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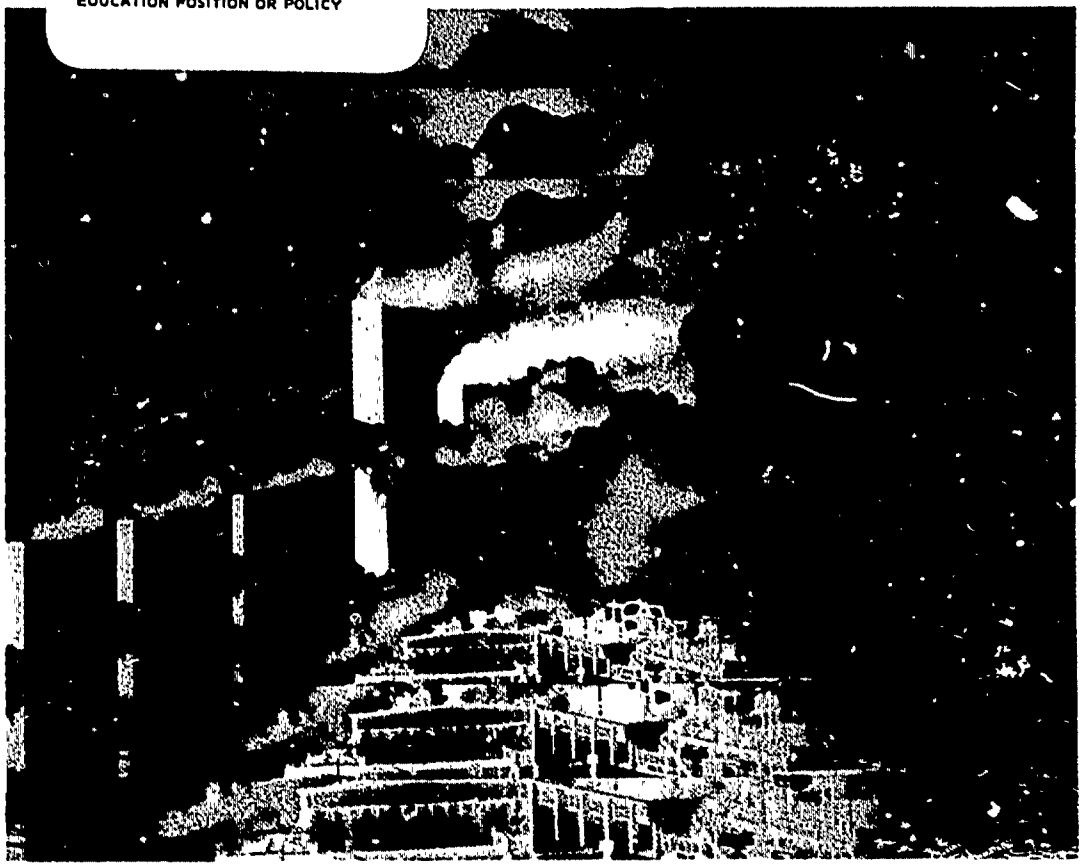
ABSTRACT

The quality of the world environment cannot be dependent upon the efforts of a single nation. This fact is now recognized by most nations. Only through cooperative international actions can effective pollution control and natural resource conservation be realized. The purpose of this booklet is to publicize the work that the United States and other nations have done to promote world environmental quality. The importance of bilateral arrangements, regional organizations, the United Nations, and non-governmental activities is discussed with respect to international quality control policies. Research, information exchange, education, and global monitoring are important factors in the work for environmental quality among nations. Mention is given to international advancement made in air, water, and land pollution control. An explanation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora is included in reference to the world-wide protection of these species. Finally, the economics of a world environmental quality are given. (MA)

WORLD ENVIRONMENTAL QUALITY

A Challenge to the International Community

Department of State



As the astronauts of Skylab I orbit the earth in America's first manned space station, we are mindful once again of the essential unity of mankind — bound together by the finite resources of one small planet. One of the chief concerns of this and subsequent space missions will be the resources of the earth and the quality of its environment. As before, our findings will form the basis for positive contributions to our fellow man.

But we do not have to rely upon the results of space research to improve the earth's environment. All men and women have a personal role to play in this vital endeavor. The United Nations Conference on the Human Environment held last June, with the participation of one hundred and thirteen nations, was a reflection of the increased understanding of all mankind that environmental quality is everybody's business—superseding any temporary differences which may hamper relations between nations.

From President Nixon's proclamation of June 4, 1973,
on World Environment Day (June 5, 1973).

WORLD ENVIRONMENTAL QUALITY

A Challenge to the International Community

Department of State

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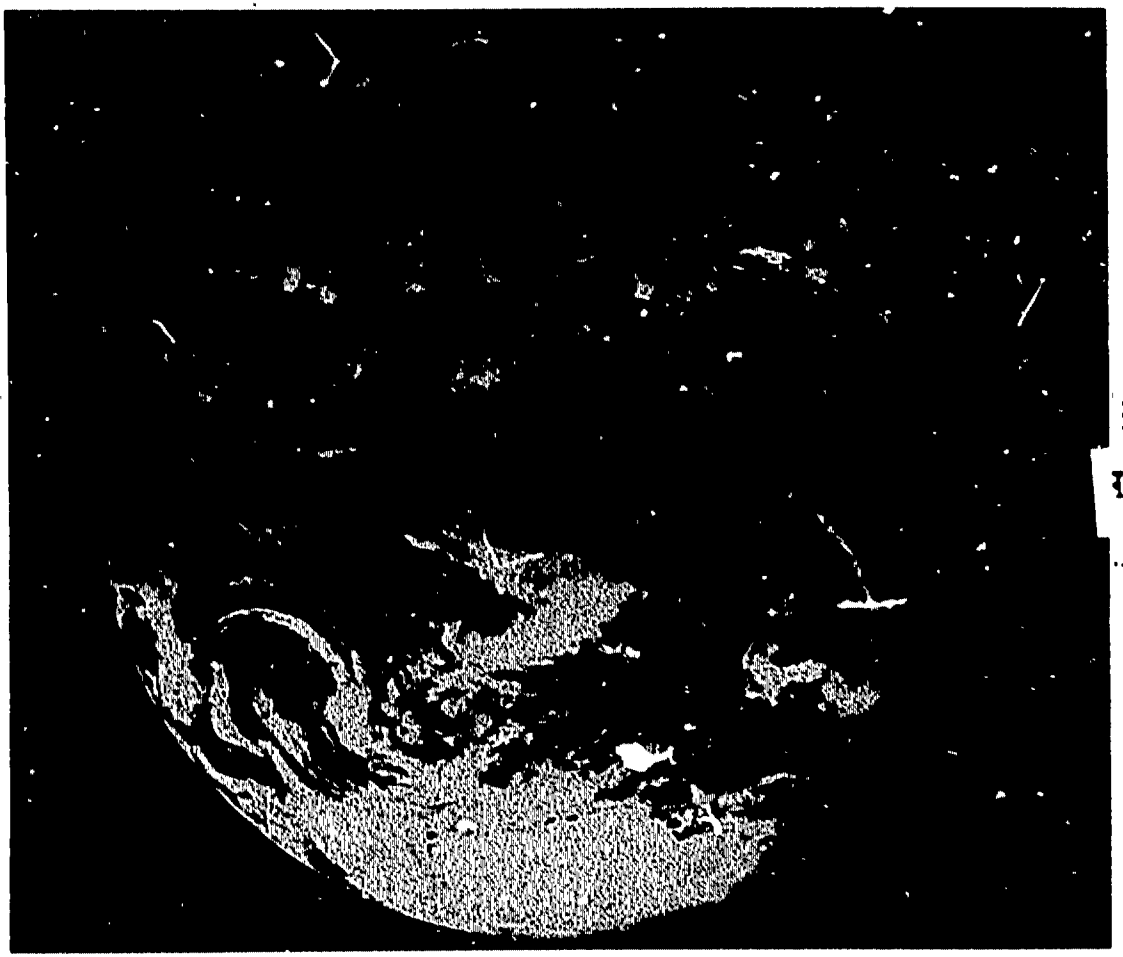
THE WORLD ENVIRONMENT—Challenge and Response



"Only one Earth."
Photo courtesy of NASA

Historians of our century will doubtless record that, during the 1960's and early 1970's, there spread across the United States and other industrial nations a new sense of alarm—until then confined to a perceptive few—over technological man's increasingly damaging impact on his natural environment and the quality of his own life. Some of the miracles of technology, with all their unquestioned benefits, had proved two-edged and appeared, through some lack of guidance or control, to have unanticipated, harmful side effects.

Uncommon words came into common use: pollution, environment, ecology, recycling. Countless citizen organizations sprang into being to press the claims of environmental quality against the often conflicting claims of economic growth. Major intrusions into the balance of nature began to face stern questioning in courts of law and in the court of public opinion. New laws and new agencies imposed unprecedented controls on air and water pollution, automobile exhausts, municipal dumps, urban sprawl, noise, and every other kind of environmental degradation. In a single decade, environmental quality became a major social goal in the United States—and, indeed, throughout most of the industrial world.

The pressures of growing population and rising economic aspirations on a finite base of resources virtually assure that environmental issues are not transitory but will rank higher rather than lower in the decision-making priorities of future generations, and that the environmental challenges we now perceive will extend through all foreseeable time.

Equally striking is the extension of these concerns over the surface of the globe. Where the human environment is involved all nations are neighbors, sharing—as the motto of the United Nations Conference on the Human Environment put it—"only one earth." The oceans, the atmosphere, fields, forests, and marine plankton, all chemical elements and life forms on earth, are parts of one vast living engine, driven by the virtually limitless fuel of solar energy. Technological man, harnessing and redirecting this energy in a multitude of new ways and on an ever-growing scale, has lately acquired a capacity he never sought—to unbalance this intricate system, on whose functioning his own long-term survival depends.

The winds and ocean currents that move ceaselessly across the face of the globe carry with them an immense and growing burden of noxious wastes generated by man's industrial-urban life. Lead from automobile exhausts has been found in the Greenland ice cap. DDT is spread all over the world. Sulphurous smoke from British factories blows with the prevailing winds and pollutes the

fields and forests of Scandinavia. Fleets of tankers and cargo ships spill petroleum along the world's sealanes and coastlines. Ever-growing quantities of chemical and animal wastes, produced on land, find their way to the world's final dumping ground, the oceans, with their priceless and vulnerable ecology.

The world's environmental predicament takes other forms too. Major nonrenewable minerals and fuels, whose total quantity on earth is unknown but obviously limited, are being consumed at such accelerating rates as to raise serious questions about what will remain for future generations. Many living species have been extinguished for lack of adequate protection and countless others are in danger of extinction. Topsoil, on which future world food supplies largely depend, washes into the rivers and estuaries of the world at rates equivalent to tens of millions of fertile acres every year. All these disturbances of nature, together with the complex global interconnections arising from trade, investment, technology, and travel, have created specific operational needs for environmental collaboration among nations. They need to join in acquiring and sharing an immense amount of environmental *knowledge* through scientific research, monitoring,

At this strip coal mine in Montana, soil residue is being reclaimed by blending it into the terrain. In this way future generations may be able to use the area for farming or recreation.
Photo courtesy of the Bureau of Reclamation, U. S. Department of the Interior

information exchange, education, and training. They need to cooperate in controlling pollution of the *oceans* that lie beyond any nation's jurisdiction. They need new international agreements and programs for conservation of *resources* of world significance, especially living species. They need to concert their policies on the *economic effects* of environmental protection on trade, investment, and development.

This pamphlet reviews the modest but important beginnings that nations have made in a very few years toward meeting such common environmental needs. A particularly active lead has been taken by the largest producer, consumer, and polluter of all—the United States. This leadership reflects a policy established in 1969 when the Congress, in the groundbreaking National Environmental Policy Act, directed the Federal Government not only to put our own national environmental house in order but also to "recognize the worldwide and long-range character of environmental problems" and to join in steps "to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment." To that end, early in 1970 the Department of State created in its Bureau of International Scientific and Technological Affairs a new Office of Environmental Affairs to act as a focal point for information on and coordination of the U.S. Government's growing collaboration in this area with the rest of the world. The director of this office, Christian A. Herter, Jr., chairs a Committee on International Environmental Affairs, which includes representatives of more than a dozen Federal agencies with environmental interests abroad.

Why does the United States place such a high premium on international cooperation in the environment field? First, we share the concern of many nations that the growing pollution of the oceans, the land, and the atmosphere may, if not controlled, lead eventually to disastrous consequences for people everywhere. Second, we recognize the inability of any nation, by itself, to deal effectively with global pollution problems.

Third, as a major trading power with costly domestic controls on industrial pollution, we have a strong interest in harmonizing such controls internationally, lest American firms be put under a competitive handicap.

As a major source of development aid to low-income countries, we have an interest in providing these countries with the information they may require to plan their development in ways that are environmentally sound.

Through exchanges of information we stand to learn much about valuable environmental techniques developed abroad, as others will benefit from our experience.

Conversely, as a leader in the technology of environmental monitoring and control, we can expect to sell abroad increasing amounts of equipment and technical advice for pollution control and monitoring, and resource conservation.

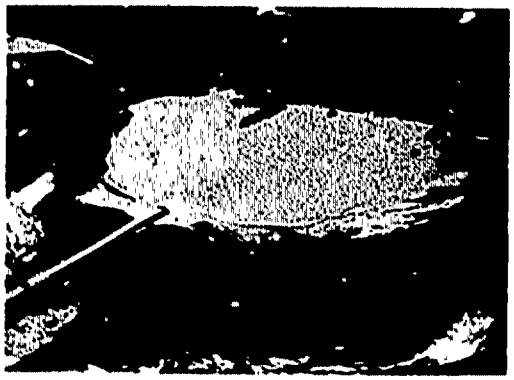
Other nations could make lists of their own interests in environmental quality. But, as President Nixon has observed, the sometimes differing interests of nations in global technological problems are of far less import than "our shared and transcendent interests in the livability of our common home, the Earth." The safeguarding of that shared interest is the goal of world environmental action. And perhaps the experience of collaboration in that cause will serve also to strengthen the awareness of all nations of their underlying community of interests which is the ultimate basis for international peace.

U.S. AGENCIES WITH RESPONSIBILITY IN THE ENVIRONMENT FIELD

The Office of Environmental Affairs (SCI/EN) is a part of the Bureau of International Scientific and Technological Affairs of the Department of State. The concerns of this office are policy guidance and coordination of U.S. Government activities in the international environmental sphere. Where United Nations environmental matters are concerned the State Department's Bureau of International Organization Affairs also plays an important role. SCI/EN works closely with the Council of Environmental Quality (CEQ), a part of the Executive Office of the President, which is charged with coordinating all environmental quality programs of the U.S. Government. It also maintains close liaison with the Environmental Protection Agency (EPA), which has important bilateral programs with other governments and provides expertise in connection with many U.S. Government multilateral activities (e.g., CCMS). Many other government agencies, according to their areas of responsibility, are also active in the international environmental field. They provide the technical expertise to support bilateral and multilateral environmental programs. These include: the National Atmospheric and Oceanic Administration; the Department of Housing and Urban Development; the Department of Health, Education, and Welfare; and the Departments of Transportation and the Interior.

Chapter II
THE WEB OF ORGANIZATION

There is probably no ideal way to organize environmental protection within the broad stream of international cooperation. It is not so much a distinct sector of human activity as it is a pervasive dimension which intersects with every activity, old or new, in which man and nature meet. There is scarcely an international agency—whether its field be agriculture or aviation, trade or nuclear energy—whose activities do not impinge on environmental quality. To centralize all environmental activities would thus be impossible, but coordination among them is badly needed—and, as we shall see, steps have been taken to provide it.



Industrial waste disposal into the Great Lakes, such as taconite residue shown here entering Lake Superior at Silver Bay, Minnesota, is among the many concerns of the International Joint Commission.

Photo courtesy of the U.S. Environmental Protection Agency

BILATERAL ARRANGEMENTS

For many years the United States has worked with its continental neighbors in joint management of shared resources. The most extensive arrangement for this purpose is the United States-Canada International Joint Commission, established under the Boundary Waters Treaty of 1909. That body is now increasingly responsible for major environmental activities affecting the two governments, particularly for recommending measures to improve the quality of the waters of the Great Lakes. The United States is also a party to a treaty with Mexico concerning the sharing of water from the Colorado River and the Rio Grande—a major concern in our relations with that nation.

In the past few years the United States has joined in a variety of bilateral environmental efforts, great and small, with other nations directed primarily to the acquisition and sharing of environmental knowledge through joint research and technical exchanges. The most far-reaching of these is the U.S.-U.S.S.R. environmental cooperation agreement of May 1972. Other environmental exchange and research programs are under way or under discussion with countries in every region of the world.

REGIONAL ORGANIZATIONS

A growing part in the world's environmental affairs is being played by longstanding regional organizations of governments,

especially those in the more highly industrialized world. Among these are the 23-member Organization for Economic Cooperation and Development (OECD), the 15-member North Atlantic Treaty Organization (NATO), and the 32-member U.N. Economic Commission for Europe (ECE). The United States is a member of all these organizations. In addition, environmental cooperation is on the agenda of the Conference on Security and Cooperation in Europe (CSCE), scheduled to convene in July 1973.

The first of these regional efforts to be organized (November 1969) was NATO's Committee on the Challenges of Modern Society (CCMS). It was established to "improve ... the exchange of views and experience among the Allied countries in the task of creating a better environment for their societies and to consider specific problems of the human environment with the deliberate objective of stimulating action by member governments." This initiative stemmed from a proposal by President Nixon, on the occasion of NATO's 20th anniversary, to create within the Atlantic alliance "a social dimension, to deal with our concern for the quality of life in this final third of the twentieth century." In its first three years CCMS has launched more than a dozen projects on the environmental problems arising from industrialization and techniques for solving them.

The ECE environmental effort is in the hands of a group called "Senior Advisers to ECE Governments on Environmental Problems," created in 1971 when a major ECE environmental symposium was held in Prague. Stalled for two years by East-West differences over the status of the German Democratic Republic, the Senior Advisers held their first meeting in April 1973. It is hoped that they will focus on practical environmental problems of the region, such as pollution of the Baltic and Black Seas.

In 1970 the OECD formally entered the environmental field by converting its Committee for Research Cooperation (which, over its 10-year life, had published a number of studies in water pollution, sewage technology, and urban transport) into a new Environment Committee. Its emphasis is on the international economic and trade implications of environmental policies and actions of member countries. OECD's work in this field is more extensive than that of any other international body.

Europe's environmental problems have provided the impulse to joint efforts by such other regional groups as the European Economic Community (Common Market), the Council of Europe, and —in Eastern Europe— the Council for Mutual Economic Assistance (CMEA). Nations belonging to the Northeast Atlantic Fisheries Convention signed a convention at Oslo in 1972 imposing strict controls on the dumping of wastes in international waters in the region. And the industrial nations of the western Mediterranean have initiated planning for a joint cleanup and maintenance of that highly polluted inland sea.

Beginnings of regional environmental cooperation have also appeared in the less-developed regions of the world, whose environmental problems are often different from those of the developed countries. Among the bodies involved are the U.N. Regional Economic Commissions for Latin America (ECLA), Asia and the Far East (ECAFE), and Africa (ECA), as well as the U.N. regional office in Beirut.

One aspect of the CCMS Road Safety Project is to develop experimental safety vehicles, such as this one built by the American Machine and Foundry Co.

Christian A. Herter, Jr., ... l Assistant to the Secretary of State for En... mental Affairs (left), Russell E. Train, ...rman of the Council on Environmental Quality ...), and Maurice Strong, Secretary Genera... U.N. Conference on the Human Environme... t during a break in the conference proceedings.

THE WORLD—AND THE UNITED NATIONS SYSTEM

At the global level, there is a profusion of diverse environmental activities; but the work of integrating and coordinating these activities has just begun.

There is scarcely a specialized agency in the U.N. system which has not in recent years turned some part of its attention to environmental concerns. When a U.S. Government study in 1970 suggested 45 possible environmental projects for global cooperation—ranging from atmospheric research to resource conservation—it was able to report that significant work in many of the areas was already under way in existing agencies, primarily those of the United Nations.

In addition, this worldwide environmental effort has begun to be reinforced by a growing body of international environmental law—including global treaties dealing with aspects of marine pollution, protection of endangered species, preservation of monuments and scenic treasures, etc.

The important missing ingredients in this picture have been clear priorities and overall coordination. For a growing number of governments and citizens, increasingly conscious of the unity of our vulnerable planet, it seemed essential that a way be found for the world's environmental problems to be viewed and dealt with as a whole. To this end there was convened in Stockholm in June 1972, after three years of intensive preparation, the first U.N. Conference on the Human Environment.

The conference was widely acclaimed as an extraordinary success. Attended by 113 governments, including every major power except the Soviet Union,* it adopted three documents of great importance:

—A Declaration on Human Environment, containing key principles of international law on the responsibilities of states regarding the environment.

—An "action plan" containing 109 recommendations, addressed to governments and international organizations, for worldwide action on an immense range of environmental subjects such as controlling marine pollution, monitoring the global atmosphere, saving endangered species, and training environmental experts.

—A recommendation, soon afterward adopted by the U.N. General Assembly, to establish a United Nations Environment Program and an Environment Fund. Thus, there was created the first world center to promote and coordinate the whole range of international environmental action.

The need for such a center had long been clear to students of the United Nations sys-

* The Soviet Union and several of its allies refused to attend because of disagreement over the status of the German Democratic Republic (G.D.R.). However, they followed the preparations and proceedings closely, and the Soviet Union, as well as the G.D.R., Czechoslovakia, and Poland, were elected to the new Governing Council for the Environment.

tem. This system embraces, in addition to the U.N. proper, more than a dozen specialized and economic agencies, each with its own policymaking body and each commanding an impressive international array of expert talent in its area of competence: health, food and agriculture, education-science-culture, labor, trade, ocean shipping, aviation, weather, telecommunications, atomic energy, development aid, etc. Although machinery has long existed to coordinate their activities, it has never worked well. This segmentation of effort, necessary as it is for many purposes, becomes an obstacle when needs arise that cut across old jurisdictional lines. Such a need is environmental protection.

The U.N. Environment Program (UNEP) and the Environment Fund came into being on January 1, 1973. Maurice Strong of Canada, the Secretary General and guiding spirit of the Stockholm conference, was elected by the U.N. General Assembly to be the first Executive Director of UNEP. He and his small Environment Secretariat staff will be headquartered in Nairobi, Kenya. Policy guidance will be provided by a 58-nation Governing Council, whose first session took place June 12-22 in Geneva.

The Environment Fund—first proposed by President Nixon, who suggested an initial $100 million in "startup assistance" for the first five years—began in early 1973 to receive voluntary contributions pledged by member governments. The United States has indicated its readiness—subject to congressional action—to contribute 40 percent of the five-year total on a matching basis. The Fund will finance, wholly or in part, all new environmental initiatives within the U.N. system.

A key feature of the new organizational structure is an Environmental Coordinating Board. Chaired by the UNEP Executive Director, it includes ranking officials from the secretariats of all the specialized agencies and other U.N. bodies concerned in the implementation of environmental programs. The U.N. resolution creating this machinery adds an appeal to governments "to ensure that appropriate *national* institutions shall be entrusted with the coordination of environmental action, both national and international."

ACTIVITIES OF NON-GOVERNMENTAL ORGANIZATIONS

One important aspect of UNEP's coordinating role is "to secure the effective cooperation of, and contribution from, the relevant scientific and other professional communities from all parts of the world." In so doing it will seek advice from the International Council of Scientific Unions (ICSU) and its Scientific Committee on Problems on the Environment (SCOPE). This committee has become a major world focal point for interdisciplinary research in environmental sciences.

In addition to the scientific community, many other nongovernmental bodies contribute to various phases of the world environmental effort. Some, like the International Union for the Conservation of Nature and Natural Resources and the World Wildlife Fund, are recognized by the United Nations and many governments for their expertise in particular environmental fields. Some are business and industry groups, such as the International Chamber of Commerce, which has made valuable studies on the linkage between environmental protection and international trade and investment. Many are public interest organizations, claiming no special environmental expertise but deeply interested as good citizen groups in advancing the cause through public education. Their activities, as well as those of the press, other information media, and educators, have contributed mightily to the launching of the international environmental movement.

It will take time to sort out and coordinate all the international bodies now active in the area of environmental quality. Whether UNEP as now constituted can do the job—whether its efforts will receive sufficient backing from governments—remains to be seen. It is a pioneering step toward rational management of the world environment, and the wide backing for its creation is a good augury.

Chapter III ENVIRONMENTAL KNOWLEDGE—Prerequisite to Action

If the interactions of modern man with his environment are to be properly managed, a vital prerequisite is knowledge. So urgently do nations today feel the need for environmental knowledge of all kinds, and for better means of acquiring it and putting it to work where it is needed, that knowledge-oriented programs make up the great body of current international environmental activities.

The need for environmental knowledge is of several kinds. *Research*, basic and applied, is needed to supply knowledge that today does not exist. Better *information exchange* processes are required to locate existing data and deliver it when and where it is needed. Environmental *monitoring* is needed for two purposes: to provide the continuous "information feedback" essential to all environmental management systems and to help scientists and decisionmakers identify the world's emerging environmental problem. *Training and education* programs are needed to impart environmental learning and specialized skills to technicians, decisionmakers, and the general public.

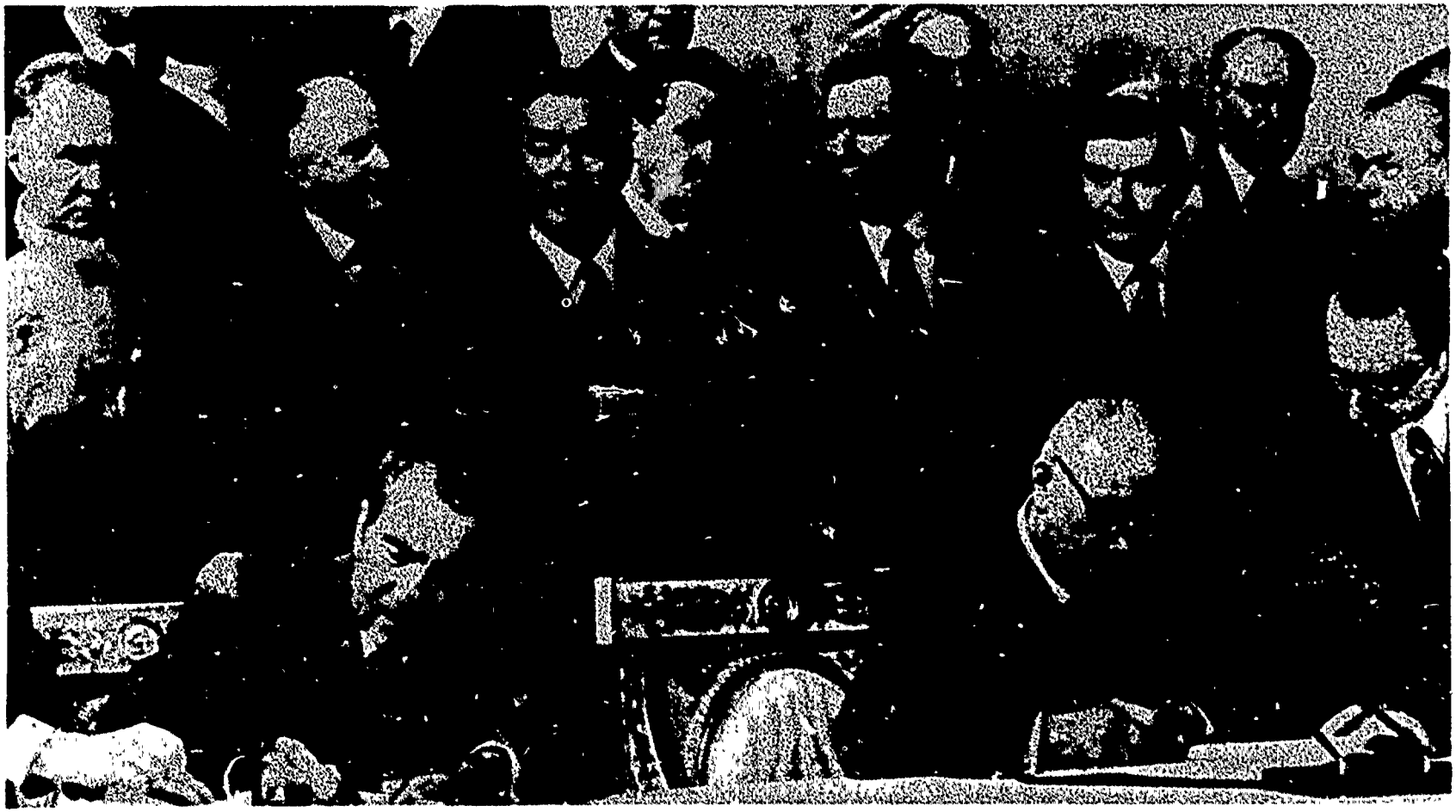
RESEARCH AND INFORMATION EXCHANGE

When governments feel the need for more knowledge to guide them in a task of environmental control, it matters little to them whether enlightenment comes fresh from the laboratory or from a dusty library shelf in Leningrad or Cambridge. Thus, environmental research and exchange of environmental information—although the organization of them is in many respects separate—can be considered here together.

Bilateral Activities

Some of the most important cooperation in fostering and exchanging scientific knowledge takes place at the bilateral level. This is eminently true of the most comprehensive bilateral environmental agreement yet made—the Agreement on Cooperation in the Field of Environmental Protection, signed by President Nixon and Soviet President Podgorny in Moscow in May 1972.

Four months after the signing, a U.S. delegation, chaired by Russell E. Train (Chairman of the Council on Environmental Quality), visited the Soviet Union, toured the Irkutsk-Lake Baikal area and the Yakut Republic—both areas of unusual environmental interest seldom seen by Americans—and worked out a program of 30 projects in 11 agreed subject areas. Detailed plans for the first of these, dealing with conservation of plants and wildlife, were settled in January 1973 for implementation during the year. In March, two additional projects were blueprinted; one deals with water pollution control in Lakes Baikal, Tahoe, and Superior, as well as in selected industrial river basins; the



President Nixon and Soviet President Nikolai Podgorny sign the Agreement on Cooperation in the Field of Environmental Protection in Moscow in May 1972.

Pesticide pollution is becoming one of the world's major environmental problems. This scientist is conducting chemical research to identify pesticide residues for the U.S. Environmental Protection Agency.
Photo courtesy of the U.S. Environmental Protection Agency

other concerns control technology for stationary and transportation sources of air pollution.

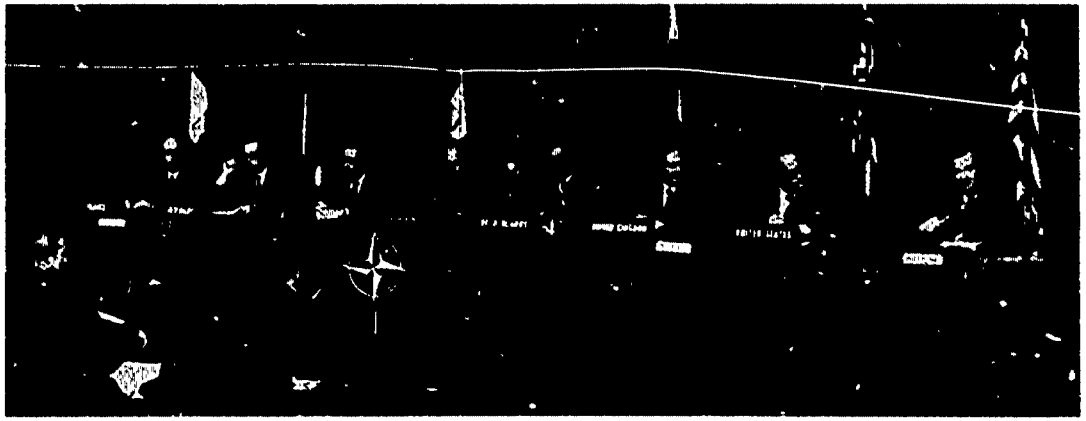
Projects in other major fields are scheduled to begin soon. They include metropolitan air pollution in St. Louis and Leningrad; industrial air pollution control; reduction of pollution from transportation; agricultural pest control; feedlot pollution; wind erosion; effects of pollutants on forests and crops; planning for environmental quality in Atlanta, San Francisco, and Leningrad; design of new communities; construction and waste disposal in permafrost areas; pipeline transport through permafrost; tundra ecosystems; parks and other reserved areas, including Yellowstone and the Caucasian State Preserve; prevention and cleanup of oil discharges in the marine environment; effects of pollutants on marine organisms; biological and genetic effects of pollutants on man; effects of pollutants on climate and systems for monitoring and assessing them; cooperation in research on polar ice; climatic effects of upper atmosphere contamination; earthquake prediction; integration of U.S.-U.S.S.R. tsunami (Pacific tidal wave) warning systems; and comparison of legal and administrative systems for environmental protection. In addition, a symposium scheduled for September 1973 will examine methods of setting standards on pollution discharges and environmental disruptions in order to protect the biosphere as a whole.

This unique agreement came about as a

constructive response to an unusual situation: two major industrial powers, separated by a long history of political tension, now desiring to work together on matters of common interest. Both sides have impressive scientific and technical capabilities and can learn much from each other. In fact, the whole world stands to benefit, for the two parties have agreed—in keeping with usual American policy—to share the results of their cooperation with others.

Conspicuous among our other bilateral environmental knowledge programs is a longstanding arrangement with Japan, the world's third largest economy and in recent years its fastest growing—in pollution as well as in industrial output. The U.S.-Japan program received a stimulus in the summer of 1970 as a result of serious air pollution emergencies in cities in both countries. It now includes projects on air and water pollution, solid waste management, automobile emission controls, and advanced sewage treatment. A further broadening of the agreement has recently been under discussion.

Altogether, agencies of the U.S. Government have engaged in recent years in bilateral environmental knowledge programs involving more than 50 nations in every region of the world. A recent addition to the list is the People's Republic of China, whose program of bilateral exchanges with the United States includes visiting delegations from China to study U.S. water conservation and nonchemical methods of pest control.



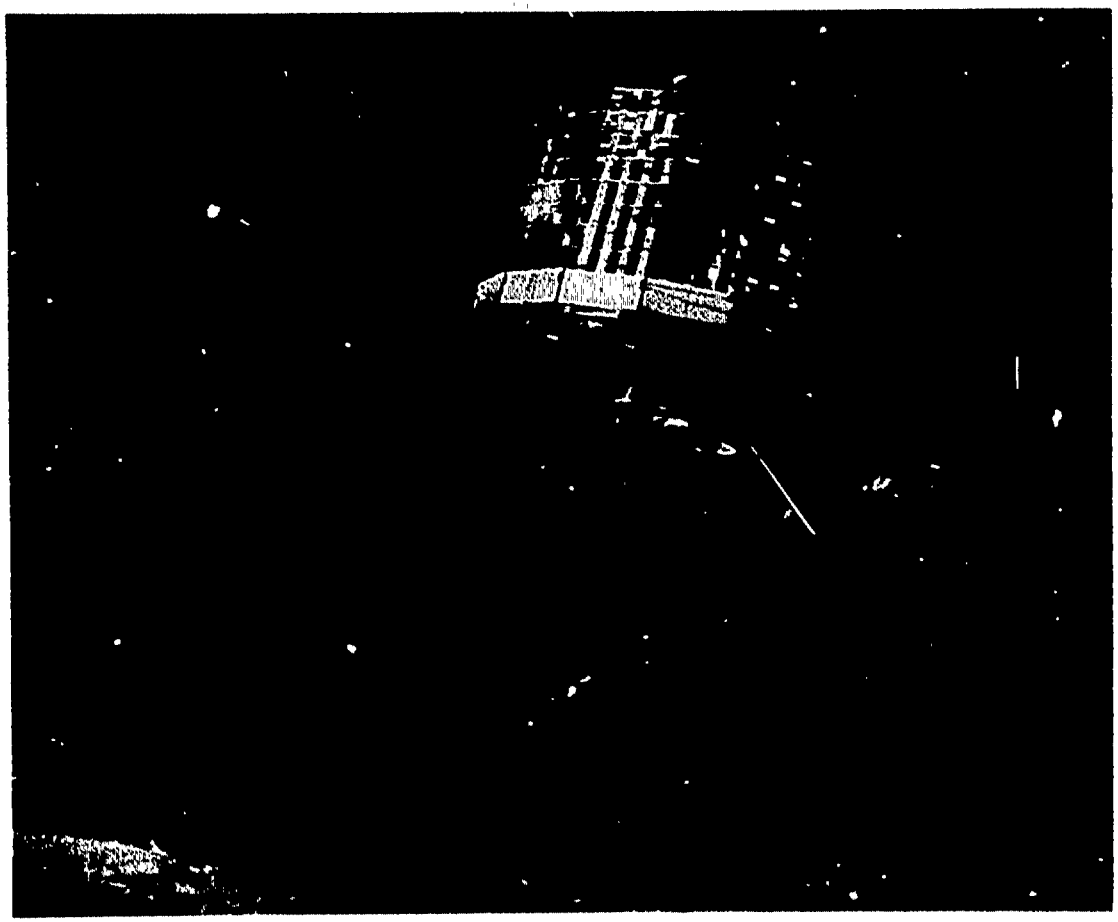
The six major automobile-producing NATO nations sign a memorandum of understanding on clean engine development in 1972 at Brussels. Robert Fri, Deputy Administrator of the Environmental Protection Agency, signed for the United States. At extreme right is Russell E. Train, Chairman of the Council on Environmental Quality and U.S. Representative to CCMS.

Regional Activities

Generating and exchanging environmental knowledge, with a view to common action, is the major emphasis of NATO's Committee on the Challenges of Modern Society and of the OECD Environment Committee. Some idea of the scope of their work in this area can be gathered from a few of the activities in which they have been engaged.

In the field of *motor vehicles*, CCMS has been promoting development of "clean engine" technology since 1971, when experts from 11 nations held a conference on electrical, gas turbine, hot air, and other advanced systems. In late 1972 six NATO automobile-producing nations signed a memorandum to promote closer collaboration in this area. OECD has created an "ad hoc group on the impact of the motor vehicle on the environment" to study automotive noise and exhausts and the economics and technology of control.

In the field of *air pollution*, CCMS has launched technical studies of urban air quality problems in Frankfurt, Ankara, and St. Louis. OECD is engaged in a series of cost-benefit studies on controlling air pollution from power plants and other stationary sources; fluoride pollution from the aluminum, iron, and fertilizer industries; long-distance transport of sulphur pollution; and statistical modeling for long-term air pollution forecasting.



Launched in December 1963, this Tiros VIII meteorological satellite orbits the Earth once every 115 minutes at an altitude of 790 nautical miles. One of 21 U.S.-launched meteorological satellites, Tiros VIII transmits cloud-cover photographs to thousands of receiving stations worldwide.
Photo courtesy of NASA

In the field of *water pollution*, CCMS has projects underway on inland water quality management (Canada) and advanced municipal waste water treatment (United Kingdom). OECD has been studying techniques and costs of pollution control in the pulp and paper industry, eutrophication (exhaustion of available oxygen) in fresh water and programs to control it, recycling of polluted water, and the impact of rising pollution on international river management systems.

In the field of the *urban environment*, CCMS joined in a conference in Indianapolis in May 1971, called by the United States on the theme "Innovation in the Cities." Several new CCMS projects resulted, including one on advanced health care and one on ways to modernize and expedite urban transportation. The OECD "urban environment sector group," now two years old, is engaged in an ambitious study program covering ways of controlling the environmental impact of urban growth, effects of investment in urban transportation, and improved techniques of urban planning and management.

Global Activities

At the world level, the acquisition and exchange of environmental knowledge has been fostered for years by a number of U.N. agencies and the scientific community. Some major instances:

—The World Weather Watch, inaugurated in 1967 by the World Meteorological Or-

ganization (WMO), uses weather satellites and other advanced technology to improve weather observation and forecasting. This later led to a Global Atmospheric Research Program (GARP) to study basic processes of global weather formation.

—A Long-term and Expanded Program of Ocean Exploration and Research (LEPOR), coordinated by the Intergovernmental Oceanographic Commission under the auspices of the U.N. Educational, Scientific and Cultural Organization (UNESCO), has been supplemented by a Global Investigation of Pollution in the Marine Environment (GIPME) involving several U.N. specialized agencies and nongovernmental scientific bodies.

—An International Hydrological Decade, under UNESCO auspices, has been under way since 1965 to coordinate research on conservation of water resources.

—As one upshot of a 1968 UNESCO conference of scientists on "rational use and conservation of the resources of the biosphere," that specialized agency launched in 1970 a wide-ranging international scientific research program on "Man and Biosphere" (MAB). Its aim is to improve understanding of the functioning of the biosphere and of man's interactions with it, stressing those problems (chiefly terrestrial) not covered by other on-going research.

Backing up such efforts by intergovernmental bodies are the world's nongovernmental scientific resources represented chiefly by SCOPE, which in addition carries on its own research program in other key environmental areas such as energy.

For all these research and information efforts, it is the U.N. Environment Program itself that must be the world's focal point. It has been given a direct coordinating responsibility for those parts of the total research effort that are carried on within the U.N. system. In addition, one of UNEP's first priorities is to speed the creation of a key facility recommended by the Stockholm conference: an "international referral service" for sources of environmental information. This service, a compact unit using advanced computers located in Geneva, will be designed to direct inquiries from governments and other institutions on any environmental question to the best existing sources of information wherever they may be. It will be a global switching point for putting the right environmental knowledge in the right place at the right time.

GLOBAL MONITORING

Environmental monitoring provides a continuous "readout" of data on environmental changes and trends, a type of information essential to environmental control. Local water supplies must be continuously monitored to detect and counteract any rise in concentrations of pollutants that could endanger health. Monitoring of major air pollutants has become a routine function of

New York City under smog in January 1940.
Fairchild Aerial Survey

government in cities and signals emergencies that require a shutdown of pollution sources.

Environmental monitoring will increasingly perform these functions at the international scene. Wherever an international environmental control system is contemplated, for example to control pollution of the seas, provision must be made for monitoring in order to assure compliance and continuously assess results.

But monitoring also serves a longer-range use. Long after today's data on air pollution in Los Angeles or Tokyo have been forgotten by the authorities responsible for pollution alerts, this and similar information will be part of a vastly larger, more permanent mosaic of knowledge. Scientists the world over will have at their disposal the long-term, year-by-year trends in air, water, and terrestrial pollution from every ocean and continent; will correlate these trends with trends in man's technological activity; and will study their effects on the Earth's natural processes, on its living species, and on man himself. Monitoring data are in this sense essential raw material for basic environmental research—leading in turn to new awareness of what future controls will be needed.

The monitoring program recommended at Stockholm will embrace major systems to keep watch over the atmosphere, the oceans, terrestrial ecosystems, human health, and food. Some parts of these systems already exist, but they must be augmented and coordinated. A world ocean monitoring network will have to be built, based partly on the Intergovernmental Global Ocean Station System (IGOSS) recently created as a tool for basic oceanographic research. A world system of 100 atmospheric monitoring stations and 10 baseline stations to measure long-term global trends is being planned by the World Meteorological Organization. Such systems are expected to receive financial support from the U.N. Environment Fund.

In some fields, such as marine pollution and crop diseases, monitoring systems are expected to use the most advanced remote-sensing technology, such as Earth Resources Technology Satellites (ERTS), the first experimental model of which, launched by the United States in 1972, has already yielded impressive results.

TRAINING AND EDUCATION

In the final environmental knowledge function—education and training—the normal level of action is local or national; but international efforts are an essential supplement, especially for developing countries.

For some environmental specialties, such as industrial water pollution control and biological pest control, experts in most developing countries are few or nonexistent. Equally important, those who make major economic decisions in government or industry must acquire sufficient background to help them perceive the environmental implications of their work. Most broadly of all, the people as a whole need to absorb the basic environmental facts and concepts in their educational system and through the public media.

The breadth of these needs—present and future—is reflected in the number and variety of the recommendations on training and education that emerged from the Stockholm conference. Training was recommended for nationals of developing countries in environmental planning in rural areas; wildlife management, nutrition, and parks; tropical marine studies: planning and management of human settlements and all aspects of pollution research, monitoring, and control. There was a special call for establishment of regional environmental training facilities and for training in how to integrate environmental values into development planning.

The Stockholm conference brought forth

proposals also on environmental education for the general public, "in school and out of school." To promote public involvement in the cause, an annual World Environment Day was proclaimed by the U.N. General Assembly in 1972. The day is June 5, the anniversary of the convening of the Stockholm conference.

One international agency, UNESCO, plans to promote international environmental training as part of its "Man and Biosphere" (MAB) program. Year-long interdisciplinary courses in major environmental fields are proposed—to serve the manpower needs of MAB research and to increase environmentally skilled manpower in developing countries. In addition, UNESCO's education programs will seek to help schools formulate better environmental curricula.

Aside from the work of international agencies, much environmental training and education for developing countries will undoubtedly take place bilaterally. For example, a 10-week experimental course in "Environmental Aspects of Industrial Development" was given in January-April 1973 at the University of North Carolina at Chapel Hill, under the sponsorship of the U.S. Agency for International Development (AID) and the U.N. Industrial Development Organization (UNIDO). The course instructed 29 senior policy officials from 18 developing countries of Asia, Africa, and Latin America.

Such training programs as this are no more than opening skirmishes in a protracted battle against environmental ignorance. To help meet the expected demand, AID has begun to maintain an inventory of environmental training facilities in the United States which can also serve the international community. But training of foreign nationals in the United States is not always the best solution, and an important need in future years will be to expand facilities—national and regional—for environmental training within the developing countries themselves. A significant part of the work of the U.N. Environment Program will be aimed at this objective.

WATCHING OVER THE EARTH

To sum up the unifying aim of all the environmental knowledge functions, the Stockholm conference coined a new word: "Earthwatch." Its simple premise is that if we wish to control our massive interactions with our environment we must know much better than we do today what those interactions are. Only then can we follow their changes from day to day, impose workable, cost-effective controls where they are required, and keep a continuous watch for other perils that may emerge. Today's major international efforts to acquire and deploy the needed knowledge should incalculably strengthen our future capabilities for environmental control.

Chapter IV
CLEANER OCEANS—A World Objective

A principal reason for the environmental interdependence of nations, as we have seen, is that so much of the biosphere is beyond the sovereign jurisdiction of any nation. The oceans—covering 70 percent of the planet's surface, the teeming life in them, and the seabeds that underlie them—are a vast international commons, largely beyond the limits of national jurisdiction.

Environmental controls in ocean space have in recent years undergone rapid development. Three kinds of control problems are discussed in this chapter: pollution from ships, ocean dumping, and future exploitation of the seabeds.

What are the effects of marine pollution? Some are all too obvious: the ruin of beaches, the killing of large numbers of sea and shore birds in major crude oil spills and of fish in fuel oil spills. Fish and shellfish heavily polluted with industrial mercury killed at least 51 people in Minamata, Japan, in the 1950's and caused brain damage to 200 more. Some widely used persistent compounds, of which DDT is the best known, concentrate in the bodies of marine organisms and are known not only to inhibit reproduction in birds and crabs but believed also to inhibit photosynthesis in the microscopic phytoplankton which are at the base of the marine food chain.

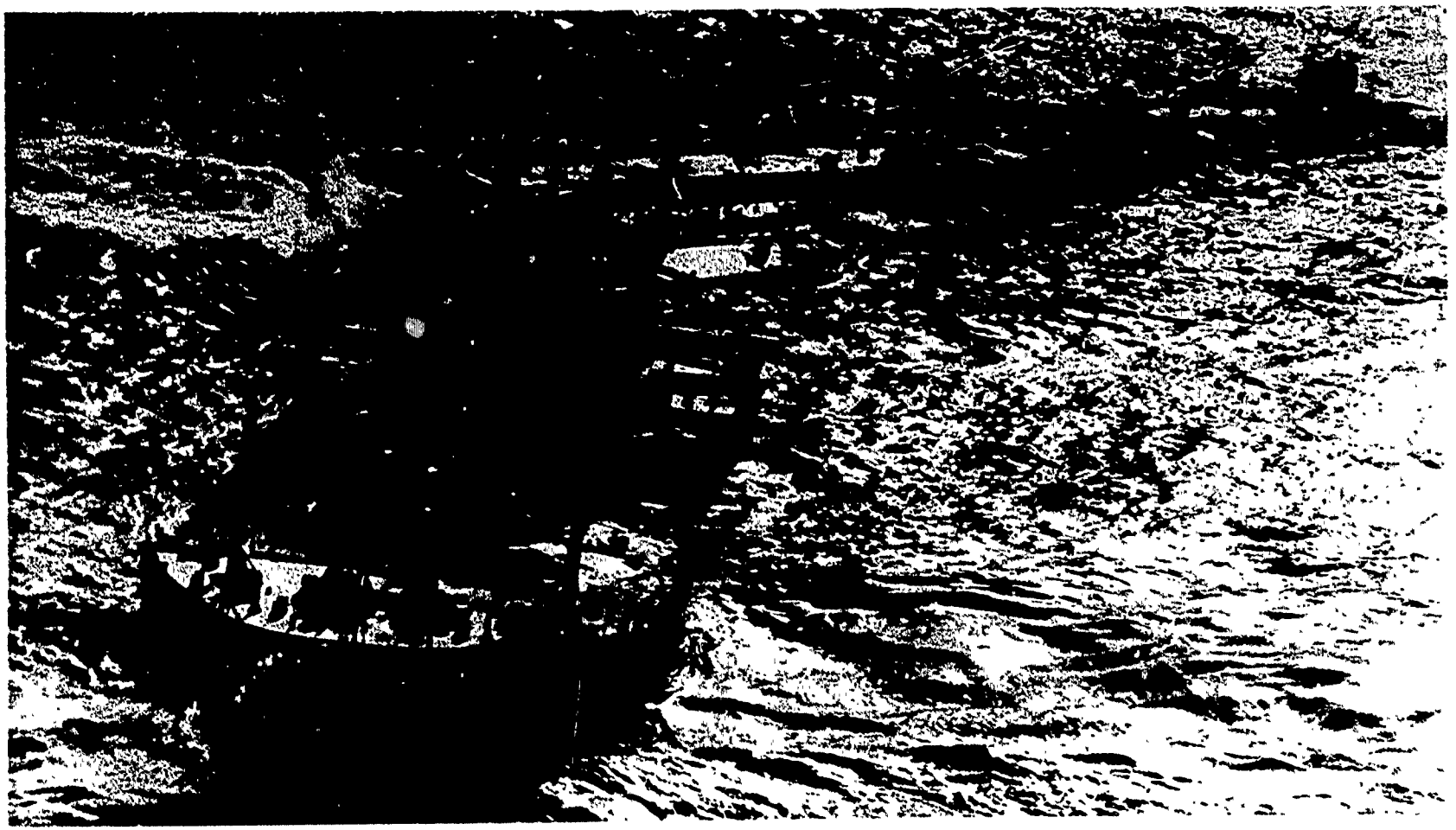
Only years of further research and monitoring can shed light on the full effects of man's growing intrusions into the cycles of marine life. But enough has already been learned to make clear the urgency of better controls—a point well expressed in this statement commended to governments by the Stockholm conference:

"The marine environment and all the living organisms which it supports are of vital importance to humanity, and all people have an interest in assuring that this environment is so managed that its quality and resources are not impaired. This applies especially to coastal area resources. The capacity of the sea to assimilate wastes and render them harmless and its ability to regenerate natural resources are not unlimited. Proper management is required and measures to prevent and control marine pollution must be regarded as an essential element in this management of the oceans and seas and their natural resources."

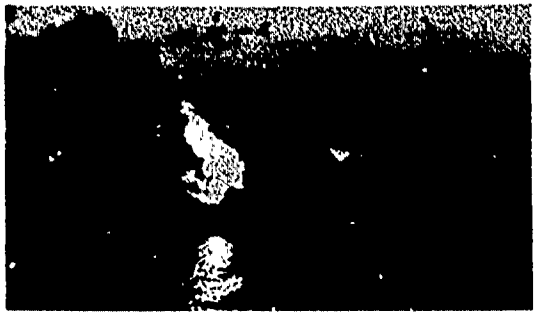
OIL POLLUTION FROM SHIPS

Petroleum, usually in the form of crude oil, is the most notorious of marine pollutants. Spectacular disasters, like the spilling of 700,000 barrels of oil from the stricken tanker *Torrey Canyon* off the British coast in 1967 and the major oil leaks from drilling operations in the Santa Barbara (California) Channel in 1969, have dramatized a pollution menace that grows from year to year.

Estimates vary widely on annual pollution



This aerial view shows the tanker Torrey Canyon *split in half on Seven Stones Reef off Land's End, England.*
World Wide Photos



Fires from eight leaking oil wells blazed for almost a month off the Louisiana coast in early 1970 before being extinguished by dynamiters. Meanwhile, thousands of barrels of oil leaked into and polluted Gulf waters, threatening oyster beds and fish in the area.
Photo courtesy of the Federal Water Pollution Control Administration, U.S. Department of the Interior

of the world's seas by oil. One informed estimate puts the figure at 5 million metric tons, nearly half from vessels and the rest from runoff of waste crankcase and industrial oil, refineries, and offshore drilling operations.*

The incidence of one major cause, deliberate and accidental oil discharges from ships (especially tankers), threatens to rise rapidly in coming years as tanker loadings continue to increase. Oilspills from ships thus become a prime target for control.

Spectacular tanker accidents actually account for only a minor fraction of the problem. Most spills are deliberate and routine—especially the discharge of oily water ballast and tank washings from tankers in midvoyage, accounting for about 1 million tons of oil pollution a year. It may well have been oil from this source that Thor Heyerdahl and his crewmates of the famous *Ra* expedition found floating in tarry lumps on the open ocean day after day as they sailed westward across the tropical Atlantic in 1969.

The first convention aimed at checking this menace was the 1954 Oil Pollution Convention, which established limits on the amount and rate of permissible oil discharges and the areas in which such discharges could occur. However, it did not adequately deal with the root of the problem, which lies in tanker design. Today's tankers, once their cargo is delivered, have only their oily cargo tanks in which to load saltwater ballast for the "empty" return voyage. The oily water must be discharged, and the tanks refilled with clean water, before touching port.

The discharge of oily ballast water can be controlled in various ways, including the use of "load-on-top" procedures to separate the oil and seawater during the return voyage. However, the only thoroughly effective solution is to build tankers with segregated, oil-free ballast tanks. This is precisely the approach advocated by the United States for the new 1973 Convention on the Prevention of Pollution from Ships to be adopted in October by the London-based Intergovernmental Maritime Consultative Organization (IMCO). The most significant provision under discussion would require segregated oil-free ballast tanks in all newly built tankers exceeding a certain tonnage level—an expense that should be repaid many times in cleaner seas. For other tankers, the convention would require stricter ballasting procedures and impose stricter discharge controls.

Meanwhile, through a number of proposed conventions written under IMCO auspices since the *Torrey Canyon* disaster, a start has been made on the problem of *accidental* oil pollution from shipwrecks, collisions, etc.

One of these is a Convention on Intervention on the High Seas in oil pollution

* The largest source of all, fallout of fuel exhaust products from the atmosphere, is not included in this estimate.

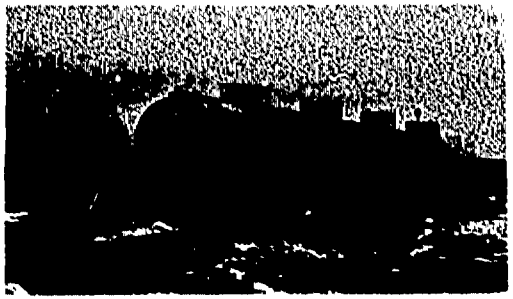
disasters, conferring on a state threatened by such a disaster near its coast the right to take reasonable preventive action—even to to the point of destroying the stricken vessel.

Two further conventions provide international means of compensation for oil pollution damage by tankers, whether accidental or not. Still another would regulate the arrangement and maximum size of tanks in all newly built tankers. The October 1973 IMCO conference will consider even more stringent preventive ship design, including a proposal by the United States that tankers utilize double bottoms as a means of minimizing oil discharge following strandings.

Finally, in 1972 IMCO members negotiated a convention modernizing the rules of ship traffic control and port safety. This step should cut down maritime groundings and collisions, of which 70 percent occur in or near seaports.

DISCHARGE FROM SHIPS OF OTHER HARMFUL SUBSTANCES

While the carriage of oil at sea poses the most serious present threat to marine life and coastal areas, the carriage of other noxious substances by ships pose similar dangers. Steps are being taken within IMCO to control operational discharges from ships of harmful substances other than oil. The IMCO Legal Committee is devising ways of expanding the conventions on liability and intervention on the high seas to such substances. The 1973 Ship Pollution Convention will include



Hundreds of thousands of gallons of commercial waste acids, aboard this barge in giant drums, pour into the Pacific Ocean some 10 miles off the California coast in 1970.
Photo courtesy of the California Regional Water Quality Control Board

comprehensive controls on chemical tanker construction, carriage and release of noxious substances, and the discharge of sewage and garbage.

Ocean Dumping

A quite different pollution problem arises from the transportation of waste matter out to sea for the express purpose of dumping it. This method of waste disposal is used by many countries and accounts for a significant fraction, perhaps 10 percent, of all man-made pollutants entering the seas. Worse, it includes —in addition to bulky dredge spoils and sewage sludge—some of the most toxic of all wastes: highly radioactive materials, heavy metals such as mercury and cadmium, and an immense variety of chemical compounds whose effects on marine life are not well understood.

Through the 1950's and 1960's, as urban-industrial growth progressed in the world's coastlands and as land dumping sites began to fill, ocean dumping steadily increased. In 1970 President Nixon, on the advice of his newly created Council on Environmental Quality, took note of this trend and recommended to the Congress that the United States impose strict controls on ocean dumping from American shores and, in addition, seek to conclude a convention extending similar controls worldwide. Both these objectives were reached in 1972: the first when the Marine Protection, Research, and Sanctuaries Act of 1972 became law; and the second when more than 30 nations (as of June 1973) signed the Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter—better known as the Ocean Dumping Convention. It was submitted to the U.S. Senate in early 1973, and hopes are high for the early achievement of the 15 ratifications necessary to bring it into force.

The heart of the Ocean Dumping Convention is a commitment by governments to prohibit dumping at sea by vessels or aircraft proceeding from their territory, or under

their control, of certain highly toxic substances and to permit dumping of other matter only under special or general permits. The term "at sea" includes external territorial as well as international waters. Among the substances prohibited are mercury and cadmium, organohalogens (a large class of persistent compounds such as DDT), highly radioactive wastes, crude oil and various petroleum products, persistent plastics that float, and biological and chemical warfare materials. Special permits are required to dump somewhat less harmful materials such as compounds of arsenic, lead, copper, and zinc. All other dumping will require a general permit. All "permit" dumping is to be regulated as to substance, place, time, and quantity, with a view to safeguarding the marine environment and its uses. Parties are to inform each other through a central secretariat on what, where, when, and how much is dumped under their authority. Each party has the duty to prevent violations and punish violators and accepts the principle of responsibility for environmental damage to others—the key principle of the Stockholm Declaration on the Human Environment.

As scientific knowledge of the oceans improves, the convention's lists of prohibited and restricted items will be revised. Knowledge on many such questions is constantly evolving. What happens, for example, to organic materials below a mile of ocean? One clue was obtained by chance a few years ago after a small research submarine operated by the Woods Hole Oceanographic Institute accidentally sank in 5,000 feet of water and was raised 10 months later. The only casualty, fortunately, was a box lunch which, on recovery, was found to be untouched by decay. From this the Woods Hole scientists deduced that seawater under the extreme pressure of great depths takes many years to recycle organic wastes. Only further research can explore the implications of such clues for large-scale deep-ocean dumping.

In addition, the convention encourages parties in particularly vulnerable ocean regions to enter into regional antidumping conventions, with rules that may be more stringent than those of the global convention; and parties to that convention, but lying outside the region, are committed to act consistently with such regional rules. One such convention is the Northeast Atlantic (Oslo) ocean dumping convention of 1972.

SEABED POLLUTION

As new environments are opened up to exploration and use, they are also opened up to pollution. A major case in point is the seabed and ocean floor, a vast international realm with immense, but largely uncharted, resources of metal and petroleum.

It is now likely that before the end of the 1970's, metallic nodules, rich in manganese, nickel, copper and cobalt, will be mined from the international seabeds at a rate of millions of tons a year. Remote-controlled drilling for oil and gas under the seabeds is also an early prospect.

When the question of peaceful use of the international seabed was raised in the United Nations in 1967, prevention of pollution and safeguarding of the biological and chemical balance of the oceans were among the principles urged by the United States and other countries. And when President Nixon proposed in 1970 the creation of an international seabed regime to formulate and administer rules for the orderly exploitation of this huge realm, he included prevention of pollution among its purposes.

The establishment of such an international seabed regime is one major project on the agenda of a wide-ranging U.N. Conference on the Law of the Sea, scheduled to convene in New York in November 1973 and to complete its work in 1974 or 1975.

To sum up, the global war on ocean pollution has begun primarily in two specific sectors: oil pollution from ships, especially tankers, and ocean dumping from the land. Most of the international agreements recently negotiated in this field already have, or will probably soon have, their counterparts in U.S. domestic law. Thus, from this country's

point of view, this growing body of international environmental law simply extends to other nations standards of environmental protection of the seas comparable to those which the United States is prepared to accept for itself.

As noted earlier, most man-made sources of ocean pollution lie outside the scope of present international efforts. The Ocean Dumping Convention explicitly notes the most neglected sources in its preamble: "dumping and discharges through the atmosphere, rivers, estuaries, outfalls and pipelines." Article I pledges the parties to "individually and collectively promote the effective control of *all* sources of pollution of the marine environment." In principle, therefore, wherever damaging wastes enter the sea—be they garbage from the city dump, fallout from New York's hydrocarbon smog, or dirty oil from automobile crankcases—such pollutants are fit subjects for eventual governmental control if necessary to protect the quality of the living ocean. But which of these other sea pollution problems the nations will next feel the need to tackle together, and through what machinery they will do so, are questions for which only speculative answers exist today.

Meanwhile, whatever progress national governments make on their own in controlling sources of air and water pollution will not only serve their national environmental goals but will also help to reduce the pollution burden of the oceans.

Discharge from this sewer treatment plant enters the South Platte River near Denver, Colorado.
Photo courtesy of EPA-DOCUMERICA Bruce McAllister

Chapter V
MANAGING THE LAND ENVIRONMENT

Man's terrestrial habitat, although comprising less than three-tenths of the Earth's surface, receives the first brunt of environmental damage from cities and farms, mines and factories. The major burden of controlling this damage is borne, of course, by national governments, their subdivisions, and their citizens—with the international community playing a secondary role.

Yet that international role is of great and growing importance. Elsewhere in these pages many instances are described in which knowledge, training, and technical aid are shared internationally so that nations can better manage environmental problems on their own soil. In other situations, such environmental management operations are beginning to be conducted at least partly at the international level. This chapter describes four examples of such activities in which the United States is involved:

1. Protecting the shared water and air resources of neighboring countries, particularly in North America.
2. Protecting many hundreds of living species whose survival is threatened by international trade.
3. Preserving genetic materials of countless forms of life useful to man, especially plant varieties, which might otherwise become extinct.
4. Safeguarding natural and cultural sites of exceptional value in man's heritage.

NEAR NEIGHBORS, SHARED RESOURCES

Between the United States and Canada lies the largest single expanse of fresh water in the world—the Great Lakes, a connected system covering 94,000 square miles and draining into the Atlantic through a major international waterway, the St. Lawrence River. An International Joint Commission (IJC), comprised of representatives of Canada and the United States and created in 1909, oversees the maintenance and use of this vast system as well as of other waters along the international boundary.

The Great Lakes receive a major share of effluents from the fast-growing industrial heartland of North America. The widely reported "death" of Lake Erie may be an exaggeration; but the serious deterioration of the Great Lakes has clearly rendered whole areas unusable for swimming and drinking and uninhabitable for fish.

A six-year study of this problem by the IJC culminated in the United States-Canadian Great Lakes Water Quality Agreement, signed by President Nixon and Prime Minister Trudeau in April 1972. It is probably the most far-reaching international water pollution abatement program ever launched. Its long-term objectives are to free the Great Lakes and the international part of the St. Lawrence River from toxic substances; excessive amounts of phosphorous nutrients; oil, debris, and other floating pollutants; and

objectionable odors, colors, and sludge deposits. It prescribes strict standards and timetables for action by each of the two governments. In 1972, the first year of the agreement, some $85 million was spent on the U.S. side under its terms. A binational committee under the IJC is overseeing fulfillment.

Recently the IJC initiated two other important U.S.-Canadian environmental projects. The two countries have agreed to coordinate action on water quality in the area of the St. John River, which flows for 100 miles along the border between Maine and the Province of New Brunswick, which is threatened by pollution from logging, pulp mills, and potato processing plants in its drainage area. The IJC has also made a report, published in October 1972, on air pollution across the international boundary, with action recommendations to both governments. Action on the U.S. side is expected to be administered under the Clean Air Act.

Between the United States and Mexico a difficult water resource problem arises with respect to the salinity of the Colorado River as it enters Mexico. By a 1944 treaty, which also deals with border sanitation problems, the United States undertook to deliver annually for use in Mexico 1.5 million acre-feet of Colorado River water. This arrangement worked until the early 1960's, when a large irrigation and drainage project upstream in Arizona increased the salinity of the waters to a level where Mexican farmers complained that they were unusable. Despite repeated remedial efforts on the U.S. side, the problem remains.

Scientists in this National Water Quality Laboratory on Lake Superior seek to determine methods to diagnose pollution-caused fish-kills and the quality of water that fish and their food organisms require to produce a "crop." Results of their findings will be made available internationally.
Photo courtesy of the Federal Water Pollution Control Administration, U.S. Department of the Interior

When Mexico's President Luis Echeverría visited President Nixon in Washington in June 1972 a joint communique was issued announcing that the United States would take further steps immediately to relieve the salinity problem and that President Nixon would appoint a special representative to investigate and propose a "definitive solution." The special representative, Herbert Brownell, Jr., has made recommendations to the President for dealing with the problem which were conveyed to President Echeverría by Secretary of State Rogers during his visit to Latin America in May 1973.

PROTECTING ENDANGERED SPECIES

On a wall in New York's Bronx Zoo is a mirror, fronted by symbolic iron bars, beneath which passing members of the species *Homo sapiens* may read this:

YOU ARE LOOKING AT THE MOST DANGEROUS ANIMAL IN THE WORLD. IT ALONE, OF ALL THE ANIMALS THAT EVER LIVED, CAN EXTERMINATE (AND HAS) ENTIRE SPECIES OF ANIMALS.

The extinction of species is a phenomenon literally as ancient as the hills. But modern man—that most adaptive, creative, and destructive of all species—has alarmingly accelerated the process. More than 100 species of birds, mammals, and other vertebrates are known to have vanished over the past century—one famous American example being the passenger pigeon, extinct since 1914, flocks of which once darkened the skies and abundantly supplied the dinner tables of eastern North America.

The same fate now threatens many hundreds of other species: animals, plants, insects, and even micro-organisms. Some endangered species have been too aggressively hunted for their meat or feathers or skins; some are needlessly slaughtered as pests; others are victims of man-made changes in their habitats.

What have we lost when a species becomes extinct? Sometimes it is an economic resource—a food fish such as the Atlantic sturgeon, a fur such as the ocelot's, a wild game preserve visited by tourists. It can be a national symbol—the bald eagle. Sometimes it is no more—and no less—than a fellow creature with which men feel the kinship of living things.

But a much broader and significant consequence may ensue; it involves that law of ecology by which the stability of any ecosystem—be it forest, jungle, or prairie—depends on the diversity of its species. When any species is eradicated from a complex ecosystem, its former prey and rivals increase, its predators and parasites either die away or find other prey, and to that extent the whole system is destabilized. To reduce man's alarming pressure on the diversity of species is, in a real sense, to defend the biosphere itself.

International concern over living species began on a modest scale generations ago. Many migratory species are the object of protective measures throughout their range by international treaty. And a number of commercially important species inhabiting international waters—fish and marine mammals—are also protected, and their annual catch regulated, by international convention.

Unfortunately, such regulation has often proved ineffective. A major instance is the depletion of the world's whale population despite the protective machinery of the 12-nation International Whaling Commission (IWC). Although some members, including the United States, have outlawed commercial whaling, other countries have continued and have increased their catch in recent years by the use of modern "factory ships." The issue was raised at the 1972 Stockholm conference, which recommended a 10-year moratorium on all commercial whaling. This recommendation was rejected by the IWC, which, however, agreed to add three whale species to the prohibited list and to reduce the permissible catch of several others.

That action did not end the whaling controversy, which promptly merged with a larger issue to which it is related: the need to control international trade in endangered species. This larger question had been pursued also during the preparations for the Stockholm conference, when strenuous efforts were made to complete a new international convention on the subject.

A leading role in this cause was taken by Kenya, whose wild game preserves are a source of national pride and a major tourist attraction. Its efforts, combined with those of the International Union for Conservation of Nature and Natural Resources (IUCN) and of the United States and other countries where illegal importation of endangered

Several African governments have adopted strict laws and procedures to protect their wildlife, such as these giraffes, wildebeests, and zebras, by establishing protective refuges, such as this one in Kenya.
Photos courtesy of the Agency for International Development

COUNTRIES WHICH HAVE SIGNED THE CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA:

COUNTRY	*DATE SIGNED*
ARGENTINA	MARCH 3
BELGIUM	MARCH 3
BRAZIL	MARCH 3
CHINA, REPUBLIC OF	APRIL 27
COSTA RICA	MARCH 3
CYPRUS	MARCH 3
DENMARK	MARCH 3
FRANCE	MARCH 3
GERMANY, FEDERAL REPUBLIC OF	MARCH 3
GUATEMALA	MARCH 3
IRAN	MARCH 3
ISRAEL	MARCH 5
ITALY	MARCH 3
JAPAN	APRIL 30
KENYA	APRIL 30
LUXEMBOURG	MARCH 3
MALAGASY REPUBLIC	APRIL 4
MAURITIUS	MARCH 3
MOROCCO	MARCH 9
NIGER	MARCH 5
PANAMA	MARCH 3
PARAGUAY	APRIL 30
PHILIPPINES	MARCH 3
SOUTH AFRICA	MARCH 3
SUDAN	APRIL 27
SWEDEN	APRIL 3
SWITZERLAND	APRIL 2
TANZANIA	APRIL 30
THAILAND	MARCH 3
TOGO	MARCH 7
TUNISIA	MARCH 21
UNITED KINGDOM	MARCH 3
UNITED STATES	MARCH 3
VENEZUELA	MARCH 3
VIET NAM, REPUBLIC OF	MARCH 3

species has long been a problem, reached an important milestone when the Convention on International Trade in Endangered Species of Wild Fauna and Flora was completed and opened for signature in Washington, March 1973. By April 30 it had been signed by 35 countries (see box). Its early entry into force is expected.

The convention will require signatory states to impose strict controls on the export, import, or reexport of specimens—or recognizable parts—of endangered animal and plant species listed in three appendices. Species listed in Appendix I—about 400 animal and 45 plant species, all seriously endangered—require export and import permits for any international shipment. Each export permit must certify that the shipment will not endanger the species' survival, violate the laws of the exporting country, or risk cruelty or injury to a living animal. Import permits may not be issued where the intended use is primarily commercial. Somewhat less stringent rules apply to the more than 250 species listed in Appendix II—those whose numbers must be watched lest they too be threatened with extinction. Appendix III will contain lists of species with respect to which any member country feels the need to control export from its own territory and desires cooperation of the other parties to that end. Simple procedures are provided for amending all three appendices.

The list of seriously endangered animal species in Appendix I reads like a passenger list of Noah's ark. It includes the Indian

elephant, the zebra, the gorilla and orangutan, the vicuña, the Bactrian camel, the bald eagle, the California condor, and the peregrine falcon. It also includes 25 species and subspecies of the cat family—tigers, leopards, panthers, cheetahs, ocelots, lynxes; 5 kinds of whales; 12 of deer; 4 of rhinoceros; 9 of kangaroo; 17 of monkeys; 7 of lemurs; 12 of crocodiles; 5 of alligators; 18 of turtles; 4 of frogs; 26 of molluscs; 8 of fishes; 25 of parrots; 19 of pheasants; and 8 of cranes. In addition, 45 seriously endangered plant species are listed, including several Central American orchids and 5 varieties of the South African aloe, a plant famous for medicinal uses.

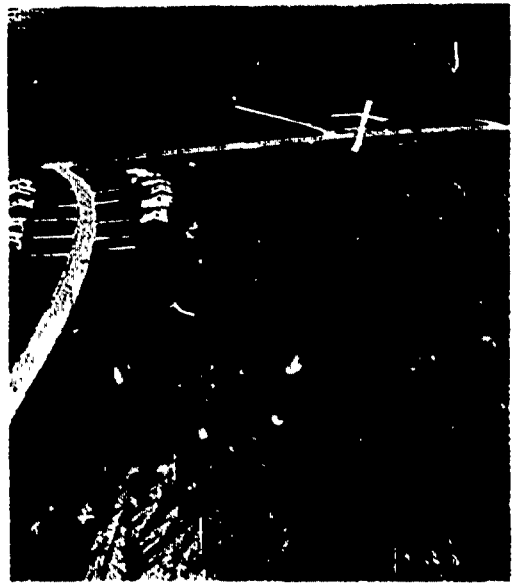
Enforcement will remain the task of national governments, but they will have the support of an international secretariat—the new U.N. Environment Secretariat will probably be given the job—and of scientific and conservation organizations the world over.

In the United States the Lacy Act of May 25, 1900, has long since forbidden the importation of any species taken in violation of the law in its country of origin. Flaws in this act, however, have hampered enforcement. In early 1973 the President submitted to the Congress new legislation to strengthen Federal enforcement powers in this field. Meanwhile, until the proposed legislation and the convention become effective, U.S. authorities plan to show special vigilance lest unscrupulous traders use the convention's appendices as a "shopping list" for animals soon to be unavailable.

SAFEGUARDING THE WORLD'S GENETIC TREASURY

If uncontrolled international trade were the only threat to the survival of living species, the convention described above might suffice to solve the problem. But a still greater threat is the relentless encroachment of civilization—cities and factories, farms, mines, timber cuttings, etc.—on natural ecosystems throughout the world.

This trend has long been of deep concern to specialists in such fields as ecology, botany, and genetics. If permitted to continue unabated, it could cause deterioration or collapse of important ecosystems and the extinction of many genetic strains of great importance in agriculture, animal and fish breeding, medicine, and industry. Particularly in the agronomy that underlies the "green revolution" and in the vast monoculture that is the basis of so much agricultural production in the United States, the availability of primitive genetic stocks for constant development of new high-yield hybrid strains is vitally important to the world's food supply.



Inadequate controls and no stabilization of the land (foreground) caused area around this housing subdivision in Omaha, Nebraska, to erode after a number of years. In contrast, the background appears cultivated with crops, trees, and undergrowth.

Photo courtesy of the Soil Conservation Service, U.S. Department of Agriculture

U.S. plant pathologist Dr. Norman E. Borlaug was awarded the Nobel Peace Prize in 1970 for his work in developing a new variety of wheat seed. Conservation of genetic resources is important as a means of incorporating desirable characteristics into new strains.

Aware of this situation, scientists from the United States and other countries, working with the U.N. Food and Agriculture Organization (FAO) and UNESCO's "Man and Biosphere" program, have devised ambitious international plans for the worldwide collection, preservation, and sharing of genetic material from all kinds of living species, especially plants.

These plans were endorsed by the 1972 Stockholm conference and are now entering the implementation phase. They call for a five-year emergency world program for collecting wild plant species already known to be endangered. Worldwide surveys will be made to determine which other genetic resources also need protection. Inventories will be made of the world's existing genetic collections. New national and regional conservation centers will be established for rare and endangered plant varieties. Protection will be given to certain natural areas rich in wild plant and animal species. Conservation centers for insect species are planned, with an eye to further development of biological pest controls. Research is planned on animal and fish breeding. To link these activities together and assure efficient sharing of the results, it has been proposed that an international genetic resources liaison unit be created within the U.N. system.

The entire plan, if it can be brought to fruition, will be an unprecedented strategic effort to preserve the millions of life forms which are an irreplaceable element of our resource heritage.

A WORLD HERITAGE TRUST

Some resources are important not for man's physical needs but for his spirit; not to be "used" or consumed but to be visited and witnessed. These are the "wonders of the world"—some created by nature, such as the Grand Canyon and East Africa's Serengeti Plain; others by man, such as Angkor Wat and the Acropolis.

To promote the safekeeping of such treasures—many of them threatened by natural or human action—President Nixon proposed in 1971 the creation of a "World Heritage Trust." This proposal took a step toward realization in 1972 when UNESCO members approved by a large majority the text of a proposed "convention concerning the protection of the world cultural and natural heritage." It would establish a list of recognized sites and a system of voluntary international aid to signatory states that need help in protecting or restoring such sites. Although the outlook for early activation of the convention is not yet clear, the negotiation of a widely approved text is an important step forward.

NATIONAL RESPONSIBILITIES

In the situations just described, the immemorial right of sovereign nations to act as they wish inside their own borders has proved an insufficient guide in coping with modern environmental challenges that transcend purely national jurisdiction. It seems likely that the list of such situations will grow longer as national and international interests in the uses of the land environment continue to evolve.

It remains to be seen, for example, whether separate national actions will suffice to hold to acceptable levels the land-based air and water pollutants—from city, factory, farm, and highway—that bulk so large in the threat to the world's oceans. Article I of the Ocean Dumping Convention pledges the parties to act on these problems. In the United States alone, scores of billions of dollars will be spent in the years just ahead on automobile emission controls, sewage treatment plants, industrial effluent controls, low-pollution public transportation, etc. Other industrial—and industrializing—countries are taking similar action, spurred primarily by a new concern for the future quality of life within their own borders.

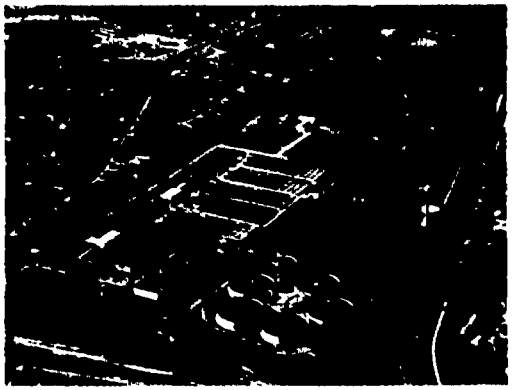
Some further international steps to the same broad purpose were recommended by the Stockholm conference:

—River basin commissions should be formed wherever two or more nations share a single river system.

—A world registry of "clean rivers" should be established, with agreed criteria of purity and scientific studies of effects in relieving ocean pollution.

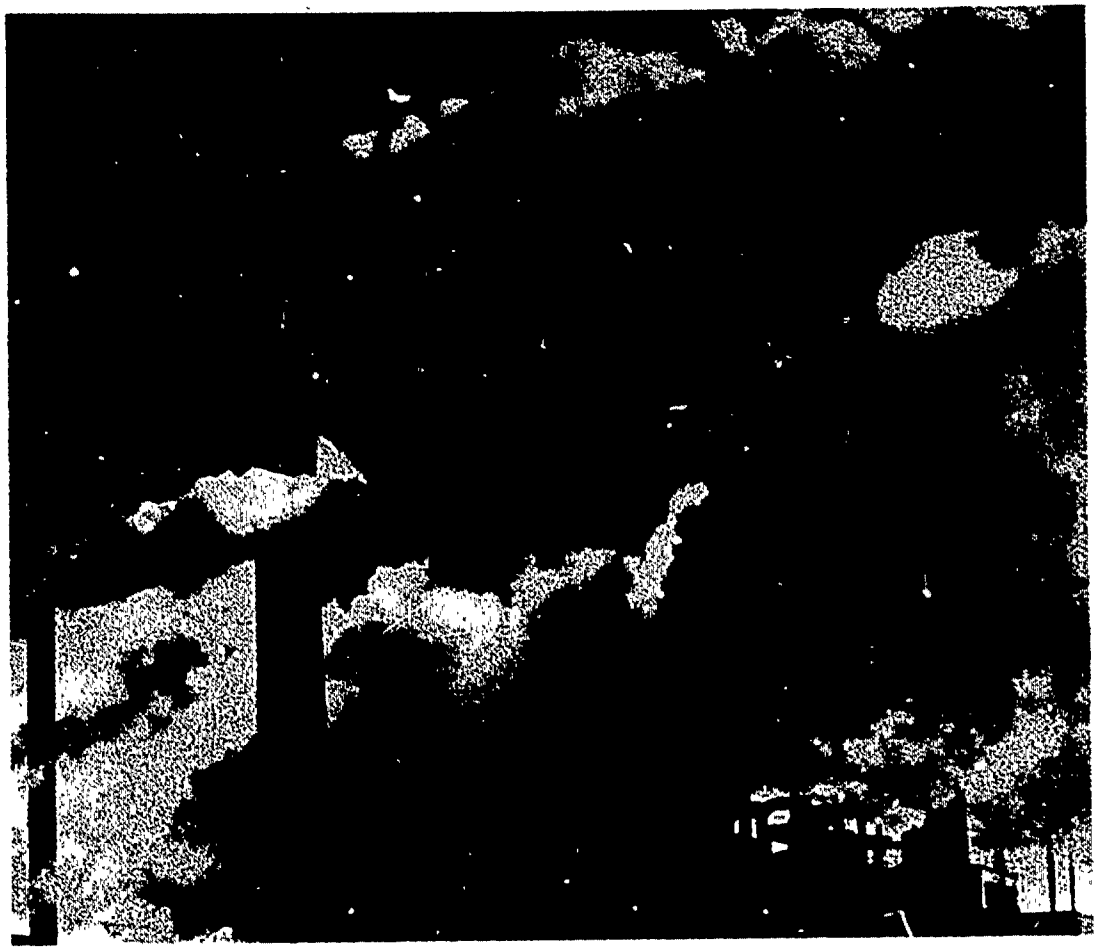
—International fishery management programs should be improved, and nations should cooperate through the United Nations to control pollution of estuaries and marshes where important food fish breed.

Still other international concerns are inherent in the problems of nonrenewable resources. Although the vast bulk of the world's known reserves of fossil fuels and mineral ores lies within the sovereign control of nations, these reserves are the finite patrimony of the whole world. The Stockholm conference called for a U.N. study by 1975 of world energy sources, technologies, and trends to help provide "a basis for the most effective development of the world's energy resources, with due regard for the environmental effects of energy production and use." Much international discussion will undoubtedly be needed before this question receives a lasting answer.



Millions of dollars are being spent every year to develop new methods for waste disposal. This modern sewage treatment plant in Sacramento, California, is one of several near the city.
Photo courtesy of the Bureau of Reclamation, U.S. Department of the Interior

Chapter VI
THE ECONOMIC DIMENSION—Costs and Values



Only a generation ago, smoke from an industrial plant symbolized progress—today it is also a warning of environmental degradation.

"Heaven knows how to put a proper price upon its goods," wrote Thomas Paine two centuries ago. "What we obtain too cheap, we esteem too lightly."

Paine's great theme was national independence, but his words could apply with equal force to the goods of nature. For generations our forebears blithely assumed that there was no limit to the earth's capacity to absorb and recycle the wastes of civilization. Economists generally viewed pollution, when they thought of it at all, as an "external cost," not reckoned in the cost of production. While production and consumption grew in geometric progression, most of the accumulating damage to air, water, and land went unnoticed and unrepaired.

Now that age of environmental innocence is over. The United States alone expects to spend some $287 billion during the 1970's—about 2 percent of our gross national product—to pay off environmental debts of the past and begin to put our national environment on a pay-as-you-go basis. All the high-technology nations in the world, and some developing nations as well, have set foot on the same road.

Each nation has the right to decide its own environmental priorities in the light of its national values and the costs it can afford; but there are at least two economic reasons why such national decisions cannot always be made in isolation. One concerns international trade and investment. The other concerns the international role in the development of nations.

ENVIRONMENTAL COSTS AND WORLD TRADE

As the public demand for a cleaner environment rises, the effort required to meet this demand becomes a significant item in the cost of manufacturing. This is true whether the demand is for low-pollution *products*, such as automobiles with clean exhaust, or for low-pollution manufacturing *processes*. Such industries as steel, paper, electric power, petroleum, and chemicals produce in the course of manufacture a great variety of noxious byproducts whose recycling or safe disposal is a serious and expensive problem.

A manufacturer is generally content to pay these environmental costs—and to reflect them in setting prices—provided his competitors are required to do the same. But if he has foreign competitors who receive government assistance to help pay for these costs or are subject to less stringent national pollution laws, or to none at all, he may understandably complain of unfair competition. Demands for compensating trade barriers or export subsidies may arise; or manufacturers may find that it pays to build their factories in foreign "pollution havens."

Such a competitive trend entails obvious perils, both economic and environmental. For the sake of fair play as well as of a clean environment, it has become important for the environmental factors affecting international trade and investment to be governed by some sort of agreed rules.

In 1970 this complex question was tackled initially by the new Environment Committee of the OECD, whose 23 members account for two-thirds of world trade. The following year OECD adopted an "early warning" system under which member governments receive notice of each other's environmental laws and regulations governing the use of chemical substances and may consult concerning any economic or trading problems that they cause.

Then, in May 1972, OECD adopted a set of "guiding principles" on environment and trade. Most basic is the "polluter pays" principle, which calls upon member countries to require that the polluter—not the government—bear the costs of industrial pollution controls, so as to avoid "significant distortions in international trade and investment." Also, common standards are to be sought on polluting products that are traded internationally so as to avoid creating new barriers to trade. Finally, the principle was accepted that governments "should seek harmonization of environmental policies" (although allowing

for differences in circumstances) and should "strive toward more stringent standards." Observance of these guiding principles should encourage countries to adopt adequate pollution controls without fear of thereby placing their industries at a competitive disadvantage in international markets.

OECD's acceptance of the need for harmonizing environmental standards among nations was particularly welcome to the United States, whose Water Pollution Control Act of 1972 includes a provision calling on the President to work toward that very objective. At U.S. initiative, the Environment Committee took a further important step in this direction in January 1973 by adopting an ambitious program aimed at (1) encouraging greater use of available health and environmental effects data in setting control standards and (2) the development of common operational policies to control the release of toxic pollutants into the environment. In addition it was agreed to study differences in national controls over three major types of pollution—effluents from the pulp and paper industry, fuel burning in factories and power plants, and eutrophication of lakes—to assess the extent to which the principle of harmonization of standards would be justified so as to avoid significant distortions in international trade that might result from such differences. Finally, the question of how to administer environmental standards for products moving in international trade is being pursued to assure that such standards do not become a new species of nontariff barriers.

MAKING DEVELOPMENT "CLEAN"

Not very long ago in this nation's history—and in that of every industrial nation—smoke belching from factory stacks was a bright omen of progress. So it is today in most of the world, where the highest priority now goes to conquering poverty through development.

Yet the gospel of "growth at any cost" has begun to be questioned in many developing nations. There is a new awareness of the need to plan not only for quantity but also for quality; for such social values as employment, housing, health, and education, and for environmental quality as well. This consciousness was markedly increased by the 1972 U.N. Conference on the Human Environment in Stockholm.

Many Stockholm recommendations were addressed to national and international development assistance agencies; in particular, they were urged to "assist the less-industrialized countries in solving the environmental problems of development projects." And the United Nations was asked to keep in mind, during its 1973 midterm review of progress in the Second Development Decade, the relevant environmental recommendations adopted at Stockholm.

As of early 1973, the two development assistance agencies that are probably most advanced in their approach to environmental values are also the two largest: the International Bank for Reconstruction and Development (IBRD) and the U.S. Agency for International Development (AID). In 1972 the IBRD issued a basic guidebook on "environmental, health, and human ecologic considerations in economic development projects." For each of 16 types of projects—agricultural, irrigation, iron and steel, mining, petroleum, paper, transport, utilities, etc.—the book lists dozens of pertinent questions on potential environmental impact. A set of guidelines for industrial projects covers the resource and pollution problems involved in every step from obtaining the raw material to disposing of the used-up product. The aim is to enable the IBRD and its clients to weigh all such implications before undertaking a loan project. The guidebook has attracted wide notice among international development authorities.

Since 1971, the U.S. development assistance program under AID has called for an environmental analysis for proposed capital development projects which might have significant adverse environmental effects. Beginning in 1970, AID required that all feasi-

bility studies financed or assisted by AID include provision for analysis of environmental factors. In addition, AID is preparing environmental checklists, similar to those prepared by the IBRD, to be used by development project planners and AID officials in the developing countries. AID's guidelines cover 13 types of projects from industrial and power plants to highways and hospitals. The Agency has also issued a series of publications which have dealt with, among others, problems of chemical and other methods of pest control, economics of aquatic weeds, technological solutions to desert encroachment, and environmental problems of developing countries.

How effective are these efforts? The IBRD has been known to withhold a loan until environmental problems in the original proposal were taken care of. The government of one African country insisted on redesign of a factory (financed by another country) after AID field representatives had pointed out what its pollutants would do to nearby waters. But it will take years of effort by governments, international agencies, and private businesses before such small successes begin to add up to basic environmental reorientation of the development process in all countries.

The first crucial step, however, has been taken. That step is worldwide awareness of a new concept: the unity of environmental protection and economic well-being. This concept was expressed at the Stockholm conference by the chief American delegate, Russell E. Train, in these words:

"Perhaps it is time for the economist and ecologist to move out of the separate, cramped intellectual quarters they still inhabit, and take up residence together in a larger house of ideas—whose name might well be the House of Man.

"In that larger house, the economist will take full account of what used to be called 'external diseconomies' such as pollution and resource depletion, and he will assign meaningful values to the purity of air and water and the simple amenities we once foolishly took for granted. He will develop better measures of true well-being than the conventional gross national product. The ecologist, in turn, will extend his attention beyond the balance of nature to include all those activities of man's mind and hand that make civilized life better than that of the cave dwellers. Both will collaborate to advise the planners and decisionmakers—so that cities and countryside of the future will promote the harmonious interaction of man with man, and of man with nature; so that resources will remain for future generations; and so that development will lead not just to greater production of goods but also to a higher quality of life."

Chapter VII CONCLUSION—The End of the Beginning

In these pages we have briefly examined a host of activities, aimed at environmental quality on land and sea, in which the United States has joined with other nations around the world. Nearly all these activities are new to the international scene and to American foreign policy. They promise to grow in importance in the years to come, because they respond to basic imperatives of our technological age.

We have seen that today's environmental needs cannot be fully met by nations acting alone. All nations are bound in a complex, global fabric of interdependence—the flow of pollutants across frontiers and from land to international seas; the dependence of all mankind on a finite base of resources; the impact of environmental costs on prices in international trade; and the need of all nations, especially developing nations, to import environmental skills and technology from abroad.

Measured by the enormous scale of the American commitment to environmental improvement here at home, our country's efforts abroad in the same cause appear as a very small ingredient in the mix. But it is a vital ingredient. If it succeeds it will go far to assure the future integrity of the world environment on which all nations depend—and will permit our national fight on pollution to go forward without unfair competition from polluting industries abroad. In the process it will also create new overseas markets for the pollution control technologies in which this country is a world leader.

There is no question but that environmental quality today is far lower in the scale of priorities of most countries than it is among the industrial nations of the non-Communist world. But the trend is upward. The Moscow bilateral agreement reveals a vastly increased emphasis on the environment in the Soviet Union. Brazil, until very recently openly skeptical about world environmental cooperation, played a leading part in the success of the Stockholm conference. Developing nations such as Kenya, Iran, and Singapore have already contributed valuable initiatives to the environmental cause.

It appears probable that environmental protection—a discipline dedicated to enhancing the quality of human life—will find a permanent place among those profoundly interrelated causes on which man's hopes depend: the cause of international peace; of human rights and political justice; of material, social, and cultural development; and of slowing down the dangerously accelerating growth in world population. Like all such causes, that of the world environment cannot be won quickly or without major efforts. The most that can be said today is that the nations of the Earth have recognized their common environmental need and have begun to act, separately and together, to see that the need is met. The American people and their Government, who have a major stake in this cause and have contributed much to its beginnings, seem certain to play a prominent part in its continuing advance.