abandonment of water systems in the Third World, the pollution of our own water systems, the decline in the quality of water available for consumption, especially in urban areas, and a massive growth in the sale of bottled waters which bypass the system.

During a long siege, Athens eventually fell to Sparta because of an epidemic caused by the polluted running water throughout the city.

Medieval Europe's inability or unwillingness to deal with the waste produced by a growing urban population led to an increase in rats which carried the plague which in turn proved so destructive to that society. Degradation of water systems in China in several periods led to disastrous floods, rivers changing routes, agricultural disasters, followed by revolts and the collapse of the empire. Similar circumstances affected the histories of Rome and Egypt.

The question is not whether pollution, especially water pollution, was caused or produced by degenerate societies. Pollution simply is and always has been one of the signs of social decline. Following all of the historical precedents, our present pollution problems could point out the degenerative entities now operating in our societies.

We must face the fact that the long period of rapid growth experienced primarily in the industrialized world since the advent of Industrial Revolution is both unprecedented in history and unsustainable.

In order for all of the present population of the world to reach a standard of living equivalent to that of the United States in 1970, it would require extraction of some 75 times as much iron as is now extracted annually, 100 times as much copper, 200 times as much lead, 75 times as much zinc, and 250 times as much tin, and increases of similar orders of magnitude in the production of many other basic resources.

As for energy, such a standard of living would require the equivalent of 7 times as much oil, 8 times as much gas, and 9 times as much coal as are now produced annually. All of that at a time when, as a recent international report by the Workshop on Alternative Energy Strategies pointed out, just keeping up with the growing demands of the more developed world may bring us to a supply gap of 20 million barrels of oil a day equivalent of energy by 1990 and that gap may begin as early as 1982.

While large supplies of some of these materials might theoretically be made available through extraction of the minute quantities which exist in much of the Earth's surface and the oceans, as well as a total commitment to recycling of metals, it is unlikely that the environmental impacts of such a vast increase in industrial activity could be kept within tolerable limits. And it is inconceivable that such levels of industrial activity could be achieved without a degree of political, economic, and social mobilization and regimentation which would be incompatible with the maintenance of free societies and the rights of the individual.

In short, I believe that the present approach to growth is simply not viable, that basic changes are necessary. I also believe they are possible.

We should accept as basic factors for a "new growth" approach the need:

1. To assure that every person on the planet has access to the means of pro-

viding the basic needs required to assure a life compatible with human dignity and well-being; and

2. To assure that our collective activities do not transgress the "outer limits" of the capacity of the biosphere to sustain human life at acceptable levels.

Conservation must become a prime element in the new growth system. Waste must be reduced to a minimum by redesigning industrial processes and careful planning of plant location to assure that the residues of one process become the raw materials of another. Technologies for recycling and reuse of materials and abatement of pollution must be integrated into production systems and not merely added on to them.

This is already a practical goal in many areas. For example, steel can be produced from steel scrap with a 75 percent energy saving over production from iron ore. And aluminum produced from discarded cans conserves 95 percent of the energy used to produce it from bauxite.

The logical way to measure progress is by the length of time the stock of processed materials is in active use; not by the speed of product turnover. Governments can encourage this in many ways, such as offering incentives for recycling facilities and removing or reducing depletion allowances for mining industries.

It is industrialized societies for whom the "new growth" concept will require the most radical changes. It will require a major transition to a less physical kind of growth, relatively less demanding of energy and raw materials.

Helping The Third World

The industrialized countries must also be prepared to help and support the establishment of most new industrial capacity, particularly that which is resource or labor intensive, in the less developed parts of the world. This, of course, must be done under conditions which enable developing countries to avoid many of the environmental and social costs we have paid for our industrial development.

The marriage of ecology and economics which I call "ecodevelopment" would be designed to assure that the precious natural resources of soil, forests, water, plant and animal life of the developing world are exploited in ways which make best use of their own skills and labor and harmonize with their own cultures and value systems to produce maximum benefits for their people without destroying the resource base on which sustained development depends. It means, too, assuring that they have full access to the latest technologies and support for the development of their own scientific and technological capabilities so that technology will serve rather than determine their own growth patterns.

The most advanced technologies today, particularly in the fields of information processing and communication, are moving dramatically in the direction of less material and less energy intensiveness. For example, the same computer capacity which in the 1950's required a machine that would fill a moderate-sized room is now available for a few hundred dollars on a hand calculator. Similarly, it is technologically feasible to reduce energy consumption by some 50 percent without significantly impairing present standards of living. And technologies are available to make even further significant reduction in the energy requirements of many production processes.

Similarly, I believe that the public policy levers which governments can today deploy are capable of altering the system of incentives and penalties to which our economic life responds so as to make it profitable to carry out those activities which are environmentally sound and socially desirable and unprofitable to do those things which impair environmental quality, destroy resources, and detract from social goals.

The arms industry is the industrial sector to have shown the greatest growth over the last years. In the arms industry, our physical growth oriented society has found its most dependable crutch.

In 1975, the world spent almost $300 billion a year on arms, and the developing countries spent more on arms than on health and education together.

If governments can create markets for arms, they can surely create markets for other things which society needs but cannot translate into economic demand through the operation of the free market alone.

Also, if expenditures on war materials, which are inherently wasteful whether they are used or not used, can be a major stimulus to the economy, surely expenditures on building better and more liveable cities, improved cultural and educational facilities, recreational areas and opportunities for meaningful leisure, can be just as stimulating to the economy while at the same time adding positively to the real capital stock of our societies.

So I believe it is feasible to make the transition to the new growth society. But that does not mean it will be easy, for it requires basic changes in the attitudes, values, and expectations of people—in effect a cultural revolution. Governmental action will not be possible unless it is supported by this cultural change. It must be a culture that places highest value on quality rather than quantity, on conservation rather than waste, on co-operation above competition. It requires that we learn to applaud and look up to those who adopt lifestyles that are modest in terms of the amount of space they monopolize or the amount of materials and energy they consume; that ostentatious, wasteful, and indulgent living become socially reprehensible.

Needed: Citizen Participation

The conditions which determine the optimum balance between individual freedom and collective constraint will be complex and decision-making will not be easy. It will call for a vastly improved method of evaluating the interactions between private and public interests in particular situations, of presenting and disseminating information, and of assuring a maximum degree of citizen participation in decisions which affect them.

Up to now the human species has changed its ways significantly only after having been chastised by bitter experience. Man's history has been based on repeated cycles of advance, tragedy inflicted by nature or by war, collapse, and rebuilding, often for many centuries on a lower level than that which was destroyed, and often without rediscovering its most advanced aspects, such as the architecture and democracy of Greece or the porcelain of China.

Now that, for the first time in our history, we possess the means of total self-destruction, can we risk repeating these cycles? Even if we could, it is surely doubtful that the wholly unprecedented scale and nature of risk we now face would enable us to have another chance if we were to wait until eco-disaster or economic and social collapse is imminent.

Our present growth process which is based on greed and conflict is a cancer which is now eating away at the body and soul of society. It will destroy the very fabric of our society if we do not bring it under control. We must know where we are growing. We must become masters of the growth process and not its slaves. We must use it to expand our unlimited potential for human growth and not subordinate our humanity to its requirements. It is not only our survival as a race which is at stake, but the survival of those very qualities which distinguish us as human. □

Maurice F. Strong served as Secretary-General, U.N. Conference on the Human Environment 1970-72 and as Executive Director, U.N. Environment Program 1973-75. The above remarks are excerpted from an address by him at the University of Uppsala, Sweden, on the occasion of its 5th Centenary.

Ethics and the Environment

Continued from page 17

and Algeria would be cases in point. They have fairly high levels of per capita income but fairly low levels of per capita well-being as measured by these social indicators. Sri Lanka, on the other hand has rather low per capita income and a rather high PQLI rating. So I think there's a great deal to be said for considering alternatives to per capita GNP as a measuring device and that the Overseas Development Council is making an important step in the right direction.

You have stressed the ethical responsibility of the U.S. and Canada as net food exporters to help hungry nations. What do the terms "triage" and "lifeboat principle" mean?

The "triage" concept, which was first applied to the world food situation by William and Paul Paddock in their book "Famine 1975," comes from a French classification of battlefield casualties into three groups: the walking wounded who can leave the scene of battle under their own power and get to a first-aid station or hospital; those who if given immediate treatment of the right kind will survive; and those who probably aren't going to make it anyhow. When you have to make tough decisions at the time of battle you just write off the third category and abandon them.

What the Paddocks said in their book was that there are a lot of countries that can't possibly make it anyhow because they're too densely populated and don't have the political leadership and technical know how to produce enough food or the political will to get the brakes on the population growth. So we might as well not postpone the day of reckoning and just let them go, and concentrate our aid instead on those countries that can make it.

Did they mention which countries are in that category?

Yes. As I remember, India and Bangladesh were among the countries that should be abandoned and that of course created a lot of controversy. The weakness of the "triage" theory is that, first, it assumes some countries can't make it, which I'm not sure is the case, and secondly, it assumes that we're in a position to decide which countries should be abandoned. It forgets or overlooks how terribly dependent we are on other countries. I think at this point in our history we have to ask ourselves: What if OPEC devises its own "triage" classification scheme in trying to decide which countries have become so hooked on oil that they couldn't possibly survive when the oil wells go dry, and then it starts deciding which ones to cut off now? That's the other side of the coin.

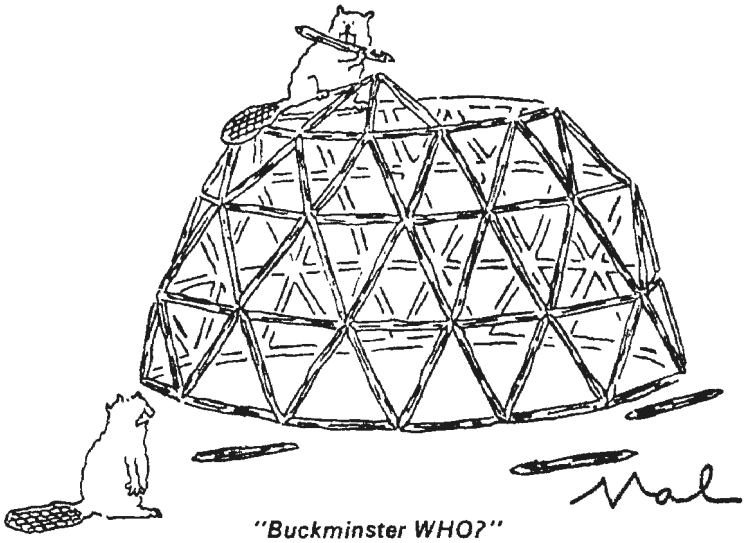
What does the "lifeboat ethic" mean?

It's the same sort of thing. It says the planet can support only so many people and uses a "lifeboat" analogy. You have to decide how many people can climb on the lifeboat before it sinks. The people who advocate this somehow or another always see themselves as already being on the lifeboat with the rest of the world wanting to climb aboard, which leaves them in a position to decide who gets on and who doesn't. This theory also recommends that certain parts of the world be abandoned and not be permitted to climb on.

So your position is that it is not only unethical for us to play God with these other countries in deciding whom we will help to feed, but also as a practical matter that we're very dependent on them for minerals and other resources?

In an increasingly interdependent world, I think advocating the "triage-lifeboat" approach would not only be unethical but it would be disastrous even from a narrow, national point of view. □

This interview was conducted by Truman Temple, Associate Editor of EPA Journal.



"Buckminster WHO?"

Spaceship Earth

Continued from page 20

Germany was not licked on energy because alcohol saved them. I was in economic warfare in World War II and I had over at the Bureau of Standards a Plymouth and a Ford and a Chevy engine which we ran for two years on alcohol and ran better than on gasoline. So now I know we can do this.

You've traveled a great deal, Mr. Fuller. Which country would you say has the most advanced environmental ethic, the most sensitivity to environment?

Well, I have been around the world 45 times. I was in China this year. I felt more at home in China. There was more sensitivity to what we're talking about than any place I've ever been.

In what way?

There was an honesty and a clarity. In Russia, I've been there many times and met their top people, and they can't talk about things. They can talk about technology, but they can't talk about how you run things. I found in China, anybody can talk about anything, government or anything. Everybody is interested in the truth. I've never, never seen anything like the progress positively in China. Japan is very impressive; every corner is growing something, but in China it's overwhelming.

We know they're planting a lot of trees in China for reforestation.

They're planting everything. Every inch of ground is used. It's very well done.

Khruschev once said that he wanted "Mr. Buckingham Fuller" to come to Russia to teach his engineers. Did you ever accept that invitation?

That same year was the year of the protocol exchange between the United States and Russia. The Russians built a great exhibit in New York. The United States had an exhibit over there. My dome was being used for that. I had already been asked by the United States government to represent United States engineering in the protocol exchange, so I was going over there anyway. And I did speak to his engineers. I did find that they did like the geodesic dome, they agreed that was one of the things that had not been done in Russia. But Khrushchev was talking about my dome when he was speaking to the New York reporters. He said some American inventors are good, and this is one of them. So they recognized it as being mine and not Russian, and have built many geodesic domes since then. □

The Energy-Environment Dilemma

By Willis W. Harman

We often hear these days of the coming "two transitions in energy supply." One is from the present dependence on oil and natural gas to more use of unconventional fossil fuels, such as synthetic crude made from coal and shale; synthetic gas, heavy oil, and tar sands. The other is the eventual major dependence on "inexhaustible sources" such as solar energy, deep geothermal energy, and possibly fusion and breeder technologies. There is a tacit assumption that in the period between the two transitions our problems will be solved if only we dig out the fossil fuels fast enough and spend enough money on anti-pollution equipment.

Well, maybe. But there are dissenting voices, who speak of environmental and social problems with accelerating use of energy, particularly hydrocarbon fuels. They argue that more fundamental changes are required than simply changes of energy sources. There is not a simple solution to the debate. But let us look at some facts about which there will be little dissent, and then see their relevance to the energy/environmental choices before the Nation.

The conventional portrayal of the economic process as a self-sustaining, circular flow between "production" and "consumption" is seriously misleading in one respect. It encourages neglect of the fact that the economy requires inputs from the environment—energy and resources—and spews back into the environment waste heat and waste materials. This important general property of the economy is related to the Second Law of Thermodynamics.

This law, the Entropy Law, states essentially that (a) all kinds of energy are gradually transformed into heat, and heat flows by itself only from a hotter to a cooler region (never in reverse), so that it tends to get more and more dissipated and unavailable to do mechanical work; and (b) matter, too is generally subject to an irrevocable dissipation.

Recycling and "pollution control" may convert noxious wastes into less undesirable ones, but do not eliminate the waste (although they may cause it to accumulate in a less undesirable location).

Industrial Trends

Among the trends characteristic of industrial society, which have accounted for its benefits and achievements but also lead toward the most basic problems, are the following:

Industrialization of production, i.e., subdividing work needed to produce goods and services into elemental increments, and organizing and managing these increments toward the goals of productivity and efficiency;

Automation, the further organizing of work so that it can be performed by energy-driven, self-operating machines;

Rising influence of science, i.e., the search for materialistic knowledge guided by the principles of objectivity and causality and embodying the prediction and control values of technological exploitation;

New concentrations of power, especially economic power in the expanding industrial corporations and associated financial institutions, and intellectual power in the scientific and technological elite;

Rising levels of education with strong emphasis on preparation for entering the industrialized economy;

Pragmatic values predominating, with the individual free to seek his own self-interest, as he defines it, in the marketplace;

Material progress, both as an observable trend and as a declared goal, implying man's expanding control over nature and his unlimited ability to understand the universe from the data provided by his physical senses.

These trends are intimately related to an underlying image of man-in-the-universe involving materialistic values, scientific principles of objectivity and causality, focus on the outer world (in contrast to the medieval inner-world focus), and an ethic of man dominating the rest of nature. Numerous signs of challenge of the long-term suitability of this pattern have been evident in the last decade.

A New Scarcity

The industrial-era trends have brought us to a new scarcity of:

- Fossil fuels and other sources of energy
- Mineral and non-mineral resources
- Natural fresh water
- Arable land and habitable space
- Waste-absorbing capacity of the natural environment
- Resilience of the planet's life-supporting ecosystems

Although they are somewhat interdependent and exchangeable, we are simultaneously approaching the planetary limits for all these resources. This is not necessarily to say that shortages in all of them are imminent, but neither are the limits infinitely far away.

The new scarcity differs fundamentally from age-old scarcities of food and shelter. The latter were solved in the past through geographical expansion and technological advancement. The new scarcity is more of a consequence of technological and industrial advances.

As a consequence of the above developments, concern has been growing over various questions. What are ultimate resolutions to the problems represented in the new scarcity? What are wise energy supply and use patterns for the future? What are our options in the long-term?

There are major uncertainties involved in attempting to arrive at answers to these questions—uncertainties of two types. One is the technical kind, those we are used to resolving through research. The other is about future public attitudes, value commitments, preferred life styles, and interest-group political actions. The second type we typically leave out of our calculations. As a result, time and again in recent years careful forecasts made with the best data have been confronted by unexpected changes in these "soft" variables. Examples include changes in attitude with respect to:

- *Family size*, unexpectedly bringing U.S. population growth below replacement fertility rates in the mid-1970's;
- *Environmental quality*, which, reflected in legislation and public actions, delayed large construction projects and hence affected both energy supply anticipations and economic forecasts;
- *Desirability of urban/suburban life*, resulting in a net out-migration from urban areas for the first time this century, contrary to demographic forecasts;
- *Science and technology*, resulting in major departures from past trends in Federal funding of basic research, affecting all post-SST technology forecasts, and bringing an unprecedented insistence by the public to be involved in major scientific decisions.

Three Views

Consider the "facts" outlined above, each of which represents propositions that all informed persons could agree upon—more or less, and up to a point. When they are examined together and implications drawn, there are violent disagreements.

The first perception is that which might be inferred from Federal energy policy thus far. The entropy argument simply

doesn't seem relevant. The situation it describes, where energy used in the process of getting out resources mounts higher and higher—as does the pile of refuse from the workings of the economy—is a picture of some far distant time. Meanwhile, we may develop fusion power, or something else, which will push it still further off. For the time being there is lots of coal, and when people realize what the issues really are, they will put up with a little environmental degradation to keep the economy rolling and unemployment down.

A *second perception* finds the entropy argument an interesting one, but only one of many (and not even the most compelling) pointing to the need for drastic cutbacks on energy demand. Social, environmental, and ecological costs of continued energy use expansion are becoming increasingly intolerable. Expanding use of hydrocarbon feedstocks to provide nonbiodegradable fibers, plastic gimmicks, and detergents has aggravated the environmental problem. Energy demands—and that means demands on economic output generally—need to be reduced greatly. This can be accomplished through voluntary choice and cultural change, made more equitable by supporting legislation.

Thus we need more understanding and action involving voluntary frugality, "doing more with less"—the simple life, engaging together in a search for meaning and commitment; pursuing handcrafts and gardening with "appropriate technology;" identifying with nature, fellow man, and future generations. There must be a "fairness revolution" in the world, with the rich nations learning to consume less and the poor nations achieving a more equitable redistribution of the Earth's resources. The planet cannot stand the resource binge of the industrialized nations, and it is not clear that humanity can stand it either.

A *third perception* is in contrast to the first two. It perceives the entropy argument as fundamental and the "new scarcity" as a sign the industrial era is approaching its end. The industrial period, with trends as indicated earlier, is most properly in a historical sense considered a brief transition period, of two centuries or so, following the long pre-industrial period during which man's control over this external environment was very limited, and preceding a period in which that environment is very much more a matter of social choice implemented through technology.

The environmental and resource crisis; the growing sense of careening ahead faster and faster with less and less consensus on what is worth getting to; the widespread alienation and anomie; the growing challenges to the legitimacy of corporate economic power concentrations and scientific-technological-manipulative intellectual power concentrations—all these are signs of a forthcoming wrenching around of society, a reorganization around a new trans-industrial pattern. The characteristics of the reorganization are far from clear, but they will emerge out of the nature of the challenging forces.

Perhaps the salient characteristics of this new pattern are represented by a shift in emphasis:

from economic individualism toward reassertion of the brotherhood of man;

from an isolated, exploitative attitude toward nature toward a unitive, stewardship attitude toward nature with an ecological ethic taken for granted;

from subservience of other values to economic values toward reassertion of transcendent social values and relegation of economic values to a subservient, instrumental role;

from discounting the future by economic logic toward direct involvement with the welfare of future generations;

and from the predominant quest for knowledge (science) biased in favor of knowledge leading to technology, toward a more balanced search for understanding both of the physical universe and of man's spiritual being and his relation to the whole.

Alternative Realities

It is important to stress that these three perceptions are ways of seeing based essentially on the same data.

We introduce it here as an aid to understanding some of the conflict surrounding energy-related issues, and also to help improve communication and reduce conflict —to lift the issues to a more fruitful plane of discourse than adversary confrontation. If the various perceptions of the issues surrounding crucial energy decisions can be made legitimate, and then explored together in the public dialogue, it may be possible to move toward establishing consensus on which perception, with the actions that follow from it, is most in accord with a long-term desirable future.

At the same time it is necessary to honor different perceptions of our energy situation, since each "fits" the observations of our environment as made by the person holding that view. It is also important to note that these patterns of perceptions are not equal in their consequences. They lead the society to a different future. Thus the choice among them is not arbitrary; in the long run they are not equally serviceable. So it is extremely important which one society chooses. Yet one of them cannot be proven, in the ordinary sense of the term, to be "right" and another "wrong."

There appear to be at least three tests that can be applied—not to whether a picture of reality is "correct," but to whether it seems to be a wholesome one for a society to hold. These are:

1. Does the view in the long term lead toward societal or system adaptability, and hence toward survivability? There are certain laws of nature and universal properties of systems that a society ignores at its peril. After all, the laws of thermodynamics, the fundamental principles of ecosystem behavior and adaptability, do obtain—regardless of the opinions of men. Some conditions for adaptation, for preservation of options, are in fact inevitable. They operate whether or not they are included in society's picture of reality.

2. Does the view lead toward fruition of the long-term trend of human civilization? Does it tend to move us in the direction of such traditional values and goals as democratic liberation from oppression by institutions, reverence for nature, the brotherhood of man, and man's further spiritual development?

3. Is the view compatible with whatever can be discovered to be man's most fundamental nature? Among the powerful criticisms of the day is the protest that to be "economic man"—Homo economicus—is not his most fundamental nature.

Social Choices

From what we have seen, the Nation's choice of future energy supply and use patterns involves far more than technical or even economic criteria. The most basic goals of society are at the heart of the issues. And yet it is precisely here that our present society is more confused. Subtly but steadily, economic goals have gradually substituted for social goals and economic rationality has come to prevail over social rationality. We have gotten it backwards. What are properly a means—technology and the economy—have been elevated to the rank of ends. The plurality of values and norms that characterize political rationality have been overshadowed by the single-valuedness of economic logic.

And so the examination of what may have appeared to be a technical issue of energy/environmental tradeoffs has led us to several related but more fundamental issues: the need to make legitimate and deal with alternative perceptions of reality, the critical nature of our present energy decisions, and the need to restablish the precedence of social choices over economic ones. □

Willis Harman is Associate Director of the Center for the Study of Social Policy, SRI International.

Environmental Mediation

By Joan Z. Bernstein

Our society has developed several ways to resolve conflict. Perhaps the oldest is the use of force, physical or economic. More formal methods created by legislators include the court system.

All of these methods have been used in attempts to resolve environmental controversies, with varying success. A substantial number of environmental conflicts are not successfully resolved by the usual methods. There are too many parties with different interests to be neatly aligned into opposing sides for a court battle or a show of power. The issues may be too local for Federal legislation, but too far-reaching for adequate resolution by State or municipal legislation. The real issues are often practical or policy issues rather than questions of interpretation of law, so the courts are unable to reach and resolve the center of the controversy. The parties to environmental disputes are thus increasingly turning to a new alternative—environmental mediation.

Mediation is a voluntary process in which those involved in a dispute jointly explore and reconcile their differences. Unlike a judge or an arbitrator, the mediator has no authority to impose a disposition. The mediator's role is to assist the parties in resolving their differences, in creating an opportunity to exchange promises. The mediator helps the parties define the framework within which they will negotiate, facilitates the substantive negotiations, and assists them in the creation of the means to implement the agreement, particularly important if the parties had no prior working relationship. The mediated dispute is settled when all of the parties reach what they consider to be a workable solution. And, all of the parties know at all times that no solution will be forced on them.

For example, some dispute almost always occurs whenever someone plans to build a dam. Several years ago, the residents of the middle valley area of the Snoqualmie-Snohomish River Basin in Washington wanted a dam to provide flood protection for their homes and businesses. The farmers in the lower valley also wanted the dam, to provide flood protection for their crops. But environmental and citizens groups opposed the dam. They objected to interrupting a free-flowing river, and they feared that the dam would open the flood plain to urban sprawl. They charged that the costs of building the dam were greater than the costs of repairing damage caused by floods, and that the plans were therefore not economically sound.

The courts are not set up to decide whether building a dam is good public policy. The construction of the dam could be challenged by an attack on the environmental impact statement, for example, but the technical legal points they would have raised would have had no relation to their specific concerns. After long, complex litigation, one side or the other would have "won," and the dam would either have been built as planned or not built at all.

Instead, the dispute was mediated. The controversy over the dam had continued for over twelve years when the Governor appointed the Office of Environmental Mediation in Seattle to aid in resolving the dispute. That was in May of 1974. In early December all of the participants signed a set of joint recommendations. The Governor endorsed the agreement, and it was implemented.

The agreement provided for a multipurpose flood control hydro-electric recreation and water supply dam on the North Fork (rather than the Middle Fork), setback levees in the middle valley for national flood storage and recreational use, control of patterns of development through the purchase of floodway easements and development rights, and the establishment of a basin planning council to coordinate the plans. By working together, with the help of the mediator, the parties were able to develop a plan which protected each of their concerns.

Instead of the limited yes/no, win/lose of litigation, mediation produced a creative compromise that was acceptable to everyone. The environmental and citizens groups supported a major flood control structure, and the farmers and urban dwellers made a commitment to substantial limitations on the use of their land. The agreement provided that it was acceptable only as a package, that no one portion could proceed without the others. Thus, even though an elected body cannot bind its successors, the agreement was designed to apply even if there was a change in the State or local administration.

The Snoqualmie-Snohomish River Basin dispute met all of the requirements for a conflict which may be mediated, as established by the Office of Environmental Mediation. The issues were defined, and were amenable to compromise. The parties were visible and involved. There was a sense of urgency and a relative balance of power among the parties, to insure that mediation would not be used by one side as a delay tactic. There was a reasonable assurance that responsible authorities would implement an agreement reached by the disputing parties. And there was an objective, but concerned, mediator to facilitate resolution.

These factors are often found in environmental disputes. For example, the Office of Environmental Mediation also aided in resolving a dispute over a highway, another standard environmental controversy.

The commuter cities supported the proposed 10-lane highway as a way to de-

crease rush-hour traffic. The County Transit Authority supported any reasonable design which would increase traffic capacity by use of designated transit lanes. The City of Seattle opposed the plan, supporting development of the mass transit system instead. Citizens groups opposed the highway for a variety of reasons, from fear of noise, air pollution, aesthetic blight, and urban sprawl to opposition for the sake of leverage in unrelated disputes with the Highway Department.

The citizens groups had delayed the project through litigation, and the cost of the project was estimated to increase at a rate of $140,000 a day. Several parties called in the Office of Environmental Mediation. The mediation and formal negotiation sessions were open to the public, and some of them were televised. Ten months later, the twenty year-old dispute was resolved. The agreement called for a configuration with special access to the transit lanes for carpools and traffic originating on Mercer Island. The improvements were to be accomplished in conjunction with major transit improvements in other urban corridors and transit inter-connections to the central cities of Seattle and Bellevue. Automobile access was limited during peak hours in the areas east of presently developed suburbs. The connector was designed to be covered with parks, homes, and commercial establishments.

Mediators have also helped to resolve other environmental controversies. In one case, environmentalists protested the lumbering in Francis Marion National Forest in South Carolina because it endangered the Bachman's Warbler. The mediated agreement made the bottomland swamp, where most of the birds nested, off-limits to lumberers. In another, local residents protested plans to build two 20-story residential towers, charging that they would cast massive shadows and be inappropriate in an area of scattered, single-family housing. The mediated agreement provided for a low-level townhouse complex of 80 units, instead of the planned 400.

In Washington State, the Office of Environmental Mediation helped the Lummi Indians and Watcom County to resolve one of their many long-term disputes. The agreement gives the Lummi Tribe the option to purchase the County's interest in land within the reservation. The tribe will then have the right and responsibility to develop it into a public park according to the guidelines of the Washington State Interagency Committee for Outdoor Recreation.

EPA has participated in two mediation efforts. The first was the National Coal Policy Project, where some sixty participants, half from coal-mining and coal-using industries and half from environmental groups, were able to agree on how and where coal should be mined and burned, and how it would be transported, priced, and conserved. In my opinion, the most significant of the long list of points of agreement was the environmentalists' support of streamlining of utility licensing and siting proceedings. In the past, environmentalists had supported complicated licensing procedures because they provided more points for technical and procedural challenges to tie up construction.

In return, industry promised to notify the public before applying for powerplant licenses and to support public financing of qualified public-interest groups' participation in hearings. The existence and success of the National Coal Policy Project convinced both sides that they could talk to each other, and that it was not necessary to battle over procedures when they could discuss substance.

In the other case, EPA was a more active participant. The Agency was already in litigation over its pretreatment regulations when, under a new requirement of the court, it had to meet with the other side to clarify the issues. At that meeting, when industry lawyers brought in engineers to discuss the practical problems, both sides realized that the industry's real concerns were narrow and specific, and unrelated to the compliance or enforcement scheme of the regulation. EPA was able to make some relatively minor adjustments which made both sides happy, and was able to save innumerable hours of preparing for litigation.

EPA is sued on virtually every regulation it promulgates. Congress enacts broad statutory schemes, and leaves the details to the administrative agencies because of their expertise in the field. The Agency establishes policy, within the statutory limitations. Once the regulation has become final, if the industry or environmental groups do not agree with EPA's policy, they have few alternatives. They can lobby for a statutory change, which is expensive and chancy. Or, they can go to court and challenge the regulation, to prevent its implementation.

EPA has not found a better system for determining correct statutory interpretation or credibility of witnesses than courtroom litigation. But challenges to the Agency's regulations are most often based on practical consideration or policy questions. The court only has jurisdiction to decide whether the regulation is invalid, based on whether EPA has done something illegal in promulgating or drafting it. So the parties cannot challenge the regulation on policy grounds. Like the environmentalists who delay construction by challenging the technical adequacy of an environmental impact statement or the labyrinthine procedures of a licensing proceeding, the challengers to EPA's regulation must prepare creative technical and legal attacks in order to get the court to throw the regulation out. If they win, and the court finds that all or part of a regulation is invalid, a new footnote is added to administrative law textbooks, but the challengers still have no guarantee that the next time around the regulation will be any closer to what they want.

Often the regulatory process is cumbersome and confining. Mediation during this stage would allow the Agency to have a more informal dialogue with interested parties. Perhaps EPA could encourage more compromise, as it did with the pretreatment regulation, without waiting to be sued. Even if EPA was not able to please all sides, elimination of one issue or one party to litigation or just a joint establishment of the factual basis for its regulation would be a major saving. Mediation after rulemaking, when both sides have something to lose from engaging in litigation, can be particularly valuable.

During my tenure, I was active in promoting the application of mediation in the Agency. My office transferred funds to the Office of Environmental Mediation through the Federal Regional Council in Region 10, and helped to arrange matching funds from the other agencies represented by the Council. A number of EPA attorneys recently participated in an all-day seminar on mediation, led by Thomas Colossi of the American Arbitration Association and John McGlennon, former Regional Administrator for Region 1 and now with Clark-McGlennon Associates, a Boston mediation firm. Our new grant appeals procedures specifically provide for the appointment of mediators to resolve grant disputes without going through a formal appeal whenever possible. EPA is also attempting to design a mediation procedure for determining proper levels of reimbursement for test data under Subsection 4(c)(3) of the Toxic Substances Control Act.

I believe that too many of EPA's lawsuits are argued on issues that are not the real concerns of the parties. Mediation opens a new line of communication for discussing those issues and developing flexible, creative solutions. Mediation requires an ethical, good faith attempt to understand and compromise, rather than the adversary posture imposed by litigaiton, which is only appropriate for the kinds of issues courts were designed to resolve. I hope that increased application of environmental mediation to conflicts will allow EPA to argue both policy and law in appropriate forums. □

Joan Bernstein served at EPA as General Counsel 1977-79. She recently was named General Counsel for the Department of Health, Education, and Welfare.

President Carter presented the President's Environmental Youth Award to Michael Birlew of Argyle, Texas, and 15 other youngsters in a recent ceremony at the White House Rose Garden. Deputy Administrator Barbara Blum (behind podium) announced names and achievements of recipients. Birlew was one of those honored for their work in the special Energy, Education, and Conservation Program. Some 3.5 million Scouts and 1.5 million adults will be working in this area in 1980.

The President noted that more than 200,000 young Americans have been given awards thus far for outstanding work in protecting the quality of life. Their projects pay rich dividends as they are carried out, he declared, and they also "can add a sense of innovation and a freshness of thought that a more senior American would never contribute, and they lay the ground work for themselves in their own lives to continue this work in the years ahead."

Anyone interested in more information about this program can write Mary Faye Dudley, the President's Environmental Youth Awards (A-107), U.S. Environmental Protection Agency, Washington, D.C. 20460.

•Deputy Administrator Barbara Blum was principal speaker at the dedication of the Nation's first solar-powered sewage treatment plant September 28 in Wilton, Maine.

Hailing the development as EPA's "first major effort to support new and functional uses for solar technology in pollution control processes," Blum said the Wilton plant marks a beginning of the Nation's journey toward energy independence "in a way that sustains a clean environment and a healthy economy."

The facility is capable of handling nearly half a million gallons of wastewater per day and has received a national award for engineering innovations. Blum noted that the plant (EPA Journal, October '77) is now serving as a model for similar projects elsewhere. EPA contributed 75 percent of the cost of the project, with the State and local community paying the remainder.

Clarence Hardy

He has been named Director of Personnel for the Environmental Protection Agency. He had been head of personnel at the National Bureau of Standards during 1979. Hardy served as Personnel Officer at the Department of Energy in 1978, planning and directing personnel operations for the Federal Energy Regulatory Commission. Earlier he had held a number of personnel positions in Federal agencies. He was Chief of Personnel Management Services in the Department of Energy 1977-78; Chief of Personnel Operations at the Energy Research and Development Administration 1976-77, and a management analyst at that Agency 1975-76. He was Personnel Officer for ERDA in Albuquerque, N.M. 1973-75 and a personnel management analyst for the U.S. Atomic Energy Commission 1970-73. Hardy began his Federal career in 1969 as a management intern with AEC. A graduate of North Carolina Central University where he received a BA degree in 1967, he also received a Master's degree in Public Administration in 1969 from the Maxwell Graduate School, Syracuse University.

Inez Smith Reid

She has been nominated EPA Inspector General, and is the first person to fill the position, which was created by a new law. Reid has served since 1977 as Deputy General Counsel for Regulation Review at the Department of Health, Education and Welfare. Previously she served as General Counsel for the New York State Division for Youth. She also is former Associate Professor of Political Science at Barnard College, Columbia University, and was Executive Director of the Black Women's Community Development Foundation in Washington, D.C.

She received a B.A. degree from Tufts University in 1959 and a law degree from Yale University in 1962, as well as a Master's degree from U.C.L.A. in 1963 and a Ph.D. from Columbia in 1968 in political science. She is the author of a book and several article dealing with black studies, law, civil rights, and African politics.

The Need for a Well-Informed Citizenry

An Interview with Joan Martin Nicholson

Why does EPA or any government agency need an Office of Public Awareness? Can't the Agency's actions speak for themselves?

Thomas Jefferson once said that people are inherently capable of making proper judgments when they are properly informed. Many of EPA's actions can be judged by the public only if the public has an adequate understanding of environmental problems and of the laws Congress passed to solve them. Without this basic information, citizens might see EPA's actions as unrelated to their basic welfare.

What is the philosophical basis for the operation of the Office of Public Awareness?

Its philosophical basis is Jefferson's observation—the need for a well-informed citizenry in a democracy. The U.S. Congress has given EPA eight major laws to implement on behalf of the public. These laws address air and water quality, drinking water, radiation, noise, solid and hazardous waste, pesticides, and toxic substances. All ultimately relate to fundamental life support systems and address areas of considerable public concern. Not only do these laws relate to broad social issues in our society, they relate to specific people in different ways. Farmers may be primarily concerned with water pollution, acid rain, and pesticides; members of minority groups are often the first victims of air and noise pollution; urban consumers may be particularly concerned with drinking water problems or the pollution of recreation areas; business managers and industry foremen worry about the effects of regulation on production; labor leaders are concerned with worker health and safety both at the work site and within the community; senior citizens watch with concern as open spaces disappear along with fresh air and clean rivers; women worry about environmental problems that affect their reproductive capabilities; and young people are concerned about the quality of their tomorrows. All of these people have very tangible connections to EPA's laws and activities. Their needs for information, as well as their involvement with EPA policy development may vary, but I think their potential for being responsive to EPA's regulations and activities is much greater than appreciated. When you realize that *the implementation of environmental laws relies heavily on voluntary compliance,* the folly of not providing adequate public information is obvious.

How is the office organized to reflect that philosophy?

It is a more precise view of these different publics and their potential that caused the Office of Public Awareness to be reorganized two years ago. We established nine *constituency* positions dedicated to providing information specifically to labor, agriculture, business/industry, women/consumer, minority, urban, environmentalist, youth, and senior citizen/health groups. In addition, we established a client service systems between our office and EPA's major program divisions —air/noise/radiation, toxics and pesticides, water and waste management, planning and management, and enforcement. Each "program client" is served by an associate director who acts as advocate, planner, implementor, and resource to the Assistant Administrator's program. That associate director, in consultation with program staff, our deputy director, and myself, designs and implements a public information and citizen participation support plan in response to program activities. The associate director's resources include a portion of our budget, constituent staff support, support from the information production unit of our office, and from our regional awareness offices.

This structure permits the Office of Public Awareness to (1) serve the programs in consonance with their priorities, (2) link program information and participation activities with specific constituencies, (3) relate environmental information to other national issues such as health, energy, and economics, and (4) increase information flow from Federal to regional, State, and local audiences.

In all our information activities, we are committed to honoring the differences among publics and their environmental orientations.

Is there an ethical difference between propaganda (p.r.) and public awareness activities?

A profound one, and one that has troubled Congress over the years. As early as 1913, Congress banned any Federal office from being called an Office of Public Relations. Since then it has tightly restricted the Executive Branch's access to television, radio, and paid advertising. Quite correctly, Congress draws a distinction between activities designed to inform citizens so they can monitor an agency's performance, comply with its laws and regulations, or participate in its programs; and activities which market an agency's image. Unlike organizations in the private sector, Federal agencies are not competing for profits in the marketplace. Federal agencies are implementors responding to public mandates.

Congress fundamentally supports the information function of government agencies. But public information offices of the Executive Branch are particularly vulnerable to external pressures; so Congress gives those agencies close and constant scrutiny.

If an office such as ours is truly doing its job, the information we provide should help prepare a citizen to assess the type and extent of environmental protection being provided. Based on that assessment, the

Joan Martin Nicholson is Director of EPA's Office of Public Awareness.

citizen can choose to comply with and support EPA's actions, challenge them in the courts, or attempt to modify them through legislative action.

What do you think the citizen can do to get a bigger voice in environmental affairs?

An important *first* step is to be become familiar with environmental problems on the local level. *Second,* identify which agency or department has jurisdiction over these matters—local, municipal, county, State, regional, or Federal. *Third,* become familiar with the laws, regulations, and standards that these various entities should be implementing. An understanding of *local* environmental issues is invaluable to both concerned citizens and EPA, as local solutions to environmental problems can often prevent the development of more widespread environmental problems.

However, there are many difficulties for citizens wishing to become involved. Too often they cannot meet with the staff directly responsible for making environmental decisions. Often, they are referred to the information office, which is all too willing to serve as a guardian at the gate or as a sophisticated barrier between the public and the public servant. I do not desire the Office of Public Awareness to serve that function. If we can fill an information need, we should; but we should not co-opt healthy dialogue between the public and the public servant.

Another problem for citizens is that although an agency may be dedicated to producing helpful information, it may not be equally dedicated to investing in adequate dissemination. In our office we now not only send out information through the Regional Offices, we distribute information on a monthly basis to States and municipalities as well. In addition, we are making information available through supermarket distribution arrangements, and through special mailings to constituent organizations. We prepare calendars of events that different public constituent groups have scheduled and disseminate the calendars within EPA to encourage program people, regions, and States to make EPA information available in these constituent forums.

Another barrier the citizen faces in seeking timely and useful information is that we announce many of our actions, as well as opportunities to participate in the Agency's business, only in the Federal Register, and too often in language unique to Washington. The Federal Register is used by a highly selective readership and is too expensive for many who have need of it. Another example of inadequate communication is the production of technical and scientific documents without providing a lay translation. And even in our public information documents, we often fail to start with the basics—drawing the relevance of environmental laws to the world of those affected. To rectify this is a goal of our constituent approach.

Public awareness and citizen participation are broad terms. What is their relationship?

An uninformed public is an uninvolved public. I am distressed when I hear public awareness and citizen participation described as "either/or" agendas or as competitive. Public awareness and public participation are the opposite ends of the same stick. They are the beginning and end of an evolving process. You can have public awareness without citizen participation, but you cannot have meaningful citizen participation without public awareness. Public information activities should lead to the *empowerment* of the citizen. *With adequate information the citizen is empowered to participate.* Citizen participation is the accommodation of that informed citizen in the Agency's development of policy or programs.

What kinds of skills and knowledge are required to serve in the Office of Public Awareness?

Public information offices are often perceived as mini-advertising offices, or as creative havens for journalists, moviemakers, and writers. While creative talents are certainly needed, we also must make sure that these abilities relate directly to agency and public needs. We need people who are intrinsically courteous, as information offices are often the first and sometimes the only point of contact between the Agency and the public. Our Office of Public Awareness handles over 20,000 inquiries a year. Courtesy, of course, is not enough. We also need public information officers committed to becoming knowledgeable about *both* EPA's programs and the public's programs. This is an important prerequisite if the staff is to be able to serve both EPA and the public. Third, we need people who understand how to relate Agency information to our other national priorities, such as energy, economics, health, and regulatory reform, as well as to the different regions of the country.

It should be emphasized also that our office must be much more precise in speaking for a regulatory agency than a public relations firm representing some campaign, for example, in driver education or community fund-raising.

We also need people at Headquarters who view the regional public awareness operations and State public information officers as equals and as allies in our efforts to implement national initiatives. We need people who can speak and write clearly. We need people who can design innovative forums for the dissemination of information. The Office of Public Awareness must serve as a *facilitator* between the public and the Agency.

What are some of the specific tools that your office uses in carrying out its mission?

The EPA Journal is a tool that reaches an estimated 100,000 readers before it goes into selected reprint. Each issue addresses the environment as it relates to a specific topic or audience. We produce materials which make the essence of complex technical programs and data accessible to the lay public. We award contracts and grants for information and citizen participation activities. We produce public service announcements. We have prepared—and update twice a year—guides to specific publics so that EPA officials can more knowledgeably provide EPA's information to affected citizens. We provide support to the regions. Through our program plans, we anticipate the need for various information tools as they relate to constituencies: publications, audio-visual materials, information for the media, and formal public participation documents.

In reference to the ethics issue, could you expand a little on your answer on the distinction between propaganda and public awareness?

There are constant ethical questions facing information officers. We must always be aware of the fine line between empowering citizens so that they in turn can monitor the performance of government, and issuing propaganda that has a hidden agenda. We are not trying to "sell" the agency as one sells a product in the competitive marketplace. The competition in government is among competing national priorities. Our task is to provide the information citizens need to make intelligent choices concerning these national priorities. The challenge in an evolving, open-ended society such as ours is how national priorities can be met and reconciled. Information is an important factor in this process. Government actions have a lot to do with values: how people value their lives, see their roles, and determine their life styles. The use of information tools by government must always be governed by an awareness that they are meant to serve citizens in a democratic society.

Looking at ethics from a slightly different vantage point, do you see any hopeful signs that society is beginning to act on environmental principles or on environmental ethics?

No question, although I think people have been put in a very difficult position. They have been put in the middle of too many strident rhetorical confrontations over the last twenty years. Confrontation politics is a legitimate element in a democracy, but when it is prolonged and so intense, both sides lose credibility. The continuous barrage of conflicting "information" and media overload has contributed significantly to a national inertia and a sense that all issues are too complex. In the absence of serious efforts to clarify issues, the claims of the "experts" on both sides are overwhelming. Many citizens don't feel they have the expertise to choose, and therefore decide not to respond at all. This situation has certainly affected the public in its attempt to adopt an environmental ethic.

I think one of the main supports of an environmental ethic is that many times it does not matter what the experts say, a person has enough expertise to know when one can't breathe, or when the water tastes bad, or when children are getting sick from some kind of toxic chemical or pesticide. Many times, the expertise is within oneself.

How does the question of environmental ethics apply to the energy-environment issue?

Regardless of pronouncements of having to sacrifice environmental standards to energy, most Americans reject having to choose between being able to breathe and being able to work. I think most people are saying yes, we do want energy, and yes, we want to be able to breathe and drink water and swim and eat safe foods and have recreation out of doors. Environment and energy shouldn't be an either/or agenda. What are the ethics of borrowing against our children's futures for the sake of energy which we use in a very wasteful fashion? We had better be well informed before acting.

Rather than seeing environment and energy as competitive, we should call on a resource which is abundant in Americans—their ingenuity. Americans do remarkably well when innovation is needed. EPA should take the lead in getting people to think about their own potential in marrying environmental solutions to energy savings.

There is a real need for a national conservation ethic which embodies such concepts as energy saving, using less water and other natural resources, recycling, and harboring lands for food production and recreation. Adopting a conservation ethic could help us as a society to sort out our "needs" from our "wants." For the things we need—breathable air, adequate water supplies and water quality, and productive land—ultimately give rise to our economic capabilities—the capacity to meet our "wants." The needs must be met first. This assessment is part of developing a conservation ethic—an ethic which includes a conservation commitment and makes good economic sense.

Do you think the drive for synthetic fuels is going to cripple the environmental cause?

No, but our national orientation is important. The decade of the 80's should be viewed as a very exciting decade, supportive to widespread technological innovation, a "frontier" decade in terms of synthesizing knowledge in new and different ways. The challenge of the 80's is the challenge of harmonizing environmental, economic, and energy agendas. Meeting this challenge could provide a much-needed impetus for fundamental changes in both corporate and government institutions.

To contemplate the crippling of the environmental cause is to create the wrong focus, because it presumes a win/lose orientation rather than a win/win orientation. A win/win orientation is one of accommodation, synthesis, and innovation—a critical orientation, if we are to solve, in the public's interest, key environmental, energy, and economic problems. I don't think the push for energy—or for anything else—can cripple the environmental movement. The environmental movement is too well integrated with broad social values. Many who would never perceive themselves as environmentalists want to be able to fish, to swim, to breathe easily, to see a sunset or a skyline clearly, to eat safe foods, to be able to sleep in quiet, or to drink a glass of water safely. Can dedication to these fundamental elements of living be crippled? I think not, and that is why the environmental movement cannot be crippled.

What environmental issues most urgently need public understanding now?

Hazardous waste handling and the negative effects of toxic substances are key areas of concern at both the local and national levels. A related issue is drinking water quality. It could become an increasing problem in our society, because water is so vulnerable to municipal waste disposal, industrial activities, food production, and energy development. Both the supply and quality of water are going to become an increasing concern.

How do we deal as a Nation with achieving compliance with air standards over the next decade is another critical matter in terms of public health and other hazards of global consequence, such as acid rain.

Do you think the environmental movement has changed over the past decade?

Environmental organizations have changed and I think they have changed in a positive way. A decade ago the primary tactic was confrontation politics, an important tactic to bring the environmental agenda into the mainstream of national priorities. But you can only yell so long, then you've got to take the next step and help solve problems.

Environmental groups are becoming much more sophisticated about problem solving. They are actively increasing their knowledge about technologies, health, energy, economics, science, and law—a necessity if the environmental leadership is going to serve as facilitators for environmental solutions in the 80's.

Do you think the operation of the Public Awareness Office benefits citizens?

It is dedicated to that. Our success, however, relates to the level of responsiveness from within the Agency, the professionalism of the individuals in the Office of Public Awareness, and the resources available. I think the way we are organized is the right prescription for success. We now operate within a coordinated framework of programs, publics, regions, and States.

The bottom line is that we are public servants, supported by public funds. Our absolute priority is to serve the public. That is our paramount obligation. In serving the public well, the Office of Public Awareness will, in the long run, be serving the Agency best. □

This article is one of a continuing series of interviews with top EPA managers.

REGION 1

Noise Abatement Grants

Region 1 has awarded grants to the State of New Hampshire and two Massachusetts communities for noise abatement projects. New Hampshire received $25,000 for a program to develop greater uniformity in community noise control efforts and to assist those communities in the State that are facing increased noise problems due to recent development. The Massachusetts communities of Brookline and Newton have been awarded a combined grant of $12,000 to develop and implement techniques for noise control in the communities. Included under both grants will be the training of local officials in noise monitoring and control efforts. These grants are the first in New England awarded under the Quiet Communities Act of 1978.

Asbestos Violations

Region 1 has issued enforcement orders for asbestos-handling violations to three companies involved in the demolition and renovation of buildings in Somerville, Mass. The companies cited were East Bay Development Corp. and the Cory Wrecking Co., both of Massachusetts, and the Cleveland Wrecking Co. of Pennsylvania. The orders require the companies to submit written notices to EPA before they begin any future work involving asbestos and to comply with the EPA asbestos handling procedures.

IRLG Seminar

Over 400 industry and health representatives attended a lead seminar hosted by the Interagency Regulatory Liaison Group (IRLG). The IRLG is comprised of five Federal regulatory agencies—EPA, the Occupational Safety and Health Administration, the Food and Drug Administration, the Consumer Product Safety Commission, and the Food Safety and Quality Service. The seminar gave attendees an overview of lead standards established by the IRLG agencies. The seminar was co-sponsored by the Associated Industries of Massachusetts. A similar session dealing with asbestos is planned for the spring.

REGION 2

PCB Fines

The General Electric Company was fined $14,300 for violations of PCB regulations at its facilities in Fort Edward and Hudson Falls, N.Y. This is the second action brought by EPA against GE. In October of 1978, GE agreed to pay $25,000 for burning PCB's at its Waterford, N.Y. plant, which was not approved for disposal at the time. The recent fine brings to $75,300 the total of penalties collected in Region 2 under the regulations.

Water Grants

Region 2 has awarded nearly $130 million in grants to New York City for three water projects. The grants, which are for electrical, mechanical, and structural equipment, are the latest in a series of Federal allocations to the City.

Construction Grants

Under an agreement between Region 2 and the State of New Jersey, the State's Department of Environmental Protection will assume management of its multi-million dollar wastewater treatment works construction program. The agreement provides for a six step takeover by the State and should insure sufficient time to acquire and train new employees for the program. During the initial phase, the State will be responsible for administrative review procedures and managing a controlled information system. Afterward, the State will have greater involvement and control over the development of programs, operations, and related grant activities.

The agreement was made possible by a 1977 Amendment to the Federal Clean Water Act giving States up to 2 percent of their annual Federal wastewater funds to manage the program.

REGION 3

State/EPA Agreement Signed

Region 3 and the State of West Virginia have signed a State/EPA Agreement designed to streamline the management and reduce the costs of environmental cleanup. The agreement was signed by Governor Jay Rockefeller and EPA Regional Administrator Jack J. Schramm. Schramm said the Agreement, "demonstrates a joint commitment to more effectively manage our environmental programs." The agreement will channel $4 million in Federal grants to West Virginia The grants are made under provisions of the Resource Conservation and Recovery Act, the Safe Drinking Water Act, and the Clean Water Act. Additional Federal programs will be included under such arrangements in future years.

Resource Recovery Grant Made to D.C.

Region 3 has awarded its first resource recovery grant to the District of Columbia to conduct a feasibility study for solid waste recycling and energy recovery. The $102,628 grant was made as part of President Carter's urban policy. It will provide funds to study the feasibility of several recycling and energy recovery technologies. Following these studies, further grants will be made for the construction, planning, and environmental assessment of a resource recovery facility for the District.

Region 3 Fights Spill

Personnel from Region 3's Environmental Emergency Branch are continuing to oversee the cleanup of an oil and chemical spill in the Susquehanna River near Pittston, Pa. The waste was first spotted pouring into the river in July from a coal mine drainage tunnel. Investigation has revealed that the wastes come from illegal dumping into mine boreholes. As much as 300,000 to 500,000 gallons of waste per month may have been put into the abandoned mines by illegal interstate dumpers. The waste contains high levels of dichlorobenzene, a known carcinogen.

Efforts by EPA personnel removed 95 percent of the waste before it could enter the river. No one knows how much waste remains in the miles of interconnected mine shafts. To prevent further contamination of the Susquehanna, the tunnel will be sealed and mine drainage will be piped through a treatment plant. Cleanup costs have already run over half a million dollars.

REGION 4

Dumper Sentenced

A Louisville businessman is appealing the stiff sentence he received in a Federal pollution case. Donald E. Distler, former president of Kentucky Liquid Recycling Incorporated, of New Albany, Indiana, was sentenced to two years in prison and fined $50,000 for dumping toxic chemicals into Louisville's sewers in 1977. The chemical dumping caused a three-month shutdown of the city's principal wastewater treatment plant. Contamination was so heavy it took the Metropolitan Sewer District until August of this year to clean out the sewer lines. Total clean-up costs were estimated at $2.25 million. In handing down the sentence, Federal District Judge Charles Allen said, "No defendant to come before this court had exhibited a more callous and flagrant disregard for the safety of vast numbers of citizens of this area."

Biomonitoring Conference

Region 5 recently hosted a conference on biomonitoring; the use of fish, plants, and insects, to detect the presence of minute quantities of toxic wastes in the environment. Midwest industrial representatives attended the seminar, which was held in Chicago. Region 5 Administrator John McGuire addressed the meeting, followed by twelve speakers from EPA facilities across the country. The presentations outlined various biomonitoring tests that can be used for effluents, sediments, and other aspects of determining water quality. The seminar closed with a tour of EPA's biomonitoring facilities at the Central Regional Laboratory in Chicago.

Administrative Order Issued to City of Fort Worth

The region has issued an administrative order to the City of Fort Worth because of continuing problems with operation and maintenance of the Village Creek Treatment Plant. The order requires operators to comply with effluent limitations; to treat as much water as possible when it rains, rather than resorting to unscheduled by-passes; and to clean up operation and maintenance procedures that contribute to odor problems. Operators must develop a schedule, to be in operation by January 1, 1980, for reducing the pollutants discharged into the Trinity River.

Adjudicatory Hearing Asked

The Georgia-Pacific Company has requested an adjudicatory hearing on a proposed National Pollutant Discharge Elimination System permit for the firm's pulp and paper mill at Crossett, Ark. At issue is whether Coffee Creek, the receiving stream, should be classed as a waterway of the United States. EPA and the State are discussing water quality standards changes for the creek that would directly affect the Georgia-Pacific permit.

EPA Goes to the State Fair

At the State Fair of Texas EPA's Region 6 joined 26 other Federal agencies in a government exhibition. Featured in the EPA booth was a slide-sound presentation on the massive inter-agency governmental response effort to an oil spill. Slides showed the control, containment, and cleanup of oil impact along the U.S. Gulf Coast, from the Ixtoc-1 well blowout in Mexico's Bay of Campeche.

Graduation Exercises Held

Betti Harris, Public Participation Coordinator, Office of External Affairs, spoke at graduation exercises held recently at the Water & Wastewater Technical School in Neosho, Miss. Ms. Harris represented Dr. Kay Q. Camin, Region 7 Administrator, at the ceremonies. Twenty-one students received diplomas certifying them as skilled Wastewater Treatment Plant Operators, following a year of intensive study at the facility where students from all over the world are trained in this highly technical field.

Highlight of the ceremony was the news that EPA had approved $500,000 to extend the capabilities of the Missouri State Environmental Training Center which is located on campus. The new funds will be used to equip a laboratory in the new building, construct an oxidation ditch and associated building, establish a pump center in one of the existing buildings, to face with brick another building on campus, and to establish a cross-connection center. The new grant covers all the costs of the projects.

Noise Center Set

Noise control grants under cooperative agreements totaling $178,598 were recently awarded to the States of Colorado, North Dakota, and Utah, the University of Colorado, and the City of Thornton, Colo. Receiving the largest grant, $90,000, is the University of Colorado for the establishment of a regional noise Technical Assistance Center which will supplement Region 8's efforts in providing technical assistance to State and local officials throughout the Region. Funding is made possible under the Quiet Communities Act of 1978. Region 8 s Noise Control Program has received a $63,000 grant from the U.S. Department of Energy. This first-of-its-kind grant will help pioneer development of a solar powered noise monitoring system to demonstrate the applicability of such a power system in quiet areas.

Noise Control Plans

Region 9 is assisting the City of Torrance, Calif. in developing a noise control program at its municipal airport. The airport, which is used by thousands of private pilots, has established an Airport Noise Abatement Center to teach pilots how to minimize the noise impact of their aircraft. The Center operates a noise monitoring system, which is unusual for a non-commercial airport, and which includes the use of instruments that identify excessively-noisy aircraft. Region 9 offered funds to the State of California, National City, and the University of California at Berkeley to further develop noise control programs.

Under the agreement, the State of California will receive $28,000 to develop a technical assistance program and train approximately 500 local law enforcement agency personnel in vehicle noise control and enforcement.

National City, Calif., located near San Diego, will receive $12,000 to expand its existing program. The expansion includes finalizing a noise control ordinance, implementing it, and publicizing the start-up of enforcement procedures.

The University of California at Berkeley, with its $90,000, will establish a Regional Technical Assistance Center and train State and local noise control officials to identify and quantify problems, analyze abatement and control strategies, and draft appropriate legislation.

PCB Problems

Region 10 and the Food and Drug Administration are working together to investigate the contamination of thousands of chickens and eggs in Franklin, Idaho. Also, more than a million pounds of PCB-contaminated tallow has been found in the Seattle-Tacoma area. Since much of the inedible lard-like material contained PCB's at levels of more than 50 parts per million, provisions of the Toxic Substances Control Act came into play, requiring EPA to insure that the tallow not be re-used and that it is disposed of in compliance with TSCA regulations. A Montana packing plant, where a spill of PCB transformer oil was discovered, is believed to be the source of the problem.

Water Ills

Region 10 inspection teams surveying drinking water systems in Oregon have discovered bacteria in excess of national standards in three systems. Residents of Sumner and Eddyville and people served by the Northwoods Water District have been advised to boil their water before using it.

Update

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

AIR

Air Rules

As a result of a Federal court decision, the EPA is proposing air pollution regulations that will significantly affect new and modified pollution sources planning to construct in either dirty or clean air sections of the country.

A major impact of the proposed changes is that fewer new sources will be subject to Agency regulations, according to EPA. On the other hand, the proposed rules increase the number of pollutants that must be monitored and for which best available control technology must be applied.

In June, 1978, EPA issued prevention of significant deterioration regulations for new and modified sources locating in areas of the country where air quality is better than national atmospheric air quality standards. Industry and environmental groups sued EPA over these rules and on June 18, 1979, the U.S. Court of Appeals for the District of Columbia issued a ruling upholding some of the requirements, but overturning others.

The proposals involve the review of new sources prior to construction, or existing sources prior to modification, to make sure that when they are built their emissions won't significantly deteriorate clean air or make dirty air worse.

ENFORCEMENT

Tampering Cases

The Department of Justice has filed civil complaints in Federal District Court against six automobile dealerships and three independent repair facilities for tampering with the emission controls on cars.

The complaints cite violations of the Clean Air Act and ask that a total of $67,500 in penalties be levied against the violators.

The tampering charges involve alteration of the air pollution controls on new cars before they were sold and on other cars brought to dealers and repair facilities for maintenance.

EPA said violations occurred in the areas of Boston, Philadelphia, Baltimore, and Detroit. The majority of the cases resulted from consumer complaints to EPA.

Under the Clean Air Act, new car dealers can be fined up to $10,000 for each tampered car. Repair facility owners, commercial mechanics, and fleet operators are subject to a penalty of $2,500 for each violation.

Requests Refused

EPA Administrator Douglas M. Costle has turned down the majority of requests by three U.S. and three foreign automakers for a two-year delay in the tougher 1981 auto emission standard for carbon monoxide (CO).

The Agency granted a "waiver" or postponement, however, for certain company models, giving them until 1983 to achieve the new clean-up level. EPA granted this relief because effective technology for meeting the standard does not exist for certain models and because the public health would not be significantly harmed by the delay.

The current CO standard is 7 grams per mile (gpm). The 1981 standard is 3.4 gpm. The current standard will continue to apply to those 1981 and 1982 models given waivers.

Gasoline Standard

Final rules extending the compliance deadline for reducing the amount of lead in gasoline have been issued by the EPA. Originally, refiners were to meet the 0.5 grams per gallon (gpg) standard in October this year. Under the new rules, refiners may produce gasoline at a lead content of 0.8 gpg until October, 1980. This change implements the one year delay announced by President Carter in his April 5 energy message.

During the one year period, refiners who elect to take advantage of the relaxed standard will either have to increase their production of unleaded gasoline by six percentage points or produce more than 45 percent unleaded gasoline. Refiners then must meet the original 0.5 gpg standard by the new deadline.

Because the standard is measured quarterly averaged over all grades of gasoline produced at a refinery, both leaded and unleaded gas will remain available to consumers. EPA estimates the one-year extension will allow production of up to 340,000 barrels of gasoline per day that could otherwise not be produced. Approximately 50 percent of all gas produced by October, 1980, will be unleaded.

NOISE

Labeling Program

A program designed to provide consumers with information about the noise characteristics of new products through a labeling system has been established by the EPA.

A new regulation will require manufacturers to affix labels to products that produce noise capable of adversely affecting public health or welfare and products that are sold to reduce noise.

The labels on noise-emitting products will provide the consumer with a Noise Rating. This will be a number showing the number of decibels of noise the product emits. The label also will provide the range in decibels of noise emitted by the same products made by other manufacturers. The lower the rating the quieter the product will be.

The labels for noise-reducing products will bear a Noise Reduction Rating. This will be a number giving a measure of the product's effectiveness in reducing noise. The label will also provide the range of noise reduction ratings for competing products. The higher the rating the more effective the product should be. The first products selected for ratings are hearing protectors.

PESTICIDES

Death Daisy

The shortage of a natural insecticide used around the home and extracted from a flower sometimes called the "death daisy" has prompted the EPA to speed up approval of synthetic substitutes.

The natural bug-killing substance, called pyrethrum, is obtained from certain chrysanthemum flowers grown mainly in Kenya and other African countries, and to a lesser extent in South America and Japan. But unfavorable African weather conditions and the greater profitability of other crops grown in these countries, such as coffee, have decreased worldwide production of the flowers and led to declining exports to the U.S.

This situation has threatened to reduce supplies in this country of several thousand EPA-registered insecticides containing pyrethrum. These are commonly used to control cockroaches and other insects in the home, to kill fleas and ticks on pets, to protect food in storage, and in certain agricultural applications.

However, to ensure continued availability of these products to consumers and to prevent market disruptions, EPA recently hastened the approval of manmade substitutes for pyrethrum, called pyrethroids.

The Agency also is willing to let farmers make emergency use of synthetic pyrethroids, such as resmethrin and allethrin, to control flies in poultry houses and dairy barns. None of the insecticides containing pyrethroids may be sprayed in areas where food is exposed because no tolerance or safe residue levels for food have yet been set.

Herbicide Action

EPA has decided to allow the continued use of trifluralin, a widely used herbicide sold under the trade name Treflan, if its producers agree to maintain production standards that minimize its contamination with nitrosamines, some of which are potential cancer causing agents.

The Agency's decision follows an intensive review of the risks and benefits associated with the drug, which is used in controlling many kinds of weeds in cotton, soybeans, fruit and vegetables, and other crops. Nurseries and home gardeners also use the herbicide in growing ornamental trees and shrubs, some flowers, and fruit and nut trees.

This decision is not final, however. It still must be commented on by the Department of Agriculture, environmentalists, industry, and other interested parties, as well as the Agency's scientific advisory panel. After receiving all comment, the Agency will reassess the situation and make a final determination.

Benomyl Allowed

EPA has decided to allow growers to continue to use the fungicide benomyl on condition that sprayers and others handling relatively large quantities of the fungicide wear cloth face masks and take other precautions.

EPA said that before deciding whether to give the fungicide full approval, it needed the following additional information from the manufacturer, E. I. DuPont De Nemours and Company:

- Data from another study on benomyl's potential to cause point mutations (changes in cellular hereditary units).
- Data from the monitoring of waters where the fungicide is used on rice fields to make certain it is not killing fish and other water animals.

DuPont is the sole manufacturer of benomyl (brand name: Benlate). Growers use the product to control plant rot and molds on rice, oranges, apples, pears, peaches, cherries, peanuts, tomatoes, beans, and other vegetables.

Benomyl is used also for home lawns, elm trees (to control Dutch elm disease), and gardens, but in such small amounts that the restrictions regarding self-protection will not apply to these uses.

RESEARCH AND DEVELOPMENT

New Strategies

EPA is awarding $3 million to 15 universities to develop new strategies to control pests that damage the major crops of cotton, soybeans, apples, and alfalfa.

The techniques the universities will be developing are known as Integrated Pest Management (IPM). IPM uses a systems approach to reduce pest damages to tolerable levels through a combination of control practices, including natural predators and parasites, genetically resistant plants, modified farming practices, and chemical pesticides.

The 15 university consortium research project on IPM will be administered through the Texas A&M Research Foundation in College Station, Texas, under the direction of Dr. P. L. Adkisson and R. E. Frisbie, EPA announced.

This program also launches a new cooperative effort with the U.S. Department of Agriculture, Science and Education Administration (SEA). Using this project as a prototype, EPA and SEA are developing a unified, interagency IPM research and implementation program. Beginning with the 1981 budget, EPA and SEA will present to Congress a coordinated IPM program designed to improve the environment and increase the output and profit of the Nation's farmers.

SOLID WASTE

Waste Streams

EPA has proposed adding 45 industrial waste streams to the list of 168 waste streams proposed last year for control as hazardous wastes under Federal law. An industrial waste stream is the total wastes produced by a type of industry. In addition, EPA is proposing the inclusion of 33 known and potential cancer-causing substances to this list.

Over half of the newly-proposed hazardous wastes streams are from organic chemical production processes and the remainder are from other industrial processes including those from iron foundries, aluminum smelting, photographic processing, newspaper printing presses, and from the manufacture of coated fabrics, paperboard boxes, and electrical equipment.

Under regulations proposed last year and expected to be in effect in the mid-1980's, the Federal government or States would track the movement of hazardous wastes and would approve all disposal facilities. The hazardous waste regulations were proposed under the Resource Conservation and Recovery Act of 1976.

Open Dumps

The EPA has published a standard which will lead to the identification and elimination of open dumps which can pose hazards to public health and the environment.

"Criteria for Classification of Solid Waste Disposal Facilities and Practices" has been issued for use in evaluating the environmental and health aspects of solid waste disposal activities. Development of the regulation involved extensive participation of the public, State and local government, industry, and environmental groups.

State and local governments will use this standard to evaluate facilities, identifying for closure or upgrading those which are open dumps. The standard will also help assure that new disposal facilities will be sited and designed to protect public health and the environment. The Resource Conservation and Recovery Act of 1976 prohibits open dumping of solid waste.

TOXICS

Rodent Poisons

The Rohm and Haas Company of Philadelphia has voluntarily requested EPA to cancel registration of its rat and mouse products in the United States. These toxicants contain the active ingredient Vacor. The company also told EPA that it had voluntarily stopped sale of these products worldwide and had instituted a recall from all distributors. The EPA said that it will cancel the four registrations in this country.

The Agency was in the process of making a toxicological review of all Vacor products after concerns were expressed by the California Department of Food and Agriculture. Their concerns arose because of the potential toxic effects of these products and their packaging, which appealed to children.

Since its initial marketing in 1975, there have been several documented human deaths from eating Vacor, mainly in South Korea. While marketing of Vacor in California has not resulted in cases where children exposed to Vacor developed significant signs of poisoning, California officials reported nine cases of adult poisoning, two resulting in death and one a suicide. It is now unlawful to sell Vacor products in California. In other states, products may be sold until current supplies run out.

WATER

Municipal Cleanup

EPA has adopted a National Municipal Policy and Strategy to deal with what the Agency says is the alarming failure of so many municipalities to achieve compliance with applicable water quality standards. The strategy was announced by Eckardt C. Beck, the White House nominee for Assistant Administrator, EPA Office of Water and Waste Management.

First, Beck said all major treatment plants will be classified according to several criteria, including variables such as funding eligibility and water quality impact. Second, noncomplying plants will be put on specific schedules for meeting applicable standards. Third, the final cleanup schedules will be closely coordinated with the availability of construction grant monies. Funding will be allocated first to projects complying with the law, to the extent legally possible.

Clarification

Because of an editing change made by EPA noise officials during program review, the article "Curbing Construction Noise" in the October EPA Journal contained a misstatement. The sentence about back-up noise devices on vehicles stating "The necessarily high level of the warning signal, however, often disturbs residents nearby." should have read, "The necessarily high level of the warning signal actually violates Federal law."

Winter of the Monarchs

Millions of monarch butterflies are now tightly clustered on towering trees in the Sierra Madre mountains of Mexico where they will spend the winter in a state of semi-dormancy before instinct will command them north in the spring to splash their gold and black beauty across the Eastern United States.

The flight of these fragile monarchs to Mexico and their return to this country is one of the great natural wonders of the world because they are able to migrate thousands of miles and find their way to a winter resting place they never visited before.

Unlike young birds, which can accompany their parents and other older birds on migration trips, the monarchs are guided only by an inherited genetic pattern on their astounding voyages.

For many years the winter resting place of the monarchs from the eastern United States was a mystery to scientists.

To help resolve the puzzle, Dr. Fred A. Urquhart, a Canadian zoologist, started a program of tagging butterflies so that their travels could be understood.

With the help of many volunteers thousands of monarchs have been caught in nets. Tiny adhesive labels were applied to their wings. The tags carried identification numbers and letters and a mailing address for Dr. Urquhart's office in Toronto.

The tagged monarchs sent to Dr. Urquhart included one killed by a California golfer who was about to drive his teed-up ball when a monarch alighted on it. Although the golfer could not brake his swing, he sent the remains to Dr. Urquhart.

The data from the tagging program led Dr. Urquhart to believe that the monarchs were spending the winter somewhere in Mexico.

A lepidopterist, Kenneth Brugger, who was working in Mexico, heard about Dr. Urquhart's request for help in finding the wintering site. With encouragement from Dr. Urquhart, Brugger finally found on Jan. 9, 1975, a mountain forest site where millions of monarchs were clustered.

In 1976, Dr. Urquhart climaxed a four-decade study of the monarchs when he visited the wintering location.

"I had waited decades for this moment," Dr. Urquhart wrote in the National Geographic magazine. "What a glorious, incredible sight."

The monarchs at these Mexican mountain sites gather in such enormous numbers that sometimes tree branches crack under their weight. The winter temperatures at these locations hover around freezing. Since the monarchs are inactivated by the chill they burn up almost none of the fat they will need on their return journey to the Eastern United States.

Monarchs in the United States west of the Rocky Mountains migrate to winter roosting sites with similar climatic conditions in California. One of these sites is Pacific Grove, which has passed an ordinance forbidding anyone to interfere with the monarchs' roosting site, a major tourist attraction.

The monarchs, after flying north in the spring, lay pin-head size eggs on milkweed plants. One of the remarkable things about this insect is that the first generation of new butterflies lives a little more than a month and does not migrate south. But these butterflies produce descendants which at the end of summer will fly south.

Sometimes the monarch eggs are laid in August and in the five-week period when the egg hatches and the emerging caterpillar metamorphoses into a butterfly, the weather can become too cold for a successful voyage south. One monarch admirer who had been observing the metamorphosis of a monarch on a milkweed plant kept in a vase at her home became concerned about the fate of the creature because of the rapid approach of winter.

She drove to the airport and persuaded a stewardess on a west coast-bound flight to carry the monarch in a small container without charge. When the plane landed in a chilly rain at San Francisco, the thoughtful stewardess took the traveling monarch to a friend who was a stewardess on a plane bound for the Monterey Peninsula, some 80 miles further south, where this butterfly was finally released into warm sunshine.

One of the protections monarchs have is that while in the caterpillar stage they absorb strong natural chemicals from feeding on milkweed plants. These chemicals carry over into the creature's butterfly adulthood and often sicken the birds or animals which eat a monarch, discouraging further predation on these insects.

Dr. Lincoln P. Brower, a biology professor at Amherst College and an authority on monarchs, told EPA Journal that he is concerned about the fate of the monarch's wintering sites.

He said that in Mexico big trees are being cut on the fringes of some of the areas where these insects rest. He added that in southern California new developments in Santa Cruz and elsewhere are threatening some of the "butterfly" trees.

"The migration of the monarchs is unique," he stated. "The grandeur of this migration is one of the great natural wonders of the world and could be lost."

He noted that Mexico where the majority of monarchs spend the winter could reap economic benefits from tourist visits if the butterfly sites were properly protected.

Discussing the future of the monarchs, Dr. Brower conceded some people might take the attitude that the fate of these butterflies is of little importance.

"Yes," he commented, "and you could also burn up the Louvre in Paris and destroy the Mona Lisa."—C.D.P.

Opposite: Clusters of migrating monarchs enshroud the tree that supports them in Mexican Mountains. Photo by George Lepp.

Back cover: Wind sculpts the snow at the base of gnarled trees.

United States
Environmental Protection
Agency
Washington D.C. 20460

Official Business
Penalty for Private Use $300

Postage and
Fees Paid
Environmental
Protection
Agency
EPA 335

U.S.MAIL

Third Class

Return this page if you do not wish to receive this publication ( ), or if a change of address is needed ( ) (Change including zip code