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AUTHOR Caldwell, Lynton K.
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ABSTRACT

This essay presents an argument for policies responsive to global environmental needs by examining the causes and consequences of six critical environmental issues, and then offering specific U.S. policy recommendations. Following an explanation of the global nature of environmental problems, a summary of the salient facts regarding the following six issues is provided: quality of the atmosphere, depletion of fresh water, loss of soil productivity, loss of genetic diversity, tropical deforestation, and toxic contamination and hazardous materials. In each of these cases, human behavior has disrupted the natural biogeochemical cycles of the biosphere, thereby generating chain reactions that multiply the problems confronting people and their governments. It is argued that regardless of the policy positions of the government on international environmental issues, U.S. citizens are involved in all of the aforementioned global issues and many more. The essay urges the United States to return to a position of leadership in global environmental matters, based on the conclusion that the cost of regaining credibility and leadership in international environmental affairs could be much less than the ultimate failure to do so. A glossary of acronyms and a list of Stanley Foundation papers and activities are also included in the document. (LH)

About the Essay

Since the mid-1960s a worldwide environmental movement has emerged and apprehensions have been aroused concerning the serious maladjustments between people and their environment. The weight of evidence has demonstrably grown toward recognition that the world is confronted by a crisis of global proportions.

In Occasional Paper 35, Dr. Lynton Caldwell forcefully argues for policies responsive to global environmental needs. He examines six critical environmental issues, their causes and consequences, and then offers specific US policy recommendations.

Dr. Caldwell calls on the United States to return to a position of leadership in global environmental matters. "The United States cannot escape sharing in the consequences of environmental disasters that fall on the rest of the world. To understand this is also to understand why vigorous positive leadership in international environmental policy is in the national interest as well as in the interest of people everywhere."

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US Interests and the Global Environment

Lynton K. Caldwell

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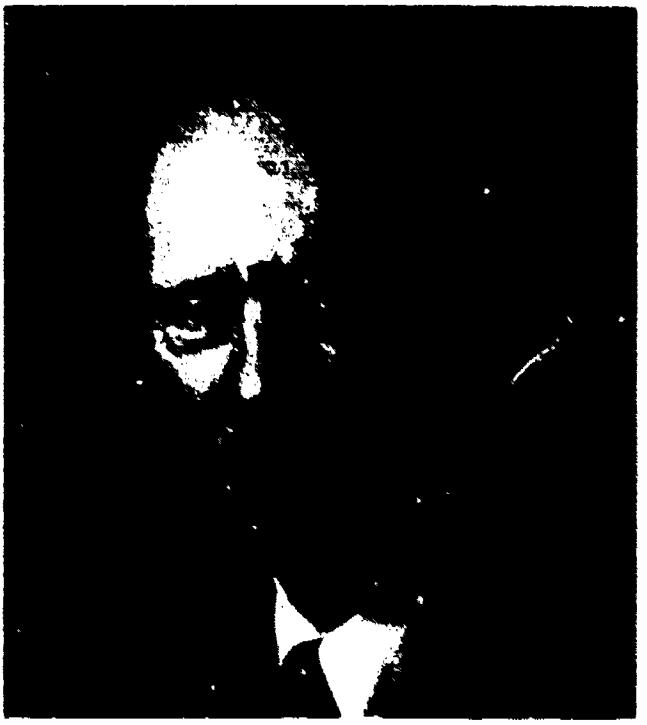

Lynton Keith Caldwell, Director of the Advanced Studies in Science, Technology, and Public Policy Program, is the Arthur F. Bentley Professor of Political Science and Professor of Public and Environmental Affairs at Indiana University. He has served as a consultant to the United States Senate; the Congressional Research Service; the Departments of State, Commerce, and the Interior; the National Institutes of Health; and the Office of Technology Assessment. Lynton Caldwell has also been a staff member and consultant to the United Nations and UNESCO.

Dr. Caldwell has written and lectured extensively on environmental issues. His most recent books are *Science and the National Environmental Policy Act: Redirecting Policy Through Procedure* (1982) and *International Environmental Policy: Emergence and Dimensions* (1984).

US Interests and the Global Environment

Since the mid-1960s public awareness of serious maladjustments between people and their environment has been growing. A worldwide environmental movement has emerged and apprehensions have been aroused—reinforced by studies, conferences, and reports which investigate threatening environmental developments, analyze their causes, and propose remedial action. Scientists have taken leading roles in these inquiries, many of which have been sponsored by governments as well as by nongovernmental and international organizations. This new environmental awareness has posed difficult policy problems. Scientific evidence and public concern have caused governments to address problems for which they have had little previous experience and for which legal and technical solutions have not been readily available. President John F. Kennedy proposed a new course for US policy when he wrote in the introduction to Stewart Udall's book *The Quiet Crisis* (1963):

> The crisis may be quiet, but it is urgent.... we must expand the concept of conservation to meet the imperious problems of the new age. We must develop new instruments of foresight and protection and nurture in order to recover the relationship between man and nature and to make sure that the national estate we pass on to our multiplying descendants is green and flourishing.

The perception of an environmental crisis that is global in scope has not been universally shared; the notion of limits to mankind's ability to populate the earth and to exploit the resources of its environment is contrary to general and long-standing assumptions. Critics of the environmental movement have declared its assumptions to be unfounded and its rhetoric alarmist, arguing instead that new resources are being discovered and that technology enlarges human capabilities. In their view the global crisis exists largely in the minds of misguided people. Within a narrow and arbitrary logic this rejection of global environmentalism may appear to make sense, but when compared with the growing findings of the sciences regarding the state of planet Earth, these plausible arguments become half-truths. While the critics are entitled to a respectful hearing, their premises need to be made explicit and their selection and treatment of factual evidence made

clear. Whether there is indeed an environmental crisis is better ascertained from the realities of the living world than from the tendentious use of logic and statistics.

The weight of evidence and opinion since the early 1970s has demonstrably grown toward recognition that the world is confronted by an environmental crisis of global proportions. Beginning in the technoscientifically advanced countries and among better informed individuals, awareness of environmental problems has spread throughout the world, gaining an unforseen strength in many developing or Third World countries. The mutual need of nations for cooperation in environmental protection measures has been affirmed through new international arrangements, organizations, and agreements backed by national statutory law. New nongovernmental environmental organizations have emerged in nearly every country where voluntary citizen action is permitted. In the UN General Assembly and in the Governing Council of the United Nations Environment Programme (UNEP), rhetoric often exceeds national commitment to action; nonetheless, rhetorical commitment is a necessary prerequisite to action—the word usually must precede the deed.

The implementation of this new dimension in international affairs has not proceeded smoothly or uniformly in the years since the UN Conference on the Human Environment in June 1972 confirmed the legitimacy and importance of the global environment as an issue for international consideration. Much has been accomplished within a relatively short time, and yet as more has been learned about the human impact upon the earth, the more critical the circumstances appear to be. Collectively the nations have the knowledge and technical capability needed to overcome their environmental problems. The crisis is one of choice—of timely and appropriate action to be taken before environmental losses become irretrievable or environmental damage irremediable. Because this crisis occurs within a world of independent yet interdependent nations, the role played by the stronger among them inevitably impacts upon the effectiveness of the whole. Thus the position taken by the United States in world environmental affairs assumes an importance transcending its political boundaries.

As in other countries, there is a diversity of opinion in the United States regarding the relationship of the nation to the world environment. However, there are US interests in this environment that exist apart from opinion. It is important that

US citizens, and other peoples as well, understand these interests because the international cooperation essential to coping with the critical environmental problems now confronting the world cannot be effective without US participation and support. The great scientific, technological, and economic resources of the United States—along with a record of past leadership in international environmental policy—place this nation in a unique position in international environmental affairs. There are many practical reasons why US interests require the government of the United States to play a constructive and leading role among nations in shaping sound and farsighted policies for the protection of the global environment.

What Makes the Issues Global?

In developing its policy position for the 1984 UN Conference on Population, the US delegation queried whether there was a global population crisis or merely problems of overly rapid population growth in particular countries. The latter position was adopted on the reasoning that not all countries were overpopulated and in some birth rates were falling. A similar point of view was taken by a Soviet delegate to an international environmental meeting: oceanic pollution, he said, was not a global or international problem but a responsibility for each country in which pollution originated. In contrast, reports from the International Council of Scientific Unions, the International Union for Conservation of Nature and Natural Resources (IUCN), and the UNEP have identified a series of interrelated issues as global in character including excessive growth of human population, air pollution, and overexploitation of the living resources of the seas.

Population growth is not a problem in every country, some have achieved population stability or in a few cases experienced decline. However, high rates of population increase handicap all efforts to improve economic and environmental conditions in many developing countries. National efforts and international assistance in education, health, housing, and rural development have been unable to keep pace with birth rates. Excessive population growth characteristically increases the number of the very poor whose pressure for survival overtaxes their natural resource base. Around the world from El Salvador to Haiti to the Sahel to the Middle East and South Asia, people pressure contributes to deforestation, soil exhaustion, degradation of water supplies, and loss of resources in plant and animal life. The consequences of this pressure upon

the environment are not confined to countries in which they first occur but spread across the globe—affecting the quality of air and water, speeding the loss of genetic diversity, and causing mass migrations of peoples seeking escape from an impoverished environment.

Why do some people regard as local, issues which others see as global? The answer in part lies in whether one's focus on environmental problems is confined to the places where they originate, or whether the problems are seen as interconnected by cause and effect to phenomena in other places. On public issues, important policy differences follow from the perspectives taken. People who do not perceive a global environmental crisis and question its reality tend to focus on discrete, geographically bounded aspects of environmental problems. They might, for example, be concerned with oil spills at sea, but not necessarily with international traffic in petroleum that makes the oil spills probable. A more inclusive perspective would involve world energy needs. This comprehensive perspective, which may be called holistic or ecological, is a systems way of looking at events. Systems thinking is implicit in the perceptions and objectives of the international environmental movement. The systems approach to environmental problems reveals why many, although localized in origin, have nevertheless become international issues—some global in extent.

An issue becomes global not because of where it originates, but because of what it affects. Cause-effect relationships in the environment were not often perceived and less often adequately understood before the advent of modern science. Scientific understanding of environmental relationships is moreover a relatively recent development. Three factors in particular account for the ability of science to explain environmental relationships and to influence public and international policy.

The first factor is the development of the means of environmental surveillance by air, sea, land, and outer space. Only in this generation have men been able to see the earth whole. By airplane and satellite the surface of the earth is now systematically surveyed and photogrammetric records are made for comparison of change over time. Equipment capable of penetrating the deep sea and outer space, and drilling equipment capable of probing the mantle of the earth have enabled science to greatly enlarge basic knowledge about the planet and its environment. A large number of instruments and tech-

niques have expanded scientific knowledge regarding the structure of matter, including living matter. From nuclear accelerators to electron microscopes, an unprecedented array of instrumentation has enormously expanded human knowledge of the conditions of life on earth—including the effects of human activities on the planetary environment.

The second factor, following from the first, is the greatly enhanced ability to measure. This ability to detect and to compare down to very minute components of things is today absolutely fundamental to government regulations on behalf of public health and safety; it is the scientific basis of policies regarding toxic substances in consumer goods and the environment. As a consequence of these advances in the sciences, people no longer generally believe that "what they don't know won't hurt them." People now tend to suspect that the opposite is more likely to be true.

These greatly advanced techniques for surveillance and measurement would not by themeslves change people's perception of their environmental relationships. A third factor is required—a means of synthesis and trend projection that gives raw data meaning. Data alone are not persuasive. To understand complex environmental relationships, data must be analyzed, compared, and related; its changes projected in time series; and a coherent synthesis of relevant information formulated as findings. This processing of information was scarcely possible before the development of advanced computer technology. The ability to project into the future the interactions of measured trends has enabled scientists to estimate probable causes of past and present developments and to make informed predictions regarding what may happen if current trends continue unchanged. Thus, the computer can reveal relationships and probabilities that the human mind unaided could not readily conceive. From this new source of insight a series of studies and reports has emerged that provides the conceptual foundation for national and international environmental policy.

Beginning with Jay Forrester's *World Dynamics* (1971), more explicitly in the studies on *The Limits to Growth* (1972) and *Mankind at the Turning Point* (1974) sponsored by the Club of Rome, and followed by at least six additional global systems models leading to the US *Global 2000 Report* (1980), the literate world received a picture of its present ecological circumstances with prognoses of its possible futures. In a letter of

transmittal to the president, the *Global 2000 Report* summarized its findings:

> Environmental, resource, and population stresses are intensifying and will increasingly determine the quality of human life on our planet. These stresses are already severe enough to deny many millions of people basic needs for food, shelter, health, and jobs, or any hope for betterment. At the same time, the earth's carrying capacity—the ability of biological systems to provide resources for human needs—is eroding. The trends reflected in the Global 2000 Study suggest strongly a progressive degradation and impoverishment of the earth's natural resource base.
>
> If these trends are to be altered and the problems diminished, vigorous, determined new initiatives will be required worldwide to meet human needs while protecting and restoring the earth's capacity to support life. Basic natural resources—farmlands, fisheries, forests, minerals, energy, air, and water—must be conserved and better managed. Changes in public policy are needed around the world before problems worsen and options for effective action are reduced.

These conclusions, and those of comparable studies stirred controversy and stimulated conferences and research efforts. Although widely rejected as prophecies of gloom and doom, they have nonetheless changed the thinking of many people regarding the responsibilities of government in relation to the world's environment.

No less significant have been the reports of scientific investigators regarding specific environmental effects and trends. National and international scientific studies have reported findings regarding sulphur dioxide, carbon dioxide, and particulates (for example, dust) in the atmosphere. Other studies have reported the spread of toxic substances in the environment, especially through water and food chains—ending in humans. Reports on environmental factors in health, disability, and death, especially from the World Health Organization (WHO), have contributed to public apprehension. From these and other publications from many different sources, a growing consensus has emerged regarding the reality of a global environmental crisis. The concept of the biosphere as the sum total of all planetary systems, almost unknown a generation

ago, is now commonplace in environment-related international documents and agreements, and is gaining currency among the general public.

A series of global environmental issues have now been identified as critical to human welfare. They are global because their effects, and often their causes, are not contained by national or even continental boundaries. However localized their immediate consequences may be, their effects ramifying in one form or another—economic and demographic as well as ecologic—are ultimately felt, however indirectly, throughout the biosphere. Not all international issues on superficial examination appear to be global. Yet when fully understood, their global character becomes apparent. The United Nations Regional Seas Programme is obviously bounded in implementation, yet its larger purpose is to end the pollution of the globe-encircling ocean environment. National population growth that outruns food supply, human services, and employment opportunities contributes to social unrest that may lead to uncontrollable migration of people, civil disorder, and even international war. No nation can safely assume immunity from the effects of these developments.

Six Critical Environmental Issues

There are many ways of categorizing environmental problems and the policy issues that follow from them. Any list of critical environmental issues would include the following six. They are widely regarded as critical because the trends which have placed them on the agendas of scientific inquiry and public policy threaten human welfare over all or large areas of the earth and, unless reversed in the very near future, may result in irretrievable damage to planetary life-support systems. They are also critical because, although the need for remedial action is urgent, remedial means are presently either not available (that is, carbon dioxide in the atmosphere) or would require complex socioeconomic changes that even willing governments could not readily bring about (for example, tropical deforestation). Yet none of these trends are today beyond remedy if the will to reverse them can be mobilized.

One further characteristic of these issues requires notice—none are compartmentalized; each issue interrelates with two or more of the others and with still more issues—ecologic and economic—not mentioned here. These interrelationships pose difficulties for policymaking because any solution to an issue-

creating problem may have implications for other issues. For example, toxic contamination has become a critical issue throughout the world and its effects are found in air, water, soil, and food chains. Direct, short-range policies to eliminate toxicants in any single medium (that is through air pollution control) may merely drive the toxic material into other media (for example, from landfills to ground water).

What follows is a summary of the salient facts regarding six critical issues, including examples of what is being done about the issue and by whom. In each of these cases human behavior nas disrupted the natural biogeochemical cycles of the biosphere thereby generating chain reactions and positive feedback that multiply the problems confronting people and their governments.

Quality of the Atmosphere

The earth's atmosphere is now believed to have evolved from an earlier thermochemical condition in which higher forms of life now present could not have survived. The atmosphere has been changed through natural forces, but is now being altered at an accelerating rate by human action. Four aspects of atmospheric change threaten its quality. Three are by-products of modern industrial society. They are emissions of: (1) sulphur dioxide and nitrous oxides resulting in acid precipitation; (2) carbon dioxide accumulating toward a greenhouse effect, raising the temperature of the earth, melting the polar ice caps, and altering weather patterns; and (3) fluorocarbons concentrating in the ozone layer above the earth and impairing its ability to shield the earth from lethal radiation from outer space. A fourth aspect of harmful atmospheric change has been attributed primarily to unwise agricultural practice: soil erosion and desertification, the resulting increased amount of dust in the atmosphere affects agricultural productivity and the health of plants and animals. The phenomenon is global, as measurable quantities of atmospheric dust are carried from Africa to the east coast of the United States and from China to western North America. During the dry season a dust cloud hundreds of miles in extent hangs over southern and western Asia—an indicator of serious maladjustment of human activities and environmental limitations.

No single government can cope with these problems; the acid rain issue is a more urgent agenda item for governments in Western and Central Europe than it appears to be in North America. The carbon dioxide problem is long range, but its

implications are extremely dangerous, involving the permanent flooding of coastal areas throughout the world and a trer toward aridity in now fertile food producing areas, notably the US Midwest. No solution to the problem is now in sight beyond abandoning the burning of coal, oil, and natural gas as energy sources. All nations would need to comply. If China, for example, chose to industrialize through burning massive quantities of coal, the carbon dioxide increase might not be stopped regardless of conservation measures in the United States and Europe. The fluorocarbon problem can be solved provided that all industrialized nations cooperate, and this cooperation is more easily attained than with sulfur dioxide or carbon dioxide because no basic industrial necessity (that is, energy source) is involved.

International action is presently focused on the immediate interest of acid rain. The issue has become acute between Canada and the United States; formal agreements have committed the two countries to cooperate in abating the problem, but domestic economic considerations have caused the United States to delay action, arguing the need for more research. The sulfur dioxide, carbon dioxide, and fluorocarbon problems have been addressed in numerous conferences and seminars and by various intergovernmental organizations including the European Community, the International Council of Scientific Unions, the World Meteorological Organization (WMO), and the Organization for Economic Cooperation and Development (OECD). One result of these efforts has been the Convention on Long-Range Transboundary Air Pollution, now in effect, which had received 30 ratifications as of January 1984. Acid rain has become an international issue in the United States and there is little reason to doubt that its abatement would be in the national interest. The problem lies primarily in the choice of method.

Depletion of Fresh Water

The demands of modern agriculture and industry and increasing levels of population and affluence have placed unprecedented stress upon fresh water supplies. Although the immediate problems of water supply in large countries such as the United States are superficially national, the long-range issues everywhere transcend national boundaries. In the United States, depleting groundwater in Texas and the High Plains has led to proposals to tap fresh water sources in Northwestern Canada and the Great Lakes. Reaction of Canadians and the governments of the Great Lakes states has been almost

uniformly negative. Meanwhile environmental disputes have arisen between Canada and the United States over degradation of rivers crossing their international boundary. Residents of Montana have complained regarding the quality of water in the Poplar River affected by a power plant in Saskatchewan, and Canadians in Manitoba have opposed completion of the Garrison Diversion irrigation project in North Dakota if Missouri River water is to be discharged into the Hudson Bay watershed. The United States government has created difficulties for Mexico by preempting Colorado River water for irrigation and urban water supply. To avoid treaty violations, the United States has commissioned a $243 million desalinization plant on the Lower Colorado to deliver an acceptable supply of fresh water to Mexico.

In Europe the fresh water issue is especially acute in the region of the Lower Rhine. In the Netherlands a coalition of environmental groups organized an International Water Tribunal in 1983 to protest the continued pollution of the Rhine by up-stream countries and to ascertain the extent to which international treaties, declarations, and domestic laws were being violated. In African and Asian countries, allocation of riparian water rights among semiarid countries has encountered the inevitable issue of water quality. Water supply deficiencies in regions such as the Sahel in sub-Saharan Africa indirectly affect the United States through demands upon US food supply and technical assistance to offset famine, and through political repercussions from possible conflict among the four states forming the Lake Chad Basin Commission (Cameroon, Chad, Niger, and Nigeria). Soviet proposals to reverse the flow of several great Siberian rivers to irrigate Central Asia have raised questions regarding the consequences for the Arctic Ocean and possible effects upon the climate in the Northern Hemisphere.

The United States has excelled in the engineering of water supplies, but has been prodigal and shortsighted in water use. Prospective water shortages in the western United States have led to proposals to divert water from the Great Lakes and Canadian sources, but the consent of Canada would be required and may not be obtainable. Within the United Nations system, fresh water problems have been addressed by the Food and Agriculture Organization (FAO), WHO, United Nations Educational, Scientific, and Cultural Organization (UNESCO) and UNEP. A major UN Water Confrence was held in March 1977 at Mar del Plata, Argentina. As early as 1965, UNESCO

took a lead in launching the International Hydrological Decade from which evolved the International Hydrological Programme (IHP), and in 1981 the International Drinking Water Supply and Sanitation Decade was initiated by action of the UN General Assembly. A World Register of Rivers Discharging into the Oceans is jointly maintained by IHP and UNEP, and since 1976 a freshwater monitoring program has been carried on jointly by UNEP, WHO, WMO, and UNESCO within the framework of UNEP's Global Environmental Monitoring System.

Loss of Soil Productivity

Scientific studies and reports by FAO identify soil erosion and degrading quality as a largely unrecognized problem of threatening proportions. Its causes and its effects are numerous and widespread. Causal factors include erosion by wind and water resulting from deforestation, overgrazing, and cultivation of steep slopes. Effects are losses in productivity, degraded air quality, and siltation of streams lakes, and impoundments behind dams, with a host of tertiary environmental consequences affecting hydropower, industrial water uses, aquatic biota, flooding, and desertification. Following the UN Conference on Desertification held in Nairobi in 1977, a UNEP effort toward combating the spread of deserts was initiated. A two year assessment of the situation presented to the UNEP Governing Council in May 1984 revealed a problem of global proportions and growing severity. It was estimated that since the 1977 conference, desertification has continued to increase at an approximate rate of 6 million hectares per year.

Topsoil may remain in place and yet lose much of its productivity through excessive dosage with inorganic fertilizers, herbicides, insecticides, and compression by heavy machinery. The long-range effects of the technology of modern agribusiness upon crop production are debatable, but every country, and especially the United States, has a stake in the agricultural future. Air and water quality and plant genetics are also factors in this future. World populations are growing toward unprecedented levels and a major disruption of food production anywhere could have economic and political consequences everywhere. International cooperation thus far has largely been confined to research—for example, in the mapping of world soil types. Soil loss continues to be regarded as primarily a national problem despite the fact that its international repercussions are becoming ever more evident.

Loss of Genetic Diversity

The miracles of modern agriculture have posed an unanticipated threat to natural and agricultural ecosystems through losses in the variety and diversity of many species of plants indigenous to various countries. Patented hybrid seed stock is seen by some agronomists and plant ecologists as threatening, through displacement, the survival of native genetic strains having long-tested survival capability. The issue was considered sufficiently serious to be addressed at the International Conference on Plant Genetics which met in Rome in April 1981. This issue among others is now on the agendas of the Consultative Group for International Agricultural Research (CGIAR), which is associated with the World Bank, and of the International Board for Plant Genetic Resources on which CGIAR, FAO, and UNEP are represented.

Habitat destruction through deforestation, draining, conversion of land to cultivation, and urbanization are major factors in depletion or extinction of species. Poaching for food and the commercial sale of protected species has become a threat to the survival of certain species of plants and animals. International cooperation has proved necessary to obtain national protection from the commercial exploitation of threatened plants and animals. Profitable international markets for rare plants, animals, and animal products greatly increase the difficulty of controlling illegal collecting and poaching.

The 1976 Convention on International Trade in Endangered Species undertook to remedy this difficulty by controlling the market for rare and threatened plants and animals. Another international effort to protect variety and diversity in both cultural and natural environments was the 1975 Convention Concerning the Protection of the World Cultural and Natural Heritage—a concept originating in the United States. Associated with this treaty has been the establishment, under the UNESCO sponsored Man and the Biosphere Programme, of biosphere reserves (226 reserves in 62 countries as of late 1983). These reserves and other areas protected through the World Heritage Convention and the international movement to establish and protect national parks, are some of the measures being taken to safeguard variety and diversity among the living species of the biosphere.

The loss of genetic diversity is bad not only because the world thereby becomes poorer and less interesting, but because opportunities and safeguards are also lost. With genetic losses

through extinction of plant and animal species are losses of biochemical and behavioral characteristics poorly understood, perhaps undiscovered. Losses of potential sources of food, pharmaceuticals, and opportunities for insight into physiological and behavioral life processes are occurring, and have become increasingly unacceptable in view of scientific evidence suggesting that irreplaceable assets are being needlessly sacrificed. The United States, as the principal agent of the green revolution in agriculture and a major market for natural products, has a special responsibility to preserve genetic diversity. Recognition of this circumstance caused the US Agency for International Development in cooperation with other federal agencies to sponsor a conference in 1981 on the preservation of genetic diversity with special reference to the nation's bilateral aid programs.

Tropical Deforestation

The rapid reduction of the tropical rain forest appears on every list of critical environmental issues. Its effects are global, first because the forests are believed to be major regenerators of atmospheric oxygen, second because loss of the forests is accompanied by loss of habitats and species with the resulting genetic impoverishments previously noted, and third because resulting damage to tropical soils through erosion, laterization (rock-like hardening), and loss of soil fertility impairs the life support base of people and other living things.

Among the causes of tropical deforestation are the cutting of trees for fuel wood and the clearing of land for agriculture and cattle raising. World Forestry Congresses have repeatedly warned governments about the consequences of the loss of the tropical forests. The International Council for Research in Agroforestry collaborates with UNEP's Ecosystems Task Force in promoting research on combining agriculture with forestry. Encouraged by the World Bank, FAO, and UNEP, tropical countries have begun to cooperate in the development of managed tropical ecosystems. In March 1980, UNEP sponsored a conference in Libreville, Gabon, on the world's tropical forests. In 1980 nine African countries meeting in Yaounde, Cameroon, agreed upon a treaty relating to the improved management of tropical forests and ecosystems. Yaounde is also the location of the regional Centre for Scientific Information and Documentation in Tropical Ecology.

The worldwide importance of these conserving efforts was underscored by Tatsuro Kunugi of Japan, chairman of the

1983 UN Conference on Tropical Timber which was convened under the auspices of the UN Conference on Trade and Development, when he said that the 37 articles adopted constituted "a global policy in resources management, taking into account the implications of this policy for other important sectors such as energy, agriculture, food supply, and the preservation of ecosystems."

Toxic Contamination/Hazardous Materials

The enormous ingenuity of the chemical industry has produced an unprecedented number of useful compounds during recent decades. This innovation, although widely beneficial, has created serious ecological problems, sometimes resulting from unforeseen side effects (as with DDT and PCBs), and more often from failure to adequately assess the risks involved in releasing new chemicals into the environment and in neglecting to take effective measures for their harmless disposal. Toxic contamination of air, water, soil, and biota was initially believed to be a problem largely confined to developed countries; but international trade, and the atmospheric and oceanic transport of toxicants, has spread the problem around the world.

Investigation of effects and consideration of control measures has been undertaken by many national governments and scientific bodies, by the European Community, the International Labour Organization, WHO, OECD, and by UNEP which has established the International Register of Potentially Toxic Chemicals and the International Programme on Chemical Safety. Two nongovernmental scientific bodies have also been established to address specific hazards: the International Commission for Radiological Protection and the International Commission against Nitrogens and Carcinogens. Concern over possible harmful effects of hazardous materials in commerce prompted the UN General Assembly on 17 December 1981 to adopt by a vote of 146 to 1 a resolution on protection against products harmful to health and environment. The United States cast the sole dissenting vote.

Disposal of radioactive materials is a special concern of the International Atomic Energy Agency, based in Vienna. Each government, however, appears to follow its own preferences in dealing with nuclear wastes. Global contamination by nuclear war is the ultimate hazard, but serious threats to living things are present in peacetime uses of atomic energy.

The foregoing discussion provides a selective sample of the environmental issues that have aroused worldwide concern and have caused governments to institute new forms of international cooperation in defense of their environments and of the biosphere. The hazards of overpopulation and war have not been included in this listing, partly because their threat to the global environment is widely (but not universally) understood. Their potential effects are more inclusive than environmental and even a cursory treatment of their potential environmental impacts could exceed the limits of this paper. There are few environmental problems that are not somehow related to excessive population growth. The rapidly expanding cities of the Third World—in Africa, Asia, and Latin America—pose very serious social, political, and economic problems for the future. These problems are being addressed through various components of the UN system, but thus far results have been disproportionately small in relation to the dangers inherent in the problems.

How the United States Is Involved

Regardless of the policy positions of the government on international environmental issues, US citizens are involved in all of the aforementioned global issues and many more. Although since 1981 the government appears to have retreated from its earlier position of leadership, nongovernmental organizations (NGOs) based in the United States have increased their participation in international environmental affairs. At international conferences on environment and population, contradictory positions have become commonplace between official and unofficial US representatives. This division weakens the influence of each group and raises doubts as to the representative character of official US policies.

For example, at the Session of a Special Character held by the Governing Council of UNEP in 1982 to commemorate the 1972 UN Conference on the Human Environment and to assess its results, the official recommendation of the US delegation was that nations should rely on market forces in preference to regulations to cope with environmental problems. This advice was widely regarded as simplistic by NGO representatives, especially in relation to developing countries in which market economies were weak. Similarly, at the United Nations Conference on Population held in Mexico City in mid-1984, officials of the United States took the position that adverse effects of overpopulation were being exaggerated and that

economic growth could overcome the alleged adversities. The NGO population and family planning groups in the United States generally dissented from the government's position, as did many representatives, both official and unofficial, from developing countries with serious population-environment problems.

Responding to charges that the government has abandoned its earlier commitment to global environmental protection, spokesmen for the Reagan administration have denied the charge that the United States no longer leads in world environmental affairs. Their position has been that controls and regulations by governments and through binding international agreements are not the best way to preserve environmental quality. The United States position on the Governing Council of UNEP and in the UN General Assembly has been that greater reliance should be placed on free market forces to correct environmental abuses. In the official view, responsibility for environmental policy should rest with each country, which should adopt its own protective measures without interposition by other countries or by intergovernmental bureaucracies. For example, President Ronald Reagan in early 1981 withdrew President Jimmy Carter's Executive Order 12264 restricting US export of hazardous materials on grounds that the United States should not try to write rules for the rest of the world and should not impose its standards on other countries.

Although the US position has been that market forces provide a better way to achieve environmental policy objectives, this viewpoint has not won acceptance abroad. Claims that the United States is still leading in issues of international environmental policy are hardly credible when no other nations are following. Because the United States has stood alone on issue after issue since 1981 does not mean that its official position is wrong. But the fact remains that in votes on environmental issues in the UN General Assembly, the division on the hazardous materials resolution was 146 to 1, on the World Charter for Nature 111 to 1 (8 technical abstentions). And in the World Health Organization Assembly the vote on control over export of artificial infant formula for bottle feeding was 118 to 1 (4 abstentions). Risk to infant health arose from the inadequate provisions in many tropical countries for sterilizing bottles, especially in rural areas in which contaminated water added a danger not encountered in breast feeding.

On other issues the United States has been less isolated yet still very much in a negative minority. After having lead in drafting the UN Law of the Sea Treaty which includes numerous environmental provisions, the United States reversed its position, declined to join 125 signatory states and undertook, mostly unsuccessfully, to persuade its closer allies to abstain. In addition, the Reagan administration attempted to reduce or eliminate US funding for international environmental programs, notably appropriations for UNEP and the UNESCO sponsored Man and the Biosphere Programme, and the World Heritage Convention. At the 1984 UN Conferences on Population, the official US delegation, as previously noted, took a policy line unacceptable to many other countries and to many US nongovernmental participants. In each of these instances, however, the United States did not oppose the environmental principle involved but rather gave higher priority to economic values or, in the case of the population issue, to a particular view of morality.

For all that, the US government is inescapably involved in international environmental issues in which US interests are at stake. These interests, moreover, are shared with other nations—some with all nations—and are not exclusively US problems. Three issues illustrate the point: acid rain, environment and development in the Caribbean, and the future of Antarctica.

Acid rain has become a high priority issue through Western and Central Europe and in Eastern North America. Its incidence and effects are even wider, but appear to be most acute in the Northeastern United States, Eastern Canada, and in Scandinava, Germany, Czechoslovakia and Poland. The issue in the United States is both domestic and international. The official position of the federal government has been ambiguous. President Reagan has declared the issue to be of highest priority for the Environmental Protection Agency, but, following strong protests from high sulphur coal producing states, the administration appears to have taken a course of delay, calling for more study before action. Nevertheless, the issue will not go away, and action taken by governments in Europe will have effects upon policy in the United States. Meanwhile the issue tends to corrode not only Canadian-US diplomatic relations, but also buildings, bridges, machinery, and cultural monuments in both countries, and progressively diminishes the viability of streams, lakes, forests, and agricultural lands.

In the Caribbean area the US government has shown great concern for social, economic, and political stability, but its role in international efforts to integrate environmental protection and sustainable development has ranged from negative to ambiguous. Since 1979, when a major Conference in Environmental Management and Economic Growth in the Smaller Caribbean Islands was held in Barbados, a number of cooperative action programs have been adopted. In April 1981, a UNEP sponsored regional conference met in Jamaica and adopted a Caribbean Action Plan comprising 66 environmental projects of which 25 were designated as of high priority and 33 for immediate action. In August 1981, a meeting of Non-Governmental Caribbean Conservation Organizations was held in the Dominican Republic and adopted a complementary strategy with assistance from nongovernmental US sources including the Rockefeller Brothers Fund, the University of Michigan, and the Caribbean Conservation Foundation. A Caribbean Trust Fund has been established with regional and external funding, and in March 1983, 13 of the 27 Caribbean nations signed the Treaty of Cartagena for the Protection and Development of the Marine Environment of the Wider Caribbean Region.

Throughout these efforts the role of the US government has been ambivalent. Administration policy has been slow to link environmental protection with economic development, and has preferred bilateral aid to financial assistance through multilateral efforts such as the UNEP sponsored Wider Caribbean Regional Seas Programme. Unwillingness to participate in programs in association with Cuba may also have deterred US involvement. There are substantial indications that many of the roots of poverty and unrest in the region are environmental—a documented example is the ecological impoverishment of El Salvador preceding its social disorders. Nearly two decades before the outbreak of civil war, a Fellow of the Tropical Science Center in San José, Costa Rica, traveling in El Salvador reported massive deforestation, soil erosion, fuelwood crisis, and environmental pollution. He foresaw a social explosion based on poverty attributed largely to "human ecologic problems caused by overpopulation." Similar evidence of man-induced ecologic disaster, especially affecting food production, has been documented in many other countries and reported by UN agencies and independent investigations. Massive illegal immigration to the United States has been as much a consequence of the inability of people to subsist on worn-out land, as of a desire to escape from political oppression.

The case of Antarctica involves a different set of US interests. The United States has taken a lead in the scientific exploration of the Antarctic continent and in its protection from damaging development and from political conflict. Unlike other nations, the United States, despite its presence and preeminent investment in Antarctic research has made no territorial claims on Antarctica. In 1959 the Antarctic Treaty was signed by 12 nations including 7 which agreed to suspend their territorial claims for the duration of the treaty. This treaty and subsequent agreements are administered by the Consultative Parties which do not include UN agencies or most Third World countries. The possibility of mineral wealth in the continent has become a two-way source of contention—first, between the Consultative Parties and those Third World states demanding a share in any material benefits and second, between the forces for resource development and those urging the preservation of undeveloped Antarctica as a natural reserve for science.

Here again US opinion appears to be divided between the administration together with some private groups willing to consider controlled development, and most scientific and environmental groups that are strongly opposed. There is also international concern among environmental organizations over the exploitation of Antarctic marine life especially by Soviet bloc nations and Japan. The effect on marine food chains of reducing the number of the shrimp-like krill has been questioned by marine scientists. Through all of these and other controversies, the preeminence of the United States in Antarctic affairs gives it a key position in any decision affecting the region. After 1990, a new regime for Antarctica will become necessary unless the present treaty is extended. The United States cannot avoid involvement in Antarctic decisions and it would appear to be clearly in the national interest for the government and scientific community to cooperate in formulating a policy position that would protect the area from political conflict and from despoliation for resources available elsewhere.

US Interests and National Policy

In none of the issues previously described have US interest, broadly defined, been injured by policies protective of the global environment. The immediate interests of some US citizens might have been adversely affected by some measures which the overwhelming majority of nations have found to

be in the general interest. Even the closest US allies favored controls over export of toxic or otherwise hazardous materials, voted for restrictions on promotion of artificial infant formula in tropical countries, and supported the Law of the Sea Treaty. No national interest whatever appears to have been in jeopardy in the UN Charter for Nature or in appropriations to assist UNEP, international scientific environmental investigations, the World Heritage Convention, or the Wider Caribbean Action Plan. The dollar cost of US contributions to international environmental protection efforts becomes relatively insignificant when compared with the aggregate expenditures of the US government.

It would be unfair to suggest that the position of the United States in international environmental affairs has been wholly negative. Individual federal agencies, notably the National Park Service, the Fish and Wildlife Service, and the Agency for International Development have continued to provide assistance upon request to other countries. In effect, US policy on international environmental affairs has tended toward inconsistency explained perhaps by a statement attributed to a State Department official quoted in the *New York Times* (28 March 1983) to the effect that "the Reagan administration still does not have an international environmental policy."

It appears that the United States has given up its leadership in global environmental affairs and has unnecessarily prejudiced some of its long-term interest abroad without any significant benefits at home. Its government has been unable to persuade other nations including its best friends to adopt its uncertain approach to environmental issues. While environmental policy has not yet become an issue for partisan division in the United States or in most other countries, the rise of "green parties" in several European nations suggests that such division is possible. For the present, however, scientific analyses of public attitudes in the United States, the United Kingdom, the Netherlands, and West Germany show no polarization and reveal similar opinion profiles—a high public concern for environmental quality cutting across social, economic, and political boundaries. A strongly marked increase in environmental concern has become evident in many Third World countries. Paradoxically much of the world that resisted US leadership at the time of the 1972 UN Conference in Stockholm is now receptive to policies and programs that the US supported then but declines to support now.

It seems safe to say that no national interests have been served by the ambiguous positions on international environmental cooperation taken since 1981 by the US government. Where official policy has been calculated to protect the special interests of manufacturers, exporters, or resource developers, it has been generally unsuccessful. Other countries have declined to follow the US attempted lead, and policies regarded as objectionable in Washington (for example, the infant formula resolution) have been implemented internationally without US participation. An unfortunate instance occurred when a representative of the US Environmental Protection Agency lobbied, unsuccessfully, against proposals in the OECD to adopt international controls over the transboundary transport of hazardous chemicals. Low budgets for international environmental programs may indeed result in higher future costs to US taxpayers. El Salvador and Haiti are cases in point wherein effective US assistance years ago to reverse socio-ecological deterioration would have cost the taxpayer much less than is now being exacted merely to prevent bad situations from becoming worse. The government in Washington—and even the Kissinger Commission in its report on Central America—has not seemed to understand the difficulty of building a productive economy on a ruined ecologic resource base.

The budget cuts and negative votes in international assemblies are symbolic—they have had no significant effect on gross federal expenditures, but they have sent a message to other countries on the apparent indifference of the United States to world environmental affairs. It would be to the national advantage for the president and Congress to reverse this negative impression. International cooperation in the Agency for International Development, the Department of the Interior, and the Environmental Protection Agency could be officially encouraged and financially strengthened. The agency intended for the initiation and review of US environmental policy has been the Council on Environmental Quality (CEQ) created by Title II of the National Environmental Policy Act of 1969 (NEPA). Under the Reagan administration the budget of the CEQ was cut by 75 percent, its professional staff largely disbanded, and the appointment of council members often delayed. Restoration of the CEQ to its former status could be a major step toward regaining national leadership and credibility abroad. The international and domestic role of the CEQ could be enhanced to the national advantage by an expanded implementation of Title II of NEPA which authorizes and

directs the council to sponsor and assist studies relating to environmental trends. No administration thus far has begun to realize the potential of NEPA, best known for its relatively secondary requirement of environmental impact statements.

Maintenance of a continuing dialogue between the large nongovernmental environmental organizations and the federal government could be helpful. It could help to reach mutual understanding that might avoid the spectacle in international gatherings of official US representatives and organizations of US citizens taking opposing positions. Such divisions may demonstrate freedom of citizen action in the United States, but they also weaken the credibility of the United States among other nations.

What policy options would serve US interests in relation to international environmental issues? A more positive role in UN organizations is indicated inasmuch as, despite its defects, the UN system is the only structure approaching universality among nations. Regardless of political differences, all nations share a concern for protection of the biosphere. Hostile governments historically have been known to work together on matters of mutual self interest, so US participation in "politics of antagonistic cooperation" would not be exceptional. Especially in view of the consequences of environmental deterioration in many Third World countries, US support for UN environmental programs could ward off the much greater costs that the United States might have to bear alone should remedial efforts fail. The United States and the Soviet Union have cooperated in scientific and technical aspects of environmental protection. Joint efforts toward common purposes help to build better relationships among otherwise suspicious and unfriendly nations. The Wider Caribbean Regional Seas Programme would seem to be a logical place for positive rather than reluctant US participation.

The US government might also find ways to encourage and assist nongovernmental international environmental efforts such as the World Conservation Strategy, developed largely through the IUCN. Our country has traditionally drawn a much harder line between official and nongovernmental relationships than have many other countries—France and Japan, for example. US government agencies have assisted the IUCN, but the United States is not one of the 58 nations officially affiliated. Proposals to privatize and commercialize environmental surveillance capabilities, such as Landsat, could have

an adverse effect upon environmental science unless protective measures were taken to assure access to the satellite system by other governments and nonprofit organizations.

In summary, the costs of regaining credibility and leadership in international environmental affairs could be much less than the ultimate cost of failure to do so. The position of the US government since 1980 has been sufficiently ambiguous on international environmental issues to permit a progressive movement toward a positive position without making a formal reversal of policy. The United States cannot escape sharing in the consequences of environmental disasters that fall upon the rest of the world. To understand this is also to understand why vigorous positive leadership in international environmental policy is in the national interest as well as in the interest of people everywhere.

Glossary of Acronyms

CEQ	Council on Environmental Quality
CGIAR	Consultative Group for International Agricultural Research
FAO	Food and Agriculture Organization
IHP	International Hydrological Programme
IUCN	International Union for Conservation of Nature and Natural Resources
NEPA	National Environmental Policy Act
NGO	nongovernmental organization
OECD	Organization for Economic Cooperation and Development
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization
WMO	World Meterological Organization

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