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ABSTRACT

This second annual report examines in depth two fundamental aspects of environmental quality: economics and legal developments. It also reviews the status of and trends in environmental quality and developments, particularly among the states, since the publication of the first annual environmental quality report. A number of environmental problems in the inner city are discussed. (Author/CP)

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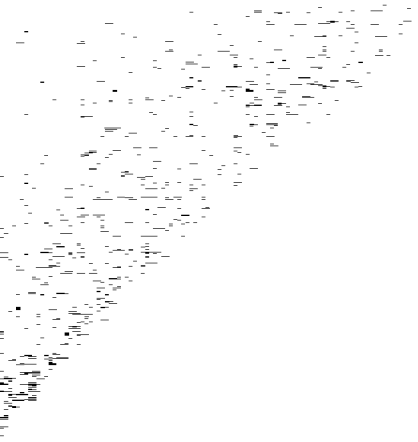

publications of the
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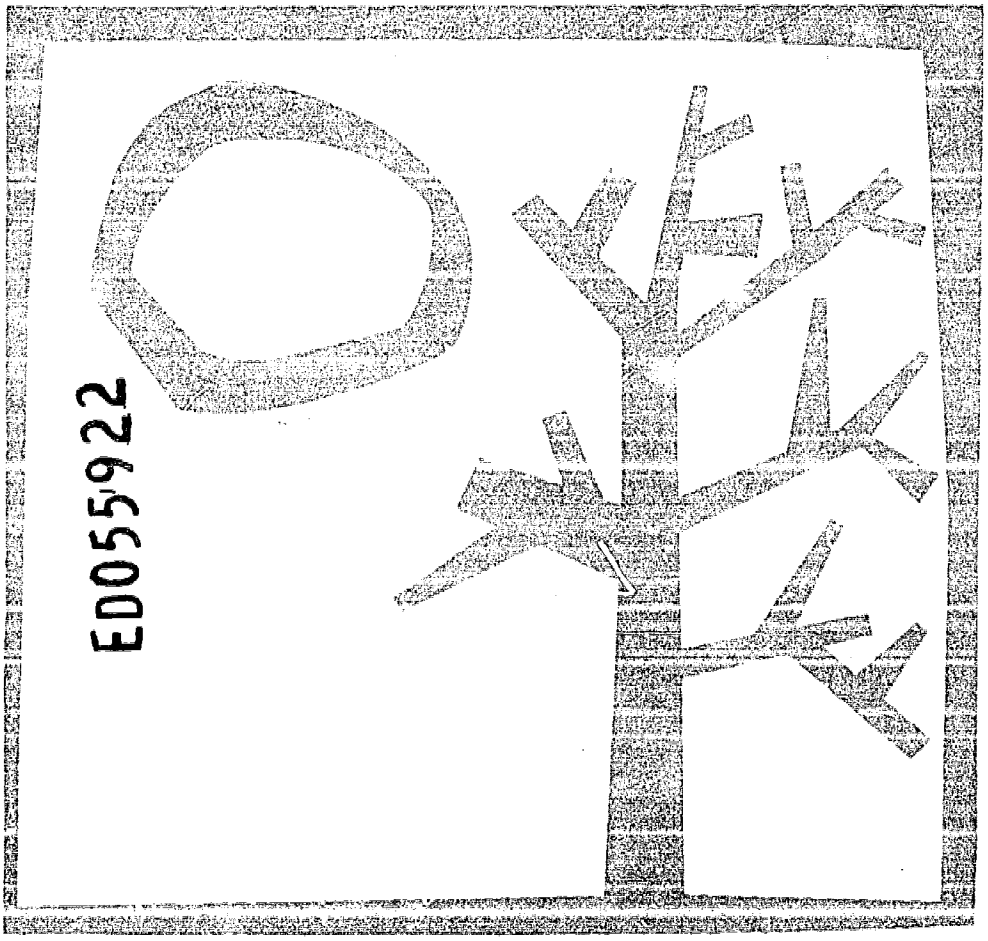

environmental quality

the second annual report of the council on environmental quality august 1971

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the president's message

the president's message

To the Congress of the United States:

The First Annual Report of the Council on Environmental Quality, which I submitted to the Congress one year ago, described our principal environmental problems and set out in broad outline the directions in which I felt we should be moving. Now, as I submit to the Congress this second annual report, I am pleased to be able to say that we have made considerable progress towards achieving our environmental objectives during the past 12 months.

During the past year we have launched many initiatives to implement the broad recommendations contained in the first annual report. At the Federal level we have proposed sweeping legislative programs to the Congress, we have taken vigorous actions within the executive branch, and we have achieved increasingly effective cooperation with other nations. The States have likewise moved to meet environmental challenges with wide-ranging institutional changes and more effective laws.

While we still have a long way to go before we meet our ultimate objectives, it is important to emphasize that we are making substantial progress. For example, there is evidence that the air in many of our cities is becoming less polluted, although the data is still incomplete. Total emissions from automobiles and the use of persistent pesticides are going down. On the other hand, there is no basis for complacency, as the level of total pollutants in our environment is still rising.

We will continue to face difficult obstacles as we work to make our surroundings more liveable and more enriching. But even now we are demonstrating that our institutions *can* be made responsive to the need for environmental reform and that the quality of our environment *can* be substantially improved, if only we go about that task with sufficient will and sufficient energy.

1. reforming institutions—the first step

The barriers to long-range progress in the field of environmental improvement are serious and comp x and varied. Some are technological, some are economic, some are social, some are political. But among the most substantial barriers to progress in this area are those which are institutional in nature.

In my environmental messages of 1970 and 1971 and in my message accompanying the Council's first annual report, I emphasized the pressing need to reform the machinery through which government carries out its environmental programs. These reforms have been progressing rapidly at the Federal level. In the Executive Office of the President, environmental policy is now being developed by the Council on Environmental Quality, a group which has been working effectively to broaden our perspectives and sharpen our insights concerning the underlying causes of environmental problems and the best methods of solving them. The Council is also responsible for coordinating all Federal environmental programs and for seeing that environmental values are given full consideration by all Federal agencies as they make their own policy decisions.

To administer and enforce our pollution control laws, we have established a new Environmental Protection Agency, giving new muscle—on a day-by-day basis—to our commitment to a cleaner environment. EPA brings together under unified direction our air and water pollution programs and our efforts in the fields of solid waste management, noise abatement, pesticide regulation, and radiation standard-setting. Already, during the first half-year of its existence, EPA has provided vigorous new leadership in all these areas. Together, the Council on Environmental Quality and the Environmental Protection Agency provide a forceful institutional team for Federal environmental actions.

Finally, I have recommended to the Congress a new Department of Natural Resources with unified responsibility for energy, water and natural resource programs. Pollution control is not the only solution to the difficulties of our environment. We must also provide wide and coordinated management of all our natural resources so that man can live and work in greater harmony with the natural systems of which he is a part. I consider the Department of Natural Resources an integral element in our reform program and I again urge the Congress to approve this high priority proposal.

State governments are likewise moving boldly. From New York to Illinois to the State of Washington, the machinery for policy-making and for administration of environmental programs has been reformed and strengthened. As expected, the diversity of our country has been reflected in the many unique and innovative approaches that various States have taken to meet environ-

mental challenges. Vermont, for example, has already adopted a program of State-wide land use authorities and it plans to supplement its water pollution controls with effluent charges. New York, Washington and Illinois have created new agencies and combined old ones in an effort to relate more effectively the functions of government to the problems of the environment. Other States are also moving to approach environmental issues in a new way.

2. federal decision making—the new ground rules

The National Environmental Policy Act requires that Federal agencies take environmental factors into full account in all their planning and decision-making. It requires agencies to describe in writing the environmental impact of their major decisions—along with alternatives to these decisions—and to make these assessments public. This process has fostered a wide range of basic reforms in the way Federal agencies make their decisions. And while some agencies still have considerable room for improvement in the environmental field, many are doing an excellent job of responding to environmental concerns.

It is critically important that these new environmental requirements not simply produce more red tape, more paperwork and more delay. Nor is there any reason why this should happen. In fact, the efficiency and responsiveness of Government is enhanced when environmental considerations are an integral part of decision-making from the time when a project is first considered and not merely added as after-thoughts when most matters have already been decided.

In some cases, of course, environmental considerations will require the modification or termination of a project. This is why, for example, I ordered a halt to further construction on the Cross Florida Barge Canal, despite the fact that some $50 million had already been spent on this project. I concluded, after receiving the advice of the Council on Environmental Quality, that the environmental damage which would result from its completion would outweigh its potential economic benefits.

In the final analysis, the foundation on which environmental progress rests in our society is a responsible and informed citizenry. My confidence that our Nation will meet its environmental problems in the years ahead is based in large measure on my faith in the continued vigilance of American public opinion and in the continued vitality of citizen efforts to protect and improve the environment.

The National Environmental Policy Act has given a new dimension to citizen participation and citizen rights—as is evidenced by the numerous court actions through which individuals and groups have made their voices heard. Although these court

actions demonstrate citizen interest and concern, they do not in themselves represent a complete strategy for assuring compliance with the Act. We must also work to make government more responsive to public views at every stage of the decision-making process. Full and timely public disclosure of environmental impact statements is an essential part of this important effort.

3. the world community—new cooperation

In transmitting my second annual "Foreign Policy for the 1970's" message to the Congress, I said: "We know that we must act as one world in restoring the world's environment, before pollution of the seas and skies overwhelms every nation." I continue to believe that this challenge presents a great opportunity for United States leadership in international affairs.

The environmental concern that has been growing in this country has its counterpart in other nations. We have been encouraged to find that other governments are now acting to improve and expand their environmental activities and we have moved to cooperate with them whenever possible.

With Canada, for example, we are working to clean up the Great Lakes—and our joint efforts there may well become a model for regional cooperation in other areas of the world. With other nations, such as Japan and Mexico, we have also developed bilateral environmental initiatives. Within NATO's Committee on the Challenges of Modern Society we have reached agreement on the control of oil discharged by ships on the high seas. And in other international bodies—including the Organization for Economic Cooperation and Development, the Intergovernmental Maritime Consultative Organization and the Economic Commission for Europe—we are actively engaged in similar efforts.

The United States is playing an active role in the preparation for the 1972 United Nations Conference on the Human Environment. This Conference will bring the nations of the world together for the first time to develop global programs for environmental protection. It is our hope that this gathering will produce an important agreement on marine pollution, as well as the beginning of an effective international environmental monitoring effort. The Conference will provide an important opportunity for bringing all nations into the attack on the environmental problems of modern society, and it will offer an especially important opportunity for helping developing nations cope with the environmental problems associated with industrialization and urban growth.

4. the congress and the executive—a partnership for the environment

It is vitally important that the Congress and the administration work together to develop better environmental legislation, repairing old laws and creating new ones. I am pleased and gratified that many of the environmental programs which I have proposed to the Congress have been approved and are now being implemented.

The Congress presently has before it a number of separate bills and treaty actions which I discussed in my environmental message of February 8, 1971. In my judgment, these proposals represent the most wide-ranging and comprehensive legislative program for the environment in our entire history. They include:

Measures to strengthen pollution control programs

—Charges on sulfur oxides and a tax on lead in gasoline to supplement regulatory controls on air pollution.

—More effective control of water pollution through a $12 billion national program and strengthened standard-setting and enforcement authorities.

—Comprehensive improvement in pesticide control authority.

Measures to control emerging problems

—Regulation of toxic substances

—Regulation of noise pollution

—Controls on ocean dumping

Measures to promote environmental quality in land

—A national land use policy.

—A new and greatly expanded open space and recreation program, bringing parks to the people in urban areas.

—Preservation of historic buildings through tax policy and other incentives.

—Substantial expansion of the wilderness areas preservation system.

—Advance public agency approval of power plant sites and transmission line routes.

—Regulation of environmental effects of surface and underground mining.

Further institutional improvement

—Establishment of an Environmental Institute to conduct special studies and recommend policy alternatives.

Toward a better world environment

—Expanded international cooperation.

—A World Heritage Trust to preserve parks and areas of unique cultural value throughout the world.

This program is designed both to reinforce existing efforts and to attack newly emerging problems such as noise pollution and the dispersion of toxic substances. One particularly important

feature of this package of proposals is that it is geared to meet problems, such as ocean dumping, before they reach crisis proportions. It also seeks to supplement our present regulatory approaches by creating new economic incentives for the reduction of pollution. In addition, it emphasizes strengthened efforts by State government.

Some of these initiatives already have been the subject of congressional hearings, but none have yet been approved by the Congress. I again urge the Congress to act expeditiously and favorably on these important measures. The problems will not wait and we dare not drag our feet as we move to meet them.

Even while this Administration has been asking the Congress for strengthened enforcement authority, we have also been taking a number of other actions to crack down on pollution by using existing authority. In the course of this effort, we have moved against a wide range of polluters, including cities and towns, companies and individuals.

Operating under authority granted by the Refuse Act, for example, I have instituted a program requiring a permit for all industrial discharges into the Nation's waters. The issuance of such a permit is conditioned upon assurance that water quality standards will be achieved. I believe this mechanism represents an important new tool for achieving our national water quality objectives.

We are also requiring that Federal agencies spend the necessary funds to avoid pollution as a result of their own activities and, where necessary, to provide abatement facilities. Some 250 million dollars is included in my 1972 budget request for this purpose.

I have also consistently urged a stronger effort to encourage the better conservation and management of our natural resources. As one step in this effort, we have redirected Government procurement policies to encourage the increased use of recycled paper. And we are actively considering other, similar changes in procurement policy. Meanwhile, to help keep the evidence of our history intact for future generations, I have issued an Executive Order requiring the protection of historic properties by Federal agencies.

5. a sense of realism

All of these actions will help make our country a better place to live. But we should not expect environmental miracles. Our efforts will be more effective if we approach the challenge of the environment with a strong sense of realism. We should not be surprised or disheartened, for example, if some problems grow even more acute in the immediate future.

We must recognize that the goal of a cleaner environment will not be achieved by rhetoric or moral dedication alone. It will not be cheap or easy and the costs will have to be borne by each citizen, consumer and taxpayer. How clean is *clean enough* can only be answered in terms of how much we are willing to pay and how soon we seek success. The effects of such decisions on our domestic economic concerns—jobs, prices, foreign competition—require explicit and rigourous analyses to permit us to maintain a healthy nomy while we seek a healthy environment. It is essential that we have both. It is simplistic to seek ecological perfection at the cost of bankrupting the very taxpaying enterprises which must pay for the social advances the nation seeks.

We must develop a realistic sense of what it will cost to achieve our national environmental goals and choose a specific level of goal with an understanding of its costs and benefits. One of the strengths of the accompanying report, in my view, is that it sets out—clearly and candidly—both the costs and the benefits of environmental protection as they are now understood.

The work of environmental improvement is a task for all our people. It should unite all elements of our society—of all political persuasions and all economic levels—in a great common commitment to a great common goal. The achievement of that goal will challenge the creativity of our science and technology, the enterprise and adaptability of our industry, the responsiveness and sense of balance of our political and legal institutions, and the resourcefulness and the capacity of this country to honor those human values upon which the quality of our national life must ultimately depend.

Richard Nixon

THE WHITE HOUSE, *August 1971.*

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LETTER OF TRANSMITTAL

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, N. W.
WASHINGTON, D. C. 20006

August 5, 1971

THE PRESIDENT:

Sir: The Council on Environmental Quality herewith submits its second Annual Environmental Quality Report, August 1971, in accordance with Section 201 of the National Environmental Policy Act of 1969.

Respectfully,

Russell E. Train
Chairman

Robert Cahn

Gordon J. MacDonald

preface

The Second Annual Report of the Council on Environmental Quality was prepared in accordance with Public Law 91–190, the National Environmental Policy Act, which requires the Council to report at least once each year on the state of the environment and efforts to improve it.

The First Annual Report laid out a variety of directions for Federal, State, and local action—both legislative and administrative. Many of these recommendations have been or are being implemented or have led to proposals for legislation now before the Congress. That action is mirrored in this Second Report.

In its report a year ago, the Council recognized the need, among others: to establish a policy for controlling ocean dumping, to set in motion a more balanced research and development program on new energy processes as part of a national energy policy, to encourage recycling, to develop new authorities to control noise, to generate legislative and administrative proposals for more effective pesticide regulation, to forge a national land use policy, and to push tax measures to improve land use. The President's 1971 environmental program, which was developed by the Council in cooperation with other agencies, embraced proposals covering these and many other problems. In all, the President's Message on the Environment outlined 18 legislative proposals; 15 have already been submitted to the Congress. It also delineated other kinds of action to improve the quality of the environment.

Instead of discussing and making recommendations on the full range of environmental problems, this Second Report examines in

more depth two fundamental aspects of environmental quality—economics and legal developments. It also reviews the status of and trends in environmental quality and developments, particularly among the States, since last year. Finally, it describes a number of environmental problems in the inner city. In many ways, this Second Report should be considered an amplification of the First.

The Council would appreciate receiving comments on this report, especially suggestions for data that could be included to show status and trends in environmental quality and activities at the State and local levels of government and in the private sector.

This report is the result of a concerted effort by Council members and staff. The Council is grateful for the excellent cooperation and assistance from other Federal agencies and from many individuals who helped us on the report, both inside and outside Government. Special acknowledgment is due Fred P. Bosselman, Esq., of Chicago; Robert L. Coughlin and Paul H. Gerhardt, of the Environmental Protection Agency; John C. Dowd, Esq., of Cleveland; Mrs. Elizabeth Haskell, of the Woodrow Wilson International Center for Scholars; Robert W. King, of the Investment Bankers Association of America; Robert P. Pikul, Charles A. Bisselle, Steven N. Goldstein, and Mrs. Martha Lilienthal, of The Mitre Corporation; William C. Stitt and Steven B. Smith, of the Inner City Fund; and Larry Young, of the Izaak Walton League of America.

the second annual report of the council on environmental quality

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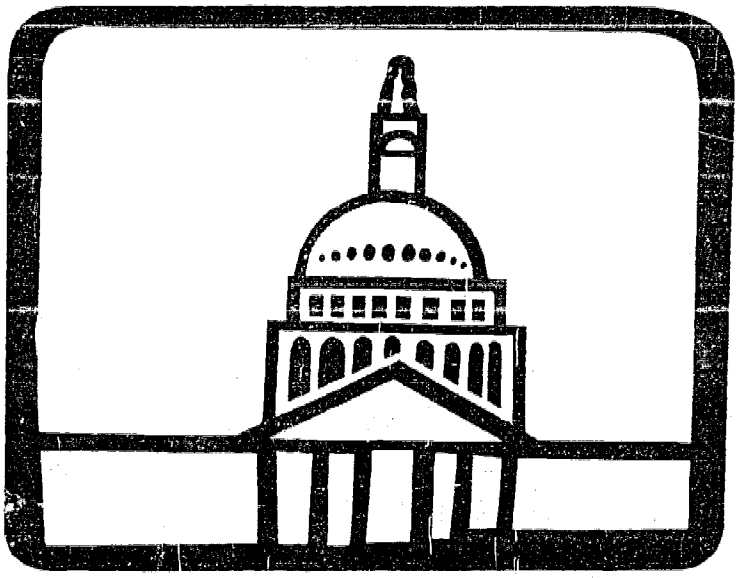


the past year—federal and international activity

If 1970 was, as the Council said in its First Annual Report, "the year of the environment," then 1971 may be known as the environmental year of action. As the Council's First Annual Report recognized, 1970 marked a beginning of unprecedented awareness of and concern with environmental quality in our Nation.

Since then, Federal, State, and local governments, international organizations, industry, and citizens all have moved vigorously to restore and protect the environment. Much was done in the last half of 1970. And so far in 1971 the tempo and scope of activity have quickened.

A key first step in all sectors of activity has been simply to organize for action. Without effective organization, a sustained and coherent approach to identifying problems, setting standards, and enforcing them is impossible. Without it, research and monitoring and the development and effective use of control technology are haphazard and the political processes are frustrated. Organization has been critical not only for government on all levels, but for industry and citizens as well.

As more effective organizations have begun to operate, the activities they were designed to facilitate have proceeded apace. Citizens have voted for environmental improvement—and have given their time to it. Regulatory agencies have accelerated the tempo of their activities. Industries increasingly have committed themselves financially to comply with pollution control stand-

ards. And international institutions have entered more forcefully into the arena of environmental action.

This chapter and the next two discuss in a necessarily selective fashion examples of what has been done in the past year. In some instances it is too soon to know whether this activity truly represents improvement. Indeed, in a field so vast and complex as environmental quality, there will be false starts. Some well-intentioned efforts will produce unanticipated and unwanted results. But rather than fail to act at all until every uncertainty is resolved—a time when action may be too late—the Nation has clearly demonstrated it intends to move forward now, with the best knowledge at its command.

federal government developments

Since our last report, the resources of the Federal Government have been significantly mobilized on behalf of environmental quality. The Federal organizational structure for dealing with environmental problems has been reshaped. Further reforms have been proposed. Federal environmental programs have been strengthened, and innovative legislation has been sent to the Congress. Federal agency awareness of environmental problems has been heightened significantly since the impact statement requirements of the National Environmental Policy Act [1] took effect.

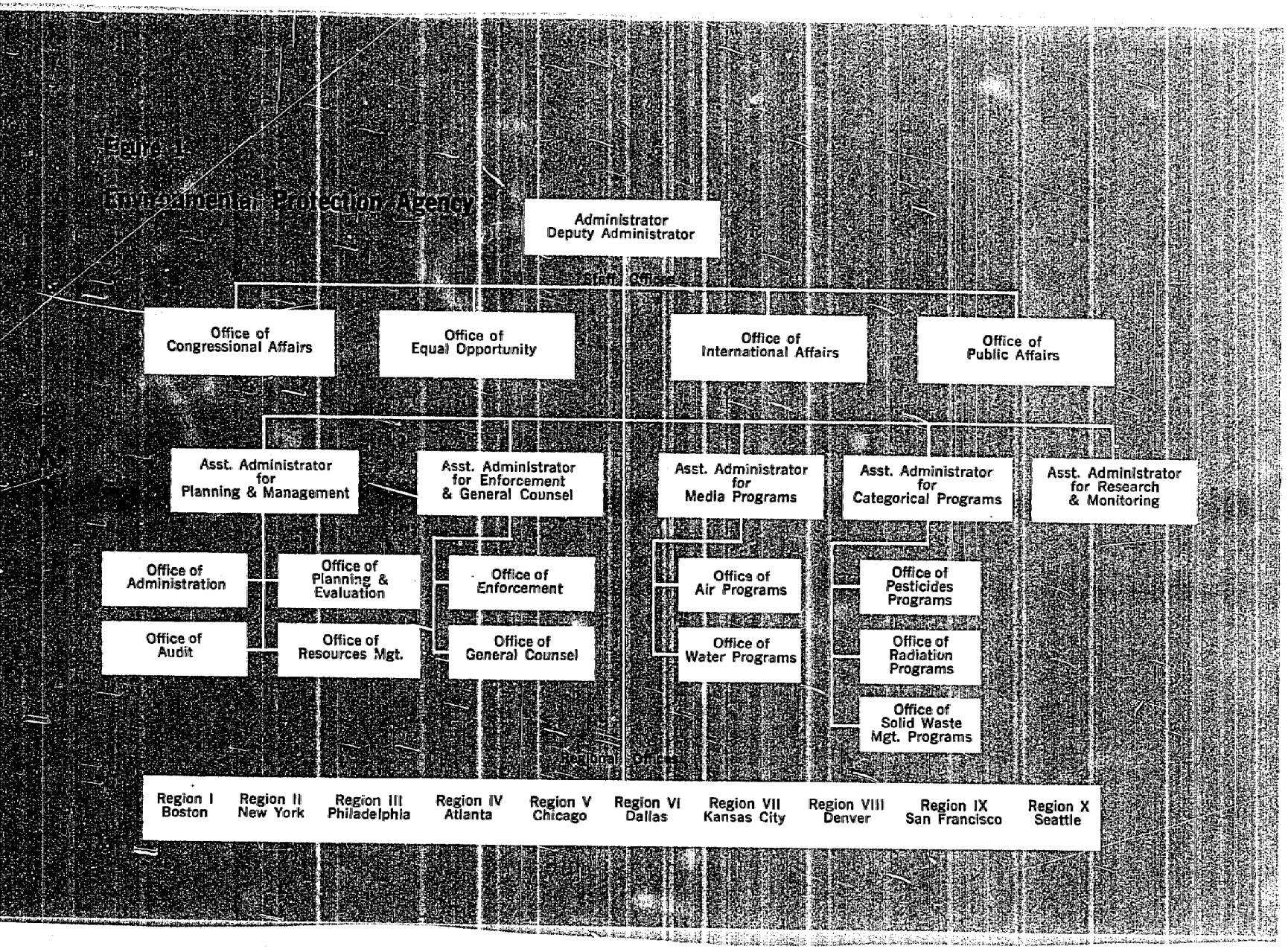
reorganization

environmental protection agency—The Environmental Protection Agency (EPA) was officially born on December 2, 1970. It consolidated into one agency the major Federal programs dealing with air pollution, water pollution, solid waste disposal, pesticides regulation, and environmental radiation. The President named then-Assistant Attorney General, William D. Ruckelshaus, EPA's first Administrator.

The Agency has made a rapid start. It announced a series of water pollution enforcement actions within 3 weeks after its formation. In the following few months, it made major moves to implement the Clean Air Act and to cancel pesticide registrations for DDT, aldrin, dieldrin, and Mirex. Internally, EPA quickly organized itself to cope functionally with related environmental programs (see Figure 1), which was an important reason for its establishment. Three of the five Assistant Administrators have line responsibility for the major functional areas—planning and management, enforcement, and research and monitoring. A fourth Assistant Administrator supervises the air and water program offices. And the fifth supervises the pesticide, radiation, and

Figure 1

Environmental Protection Agency



solid waste programs. EPA's 10 regional directors report directly to the Administrator.

Organization by itself, however, cannot make programs work. Because they also require adequate resources, the Administration has recommended a major increase in EPA funding and personnel. The fiscal year 1972 budget requests $2.45 billion for EPA—an almost 90 percent increase over the 1971 level—and a manpower hike of 1,655 authorized positions over the current 7,192. Two billion dollars of the proposed 1972 funds would be grants to communities for building waste treatment plants.

Although EPA and the Council on Environmental Quality work closely, there are significant differences between the two. The Council is a small, staff agency in the Executive Office of the President. Its responsibility is to provide policy advice to the President and to review and coordinate the environmental impact and environmental control activities of all Federal agencies. EPA is an operating line agency. Its responsibility is to administer and conduct Federal pollution control programs. While EPA's activities focus on pollution control, the Council's concern is with the whole spectrum of environmental matters, including parks and wilderness preservation, wildlife, natural resources, and land use.

national oceanic and atmospheric administration—The National Oceanic and Atmospheric Administration (NOAA) is the second major organizational innovation of 1970. This new agency, within the Department of Commerce, consolidates the major Federal oceanic and atmospheric research and monitoring programs. Both the Weather Bureau and the Coast and Geodetic Survey now operate within NOAA.

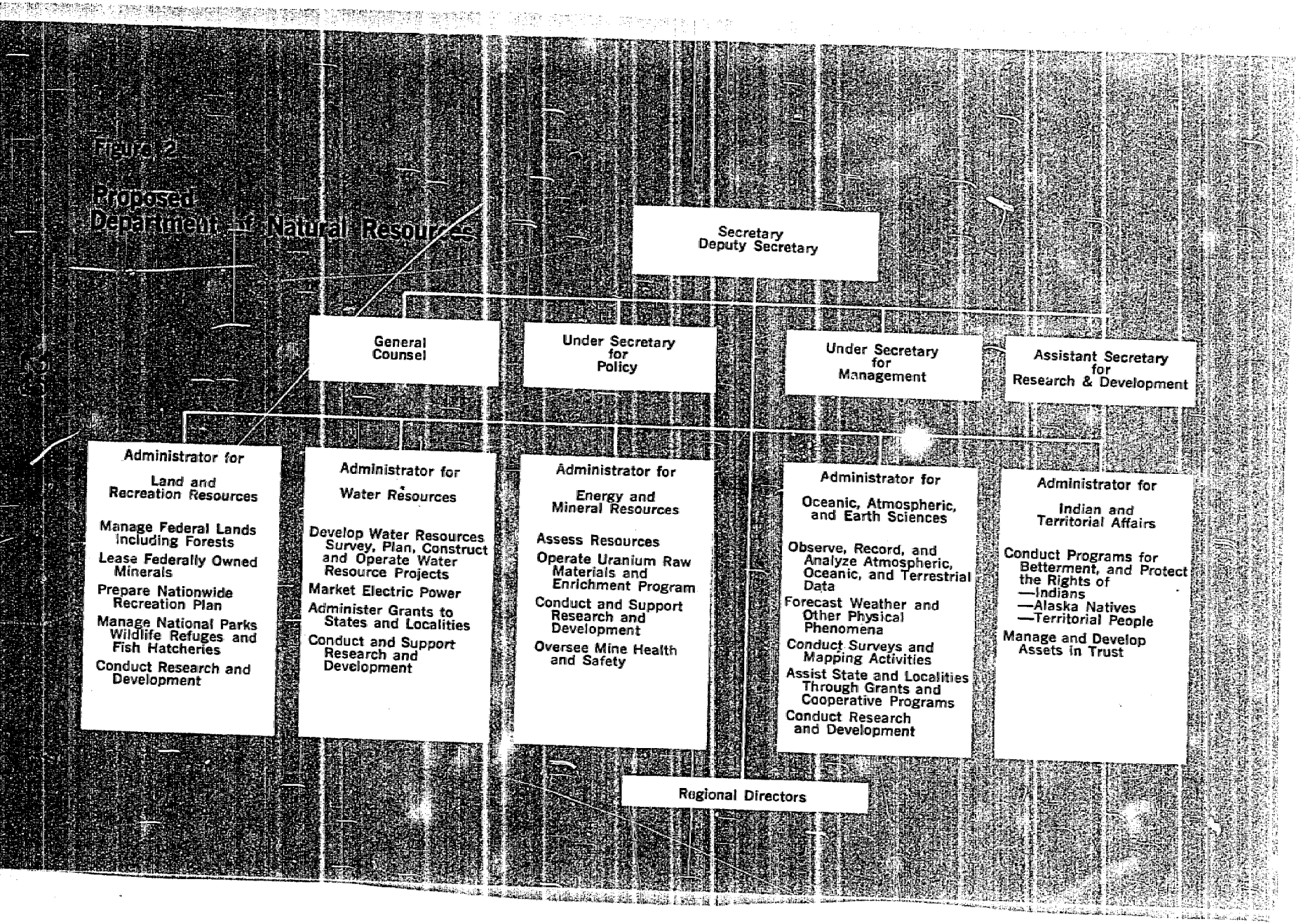
Dr. Robert M. White, former Director of the Environmental Science Services Administration in the Department of Commerce, is NOAA's first Administrator. The agency monitors the impact of pollutants on the marine environment; describes changes in the oceans, estuaries, and the atmosphere; and establishes ecological base line data and models.

department of natural resources—a proposal—EPA and NOAA significantly improve the Government's ability to deal with environmental problems. But the Federal ability to cope with natural resources problems—including energy, water, land management, and recreation resources—is still scattered among several agencies. To deal with that problem, the President's Advisory Council on Executive Organization recommended a Department of Natural Resources. On March 25, 1971, the President sent to the Congress legislation to create such a department.[2]

The Department would consist of five parts: land and recreation; water resources; energy and mineral resources; oceanic, atmospheric, and earth sciences; and Indian and territorial affairs (see Figure 2).

Figure 2

Proposed Department of Natural Resources



The Department would embrace most of the agencies now in the Department of the Interior; the Forest Service and the Soil Conservation Service from the Department of Agriculture; the civil works planning functions of the Army Corps of Engineers; the civilian power functions of the Atomic Energy Commission; and the National Oceanic and Atmospheric Administration from the Department of Commerce.

congressional organization—The Congress also is seeking to focus and coordinate its responsibilities for environmental programs. Both the House and the Senate passed joint resolutions to create a Joint Committee on the Environment.[3] An equal number of Senators and Representatives would sit on the Committee. It would not have legislative authority, but it would be empowered to study the impact of environmental and technological changes. And it would pursue methods for upgrading environmental quality. Its responsibilities would be analogous to those of the Joint Economic Committee. Differences in the House and Senate versions of the resolution may require a conference to negotiate a single version for final passage.

The Congress also reorganized and expanded existing committees to give more explicit attention to the environment. Two House and four Senate committees have added "environment" to their official titles, in most cases simply identifying more specifically their preexisting jurisdiction. In addition, three new environmental subcommittees were created: the Subcommittee on Environmental Science and Technology of the Senate Committee on Public Works; the Subcommittee on Environment of the House Committee on Interior and Insular Affairs; and the Subcommittee on Environment Problems Affecting Small Business of the House Select Committee on Small Business.

environmental programs

air quality—implementation of 1970 clean air amendments—The Federal air quality program changed dramatically when the Clean Air Amendments of 1970 became law.[4] They embody both recommendations contained in the President's 1970 Message on the Environment and proposals from the Congress. The Act requires EPA to establish national air quality standards as well as national standards for significant new pollution sources and for all facilities emitting hazardous substances. It also establishes a framework for the States to set emission standards for existing sources in order to achieve the national air quality standards. The State implementation plans are subject to Federal approval. If a State plan is unacceptable, the Federal Government is empowered to promulgate a plan of its own which will take precedence. The 1970 Act also provides more effective procedures for Federal enforcement.

The 1970 Amendments require stringent national emission standards for new automobiles—a 90 percent reduction from existing levels of hydrocarbons and carbon monoxide by 1975 and a 90 percent reduction of nitrogen oxides by 1976. EPA has issued emission regulations to implement these requirements.[4a] The Amendments authorize EPA to set emission standards for air pollution from airplanes, authorize citizen suits to enforce the provisions of the Act, and strengthen controls over pollution from Federal facilities.

EPA has set national air quality standards for particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons, and nitrogen oxides.[5] By January 30, 1972, State plans to implement these standards must be submitted to EPA, which has mounted a major effort to help the States prepare the plans. Regulations prescribing the content of the plans have been published.[6]

The EPA Administrator has published an initial list of five categories of stationary sources of pollution for which performance standards, requiring use of the best adequately demonstrated control technology in new facilities, will be established.[7] The five categories are nitric acid plants, contact sulfuric acid plants, portland cement plants, large incinerators, and fossil fuel steam generators. Asbestos, mercury, and beryllium have been designated as hazardous air pollutants for which Federal emission standards, applicable to all sources, will be promulgated.[8] Additional sources and pollutants may be designated as additional information is developed.

Pursuant to the Clean Air Amendments of 1970, the President issued on June 30, 1971, Executive Order 11602, which provides for facilities involved in convictions under the Clean Air Act for noncompliance with standards to be barred from entering procurement or other contracts with the Federal Government and from receiving Federal financial aid (see Appendix I).

enforcement—While Federal enforcement of emission and performance standards under the 1970 Amendments must await final promulgation of the standards, EPA continues to exercise its limited enforcement authority under preexisting provisions of the Clean Air Act. One case which has received considerable public attention involves the Union Carbide Corp. plant in Marietta, Ohio. The plant has been the subject of an enforcement conference that began in 1967. In November 1970, Union Carbide was given until the end of the year to submit an acceptable timetable for complying with conference recommendations. However, EPA rejected the company's several plans. Union Carbide then stated that the proposed EPA timetable could be achieved only by closing part of the plant and laying off 625 workers. After further negotiations, the company determined that it could

comply without laying off any workers. A new compliance schedule agreed to by Union Carbide calls for the plant to cut its emissions 70 percent by April 1972.

proposed lead tax and sulfur charge—Measured by weight of pollutants emitted, the automobile continues to be the greatest single source of air pollution. The primary focus of past controls has been to reduce emissions by making changes in new automobiles. In the last 2 years, attention has turned to the gasoline used by cars—particularly to the lead added to gasoline to increase octane and eliminate "knock." Lead in gasoline is a potential health hazard when emitted into the air in automotive exhaust. In addition, it interferes with devices that will very likely be used to control other automotive pollutants in order to meet the stringent 1975–76 emission standards.

The Clean Air Amendments of 1970 contain authority requested by the President to regulate polluting constituents of automotive fuels such as lead. In addition, the President proposed a tax on the lead in gasoline to encourage motorists to buy low-lead or unleaded gasoline by making their prices competitive with that of leaded gasoline. Without the tax, leaded gasoline is cheaper to produce and hence is less costly to the consumer than unleaded gasoline of comparable octane rating. The tax would help to insure that low-lead or unleaded gasoline is available in sufficient quantities now for automobiles whose octane requirements permit its use and in larger quantities when automotive pollution control devices requiring such gasoline are available to meet the 1975 emission standards. Also, in October 1970, the President announced that Federal vehicles, whenever possible, will use low-lead or unleaded gasoline.

The proposed lead tax is an economic lever to force pollution control. An even bolder attempt to accomplish the same end is the President's 1971 proposal to impose a charge on sulfur oxides emissions. The clean air emission charge would be levied on sulfur emitted into the atmosphere from combustion or distillation of fossil fuels. The charge is intended to stimulate development and use of sulfur oxides control technology and fuel cleaning technology and to encourage use of low-sulfur fuels. The charge would complement, not replace, regulation of sulfur oxides emissions under the Clean Air Act. The Council on Environmental Quality and the Treasury Department together are preparing a detailed proposal for the Congress.

water quality—the refuse act: permits and enforcement—On December 23, 1970, the President announced a new program to control water pollution from industrial sources through the permit authority in the Refuse Act of 1899.[9] The Refuse Act outlaws discharges and deposits into navigable waters without a permit. The Secretary of the Army may issue a permit only when the Corps of Engineers determines that anchorage and navigation

will not be impaired. Knowing violation of the Refuse Act is a misdemeanor, subject to a $2,500 fine or 6 months' imprisonment. Violators also are subject to civil suits for injunctive relief.

The program initiated by the President makes a permit mandatory for all industrial discharges into navigable waters of the United States.[10] Violators of water quality standards—including standards imposed by EPA when Federal-State or State standards do not apply or are clearly deficient—are ineligible for permits and liable to enforcement proceedings. All dischargers were required to file basic information on their discharges by July 1, 1971, with an October 1, 1971, deadline for certain more detailed or difficult to obtain information.

To obtain a permit, an industrial discharger must disclose what effluent he intends to discharge and how much of it. Permits require periodic followup disclosures.[11] This is a key advantage of the permit system. It will provide a much more accurate index of the nature and extent of industrial pollution than we now have. In return, industry will obtain more explicit guidance on waste treatment requirements.

There has been no moratorium on use of the Refuse Act to enforce water quality standards while the permit program is being initiated. The Administration has announced that the filing of a permit application will not preclude an enforcement action against the applicant. Indeed, since the permit program was announced, enforcement activity under the Refuse Act has continued to increase.

During the first 11 months of fiscal year 1971, approximately 159 criminal actions were initiated under the Refuse Act, compared with 129 criminal actions in the entire fiscal year 1970. In contrast, an average of only 43 criminal prosecutions per year was initiated under the Act in fiscal years 1964–69. Most criminal actions during the past year have resulted in convictions and assessment of fines. In one case alone, a violator was fined $125,000; in another, $25,000.

More important, however, than the increased use of the Refuse Act for criminal prosecutions has been the use of civil suits under the Act to secure injunctions to halt discharges of harmful material. The first civil injunction action ever initiated under the Refuse Act was filed in 1970 against the Florida Light & Power Co. to abate the discharge of heated water into Biscayne Bay. During fiscal year 1971, more than 50 additional civil suits were filed to enjoin objectionable discharges.

Fourteen civil actions were concluded favorably by court-approved settlements in fiscal year 1971. In addition, interim stipulations were entered in 9 of the 10 cases brought under the Act against facilities discharging mercury. In the 10th case, the plant was shut down. The stipulations and plant shutdown resulted in a total reduction in mercury discharged from these

facilities from 139 pounds to 2 pounds daily. Final disposition of these cases awaits EPA's review of the defendants' plans for further reductions in mercury discharges.

Other civil suits have produced impressive results. The ITT Rayonier pulp processing plant in the State of Washington agreed to construct, at a cost of about $22 million, a waste treatment plant recommended by EPA. A General Motors automobile assembly plant in New York agreed to install large treatment tanks at a cost of over $2 million. In a number of cases involving relatively small manufacturing establishments, complete relief has been secured immediately.

The Refuse Act is an important mechanism for enforcing water quality standards because it permits swifter action against polluters than is possible under the enforcement provisions of the Federal Water Pollution Control Act (FWPCA) itself.[12] Because it prohibits discharges into navigable waters in the absence of a permit and gives the Secretary of the Army broad discretion in establishing permit conditions, the Refuse Act could remedy some deficiencies in the nature and scope of standards adopted pursuant to the FWPCA. For example, standards for nonmunicipal discharges could be extended to all navigable waters and could be stated in terms of precise effluent limitations tailored to meet ambient water quality requirements.

However, because the FWPCA is the most recent and explicit congressional action with respect to water quality, the Administration has asked the Congress to make major improvements in the Federal water quality program through that Act. In the meantime, the permit and enforcement program under the Refuse Act is being used primarily to enforce existing water quality standards.

other enforcement—The present FWPCA provides two limited and cumbersome enforcement mechanisms for pollution abatement by the Federal Government.[13] The first is a three-step procedure consisting of a conference of Federal, State, and interstate water quality agency representatives; a public hearing; and finally, court action.

The conference may be called at State or Federal initiative. However, there must be a State request if the pollution causes only intrastate effects unless the pollution causes economic injury to shellfish producers. The enforcement conference is a mechanism for bringing to light complex and longstanding pollution situations.

Two new enforcement conferences have been called since EPA was established. The first covered the interstate waters of Long Island Sound in Connecticut and New York, and the second covered the navigable waters of Galveston Bay and its tributaries in Texas.

EPA has reconvened five conferences, two of which received wide attention. The four-State Lake Michigan conference, first convened in 1968, focused on the need to protect Lake Michigan from waste heat discharges. The EPA Administrator recommended strict temperature standards for the Lake. After considering proposals of the State and Federal conferees, the Administrator issued a conference summary recommending closed cycle cooling systems for new waste heat discharges and deadlines for plants now in operation to install abatement facilities. In the Lake Superior enforcement conference, first convened in 1969, the remaining difficult issue is the discharge of taconite tailings into the Lake from a Reserve Mining Co. facility in Minnesota.

The second enforcement procedure under the FWPCA, also applicable primarily to interstate pollution, calls for notification both to the violator of water quality standards and to interested parties, followed by court action if necessary. Under the present law, 180 days must elapse after a notice of violation is issued before court action may be initiated. This gives violators the opportunity to comply voluntarily. EPA recently issued a violation notice to Reserve Mining Co. because of its failure to present an acceptable abatement plan to the Lake Superior enforcement conference.

One of the EPA Administrator's first official acts was to issue violation notices to three major cities—Atlanta, Cleveland, and Detroit. By the end of the 180-day period, EPA announced agreements with each of the three cities and with the States involved for joint Federal-State-local financing of the needed waste treatment facilities construction. Of the total estimated cost of $1.2 billion, more than $1 billion will go to reducing pollution of Lake Erie by Cleveland and Detroit.

The Outer Continental Shelf Lands Act [14] was invoked in 10 cases during the past year against major oil companies for their failure to implement required subsurface safety measures on oil wells in the Gulf of Mexico. The cases have been concluded with the collection of more than $2.3 million in criminal fines.

federal funding—The major part of Federal funds for water pollution control goes to municipalities to help finance construction of sewage treatment plants. For fiscal year 1971, the President proposed and the Congress appropriated $1 billion for waste treatment grants. EPA estimates that an additional $12 billion must be spent over the next 3 years for municipal waste treatment needs. To meet this need, the Administration has requested an authorization of $6 billion—$2 billion each for this and the following 2 fiscal years—to provide the needed Federal share of the $12 billion program.

proposed legislation—The President has asked the Congress to amend the FWPCA to provide needed reforms: effluent standards

tied to water quality requirements, mandatory use of best available treatment technology in new industrial facilities, and stringent Federal toxic discharge standards.[15] The Administration's proposed legislation would also extend Federal-State water quality standards, now applicable only to interstate waters, to almost all waters. Moreover, it would authorize legal actions by private citizens to enforce standards. The Administration's proposal would provide for broader Federal enforcement authority, streamlined enforcement procedures, and more stringent fines. The enforcement proposals are similar to provisions in the Clean Air Amendments of 1970.

The President also has proposed legislation to deal with the potentially serious problem of ocean dumping. The legislation would prohibit dumping any wastes originating in the United States into estuaries, the Great Lakes, coastal waters, or the oceans without an EPA permit. A permit would also be required for dumping wastes from any source into waters of the contiguous zone—or into waters within the jurisdiction of the United States. The EPA Administrator would be empowered to ban all ocean dumping of certain materials and to designate safe disposal sites for others. The legislation is based on a report that the Council on Environmental Quality submitted to the President in October.

Administration legislation also calls for establishing an Environmental Financing Authority to aid localities in funding bond issues for municipal waste treatment plants[17] and an increased State grant program to assist State agencies in improving their water quality programs.[18]

cleanup of federal facilities—Although air and water pollution caused by Federal facilities is still a problem, significant progress is being made. In fiscal year 1971, the Federal Government appropriated $113 million to eliminate such pollution, and the President has asked Congress for $250 million in fiscal year 1972. This compares to an average annual appropriation of only $52 million for the previous 3 years. The combined total of $363 million for fiscal years 1971 and 1972 alone contrasts strikingly with the $359 million estimate made in 1970 for the cost in fiscal years 1971, 1972, and 1973 of having remedial measures completed or underway at all Federal facilities by the end of 1972.

While progress is being made in cleaning up Federal facilities, some individual facilities are still major polluters. Many of these are on military installations. As in the case of industrial pollution control, management attitude is a critical ingredient in complying with environmental standards. Budget requests and appropriations alone do not guarantee success if agency management does not give high priority to the effort. The President's Executive Order on pollution from Federal facilities contains an im-

portant limitation on agency discretion: Funds appropriated for pollution abatement may not be used by agency heads for other purposes.[19]

pesticide control—The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)[20] requires that all pesticides shipped in interstate commerce be registered with EPA. EPA may cancel a registration when the label of the product, if complied with, is inadequate to prevent injury to "man and other vertebrate animals, vegetation, and useful invertebrate animals."[21] Suspension of a pesticide registration, which, unlike cancellation, stops interstate shipment immediately, can be initiated only when the product presents an "imminent hazard."

In January 1971, a Federal court of appeals decision[22] departed significantly from the prevailing interpretation of the registration cancellation provisions in FIFRA. The court declared that "Congress intended any substantial question of safety to trigger the issuance of cancellation notices"[23] so that interested parties can participate in hearings on the question of cancellation. Pursuant to the court's directive, EPA issued notices of cancellation of all registrations for pesticides containing DDT.[24] In March, EPA initiated cancellation proceedings on all registrations for aldrin, dieldrin, and Mirex. Because FIFRA provides a long and complex appeals process for parties adversely affected by cancellation orders, a final decision on DDT and the other pesticides may not be made until early in 1972. EPA has determined that none of the pesticides proposed for cancellation poses an "imminent hazard" warranting immediate suspension of their registrations.[25]

Comprehensive pesticide control legislation to replace FIFRA, the Federal Environmental Pesticide Control Act of 1971, has been proposed by the President.[26] The bill is designed to prevent misuse of pesticides by controlling their application, which FIFRA does not do. Under FIFRA, control over use is achieved only to the extent that users read, understand, and follow the instructions that must be placed on the labels of pesticide containers.

Under the Administration bill, a pesticide registered by EPA would be classified "for general use," "for restricted use," or "for use by permit only." Pesticides designated for restricted use could be used only by trained applicators. Pesticides designated for use by permit only would need approval of a trained consultant before application. Applicators and consultants would be licensed by the States, and the Federal Government would provide part of the funds to train them.

Other provisions of the bill include: authority to permit experimental registration of pesticides; streamlining the process of appeals from registration, cancellation, and suspension deci-

sions of EPA; and authority for the Administrator to stop the sale of a pesticide if it violates the Act. Registration and inspection of establishments manufacturing or processing pesticides would be mandatory. And the Administrator would be authorized to regulate pesticide storage and disposal.

solid wastes—In October 1970, the Resource Recovery Act of 1970 [27] became law. The Act puts an important new emphasis on recycling, a goal which the President articulated in his 1970 Message on the Environment. It authorizes funds for demonstration grants for recycling systems and for studies of methods to encourage resource recovery. It requires EPA to publish guidelines for construction and operation of solid waste systems. The guidelines will be binding on Federal agency operations and on federally funded demonstration projects. The Act authorizes grants and contracts for training solid waste disposal personnel. And it directs EPA to submit to the Congress a comprehensive plan for a national network of disposal sites for hazardous wastes. It also creates a National Commission on Materials Policy to conduct a broad study on materials availability, use, and disposal. The Commission will report to the Congress by June 30, 1973.

The Administration has been exploring ways to use Federal purchasing power to encourage recycling. The first major step in this direction was taken by the General Services Administration (GSA). GSA changed its procurement specifications to require that paper purchased by the Federal Government contain a specified minimum percentage of recycled material. The Council and EPA are examining with GSA and other Federal agencies other areas in which the Government can wield its purchasing power to encourage recycling.

EPA's Office of Solid Waste Management Programs launched "Mission 5,000" in July 1970. This is a drive to close 5,000 of the approximately 15,000 open dumps in the United States. EPA's goal is to replace them with better methods of disposal, such as sanitary landfills, by mid-1972. The program thus far has resulted in closing 1,000 dumps.

The Council on Environmental Quality is currently conducting a major study of solid waste recycling in cooperation with EPA and other Federal agencies. Primary emphasis is on present economic constraints against recycling and on incentives to encourage further recycling.

radiation—When EPA assumed the functions of the interagency Federal Radiation Council—and with it responsibility for setting generally applicable environmental radiation standards—a comprehensive review of existing radiation standards was underway. EPA, in cooperation with the Department of Health, Education, and Welfare, the Atomic Energy Commission (AEC), and other Federal agencies, has continued the review through a contract

with the National Academy of Sciences. The review is scheduled for completion in 1972.

Under the reorganization plan establishing the Environmental Protection Agency, EPA assumed Federal authority to set generally applicable environmental radiation standards. The AEC retains authority to implement and enforce EPA standards in the regulation of radioactive materials and nuclear facilities.[28]

In December 1970, the AEC adopted in its regulations design and operating requirements for nuclear power reactors to keep radioactivity in reactor effluents as low as practicable.[29] The Commission has since proposed numerical guides on design objectives and limiting conditions of operation to quantify the "low as practicable" requirement.[30] Conformance with the proposed guides would generally keep human exposure to radioactivity from nuclear power reactors to less than 5 percent of ordinary exposure from natural sources, such as cosmic rays and radioactive rocks, and to 1 percent or less of the overall limits on exposures from all sources, other than medical procedures and natural background, under present environmental standards.

toxic substances—The Administration has sent to the Congress a proposed Toxic Substances Control Act. [31] Based on a recently published CEQ study, the proposed legislation, would provide several major, new authorities to control the large and rapidly increasing number of harmful and potentially harmful chemicals and chemical substances that are commercially used and that eventually enter the environment. The EPA Administrator would be empowered to restrict or prohibit the use or distribution of a chemical substance if necessary to protect health or the environment. If the Administrator found that a substance created an imminent hazard, he could ask the courts to restrain its use or distribution immediately. The Administrator would be authorized to issue standards for tests to be performed—and for results to be achieved from such tests—for various classes and uses of new substances. And he could request information from manufacturers concerning potentially toxic substances including their chemical composition, production level, uses, and the results of tests of their effects.

The need for such legislation was dramatized by several incidents involving toxic substances during the past year. The mercury problem might have been recognized much earlier had the Toxic Substances Control Act been law. In December, at the urging of the Surgeon General and EPA, the detergent industry voluntarily agreed to stop use of NTA (nitrilotriacetic acid) in detergents, pending the outcome of further tests on its health effects. The Federal Government presently has very limited legal authority to halt the use of hazardous materials, even in such widely used products as detergents. The proposed Toxic Substances Control Act would greatly expand that authority.

One limitation in determining the effects of potentially toxic substances has been inadequate facilities for tests to determine the effects of long-term exposures to low levels of such substances. An important step has been taken to relieve this situation. Part of the Pine Bluff Arsenal in Arkansas, previously a facility for development of biochemical warfare materials, has been converted into a National Toxicology Center for testing potentially toxic substances. The Center, a joint Food and Drug Administration-EPA facility, will test low doses of a substance on a large number of animals, determining effects undetectable from tests conducted on a smaller number of animals.

federal environmental research—Research and development is an essential part of most environmental programs. It provides information needed both to understand environmental problems and to solve them. During the past year, the trend toward increased Federal research and development activity continued. A recently completed study by the Federal Council for Science and Technology shows that Federal budget outlays for environmental quality research and development climbed from $542 million in fiscal year 1969 to $606 million in fiscal year 1970 and to $719 million in fiscal year 1971. These figures are based on a somewhat restricted definition of research and development and thus are smaller than the comparable figures compiled by the Office of Management and Budget (see Appendix K).

Environmental research and development is generally devoted to three areas: the effects of environmental insults, ecological relationships and natural processes, and pollution control technology. Sometimes research covers more than one of these areas. For example, EPA plans a project for St. Louis, Mo., where the total air pollution problem of a single city would be studied in depth. An integrated effort involving Federal and State agencies, universities, and other groups would explore the chemical, meteorological, and biological ramifications of air quality.

With respect to the effects of environmental insults, primary attention has been devoted to determine the adverse health effects of pollutants. Health effects research usually involves testing particular substances or combinations of substances on laboratory animals. Often it also involves epidemiological studies which examine the occurrence of certain effects in human populations and attempt to correlate the distribution of these occurrences with the prevalence and concentration of particular pollutants. A report on the health effects of environmental pollution has been prepared by EPA and the Department of Health, Education, and Welfare and will be sent to the Congress shortly.

Our understanding of natural processes in the atmosphere, oceans, and elsewhere has advanced remarkably over the past few years. Mathematical models have been developed for predict-

ing a variety of phenomena, including the distribution of pollutants both in the atmosphere and in rivers. During the past year, increased attention has been devoted to the use of earth satellites for monitoring and predicting environmental changes.

Research on methods of controlling pollution range from investigations on sterilizing insect pests—in order to facilitate reductions in the use of chemical pesticides—to development of a nonpolluting automobile. In many cases, research may have both economic and environmental implications. Thus, the President's Energy Message of June 4, 1971, announced an accelerated program for developing methods to convert coal into a gaseous form which, if economically feasible, would provide both an expanded economic use for the Nation's most abundant fossil fuel and great promise for reducing air pollution from sulfur oxides emissions.

As human activities more rapidly change the whole face of the earth, awareness of the pervasiveness and magnitude of these changes has created a recognition of the need to save at least samples of the full range of natural environments. These sample areas can serve as base lines against which man-caused changes can be compared. For example, they can provide information on the background levels of various potentially toxic substances, such a mercury, against which the levels and effects of these substances in areas heavily impacted by man can be judged. They can provide natural laboratories which, in some cases, are the only places where studies can be carried out to understand the operation of certain ecosystems.

In recognition of the importance of preserving a variety of natural areas, a Federal program for Research Natural Areas has been established. The aim of the program is to be certain that the Federal land managing agencies, in cooperation with the States, universities, and other private and public institutions, preserve examples of all of the many and diverse natural environments in the United States. The Council's First Annual Report noted that 336 Research Natural Areas had been classified and established. This number has been increased to nearly 600, and a unified policy for acquisition, management, and use of these areas is being developed to assure that the areas will be treated consistently by the various agencies concerned. Federal lands, of course, do not cover all the major ecosystems. Consequently, in association with the Federal effort, a program to identify and inventory the Research Natural Areas on State and private lands is going forward under the direction of the U.S. International Biological Program.

land use—toward a national land use policy—Land use decisions are an important determinant of environmental quality. Although planning and control of land use are largely the responsibility of local goverments, the impacts of these activities

often reach statewide, regionwide, or nationwide. Purely local regulation often frustrates environmental quality objectives.

To encourage State control of land use issues transcending local importance, the President has proposed a National Land Use Policy bill.[32] It would provide $100 million over 5 years to aid States in assuming land use regulatory authority over areas of critical environmental concern—wetlands and flood plains, lands around key facilities such as major airports and highway interchanges, large-scale development, lands surrounding new communities, and land and development of regional benefit. Chapter 2 describes recent State actions to assume more control over important land use issues.

The Secretary of the Interior has proposed legislation to the Congress to establish a land use policy and management program for the 450 million acres of the public domain. The guiding principle of this policy would be to protect the quality of the environment of these lands, to require restoration of the land as a condition of use, to give first priority to the protection of environmentally "critical areas," and to keep these lands in Federal ownership for perpetuity, permitting disposal only in very limited circumstances under specific statutory criteria.

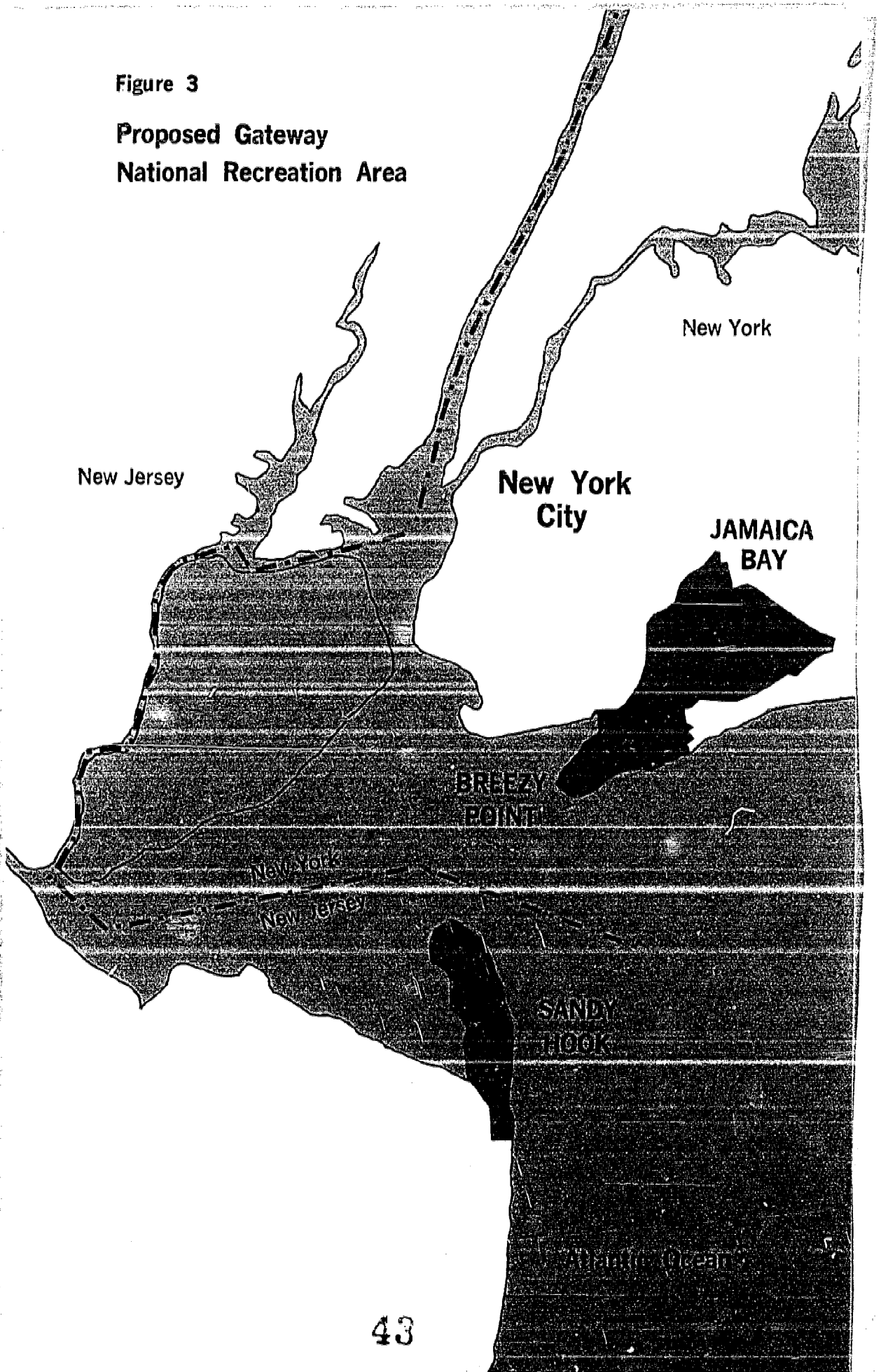
parks and wilderness areas—The Federal Government has taken several actions to add to the amount of land used for parks—particularly in or near urban areas, where the need is great but the supply is short. Under his "Legacy of Parks" program, the President requested a 1972 appropriation of $200 million for the Department of Housing and Urban Development (HUD) Open Space Lands Program. That is nearly three times the 1971 funding level. The HUD Program will give special emphasis to developing vacant or abandoned properties in the inner city. Its highest priority will go to projects in low-income areas.

The President's budget request for the Department of the Interior Land and Water Conservation Fund is for the full $380 million authorized by the Congress. Proposed legislative amendments would channel a greater share of money from the Fund into populous States. The Fund is used both to finance Federal park and other land purchases and to aid State and local governments in acquiring and developing recreation areas.

To further the "Legacy of Parks" program, the President submitted to the Congress, in May 1971, a bill to establish a Gateway National Recreation Area in the States of New York and New Jersey.[33] The area would be a federally managed national recreation area made up of three units—Jamaica Bay and Breezy Point in New York and Sandy Hook in New Jersey. Together, they contain about 7,000 acres of land and 16,000 acres of important marsh and submerged land. The proposal would open to New York City metropolitan area's more than 14 million people a 9,000-acre wildlife preserve, a 460-acre park, and the Nation's

Figure 3

Proposed Gateway National Recreation Area



oldest operating lighthouse, as well as an ocean beach, sand dunes, and a bay for game fishing. A ferry shuttle system linked to existing mass transit lines would provide access for millions of persons who do not own automobiles and otherwise would not be able to reach the area.

During the past year, the President asked the Congress to add 14 areas, totaling 1.8 million acres, to the country's Wilderness System, with new emphasis on the Eastern States.[34] He also resubmitted to the Congress proposals for 13 other wilderness projects covering 1.3 million acres.[35] Efforts are now underway to catch up on the significant backlog of wilderness designations.

In addition, a number of Federal properties were declared surplus by the President's Property Review Board. Among them are properties in Nassau County, N.Y.; Fort Worth and Duncanville, Tex.; Bremerton, Wash.; Parma, Ohio; Cheyenne, Wyo.; and Redondo Beach and Alameda County, Calif. This declaration permits their transfer to States and localities for parks and recreation. The President has pledged to release additional underused Federal properties, particularly in urban areas, to State and local governments for recreation purposes. The Property Review Board, established last year, has already identified 60 Federal properties with high potential for park use.

siting powerplants and protecting mined lands—Other land use problems addressed in the President's environmental program include powerplant siting and strip and underground mining. The proposed Power Plant Siting Act of 1971 [36] would require long-range planning by all electric utilities. Continuous 10-year projections of power needs and additional facilities required for power generation and transmission would be mandatory. Advance review of tentative plant sites would be held 5 years prior to beginning construction. The reviewing agency could reject any such sites as environmentally undesirable. Finally, a preconstruction review would require each utility to apply for certification of a bulk powerplant or major transmission line two years before it is built. The Act would provide a sound framework for protecting environmental values while guaranteeing an adequate supply of electric power.

The proposed Mined Area Protection Act [37] would insure adequate State regulation of surface and underground mining. The Secretary of the Interior would issue guidelines, and the States would be given 2 years to develop and enact mining regulation laws consistent with the guidelines. If a State failed to do this or if a State failed to enforce its own approved laws, the Secretary could establish and enforce Federal regulations.

land controversies—Land use problems surfaced in two major controversies in the past year. Construction by a private consortium of an oil pipeline across Alaska was delayed by the De-

partment of the Interior, which withheld a right-of-way permit across Federal lands, pending detailed examination of the environmental effects of the pipeline. The pipeline proposal raised a number of questions about effects on the Arctic tundra and on wildlife in Alaska and about damage from pipeline leaks or from vessel spills when the oil is en route to refineries. A final environmental impact statement on the pipeline is expected from the Department of the Interior this summer.

The second controversy involved the construction of a barge canal across northern Florida. Although construction by the Corps of Engineers was about one-third completed, the President ordered that the project be stopped because it threatened to destroy the unique scenic area, a major wildlife habitat, and a large sport fish population. Other adverse effects, such as pest infestation and water pollution, were also feared. The Council is working with the Corps of Engineers to develop measures for restoring the already affected area.

preserving historic buildings—In Executive Order 11593, the President directed all Federal agencies to evaluate their properties to determine which possess historic, archeological, or architectural significance (see Appendix H). He directed agency heads to develop procedures to assure that federally owned historic properties are preserved and maintained under standards prescribed by the Secretary of the Interior.

The Executive Order was issued pursuant to authority of the National Environmental Policy Act [38] and the Historic Preservation Act.[39] The Historic Preservation Act established a National Register of Historic Places, in which properties of historic, archeological, or architectural significance are recorded. The Act provides that prior to any proposed Federal action affecting a recorded property, the Federal agency concerned must refer the matter to the Advisory Council on Historic Preservation, a body made up of Federal agency representatives and of private citizens appointed by the President. The Advisory Council renders opinions on the desirability of such proposals and often recommends modifications to Federal projects to protect historic sites.

Properties are listed in the National Register on the basis of State nominations. Since 1968, listings in the Register have increased dramatically, with the current rate of increase at approximately 100 sites or districts per month. The Federal Government controls an estimated 2,000 historic sites not yet recorded on the Register, many of which are located at old military and naval installations. Until July 1973, when evaluation of these properties is completed, properties that appear to possess historic characteristics will be treated as though they were on the National Register, and any action to alter, transfer, or dispose of such properties will be referred to the Advisory Council on Historic Preservation.

Executive Order 11593 is part of a broader program to preserve historic properties. Legislative proposals submitted by the President include a measure designed to facilitate preservation of historic properties transferred to State and local governments at no cost by the Federal Government.[40] This measure provides that State or local governments agreeing to preserve historic properties transferred to them by the Federal Government may permit the properties to be used commercially, thereby enhancing their economic viability and offsetting their restoration expenses. Additional Presidential proposals would provide Federal insurance for the improvement of privately owned historic properties and tax incentives for their rehabilitation.[41]

congressional action—Congress turned its attention to environmental issues as never before this year—a significant indication of the intensity of general public concern with these issues. Of the 695 bills signed into law during the 91st Congress, 121 were identified as "environment oriented" by the Congressional Research Service of the Libary of Congress. This number includes 11 appropriations bills and bills relating primarily to other subjects, such as agriculture, disaster relief, and economic development. It includes 37 parks and recreation bills and 23 water resource development bills. There were only two bills each in the categories of air pollution, water pollution, solid wastes, population, and land use planning. But the importance of measures such as the Clean Air Amendments of 1970,[42] the Resource Recovery Act,[43] and the Water Quality Improvement Act,[44] all enacted in 1970, illustrate the danger of attaching undue significance to the quantity of legislation.

in the senate—Thus far in the 92d Congress, attention to environmental matters has remained high. As of July 25, 1971, the Senate had passed three environmental bills—appropriating money for water resources planning,[45] limiting public exposure to sonic booms,[46] and requiring radiotelephone bridge-to-bridge communication between certain vessels in inland waters to reduce collisions and mishaps.[47] It had also passed two joint resolutions—one to establish a Joint (congressional) Committee on the Environment[48] and one to authorize additional appropriations for the Department of Housing and Urban Development for open space acquisition grants.[49] Hearings were held on environmental bills covering subjects ranging from pesticides and hazardous chemicals to legal actions by citizens, land use policy, ocean dumping, and water quality.

in the house—During the same period, the House of Representatives passed six environmental measures. They include bills concerned with environmental data,[50] a National Advisory Committee on the Oceans and Atmosphere,[51] penalties for shooting certain birds,[52] bridge-to-bridge communication between vessels

in inland waters,[53] and funds for water resources planning.[54] The House also passed a joint resolution to establish a Joint (congressional) Committee on the Environment.[55] Hearings were held on a number of bills. In addition to the subjects covered in Senate hearings, the House hearings considered subjects such as drinking water supplies and powerplant siting.

factfinding—In addition to its hearings on proposed laws, the Congress has held a number of factfinding hearings to review executive branch activities. These hearings have dealt with subjects such as implementation of section 102 of the National Environmental Policy Act by Federal agencies, the economic impact of pollution control, initiation of a permit program for water pollution control under the Refuse Act, stream channelization, eagle deaths in Wyoming, clearcutting of timber on Federal lands, and coal-fired powerplants in the Southwest.

environmental impact statements: a new ingredient in federal decisionmaking—Section 102(2)(C) of the National Environmental Policy Act (NEPA) [56]—the Act which created the Council—requires that any agency of the Federal Government proposing legislation or planning to undertake an action "significantly affecting the quality of the human environment" file an impact statement with the Council. The statements describe the legislation or action, its impact, and the alternatives considered. Before filing, the statements must be circulated by that agency to the public and to appropriate Federal, State, and local environmental agencies. Comments received on the draft statement become a part of the public record along with the final statement, which should reflect the comments. Section 309 of the Clean Air Act [57] gives the Administrator of EPA independent responsibility for reviewing and commenting on the environmental impact of proposed Federal activities or legislation relating to his authorities. This provision overlaps but expands the Administrator's responsibilities under NEPA for commenting on Federal proposals.

As of June 30, 1971, draft or final environmental impact statements on 1,380 actions had been received by the Council. The number of statements has increased rapidly, although a disproportionately large number has involved highway projects, some of which involve relatively minor impacts. The Council believes, nevertheless, that many Federal actions which significantly affect the environment are not being reported in environmental statements. Some major Federal departments have filed fewer than five statements during the past 18 months.

NEPA and its environmental impact analysis requirement are influencing the Government decisionmaking process. The Department of Transportation, the Army Corps of Engineers, the Department of the Interior, the Federal Power Commission, the Atomic Energy Commission, and the Department of Defense are

among the agencies most heavily affected by the Act's requirements. Over 20 agencies have established internal procedures for preparing impact statements. Some agencies for the first time have explicitly incorporated environmental considerations into their decisions. A recent example is the Interstate Commerce Commission. It has recognized that it should conduct environmental impact analyses before making freight rate and carrier certification decisions that can either promote or stifle recycling of "secondary" or waste materials.[58] The Securities and Exchange Commission is requiring that information on pollution violations be made part of stock offerings to the public.

Federal agencies have taken, modified, and avoided actions on the basis of the NEPA environmental analysis. For example, the Corps of Engineers refused to grant some dredge and fill permits in order to protect ecological and esthetic values. The Corps also has suspended some water resource projects pending congressional consideration of the environmental impacts. The Coast Guard has denied several bridge construction permits to avoid adverse environmental consequences. The Forest Service switched from clear cutting to selective cutting in a National Forest, the Department of Transportation reconsidered several proposed Interstate Highway routes, and the Department of Defense amended plans for munitions disposal.

The impact of NEPA and of the section 102 requirement has been reenforced by court decisions, some of which are discussed in Chapter 5.

Yet much more remains to be done to insure that all agencies fully and objectively consider the environment in their actions—not just in connection with specific projects but also in relation to basic policies and program structures. Lack of environmentally trained personnel and the difficulty of changing established decisionmaking patterns are still problems. Too often, the environmental statement is written to justify decisions already made, rather than to provide a mechanism for critical review. Consideration of alternatives often is inadequate. And the ultimate agency alternative—taking no action at all because of the environment—has rarely been considered. Some agencies or their components define their mission in a narrow sense, which excludes adequate consideration of environmental protection. NEPA was intended to elevate environmental considerations to full partnership with technological and economic factors in Governmet decisionmaking. But it still is not working entirely that way.

Questions have surfaced concerning issues such as the extent to which actions authorized and underway prior to enactment of the Act should be subject to environmental statements. Some agencies have been troubled by the potential of a detailed process of public analysis and review to delay Federal actions and to burden Federal officials with increased paperwork.

The Council has helped resolve some of these problems—in its interim guidelines of April 30, 1970,[59] and later in its guidelines of April 23, 1971 (see Appendix G). However, it has not been possible to anticipate all the specific problems which various Federal activities will raise. The responsibility for detailing the way in which each agency will comply with the Act ultimately rests with the agency itself.

In assessing the experience with the impact statements, it is important to recognize the unique and unprecedented nature of the requirement. Federal agencies accustomed to a role of advocacy on behalf of their activities are now required by law to engage in public self-criticism. They must detail adverse impacts and candidly assess alternatives. In fact, many of the less satisfying statements have been prepared by agencies overcautious about minor actions. Some agencies, strongly criticized during the early months under the Act, have since developed improved procedures.

council on environmental quality—During its first full year, the Council has undertaken a wide variety of activities. Some have resulted in a visible product, such as proposed legislation or a published report. But much of the Council's time and effort are devoted to coordinating Federal activities and providing policy advice to the President.

CEQ was responsible for shaping the President's 1971 environmental legislative program, with assistance from many agencies. This program, which the President submitted to the Congress in February, contained 18 major proposals covering almost the entire spectrum of environmental concerns. Many of these proposals have been described in this chapter. The Council also played a key role in developing the Refuse Act permit program.

Two Council reports were published during the year: *Ocean Dumping—A National Policy*, which resulted in the proposed Marine Protection Act of 1971, and *Toxic Substances*, which was based on the staff work done by the Council in preparing the proposed Toxic Substances Control Act of 1971.

The primary mechanism that the Council has used to review environmental impacts of Federal projects is the environmental impact statements submitted by Federal agencies. The Council issued revised guidelines for section 102 statements on April 23, 1971 (see Appendix G). These guidelines require that the draft environmental statements be made available to the public at least 90 days prior to an administrative action (actions other than proposals or reports on legislation). Final environmental statements, with agency comments, must be made public at least 30 days prior to action. When public hearings are held on a proposed Federal action, the guidelines require that a draft statement be available 15 days before the hearing. These new guide-

lines give interested citizen groups and others more time to review and comment on the environmental impact statements.

The Council notifies the public and the Congress of the statements that have been filed in several ways: in its monthly bulletin, the *102 Monitor*; in biweekly lists in *Environmental Pollution and Control*, a bulletin of the National Technical Information Service of the Department of Commerce; in State and local clearinghouses in States affected by a proposed action; through the Legislative Reference Service of the Library of Congress; and in lists published in the *Congressional Record*. Public interest in section 102 statements has been high. One indication is that the Council's *102 Monitor*, first published in February of 1971, has over 2,000 subscribers, many of them public interest and educational organizations.

worldwide developments

As last year's report said, the environment knows no international borders. The same earth, sea, and sky are common to all nations and political ideologies. President Nixon said in transmitting his 1970 Report to the Congress on Foreign Policy for the 1970's: "We know that we must act as one world in restoring the world's environment, before pollution of the seas and skies overwhelms every nation."

In the past year citizens of many nations awoke to the international nature of their common concern—a polluted environment. Fish throughout the world were becoming contaminated with mercury. Toxic metals and air pollutants were filtering across national boundaries. Many nations realized they needed to upgrade their domestic environmental programs. Other nations sought new comprehensive policymaking and administrative weapons to deal more effectively with environmental decay.

Australia, Canada, France, Germany, Great Britain, India, Japan, Kenya, New Zealand, Singapore, Switzerland, and the United States all have either implemented or planned reorganization of their environmental protection programs. Great Britain has a new cabinet-level Ministry charged with environmental protection, national land use planning, housing, and transportation. Japan has added its first new cabinet position in 100 years. The new Minister will head an environmental agency to implement new and comprehensive laws relating to air, water, and marine pollution.

In the United States, the Council on Environmental Quality has taken an active role in the international field. The Council's activities are closely linked to the work of the Department of State and to the activities of the Environmental Protection Agency, the Department of the Interior, and other agencies.

One of the most significant developments during the past year has been a clearer delineation of the roles major international institutions are playing in environmental matters. The Environmental Committee of the Organization for Economic Cooperation and Development is conducting significant work on the international economic effects of member countries' environmental policies with a view to minimizing potential distortions of foreign trade. NATO's Committee on Challenges of Modern Society is concentrating on special problems of industrialized societies—such as how to develop low pollution motor vehicles. The Intergovernmental Maritime Consultative Organization is active in the area of marine pollution with special emphasis on how to prevent oil spills. The Economic Commission for Europe is serving as a valuable forum for information exchange between Eastern and Western nations on pollution control. The United Nations Secretariat is working to prepare for the 1972 U.N. Conference on the Human Environment, and is actively encouraging the participation of developing nations in the Conference. These organizations and others are developing special qualifications and programs to deal with particular environmental problems on the international level.

bilateral programs

united states and canada—The past year has seen major accomplishments by the United States and Canadian Governments working together to restore the quality of the Great Lakes—a vital asset for a large segment of the population on both sides of the boundary. The stark implications of continued deterioration of the Lakes emerged fully in early 1970, when the International Joint Commission (IJC) issued a carefully researched interim report which became the basis for its final recommendations of December 1970.

President Nixon charged the Council on Environmental Quality to work with Canada on the problem. Ministers of both countries met in June 1970 and agreed to set up a Joint Working Group. The Group began to study ten major problem areas in the fall, and by April 1971, issued a report containing its recommendations. It urged the two Federal Governments to agree to adopt common water quality objectives for the Great Lakes, to agree to programs for attaining the objectives, and to give the IJC authority to monitor these efforts.

At the second meeting of Ministers, on June 10, 1971, the two Governments agreed to adopt the report of the Joint Working Group and to complete a Great Lakes Water Quality Agreement embodying the recommendations by the end of the year. The Agreement will specify measures to control Great Lakes pollution by 1975. In the meantime, close contact continues through

the IJC on such problem areas as the St. Croix River in Maine and the Skagit River in the State of Washington.

united states and japan—The United States and Japan have exchanged environmental information for many years under the United States-Japan Cooperative Program on Natural Resources. In 1970, the two nations launched an intensive effort to establish strong joint programs dealing with air and water quality. Struck by the dramatic convergence of serious air pollution incidents in late July and early August in Japan and along the eastern seaboard of the United States, President Nixon suggested, and Prime Minister Sato agreed, that increased cooperative efforts should be undertaken. Chairman Russell E. Train of the Council on Environmental Quality and Minister of State Sadanori Yamanaka represented their Governments at a conference in Tokyo in October 1970. They identified a number of areas in air and water pollution control and solid waste management in which to pursue joint programs. At a second conference, on June 1–2, 1971, in Washington, the two Governments agreed to exchange information on curbing air pollution from automobiles and on applying advanced technology to sewage treatment.

other joint programs—The United States is in the process of developing bilateral relations on environmental matters with Mexico and Spain. Preliminary talks have been held with the Mexican Government, and environmental protection programs were part of a recently negotiated agreement with Spain. Ongoing bilateral programs with France and Germany on scientific matters now embrace environmental activities. The United States is also actively exploring opportunities for environmental cooperation with Poland, Yugoslavia, and India.

multination programs

nato—Since 1969, following President Nixon's initiative, NATO's Committee on the Challenges of Modern Society (CCMS) has gradually won over skeptics who questioned whether NATO could or should embark upon activities other than mutual defense and political consultation. The range of CCMS activity has embraced such diverse subjects as flood control, reduction of earthquake hazards, and comparative air pollution monitoring in Ankara, Frankfurt, and St. Louis.

An historic turn in the struggle for cleaner oceans was made by the CCMS and the NATO Council in November 1970. The member nations agreed to take steps to eliminate the intentional discharge of oil and oily wastes into the oceans by 1975, if possible—and no later than by the end of the decade. The Intergovernmental Marine Consultative Organization endorsed the undertaking as the basis for an international convention.

CCMS also stimulated the development of a series of agreements to cooperate in developing safe, low-pollution vehicles. These agreements represented a significant pooling of engineering expertise and technology.

A major conference on urban and environmental problems attended by a number of cabinet-level NATO officials convened in Indianapolis in late May. Mayors and urban experts discussed specific cooperative action related to the central problems of the urban environment. Recommendations from the conference will be presented at the fall 1971 CCMS plenary meeting and should lead to further international cooperation in this field.

oecd—The Environmental Committee of the Organization for Economic Cooperation and Development, formed in December 1970, is focusing on international economic implications of domestic environmental quality standards. Action by any one nation on pesticides or toxic substances, for example, might have a significant impact on the economy and trade of other nations. The OECD has set up an early warning system for consultations among governments before such actions are taken. OECD also is seeking ways to harmonize national practices in assigning the costs of environmental improvement in order to minimize possible adverse trade effects. The international economic implications of differing national pollution control standards are also being examined. In addition, studies are underway on the impact of the motor vehicle on the environment and on pollution by the pulp and paper industry.

the prague symposium—The Economic Commission for Europe (ECE) is the sole intergovernmental forum in which only the industrialized countries of Western and Eastern Europe are represented. The ECE's May 1971 Prague Symposium advanced East-West environmental cooperation. The results of the meeting will provide guidance to the newly established Senior Environmental Advisors to ECE Governments, a permanent ECE body which will hold its first meeting in the fall.

imco—The Intergovernmental Maritime Consultative Organization is the principal forum in which the world's maritime nations forge international agreements on the control and abatement of pollution from ships. In recent years, IMCO has developed international conventions on liability of shipowners and on the rights of nations to destroy or tow away stranded vessels that pose oil spill hazards. It has also set limits on the discharge of oil on the high seas. All of these conventions are now before the U.S. Senate for ratification.

In March 1971, after several years of negotiation, the Maritime Safety Committee of IMCO forwarded to the IMCO Assembly recommended limits on tank size of oil tankers. The recommendations seek to reduce the outflow of oil from ships in the

event of collision, grounding, or breaking apart. The IMCO Assembly will meet this fall to vote on the proposal. This measure is especially significant in view of the current trend toward supertankers and increased tank sizes. Also before the Assembly is a recommendation to all governments to set strict specifications on construction of liquified natural gas (LNG) and liquified petroleum gas (LPG) tankers by implementing the proposed Code for the Construction and Equipment of Ships Carrying Dangerous Cargoes in Bulk. LNG and LPG tankers carry their gas cargoes at extremely low temperature and high pressure. Strict construction standards will help lessen the potential for explosions. Besides these recommended actions, IMCO subcommittees are considering measure to limit the risk of collision or stranding, to dispose of bilge and ballast water in ports, and to improve vessel construction.

the 1972 u.n. conference on the human environment—Preparations for the major U.N. Conference on the Human Environment, to be held in Stockholm in June 1972, began in 1969. The Conference Secretary General, Maurice Strong, has generated wide interest in the Conference and has made a particular effort to include developing countries. To identify their interests further, a series of regional conferences will be held in Latin America, Africa, Asia, and the Middle East this fall.

Many nations have submitted possible agenda items to the Secretariat for review in September at the Third Preparatory Committee Meeting. The items centered on six broad topics adopted at the Second Preparatory Committee Meeting in February 1971: planning and management for human settlements; natural resource management; control of pollutants of broad international significance; educational, informational, social, and cultural aspects of environmental issues; development and environment; and the international organizational implications of action proposals.

In the United States, interdepartmental task forces have worked on a number of possible agenda items. Marine pollution, monitoring, information exchange and regional environmental institutes are receiving special attention. Another key agenda item is President Nixon's proposal for the establishment of a World Heritage Trust to preserve important natural, historical, and cultural areas. Intergovernmental working groups will meet on five topics of particular interest—marine pollution, monitoring and surveillance, conservation, soils, and a declaration on the environment—prior to the Stockholm Conference.

The U.N. Conference will be the scene of the first meeting of the developing and the developed nations on the matter of environmental quality. The Conference agenda is being put together with special care to take into consideration the social, economic, and political conditions in the developing

countries. The Conference will attempt to develop methods to achieve environmental quality that will neither inhibit economic development nor impose upon the developing nations the values of the developed countries.

nongovernmental organizations

The International Union for Conservation of Nature and Natural Resources (IUCN) is the only nongovernmental organization concerned solely with environmental matters on an international basis. With membership from over 70 nations, it provides a forum in which environmental problems of developed and developing countries may be approached. It works closely with various U.N. organizations, as well as with regional intergovernmental bodies. Its activities range from the traditional conservation considerations of wildlife and national parks to management of natural resources and environmental considerations in international development.

Last year, the International Council of Scientific Unions established a Special Committee on Problems of the Environment (SCOPE). As one of its first actions, SCOPE is developing a plan for international environmental monitoring.

summary

Federal progress in environmental protection is evident in several broad areas. Organization for action is better. Water quality enforcement is stronger. Standards in areas such as air quality and radiation have been tightened. Pesticides are regulated more stringently. The Nation's financial commitment to environmental improvement has been substantially increased. A broad spectrum of specific proposals has been made both to strengthen existing authorities and programs and to provide needed controls in new areas—such as toxic substances, noise, ocean dumping, power plant siting, mining, and land use policy. The President's commitment to use more Federal money and property to provide urban area recreation opportunities is being carried out. Federal agencies are implementing a major new statutory requirement to analyze the environmental impacts of their actions and, when appropriate, to search for alternatives less harmful to the environment. Within all Federal agencies, greater commitment to the environment is needed to insure more effective implementation of the National Environmental Policy Act and of the statutory and Presidental directives concerning cleanup of pollution in Federal facilities.

Two areas of Federal activity that particularly need increased attention are monitoring of environmental conditions and intergovernmental coordination. (Chapter 7 discusses the need for a much improved system of monitoring and evaluating environ-

mental conditions and trends.) The internal organization of EPA along functional lines and the establishment of NOAA are key first steps for an integrated pollution control monitoring program. Efforts in this area will receive increased attention from EPA, NOAA, and other agencies, such as the Geological Survey, with coordination by the Council on Environmental Quality.

The importance of intergovernmental coordination will become increasingly apparent as new and expanded environmental programs continue to rely primarily on State and local actions within the framework of Federal standards and guidelines. The establishment of EPA provides an important basis for beginning to build more effective and clearly defined Federal-State relations, particularly in view of the increasing movement of States toward consolidating pollution control programs.

There have been a number of important forward steps in international efforts to protect the environment. The United States has initiated active bilateral programs with Canada and Japan and is laying the groundwork for other joint actions. NATO's CCMS has succeeded in examining several specific environmental problem areas in industrial nations and especially in achieving agreement on eliminating intentional marine oil discharges by 1975 if possible, but no later than 1980. IMCO has continued its leadership in combatting marine pollution. OECD has tackled the international economic implications of national environmental policies and programs. ECE has broadened communications between East and West on the environment. The United Nations faces the difficult task of dealing with environmental quality on a global scale in its preparations for the 1972 Conference on the Human Environment.

Many knotty international problems remain to be resolved. For example, what will be the impacts on international trade and competition of national pollution control programs? Are existing international institutions and basic international law adequate to meet environmental demands?

One thing is clear: Environment has become—and must remain—a high national priority in the United States and in an increasing number of other nations.

footnotes

1. 42 U.S.C.A. §4321 *et seq.*
2. S. 1431, H.R. 6959, 92nd Cong., 1st Sess. (1971).
3. S.J. Res. 17, 92nd Cong., 1st Sess. (1971); H.J. Res. 3, 92nd Cong., 1st Sess. (1971).
4. 42 U.S.C.A. §1857 *et seq.*; 49 U.S.C.A. §§1421, 1430; and 50 App. U.S.C.A. §2061.

4a. 36 Fed. Reg. 12657 (1971).

5. 36 Fed. Reg. 1503 (1971).
6. 36 Fed. Reg. 6680 (1971) (previous to final issuance).

7. 36 Fed. Reg. 5931 (1971).
8. 36 Fed. Reg. 5931 (1971).
9. 33 U.S.C. §4077.
10. Executive Order No. 11574, 3 C.F.R. 188 (1970).
11. 36 Fed. Reg. 6564 (1971).
12. 33 U.S.C.A. §1160.
13. *Id.*
14. 43 U.S.C. §1334.
15. S. 1014, H.R. 5966, 92nd Cong., 1st Sess. (1971).
16. S. 1238, H.R. 4247, H.R. 4723, 92nd Cong., 1st Sess. (1971).
17. S. 1015, H.R. 5970, 92nd Cong., 1st Sess. (1971).
18. S. 1012, H.R. 5958, 92nd Cong., 1st Sess. (1971).
19. Executive Order No. 11507, 3 C.F.R. 91, 94 (1971).
20. 7 U.S.C. §135 *et seq.*
21. *Id.* §135(z)(2)(d).
22. *Environmental Defense Fund* v. *Ruckelshaus,* 439 F. 2d 584 (D.C. Cir. 1971).
23. *Id.* at 593.
24. Pesticide Regulation Notice No. 71–1 (January 15, 1971) (available from EPA).
25. Standards & Criteria for Suspension, Environmental Protection Agency Policy Statement (March 18, 1971) (available from EPA).
26. S. 745, 92nd Cong., 1st Sess. (1971).
27. 42 U.S.C.A. §3251 *et seq.*
28. President's Reorganization Plan No. 3, 3 C.F.R. 199 (1971).
29. 10 C.F.R. §50.34a (1971).
30. 36 Fed. Reg. 11113 (1971).
31. S. 1478, H.R. 5276, H.R. 5390, 92nd Cong., 1st Sess. (1971).
32. S. 992, H..R 4332, 92nd Cong., 1st Sess. (1971).
33. S. 1842, H.R. 8816, 92nd Cong., 1st Sess. (1971).
34. 7 *Presidential Documents* 694 (1971).
35. 7 *Presidential Documents* 109 (1971).
36. S. 1684, H.R. 5277, H.R. 5389, 92nd Cong., 1st Sess. (1971).
37. S. 993 and H.R. 4704, 92nd Cong., 1st Sess. (1971).
38. 42 U.S.C.A. §4321 *et seq.*
39. 16 U.S.C. §461 *et seq.*
40. S. 1152, H.R. 6769, 92nd Cong., 1st Sess. (1971).
41. S. 1207, H.R. 5778, 92nd Cong., 1st Sess. (1971).
42. 42 U.S.C.A. §1857 *et seq.*; 49 U.S.C.A. §§1421, 1430; and 50 App. U.S.C.A. §456.
43. 42 U.S.C.A. §3251 *et seq.*
44. 33 U.S.C.A. §1151 *et seq.*
45. H.R. 6359, 92nd Cong., 1st Sess. (1971).
46. S. 1117, 92nd Cong., 1st Sess. (1971).
47. S. 699, 92nd Cong., 1st Sess. (1971).
48. S.J. Res. 17, 92nd Cong., 1st Sess (1971).
49. S.J. Res. 52, 92nd Cong., 1st Sess. (1971).
50. H.R. 56, 92nd Cong., 1st Sess. (1971).
51. H.R. 2587, 92nd Cong., 1st Sess. (1971).
52. H.R. 5060, 92nd Cong., 1st Sess. (1971).
53. S. 699, 92nd Cong., 1st Sess. (1971).
54. H.R. 6359, 92nd Cong., 1st Sess. (1971).
55. H.J. Res. 3, 92nd Cong., 1st Sess. (1971).
56. 42 U.S.C.A. §4332(2)(C).
57. 42 U.S.C.A. §1857L–7.
58. Notice of Proposed Rulemaking, Implementation of Public Law 91–190, National Environmental Policy Act of 1969 and Related Requirements, I.C.C. No. 55 (May 26, 1971).
59. 35 Fed. Reg. 7390 (1970).

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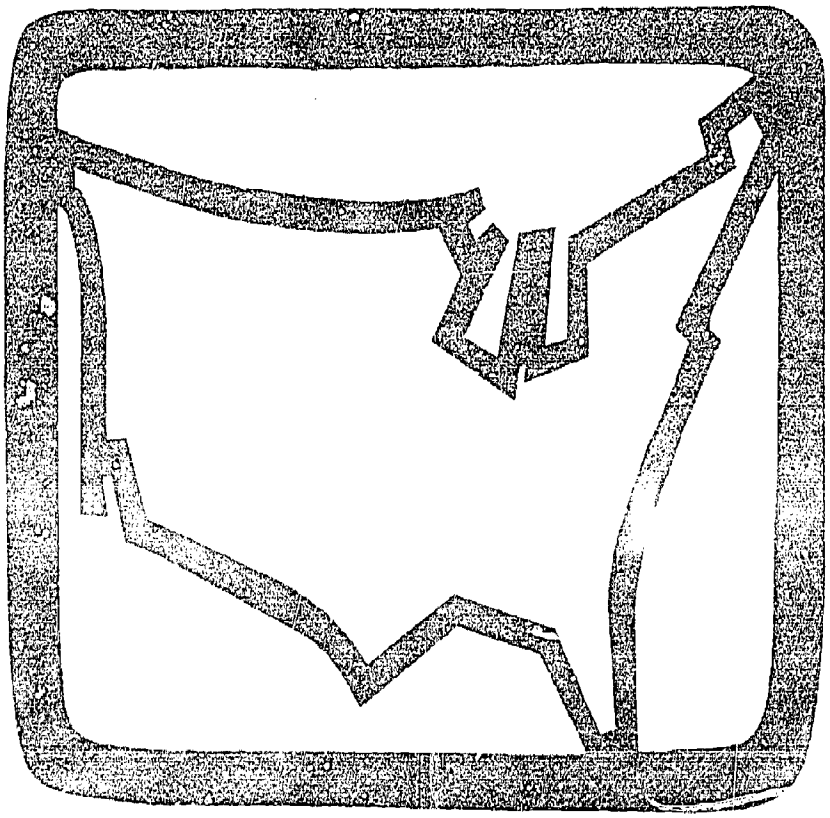


the past year—state and local activities

States and their political subdivisions have traditionally played the lead role in environmental protection. They have led both in curbing pollution and in controlling land use. Although the Federal Government has long been active in preserving wilderness and wildlife and in providing parks—largely because of its immense land-holdings—not until the mid-1950's did it mount a significant water quality program, and not until the early 1960's did it become involved with air pollution. And except for its own land, the Federal Government has not engaged in land use regulation.

But even now with the more direct Federal involvement in environmental protection—to meet increasingly serious problems with ever clearer interstate implication—States continue to play a vital role. State and local governments remain on the front line of essential planning, management, and enforcement.

In our system of government, the States are experimental laboratories for a variety of solutions to common problems. And State innovation frequently sets a precedent for Federal action. For example, California's automotive emission laws,[1] born of acute smog in the Los Angeles basin, set the stage for the National Emission Standards Act of 1965.[2]

Wisconsin's ban on DDT was a harbinger of similar Federal action, commenced in 1969 and expanded in 1971, to cover all uses of DDT. Permit systems for pesticide use in California, Florida, Maryland, and New York established a precedent for the President's proposals for Federal regulation of pesticide use.[3]

Even organizational reform at the Federal level, such as the creation of the Environmental Protection Agency (EPA), also finds precedent at the State level. In 1967, Minnesota created a consolidated Pollution Control Agency.[4] That same year Wisconsin formed an environmental "super department" putting resource management and pollution control activities under a single wing.[5] Through creative new State approaches and national acceptance of the most successful, the Federal system has profited.

Because of limited space and data, this chapter on State and local developments is a selective survey. Examples cited range from interesting and unique innovations to actions representing larger trends. In many areas, unfortunately, data are insufficient to identify trends or representative actions. To cite a particular example is not to endorse the program. Nor should failure to cite a program or accomplishment be viewed as a judgment that it is less important or significant than one which is cited. Some important activities are not reported simply because information was lacking or because an action occurred too late to be covered adequately.

The following discussion accents State rather than local activities because Federal legislation is putting more and more responsibility at the State level in order to encourage comprehensive, regional efforts. For instance, the Federal water quality program traditionally has focused on the States. And State responsibility for air quality has been increased by the 1970 Amendments to the Clean Air Act.[6] Moreover, although local governments are vital to pollution control, the data on local activities are sparse. Finally, in land use regulation, long the almost exclusive province of local governments, there is widespread agreement that increased State involvement is the key to more effective controls.

pollution control

As the Advisory Council on Intergovernmental Relations has stated, the past year evoked from State and local governments "broadened fiscal support for environmental protection, stricter regulations over air and water pollution and solid waste disposal, and the design of innovative programs to control environmentally related problems." Although concrete cleanup results are hard to quantify, the government machinery needed to produce positive results is being improved and in some cases built for the first time.

broadened fiscal support

The States provided more money and manpower for pollution control in the past year. Figure 1 shows how much more—for both air and water pollution control programs; a State-by-State analysis in the appendix to this chapter breaks it down further. However, the figure and detailed tables do not fully depict the adequacy of State efforts. Factors such as population, number and type of pollution sources, past accomplishment, organizational efficiency, and skill of personnel also must be considered.

Despite significant increases, many States still suffer severe shortages of funds and manpower. Inability of States to attract qualified personnel because of very low salary scales—particularly for junior employees—is a major problem.

The money and manpower amounts in Figure 1 reflect spending for control programs—standard setting and enforcement, monitoring, planning, and training. They do not include the very substantial expenditures, primarily at the local level, for pollution control facilities such as waste treatment plants. In 1970, States contributed roughly $280 million in grants and loans to help support municipal construction of sewage treatment facilities. Local expenditures for such projects in 1970 are estimated at $420 million. During the same period, the Federal Government obligated approximately $450 million for projects qualifying for assistance under the Federal Water Pollution Control Act.

In the past year, Florida and Louisiana joined the list of States with programs to help finance construction of waste treatment plants. Twenty-three States, including most of the populous ones, now have such programs. Communities qualify for a "bonus" in Federal grant assistance whenever the State pays 25 percent of the cost.

In 1970, voters strongly supported State involvement in financing pollution control facilities. Data on 1970 bond elections show that voters approved all five bond issues designated by the Investment Bankers Association as "pollution control" issues. These issues totaled more than $1 billion, including Illinois and California issues of $750 million and $250 million, respectively. "Water and sewer" issues, a category that includes most sewage treatment facility bonds, won 90.2 percent approval by dollar volume. This compares with the 60.1 percent approval rate for all bond issues in 1970.

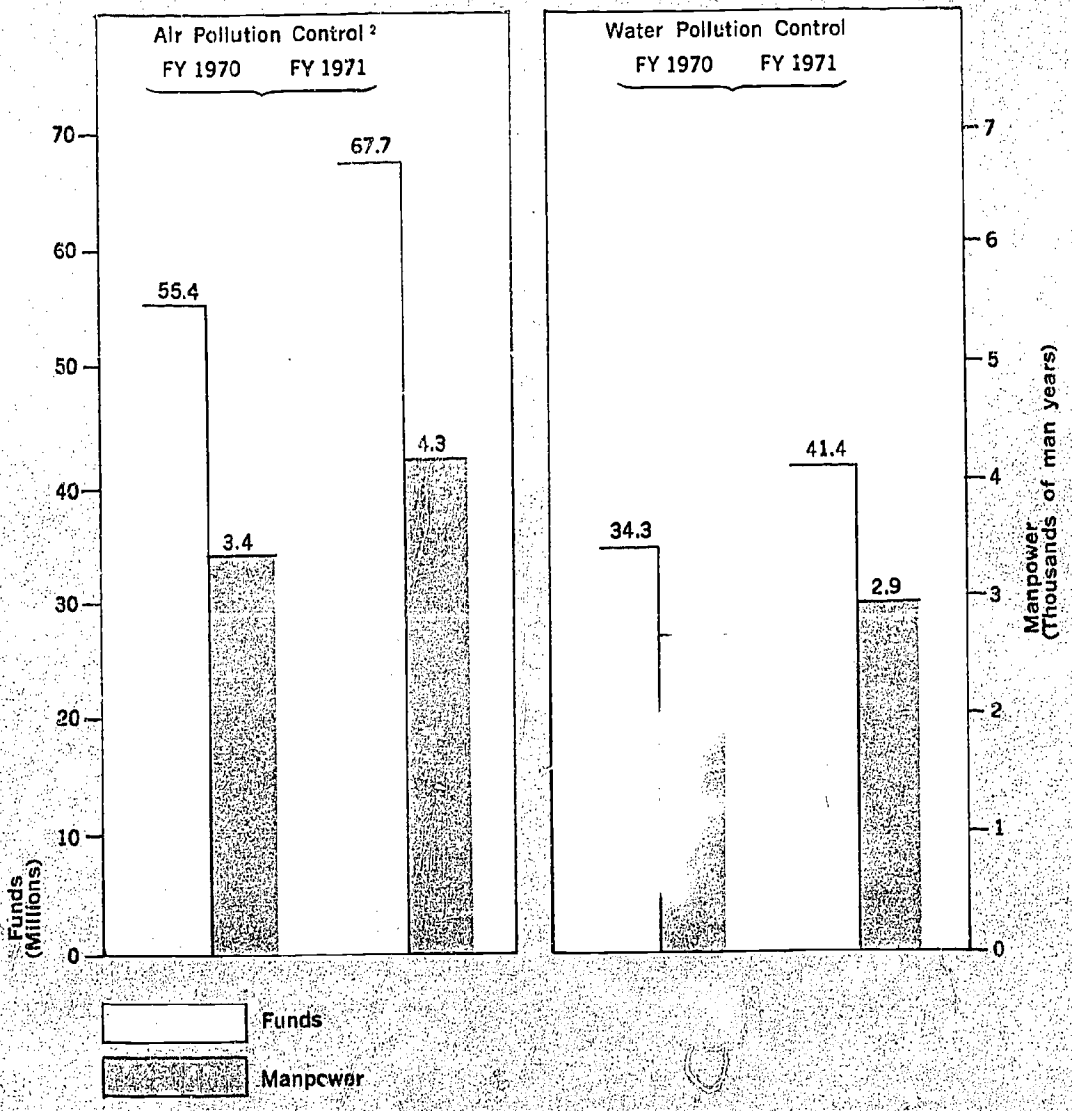
stricter regulation

Many States have tightened pollution control standards or expanded their coverage to new pollutants or activities. Many have intensified antipollution enforcement.

Inadequate data on prior State enforcement activity make it

Figure 1

Funding and Manpower for State and Local Air and Water Pollution Control Agencies [1]



[1] Includes Federal financial assistance.

[2] Data for air pollution control substantially complete, although they include only agencies receiving Federal financial assistance.

Source: Environmental Protection Agency.

difficult to judge the volume or effectiveness of the past year's activities on a comparative basis. However, public clamor for action against violators of pollution control standards has highlighted the weaknesses of many existing State enforcement authorities and prodded States to develop new and better mechanisms.

air quality—A vivid example of limited enforcement authority occurred in Alabama. In July 1970, the Federal Government denied the State's request for $600,000 in financial aid for its air quality program because the State Air Pollution Control Act[7] failed to meet minimum requirements for such aid. Inadequate enforcement provisions were the basic reason. Then, in April 1971, after a 5-day air pollution "episode" in Birmingham, the Alabama Attorney General filed a suit under the State's public nuisance law against 13 major industrial companies requesting that they be given a 6-month deadline to abate their pollution. The Attorney General stated that the Alabama Air Pollution Control Act could not have been invoked since it set no applicable standards. (For a discussion of some of the limitations of State public nuisance law generally, see Chapter 5.)

residential fuel burners and incinerators—New York City's ordinance regulating the use of fuel burners and refuse incinerators in multiple dwellings[8] was upheld by the State's highest court in November.[9] It was challenged by more than 400 apartment house owners. The New York City Administrative Code requires the Air Pollution Commissioner to issue operating certificates for fuel burners and incinerators. Owners must conduct such tests as the Commissioner finds necessary to determine whether the equipment meets the new standards. The law sets standards for sulfur content of fuel and requires owners to install sulfur emission monitoring and recording devices. Once compliance dates have passed, the Commission is empowered to seal any equipment lacking a permit or emitting harmful substances. Following the court decision, the City promptly set deadlines for plans to upgrade substandard facilities. It also warned that it would use the law's enforcement authority in cases of noncompliance.

auto emissions—Under the Federal Clean Air Act, State and local governments retain authority to regulate pollution from automobiles in use.[10] But authority to regulate emissions from new motor vehicles is reserved to the Federal Government. California is an exception. Under section 209(a) of the Federal Clean Air Act, California is eligible for a waiver from EPA permitting it to establish emission standards for new motor vehicles stiffer than Federal standards if needed to meet "compelling and extraordinary conditions" in that State. California, whose regulation of automotive emissions established the precedent for present Federal law, has obtained several waivers since the Federal law

was enacted in 1965. In 1971, waivers were granted by EPA for emission standards and test procedures for various classes of vehicles in the 1972, 1973, and 1975 model years.[11]

A number of State and local governments have "antismoke" laws, which prohibit annoying, visible exhaust from vehicles. Michigan's vehicle code is one example.[12] Although many such laws are rarely enforced, some jurisdictions are moving to strengthen their implementation. For example, officials in Jacksonville and in Dade County, Fla., have announced that they are intensifying enforcement of their recently enacted antismoke laws. On a nationwide basis, however, much more needs to be done to enforce such laws.

Several States are studying the possibility of establishing emission testing and inspection programs. Section 210 of the Clean Air Act authorized Federal grants to assist such programs.

Some cities are curbing the use of surface transportation to help control air quality, and others are actively considering such measures. In New York City, for example, new air pollution emergency procedures embody provisions for closing streets and restricting automobile use. To help meet Federal air quality standards, the City is working with the Tri-State Transportation Commission to develop a master plan for area traffic.

New York recently closed several streets on an experimental basis to explore possibilities for generally limiting the role of the automobile there. The Mayor has ordered a study to determine if one of the experimental streets—Madison Avenue—could be converted into a mall.

indirect pollution controls—In come cases, pollution control requirements may be imposed indirectly, rather than through standards. For example, the Illinois Public Utility Commission, at the urging of the State Attorney General, granted a rate increase to a large electric utility, Commonwealth Edison, on the condition that the utility take several specific pollution abatement actions.[13] If Commonwealth Edison fails to take the actions within the allotted time, the State may reduce the rate increase 50 percent. This is believed to be the first rate regulation in the Nation to contain explicit and extensive environmental quality requirements. The requirements call for the utility to convert to cleaner fuels to protect air quality and to install cooling facilities to prevent thermal water pollution.

water quality—Representatives of the numerous Federal, State, and interstate authorities with water pollution control enforcement responsibilities in the New York City metropolitan area have agreed to pool information and to coordinate enforcement and monitoring. This elementary step should enhance enforcement efforts, which have been hampered by fragmentated data and responsibilities.

Illinois has comprehensive legislative authority for water pollution control enforcement. For example, the new State Environmental Protection Act permits the Illinois Pollution Control Board to force any municipality or sanitary district that has been ordered to abate water pollution to issue general obligation or revenue bonds to finance the needed treatment facilities.[14] This provision is designed to overcome lack of funds and debt limit problems that often forestall construction of necessary sewage treatment works in many communities.

New York's new Department of Environmental Conservation has waged an active battle against water pollution. The Department reduced mercury discharges into New York waters by 97 percent—down to about 2 pounds per day. Under New York's Pure Waters Program, a pioneer program of State financing for waste treatment, 358 municipal sewage treatment plants, costing approximately $2.2 billion, were built or were under construction or design as of March 31, 1971. State funds totaling more than $1 billion have been committed to these projects.

California has also been active in water quality enforcement. The State's new Water Quality Control Act,[15] which took effect on January 1, 1970, arms the State with an arsenal of enforcement powers, including strict fines—up to $6,000 a day—against polluters. Enforcement has been vigorous, with more than 100 direct enforcement actions taken and many waste discharge requirements strengthened.

The San Diego Regional Water Quality Control Board won a citation from the Department of the Interior in October 1970 for its efforts, in conjunction with local authorities, to visibly improve water quality in San Diego. Cleanup measures included establishment of a regional sewage treatment system. The Los Angeles Regional Water Quality Board tightened discharge standards for the Inner Los Angeles Harbor and Dominguez Channel. By late spring of 1970, Inner Harbor water quality had been distinctly improved. Several species of marine life not seen for 25 years returned to the harbor's waters.

ocean dumping—In both San Diego and Los Angeles, major reductions in ocean dumping of wastes contributed to water quality improvement. Several large-volume dumping operations voluntarily curtailed dumping involving materials such as filter cake in San Diego and oil drilling wastes in Los Angeles. Subsequently, the San Diego Board banned ocean dumping within its jurisdiction. Similar action by the San Francisco Board and voluntary reduction of paper mill and oil wastes dumping in Seattle resulted in a total decline in Pacific Coast dumping (excluding dredge spoils) from about 1 million tons in 1968 to about 24,000 tons in 1971.

Both New Jersey and Rhode Island have recently enacted legislation to regulate ocean dumping within their jurisdiction.[16]

In Rhode Island, transportation and dumping of specified types of materials will require a permit from the State environmental agency. In New Jersey, permits for loading and transporting will be used to control dumping.

subsurface disposal—Colorado moved to regulate subsurface disposal of liquid wastes—a practice used increasingly as more stringent surface water quality standards and stricter enforcement reduce the waste disposer's options. With some exceptions, State Water Pollution Control Commission rules prohibit the direct or indirect underground discharge of liquid wastes without a public hearing and a permit.[17] The regulations protect usable waters and authorize the Commission to specify disposal methods. They also require monitoring, evidence of financial responsibility, and engineering and other data. Although some other States also regulate underground disposal, authority often is limited and is unevenly exercised.

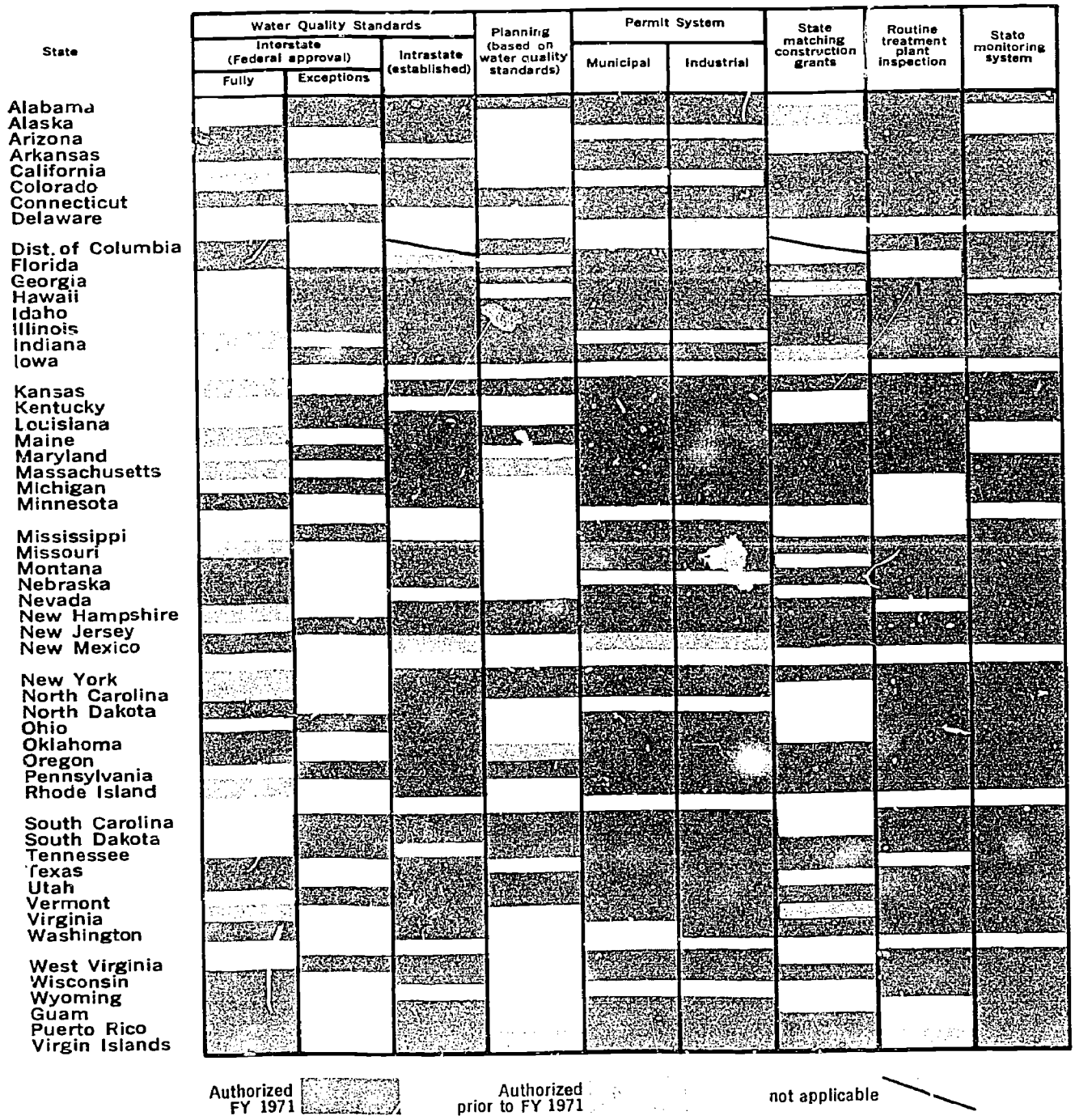
phosphates—At both the State and local levels, one of the most publicized regulatory activities in the past year was enactment of restrictions on phosphate content of detergents. Cities and counties in Florida, Illinois, Maine, Maryland, Michigan, New York, Ohio and Wisconsin have acted to limit phosphates in detergents. Several of these laws have been challenged in court by detergent manufacturers.

Among the States, Connecticut, Florida, Indiana, Maine, Minnesota, and New York have enacted legislation to regulate the phosphate content of detergents.[18] In New York and Connecticut phosphates will be banned from detergents after January 1 and June 30, 1973, respectively. In Indiana, phosphates will be limited to 3 percent by weight on January 1, 1973. These three States have also authorized or required interim reductions. In Maine, phosphates in detergents are limited to 8.7 percent (phosphorus) as of June 1, 1972. Florida provides that after January 1, 1973, no detergent may contain additives—including but not limited to phosphates—found by the State pollution control agency to be harmful to health or the environment. Minnesota legislation authorizes the State pollution control agency to regulate maximum permissible concentrations of any nutrients, such as phosphorus. Many other States and communities are considering phosphates legislation.

Figure 2 and Table 1 show State performance in relation to important air and water quality program elements. In Figure 2, the distinction between standards for interstate and intrastate waters reflects the fact that the Federal Water Pollution Control Act presently applies only to interstate waters.[19] However, the bonus grant provisions in the Act inject a strong incentive to develop intrastate standards. All but seven states now have such standards, as the table shows. The "permit system" category in-

Figure 2

State Water Quality Program Elements, May 1971



Source: Environmental Protection Agency, Office of Water Programs.
[1] Municipal only.
[2] Federal only.
[3] Municipal and State only.

dicates existence of legal authority to issue permits or their equivalent for discharges; it does not show whether permits are issued or how they relate to water quality standards. The "State matching" category refers to legal authorization for a State to help municipalities build sewage treatment facilities by grant or loan. It does not reflect whether such assistance is regularly provided. The "treatment plant inspection" category covers surveillance of the operation and maintenance of all facilities at least once a year. The elements in Table 1 are based on requirements of the Clean Air Act with respect to State implementation plans to be submitted to EPA.

Table 1

State Air Quality Program Elements, January 1971 [1]

Legislative Authority	States with authority	States without authority
Adopt emission standards and promulgate other regulations	54	3
Require information on processes and potential emissions from sources of air pollution	39	15
Issue permits for construction of new sources of air pollution	38	16
Inspect facilities causing pollution	52	2
Require emission information from polluters and make it available to public	20	34
Require monitoring of emissions by polluters	13	41
Issue and enforce compliance orders	51	3
Enjoin standards violators	52	2
Take special prompt action in air pollution emergencies	44	10
Regulate land use and transportation to meet air quality standards	5	49
Inspect automotive pollution control devices	16	38

[1] Includes District of Columbia, Guam, Puerto Rico, and U.S. Virgin Islands. In some cases, figures are approximations based on best available data.

Source: Environmental Protection Agency, Office of Air Programs

solid waste—Regulation of solid waste management practices, other than for public health protection, is in a rudimentary state. However, statewide and regional solid waste planning is on the rise. And it is leading to increased regulatory activity—such as prohibitions against open dumps and controls over landfill practices.

In New Jersey, the Department of Environmental Protection was empowered to register all solid waste disposal operations, to formulate a statewide waste management plan, and to encourage regional action. It was also empowered to build disposal facilities

on an experimental basis.[20] The State plan, recently issued by the Department, recommends incineration and landfill districts.

A new Kansas law calls for limited State regulation of solid waste management.[21] It creates a Solid Waste Advisory Council to recommend ways to finance solid waste systems and standards to govern the operation of disposal facilities. North Carolina has armed its State Board of Health with new solid wastes research, standard-setting, and inspection responsibilities.[22]

The Solid Waste Disposal Act[23] demands that State solid waste management plans funded under the Act include an inventory of waste disposal facilities and a survey of problems and practices. Under the 1970 Amendments, provision for recycling or recovery of materials from waste must be included whenever possible.[24] Figure 3 shows the progress of State solid waste management plans pursuant to section 207 of the Solid Waste Disposal Act, as amended.

litter—Oregon recently passed legislation dealing with another public-arousing problem—litter by beverage containers.[25] The Oregon law requires a deposit on all beer and soft drink containers, 5 cents on standard-sized bottles and cans and 2 cents on small beer bottles. It also bans detachable tabs on metal cans. The law takes effect in October 1972. Over 40 States are considering similar legislation. In the November 1970 elections, a mandatory deposit was defeated in the State of Washington. Several years ago Vermont prohibited nonreturnable beer bottles, a law that was rendered ineffective and later abandoned after the advent of beer cans.

noise—Comprehensive noise pollution control is an area of increasing State and local regulatory activity. Although there are an estimated 1,500 to 2,000 State and local noise control laws, many are limited or unenforceable. However, concern and activity in this area have been renewed. Florida recently enacted legislation authorizing its Department of Air and Water Pollution Control to establish noise standards.[26] North Dakota has taken similar action.[27]

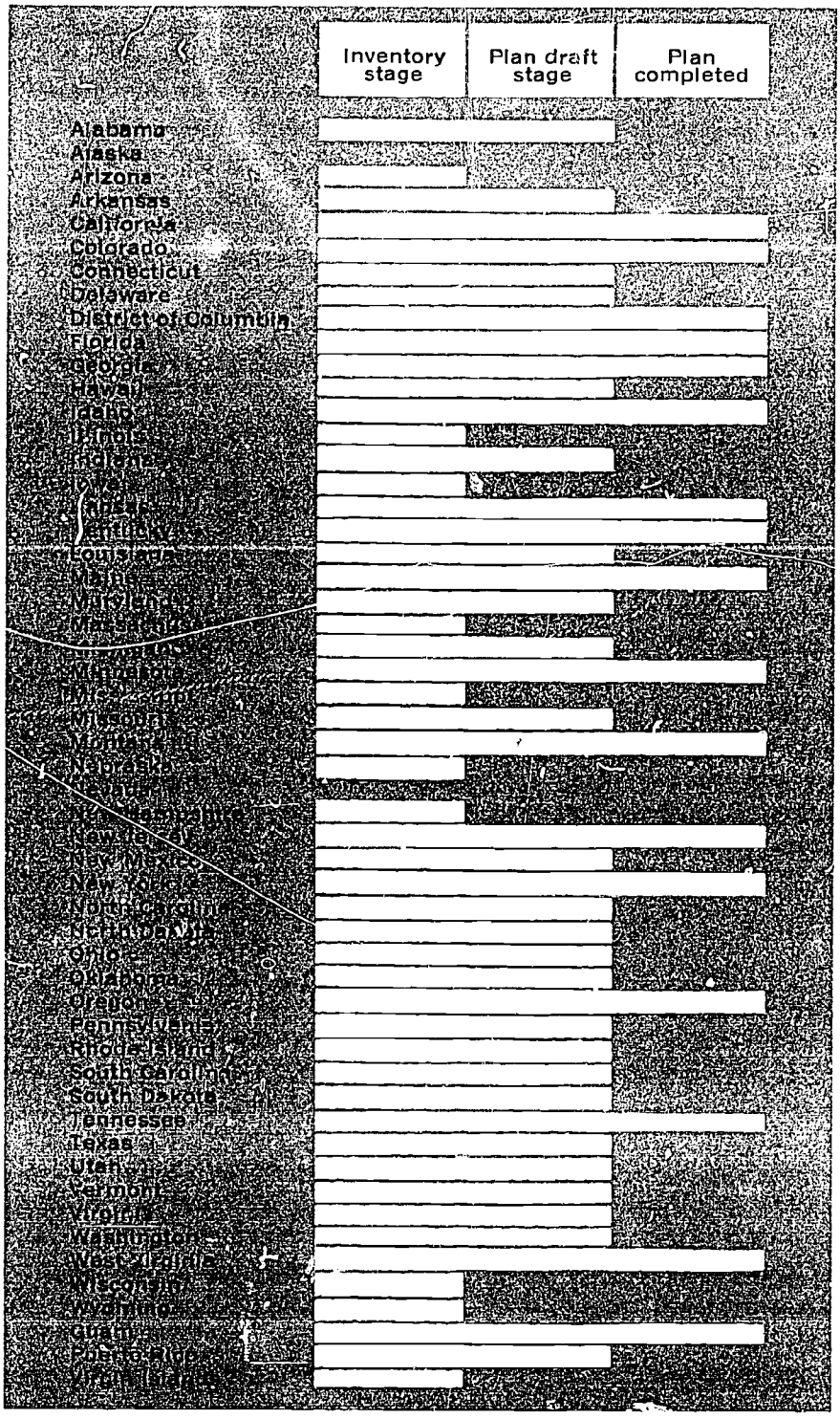
In March, 1971, Chicago adopted a comprehensive noise control ordinance, which became effective on July 1.[28] Under the ordinance, manufacturers must certify that specified types of vehicles and equipment, including construction equipment, sold in the city meets prescribed noise emission standards. Vehicle users are also subject to noise limitations. Noise from buildings and certain noise-generating activities are also regulated.

Chicago has come up with a unique method of enforcing its new noise standards. Mobile teams, equipped with portable sound meters, will cruise the city "listening" for violations and ticketing violators.

New York's Quiet Communities Program embraces research, monitoring, and land use planning. Enforcement of noise stand-

Figure 3

Progress in State Solid Waste Management Plans, June 30, 1971



Source: Environmental Protection Agency, Office of Solid Waste Management Programs.

ards is carried out primarily through local law enforcement agencies.

California,[29] Connecticut,[30] and New York[31] all have legislation establishing maximum decibel noise levels for motor vehicles on public highways. California also regulates noise levels of new motor vehicles.[32] Studies in New York indicate substantial reductions in vehicle noise levels. Most States have laws requiring mufflers on vehicles to prevent excessive noise, but because these laws generally do not establish maximum decibel levels, they are difficult to enforce.

Although many municipal noise ordinances regulate noise from fixed industrial locations, very few regulate the annoying noise from construction activities. Public nuisance laws have rarely been invoked successfully against such noise.

Municipal building codes often contain provisions to minimize noise passing through walls, but many such provisions are inadequate or poorly enforced. There is virtually no regulation of household appliances by State and local governments.

radiation—Legal uncertainty shrouds the future of State regulation of radioactive emissions from nuclear powerplants. Opinions by a Federal district court in Minnesota[33] and by the Illinois Pollution Control Board[34] reached opposite conclusions on whether States are preempted by Federal law from regulating such emissions. The Federal district court held that Federal radiation control authority precludes State regulation. The Illinois Board ruled just the opposite, contending that when public health and safety—traditional State concerns—are involved, a congressional intent to foreclose State regulation must be very explicit. The Board found such an intent to be lacking in the Atomic Energy Act.[35] The ultimate outcome of the t both of which are now on appeal, will significantly influence the future of State nuclear powerplant regulation.

reorganization

States, like the Federal Government, have reorganized themselves to cope with the environment. The trend toward consolidation of State pollution control programs began in the late 1960's. And it has taken a variety of forms. The examples discussed are representative although not necessarily typical.

Prior to the reorganizations discussed below, environmental programs in most States were—and in many other States still are—scattered among several agencies, boards, and commissions. Boards and commissions, manned by government agency representatives, citizens, special interest groups, or all of these, usually wielded considerable influence in setting pollution control policy. Often these entities exercised powers independent of the Governor, and special interest groups sometimes dominated them.

Implementing board-established policy was generally left to one or more agencies. Most often, a State health department contained one or more units responsible for air and water pollution control. In some cases, the water pollution control program was lodged in a separate agency or combined with other water programs, such as water resources management. The State solid waste management program, if any, was usually under a health department arm. Pesticides regulation was a function of the health or agriculture departments—or both. State park, recreation, fish and wildlife, and other resource programs were sometimes grouped together or were sometimes totally separate.

new york—By a statute enacted on Earth Day 1970, and effective July 1, 1970, New York State transferred most of its pollution control and resource management programs—the air, water, and pesticides control programs and the water resource, forest, fish and wildlife, and marine and mineral management programs—to a new Department of Environmental Conservation (DEC).[36] Solid waste disposal regulation, land use planning, and noise pollution control were also put under the Department's general purview, and it is expected that DEC will seek more specific statutory authority in these areas.

DEC is empowered to develop a statewide environmental plan and a statement of goals and strategies, to review all State agency programs affecting the environment, and to formulate guidelines for measuring the environmental values and relationships involved.

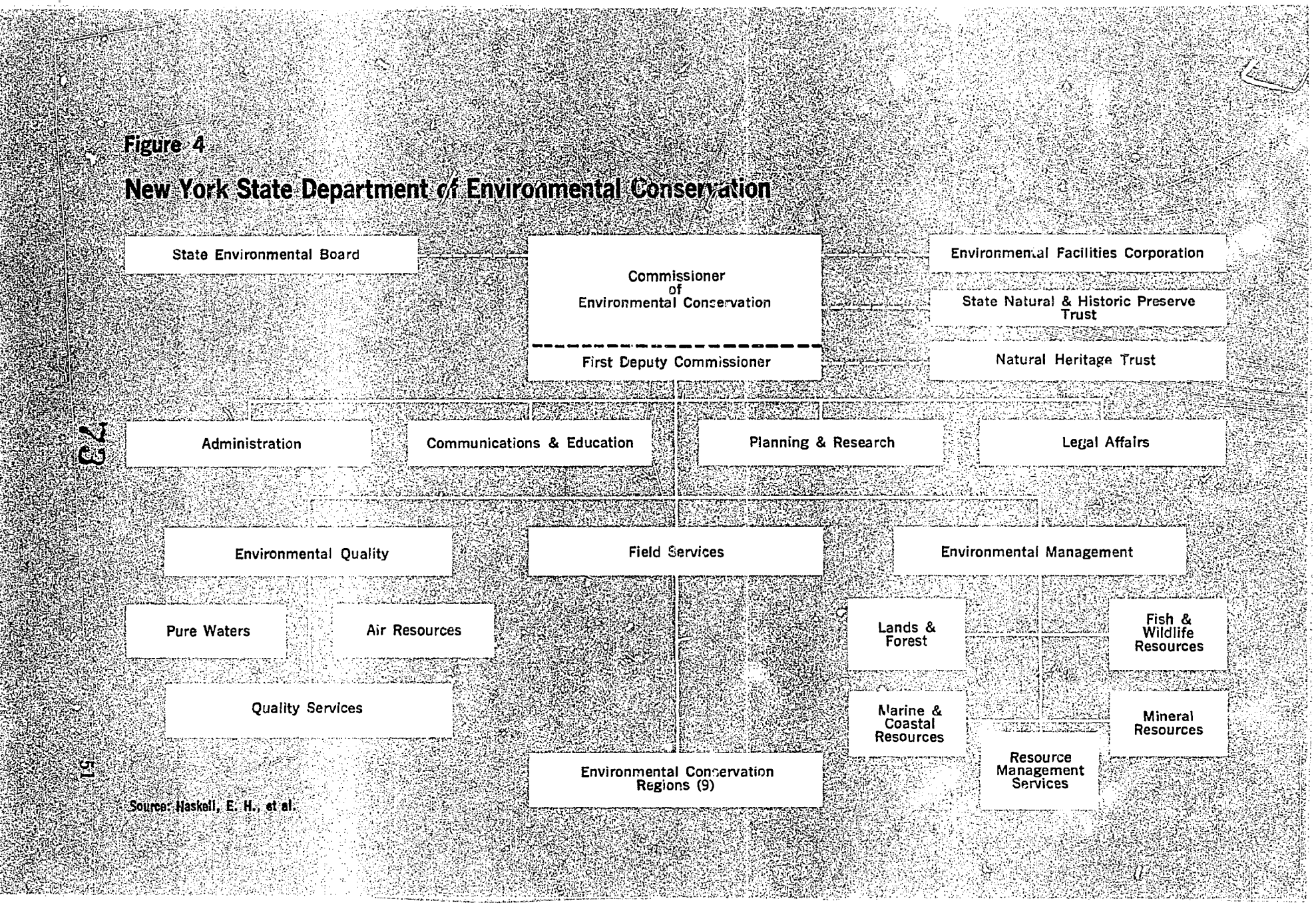
Internally, DEC is basically divided into an environmental quality (pollution control) section and an environmental management (resource management) section (see Figure 4).

The act creating the DEC also created a State Environmental Board—made up of citizens and representatives of State agencies—and a citizen Council of Environmental Advisors. The Board, which replaces interagency air and pesticides boards and the Water Resources Commission, will advise the DEC Commissioner. It has veto power over environmental standards, criteria, rules, and regulations proposed by the Commissioner. The citizen Council is an advisory body to the Governor on broad environmental policy. It has specific responsibility for developing guidelines on environmental quality and economic and population growth.

washington—The State of Washington enacted legislation in 1970—less extensive in scope than the New York law—which consolidates environmental protection programs under a Department of Ecology (DOE).[37] Created on July 1, 1970, DOE resulted from an across-the-board effort in the State to overhaul government structures and make them more responsive to the Governor, the legislature, and the public.

Figure 4

New York State Department of Environmental Conservation



Source: Haskell, E. H., et al.

DOE consolidates the water and air quality, solid waste management, and water resource programs. In contrast to New York's DEC, DOE does not incorporate other resource management programs. Although the Department is basically a pollution control agency, programs such as pesticide control and drinking water quality remain with the Agriculture and Social and Health Services Departments, respectively.

As in some other States that have reorganized environmental programs, a key objective was to create a strong environmental executive directly accountable to the Governor while limiting the number and authority of special interest and interagency boards and commissions that have been a hallmark of State environmental management.

Preexisting citizen or interagency boards such as the Water Resources Advisory Council and the Air Pollution Control Board gave way to an Ecological Commission to advise the DOE director. All nonprocedural rules and regulations proposed by the Director of DOE are reviewed by the Commission. The Commission has veto power over such proposals if five of its seven members disapprove.

The third element in Washington's new pollution control structure is a three-member quasi-judicial Pollution Control Hearings Board. It hears appeals from decisions of the DOE and of local air pollution control authorities.

One of the most significant aspects of DOE is its internal structure. It is structured according to functions, such as standard setting and planning. There is no separate air quality, water quality, water resource, or solid waste component. Instead, there are two functional branches—one for [illegible] and planning and one for public services (see Figure 5).

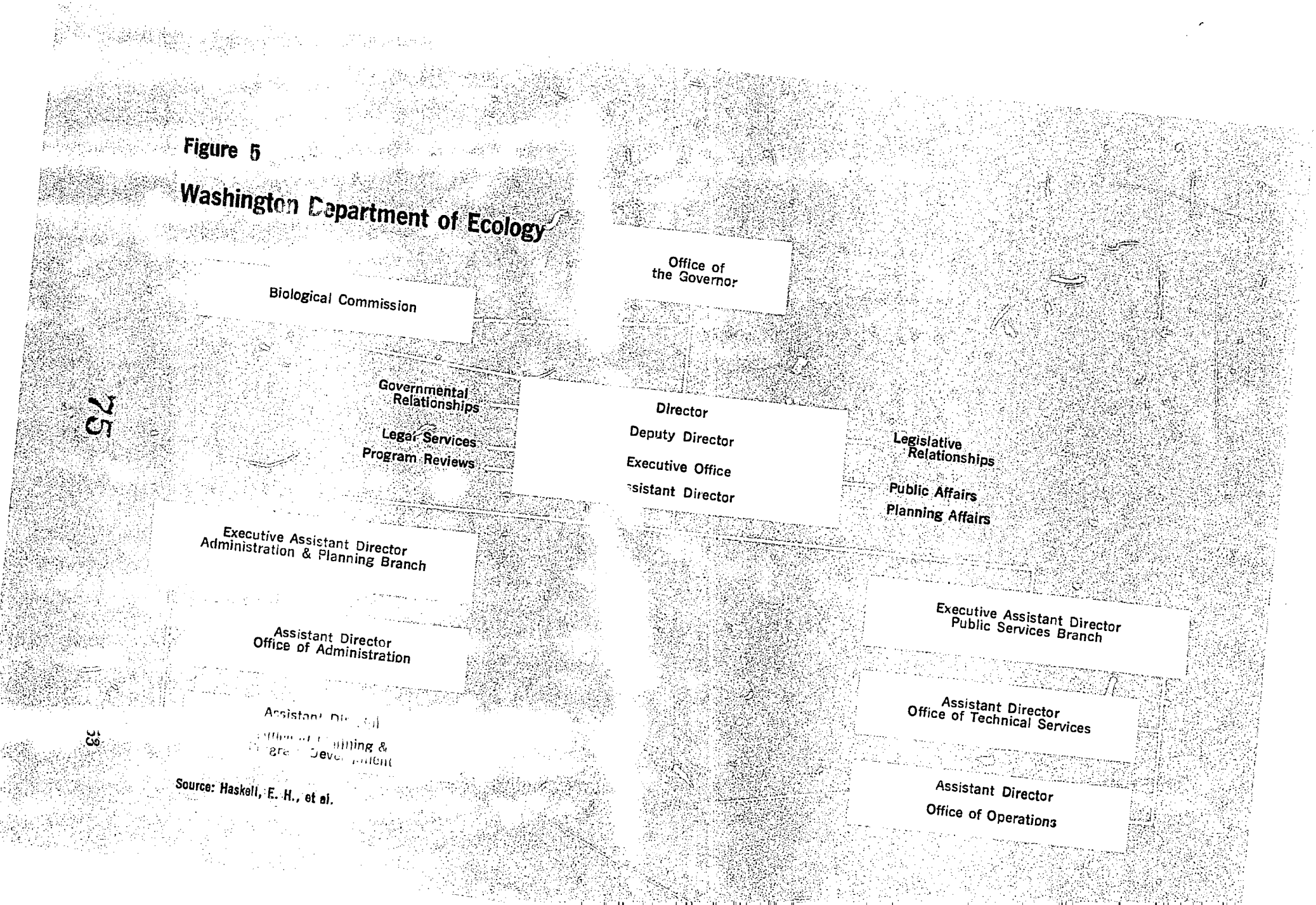
Illinois—Probably the most innovative State reorganization program was adopted in Illinois. The Illinois Environmental Protection Act of 1970[38] transferred preexisting authorities and programs and added some new ones to three new functional entities. Resource management programs were not affected. The Pollution Control Board (PCB) sets standards and adjudicates enforcement proceedings. The State Environmental Protection Agency (EPA) identifies and prosecutes alleged violators before the Board, issues permits, and gives technical assistance. The Institute for Environmental Quality (IEQ) conducts long-range policy planning and applied research. (See Figure 6.)

Pollution control programs—air quality, water quality, radiation control, and "land pollution control" (solid wastes)—thus were divided in the reorganization among three organizations. This is an atypical response to common problems that have led various other states to reorganize.

The Illinois reorganizers saw many problems. The State Department of Public Health (DPH) overadvised and overconsulted

Figure 5

Washington Department of Ecology



Source: Haskell, E. H., et al.

with polluters instead of regulating and prosecuting them. Part-time standard-setting boards—such as the Air Pollution Control Board and the Sanitary Water Board—were ineffective; they met infrequently, and some members were associated with polluting constituencies. The air and water quality boards were separate. Finally, the pollution control units within DPH had to compete with other important DPH interests for money.

The framers of the Illinois reorganization plan were guided by principles in large measure different from those followed by other States. First, rather than eliminating or reducing the role of the policymaking board, Illinois professionalized it by giving it a full-time membership with staff. It also gave the board sharply defined, final authority for standard setting and policy development.

Second, Illinois acted upon the theory that some functions, such as prosecution and adjudication, conflict, or at least compete unfavorably, if administered by a single agency. The State also felt that long-range research and planning inevitably suffered when forced to compete for funds within an agency that must respond primarily to immediate crises and pressures. Hence, it created the independent IEQ.

Third, the Illinois approach is grounded in the belief that some duplication of responsibilities promotes a healthy competition that will maximize action against pollution. It assumes that interacting and overlapping organizations, with an involved citizenry, will "check and balance" inadequate or arbitrary action by any one organization. The Illinois Environmental Protection Agency, the Attorney General, and any private citizen all have authority to initiate enforcement proceedings. And citizens as well as the State EPA and IEQ may initiate standard-setting proceedings.

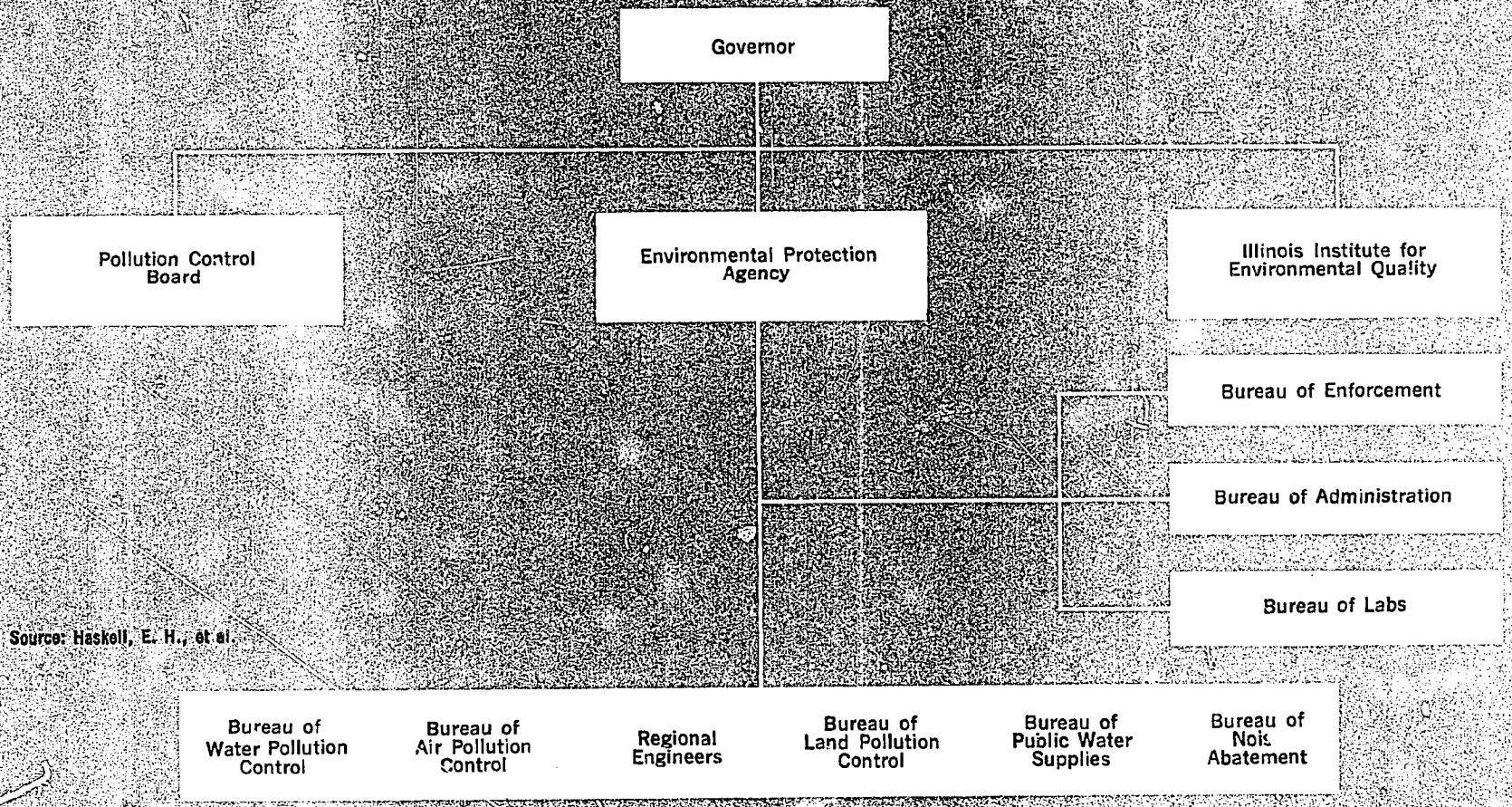
Reorganization of environmental programs such as those in New York, Washington, and Illinois, especially when linked to an expansion or streamlining of pollution control authority, should significantly accelerate substantive progress at the State level. The varying approaches to reorganization—consolidation versus separation of functions and competitive overlap; pollution control alone versus a combination of pollution control and resource management; internal functionalization versus pollutant or media orientation—all will lend valuable comparative experience for future refinement of environmental management efforts.

program innovations

Aside from reorganization, some States have also introduced innovations in environmental problem solving. States have pioneered new approaches to citizen involvement, waste management and its financing, pollution charges, and applications of

Figure 6

Illinois Interim Environmental Organization



Source: Haskell, E. H., et al.

technology. (New State laws, patterned after the National Environmental Policy Act (see Appendix A) and requiring State agencies to weigh the environmental impact of proposed activities, are discussed in Chapter 5.)

citizen involvement—Michigan has given private citizens broad rights to obtain a court injunction or other equitable relief against conduct that will "pollute, impair, or destroy the air, water, or other natural resources or the public trust therein." [39] The new Michigan law covers much more than air and water pollution, but it can be expected to have a particular impact in those areas.

The Michigan law contrasts with the Illinois Environmental Protection Act of 1970,[40] which provides for major citizen involvement in the regulatory processes of State agencies but authorizes a more limited type of citizen enforcement. The Illinois Act gives citizens broad rights to be informed of agency proposals and actions, to examine records, and to participate in agency procedings. The standard-setting agency, for example, must hold a public hearing on any standard or rule proposed by 200 or more citizens—unless it is "plainly" devoid of merit or has been considered within the previous 6 months.[41]

Any Illinois citizen may initiate an adjudicative proceeding before the Pollution Control Board to enforce the Act or standards established pursuant to it. In addition, a recent amendment of the State constitution enables citizens to sue in the State courts to protect their right to a "healthful environment." [42] (Chapter 5 discusses in more detail the Michigan, Illinois, and other State laws giving private citizens access to the courts to protect the environment.)

waste management and its financing—Three States, Maryland, New York, and Ohio, have public corporations empowered to engage in a traditionally local function: financing, constructing, and operating municipal sewage treatment and solid waste disposal facilities. The Maryland and Ohio corporations have similar authority with respect to some industrial facilities, and the New York and Ohio corporations have responsibility for water supply facilities.

maryland—The most recent of these three innovative institutions is the Maryland Environmental Service (MES), created in 1970.[43] MES may finance, design, construct, operate, and maintain solid and liquid waste disposal facilities. It provides research, technical assistance, and planning services on a regional basis. MES may contract with municipalities, other government entities, and private parties to provide these services. When directed to do so by State pollution control officials, it must install or operate abatement facilities for a municipality, firm, or individual that

has failed to comply with an order issued by such officials. Recipients of MES services bear the costs.

MES is expected to effect economies of scale through regionalization of waste treatment and disposal, better financing opportunities than those available to most local jurisdictions (MES is authorized to issue its own bonds), and stricter compliance with water quality standards and solid waste disposal regulations.

MES will draft and seek to implement 5-year plans for the regions that it designates. However, the MES legislation requires approval by local governing bodies in a designated region as a precondition to adoption and implementation of a plan. Only the State General Assembly can override a local veto. Moreover, local governments can veto the location of waste disposal sites and continue to set fees for sewer and refuse services. Once a plan is adopted, an MES district will be established to acquire or construct the necessary facilities.

Some skeptics suggest that the local veto provision will hamstring MES and force it merely to implement local priorities instead of pursuing regional objectives. However, it is quite possible that MES can at least move toward regional waste management by persuading local officials that it will be cheaper and more effective to think regionally. MES must sell itself.

The primary difference between MES and the New York and Ohio public corporations—the New York Environmental Facilities Corporation (NYEFC) and the Ohio Water Development Authority (OWDA)—is that neither NYEFC nor OWDA has statutory authority to take over any facility that is violating standards. None of the three corporations provides grants to municipalities, although in Maryland and New York, municipalities may obtain State grants to help construct sewage treatment facilities. In Ohio, state funds that qualify for Federal grant assistance are provided on a loan basis.

new york—NYEFC, created in 1966 as the Pure Waters Authority, began operations in September 1968 and has authority to finance, construct, and operate municipal air pollution control facilities in addition to its solid and liquid waste management and water supply authorities.[44] Basically the corporation is a service organization to help communities that have assessed their own needs and priorities. Unlike MES, it is not designed to impose regional solutions to waste disposal problems.

As of March 31, 1971, NYEFC had outstanding 14 contracts for sewage treatment financing, 17 contracts for sewage treatment construction, and 20 for operation and maintenance of such facilities. Also outstanding were one construction contract for a water supply facility and one contract for operation and maintenance of a solid waste disposal facility. The Corporation's outstanding obligations totaled more than $28 million, and the total value of its contracts was more than $125 million.

ohio—OWDA, established in 1969,[45] has received as of June 1, 1971, a total of 249 applications for assistance from local governments. It has signed agreements with 81—for projects valued at more than $165 million. Five projects have been completed, and 52 projects, costing a total of more than $119 million, are under construction. Two projects for industry are under construction, and one has been finished.

OWDA, like NYEFC, does not have regional planning responsibilities. But projects that it funds must be consistent with regional waste management plans soon to be completed by the Ohio Department of Natural Resources. OWDA, unlike MES, does not have authority to build a facility in order to remedy a violation of standards. However, under the terms of its contracts, it does have authority to take over the operation of any facility —industrial or municipal—which it has financed or constructed, if standards are being violated.

MES, NYEFC, and OWDA are pioneering institutions, each reflecting to some degree the growing awareness that regional planning and facilities, economies of scale, and large-scale financing are important to effective waste management. As waste management problems become more difficult and public demands for a quality environment more intense, such statewide solutions will become more important.

pollution charges—The "effluent fee" or pollution charge has been a key innovation in financing pollution control at the State level. However, its implementation so far has been limited. Vermont passed a law in 1969 levying a charge on dischargers not in compliance with State water quality standards.[46] The Vermont law provides that after July 1, 1971, a "temporary pollution permit" may be issued to a discharger ineligible for a "discharge permit." A discharge permit is issued only for discharges that will not reduce the quality of receiving waters below applicable standards. To receive a temporary permit and avoid legal action by the Water Resources Board, the discharger must show that he is making a bona fide effort to install or develop control facilities or systems, has no reasonable alternatives, and would suffer hardship if the permit were denied. He must also demonstrate that some public benefit will result from issuance of the permit and that the discharge will not unreasonably degrade water quality.

Any temporary permit issued must contain various conditions specified by statute. One of these is periodic payment of a pollution charge, established by the Board "to approximate in economic terms the damage done to other [public and private] users of the waters." This is designed to give permit holders "the economic incentive . . . to reduce the volume and degrading quality of their discharges" during the limited period of time the permit allows to complete remedial action.

The Vermont effluent fee system deviates most sharply from the basic effluent fee concept, as advocated by welfare economists, in this way: The Vermont charge applies only to dischargers determined to be out of compliance with water quality standards. The basic effluent fee concept generally calls for charges to be levied against all dischargers. The July 1, 1971, deadline for implementing the effluent fee law recently was extended for 1 year by the Vermont Legislature to give firms more time to comply with water quality standards. However, firms not complying by July 1, 1972, will be assessed fees retroactive to July 1, 1971.

Michigan recently enacted legislation establishing an effluent and water quality monitoring fee system. That law requires all manufacturing and other commercial dischargers to pay a fee "for the cost of surveillance of industrial and commercial discharges and receiving waters."[47] The fee, assessed annually by the Water Resources Commission and based on the volume and strength of discharge, may range from a $50 minimum administrative fee to $9,000 per location for discharges in conformance with the Commission's effluent restrictions. The law specifies no maximum fee for unlawful discharges. Thus, it apparently could be applied similarly to the Vermont law.

The new waste treatment and disposal program in Maryland, discussed earlier in this chapter, may also be used to impose an effluent fee. Maryland's new Environmental Service is authorized to charge for its services. The Environmental Service Act would permit MES to structure its charges to reflect the costs of environmental damage caused by pollution.

new applications of technology—A promising example of recent innovation in technological experimentation by State governments and their subdivisions is the Muskegon County Wastewater Management System With more than $2 million from EPA, the Michigan county has initiated a demonstration project using partially treated municipal sewage, which contains soil conditioners and nutrients, to reclaim barren land for agricultural use. When waste water is sprayed on the land, the soil will remove nutrients and absorb heavy metals, both of which are used by plants. The project is designed, however, to prevent overloading of heavy metals in the soil. A drainage network of tiles and wells will return clean water to the county's aquifers, lakes, and rivers—to augment water supply or stream flows. The concept is not new, but the large-scale application of it is.

A bold project that required the cooperative commitment of the county, the State, the Federal Government, and 13 units of local government, the Muskegon County experiment is an example of increasing and needed efforts to reuse waterborne wastes rather than simply collecting them for unproductive and costly disposal. If the project proves viable for widespread application, it will provide an alternative to the conventional municipal

waste treatment plant. Preliminary evaluation suggests the project will be less costly than expensive tertiary treatment that would still result in wastes being discharged into Lake Michigan.

In a related, subsequent development, the Army Corps of Engineers and the Environmental Protection Agency announced a joint program to develop regional waste water management systems for five of the Nation's largest urban centers. In these areas—Boston (Merrimack Basin), Chicago, Cleveland, Detroit, and San Francisco—the two agencies will jointly study alternative waste water management posibilities in close cooperation with State and local governments. Based on the premise that pollutants are potential resources out of place, these studies will consider alternatives such as the Muskegon County system. Only alternatives capable of achieving established water quality standards and compliance schedules will be considered.

With approval from the Commonwealth of Pennsylvania, under a new law requiring State approval of all waste disposal projects,[48] a new type of sanitary landfill has been put into operation near Tullytown. Designed to protect against water pollution, the site is expected to provide refuse disposal space for a number of communities for 8 to 10 years. To prevent polluted water from the landfill from penetrating to underground water supplies or from running off to nearby streams, a membrane barrier has been installed at the base of the landfill to collect all water which penetrates. Surface water that filters down to the membrane flows to collection points where metals and biological materials are removed. The treated water may be discharged to the streams or returned to the landfill where, under certain conditions, its recirculation promotes rapid stabilization of the wastes. The system is intended to permit reclamation of areas such as swamps or low-lying ground, which otherwise would not be used for refuse disposal because of danger to the water table.

Because public concern for environmental protection has focused largely on pollution control, it is not surprising that much of the State and local environmental activity has focused on this area. States also have been pioneering new land use programs. These range from setting up new regulatory authorities and institutions to paying more attention to increasing parks and protecting natural areas.

regulation of land use

In the past year, State control over critical areas and types of land use has increased. Under the U.S. Constitution, States possess the inherent police powers on which land use regulatory authority depends. However, since zoning rules were first applied in New York City in 1916, land use regulation has been

regarded predominantly as an instrument for controlling urban development. Following the pattern prescribed in the Model Standard Zoning Enabling Act published by the Department of Commerce in 1922, most States have delegated land use regulation to local government.

The traditional local zoning system is ill suited to protect broader regional, State, and national values. Local governments have a limited perspective on and little incentive to protect scenic or ecologic vital areas located partially or even entirely within their borders. Economic pressures often spur development to the detriment of the environment because of local government dependence on property taxes.

Local land use regulation alone, therefore, cannot deal effectively with many of today's environmental problems: protecting lands that have natural or esthetic value to a region; accommodating development that is necessary for a region but may not be desired by local communities; and controlling large-scale development that impacts upon more than one local government. Recent State initiatives in land use regulation are aimed at overcoming these disabilities.

protecting wetlands and other key areas—Several States have assumed control of land use in important geographic areas in order to preserve fragile ecological characteristics from incompatible development. For example, legislation in some States has subjected draining, dredging, filling, and development in coastal wetlands to State regulation.

These laws respond to the fact that continued draining, filling, and consequent disappearance of wetlands destroy important wetland-dependent shellfish, marine life, and waterfowl. At least two-thirds of the marine population spends an essential part of its life cycle in estuarine waters—or depends on species that do. (Statistics on wetlands losses in various States are detailed in Chapter 7.)

Wetlands laws often require a prospective developer to obtain permits from both local and State government prior to development in wetlands. The better laws customarily restrict development activities to those compatible with preservation of wetlands for dependent plants, micro-organisms, fish, and wildlife.

The 1963 Massachusetts wetlands protection law, the first such State law, limited certain kinds of development and set up a permit requirement.[49] Additional wetlands legislation in 1965 authorized the State to issue comprehensive protective orders that are recorded as conservation restrictions against deeds and thus are binding on the property through successive ownerships.[50] These orders, issued prior to any development, specify one or more permissible classes of wetlands use for the property to which they are applicable: unqualified (e.g., recreation, hunting, and grazing of stock); conditional (e.g., roadways, under-

ground utilities, mooring slips); and [illegible]cial permit only (e.g., excavations for boat channels, beaches, [illegible] launching ramps).

As of the spring of 1971, protective orders were recorded against 18,100 acres of Massachusetts coastal wetlands. Orders were pending against other acreage which, if added to the present total, would cover 40,000 of the approximately 53,000 acres of coastal wetlands in the State. A key advantage of the protective order system is that it determines land capability and compatible uses in advance of actual development and related disputes.

In 1969, California expanded the authority of the San Francisco Bay Conservation and Development Commission (BCDC) to protect the Bay's wetlands and to prevent inappropriate piecemeal filling of the Bay.[51] BCDC, composed of 27 members representing Federal, State, and local governments and the general public, regulates all dredging and filling in the Bay. It has limited jurisdiction over substantial development within 100 feet of the Bay as well as over proposed filling of salt ponds and other wetlands. BCDC will approve only those developments that are water-related and provide public access to the Bay.

Since 1969, the Commission has processed 13 major permit applications, approving all but one. The approved projects provide two new shipping terminals and more than 2 miles of new public access to the Bay. The project for which a permit was denied would have endangered water quality. BCDC received no applications for major Bay fill projects such as subdivisions or refuse dumps—presumably because the law clearly precludes major Bay shrinkage.

Concern for wetlands protection has led at least two States, Arkansas and Maryland, to establish inventory systems to identify particularly vulnerable areas. The Arkansas Act[52] aims to preserve disappearing wetlands in the eastern part of the State. Related measures seek to save trees growing below the high water mark in navigable streams[53] and to bring the use and disposition of islands formed in such streams under State and local control.[54]

Maryland's inventory program is part of a broader scheme of wetlands protection. The Wetlands Act of 1970 directs the Secretary of the Department of Natural Resources to inventory all private wetlands and to establish their boundaries.[55] The Act also requires a license for dredging or filling and for removing or otherwise altering or polluting private wetlands.

After studying the State's long winding coast, Florida's Coastal Coordinating Council, an advisory board, has recommended protective zones for marshes, mangrove areas, beaches, and other environmentally vulnerable terrain. Certain State-owned estuarine areas are already protected through a system of aquatic

preserves.[56] The State recently added five new preserves, bringing the total to 31.

In June 1971, Delaware enacted a far-reaching Coastal Zoning Act prohibiting new heavy industrial development and strictly regulating all other new industrial development within a 1- to 6-mile strip along the 100-mile Delaware Bay coast and along the State's 25-mile Atlantic coast.[57] The law flatly prohibits additional oil refineries and petrochemical complexes, basic steel manufacturing plants, pulp paper mills, and offshore bulk facilities. It cites garment factories, auto assembly plants, and jewelry and leather goods factories as industries that may continue to locate in the coastal zone, but only by permit. The Delaware law embodies a clear-cut decision to preserve for recreation and tourism—and to reject as a site for major industry—a large area uniquely suited by geography for either purpose. By banning offshore transfer facilities, the State bars the use of Delaware Bay as a major deep water port for supertankers and other large bulk carriers. The law describes transfer facilities as representing a "significant danger of pollution to the Coastal Zone" and as magnets for new, unwanted development and growth.

Although most "area control" land use initiatives have involved coastal wetlands, land-locked Colorado in 1971 called on its State Land Use Commission to define "critical conservation and recreation areas" and recommend them to the legislature for State regulation.[58] Various environmental characteristics, such as ecological vulnerability and scenic quality, qualify Colorado lands to be considered areas for State regulation.

An increasing number of States is becoming concerned about prime agricultural land near urban areas that is rapidly being taken over by housing, industrial, and other development. This concern springs from the desire to prevent urban sprawl and to preserve urban area open space as well as from the desire to preserve prime agricultural lands. New York recently enacted a law that permits the State after 3 years to zone up to 3 million of the State's 5 million acres of farmland into agricultural districts that will be protected from incompatible development.[59] This law goes beyond the preferential assessment laws in a number of States which permit farmers voluntarily to enroll their land as agricultural in order to obtain property tax assessment based on its agricultural value rather than on its often much higher development value. Such laws, often designed to mitigate the economic pressure on farmers to sell land to developers, have had mixed success thus far.

restricting potentially harmful development—Certain kinds of development may concern a State regardless of its proposed location or the character of the land involved. The impact of some development is felt well beyond its immediate vicinity. A power-

plant, for example, may need large volumes of cooling waters, emit air pollutants, and require transmission line corridors. A large airport generates problems of noise and of ground access to the surrounding area. A large recreational area or amusement park can clog nearby communities with heavy traffic from visitors attracted to new surrounding commercial developments—restaurants, motels, or service stations.

Several States have enacted laws to control the siting of new electric powerplants. In 1970, California established long-range planning requirements and a certification procedure.[60] Maryland enacted legislation authorizing the State to purchase powerplant sites in advance of need.[61] Washington created a siting board composed of State agency representatives,[62] and Oregon has set rigid standards for the siting of nuclear powerplants.[63] New York enacted controls over the location of transmission lines.[64]

Many areas around major airports, developed with little land use control, are largely incompatible with the needs and functions of the airport or surrounding communities. The result has been noise complaints, ground traffic congestion, and disorderly development. In 1969, Minnesota came to grips with the problem, implementing an Airport Zoning Act to control development around major airports.[65] The law vested in a Metropolitan Airport Commission responsibility for planning and siting airports in the Minneapolis-St. Paul area. The Commission's comprehensive plans for siting must be approved by a 15-member Metropolitan Council, which has overall metropolitan planning and development authority, before an airport can be built. The Council also formulates guidelines for land use around airport sites. Local governments are required to obtain Council approval for all land use regulations within the vicinity of the airport. Thus, the Metropolitan Council effectively controls both selection of a new airport site and the subsequent use of land around it, based on planning by the Commission.

One of the most innovative State land use initiatives taken in 1970 was in Vermont. Following a decade of burgeoning second-home and ski resort development and facing the prospect of continued growth and development in the years ahead, Vermont moved to protect its land and waters from inappropriate or excessive development.

Legislation was passed in the spring of 1970 establishing a State Environmental Board, an independent regulatory board within the Agency of Environmental Conservation.[66] The Environmental Board is charged with adopting two types of plans to guide and coordinate development within the State: A capability plan will describe land use capabilities and outline planning criteria. A land use plan then will delineate two types of areas—those generally suited for development, subject to conditions assuring compatibility with the environment of the area, and

those not appropriate for development, except under very special circumstances, because of their vulnerable ecological characteristics or their special historic or scenic value.

Prior to adoption, both plans will receive wide publication. Comments will be solicited at public hearings from citizen groups and from planning agencies. Adoption requires approval of the Governor and of the Vermont Legislature.

The Vermont law also establishes district commissions to grant or deny application for the use of sites for development and subdivisions. This permit system is designed to make development compatible with the State land use plan. For example, recognizing the vulnerability to erosion, special waste disposal problems, delicate plant life, and beauty of its mountain areas, the Vermont law requires a State permit for all commercial, industrial, and residential development above 2,500 feet, regardless of acreage or size. At lower elevations, permits are required for development of more than 10 acres, or if there is no local zoning, developments of more than one acre. Housing projects of less than 10 units within a 5-mile radius are exempt. Permit applications must include a complete plan for the layout of the proposed development, statements of costs, financing, and purpose, proposed utilities systems, and adjacent land uses.

Before a permit is granted, a district commission normally holds a public hearing. It must find that the development will not cause undue air or water pollution; that it will have an adequate water supply without siphoning from existing systems; that it will not create heavy pressures on roads, educational facilities, and municipal services; that it will not mar the natural beauty of the area; and that it is consistent with land use plans.

As of April 1, 1971, district commissions had received 234 applications and acted on 177. Ten decisions had been appealed to the Environmental Board. Five had been decided, four were pending, and one had been withdrawn. Several appeals from Board decisions are pending in the Vermont Supreme Court, but none appears to challenge the validity of the statute. The Vermont experience will be watched nationally as one of the most ambitious and sophisticated State efforts in land use regulation.

Another New England State, Maine, also acted in 1970 to control large-scale development. Moved by the threat that development would damage scenic and biologically important coastal sites and realizing that Maine laws provided very little authority over land use, the legislature passed a new Site Location Law.[67] Certain types of commercial or industrial development require a permit from the Environmental Improvement Commission. They include any development on a land area which is in excess of 20 acres, or which involves drilling or excavating natural resources or building structures in excess of 60,000 square feet on a single site. Residential developments

which are in excess of 20 acres, or which would require a pollution permit, have been defined by the Commission as commercial developments requiring permits.

The law provides that anyone proposing such development must file a notice of intent together with a description of the type and location of the development. An applicant must file an extensive informational form and request review of his proposal by a number of State and local agencies, including regional and local planning bodies. When reviewing agencies recommend that conditions be imposed, the Environmental Commission usually complies.

The criteria for granting, denying, or conditioning permits are similar to those in the Vermont law. They include pollution impacts, congestion of facilities, esthetics and natural systems, and suitability of soil. The Commission approves the application only when the criteria are met, with the burden of proof on the applicant.

As in the case of the Vermont law, it is too early to judge the effectiveness of Maine's Site Location Law. Almost all of the more than 90 final Commission decisions rendered have granted permits subject to conditions. However, in the first major controversy faced by the Commission, a proposal to construct a $150 million oil refinery on Sears Island, the permit was denied, on environmental grounds.

facilitating desired development—Maine and Vermont's concern over the environmental consequences of ill-planned or unregulated development caused them to impose controls. Other States have done so out of a concern that restrictive or uncoordinated local land use regulations may interfere with desirable development. New Jersey's regulation of the Hackensack Meadowlands is an example.[68] New Jersey's authority for comprehensive planning and land use regulation in this area, which includes portions of 13 municipalities and contains substantial wetlands, is based on the State's interest in encouraging effective regional development. It is intended that the State commission regulating land use in the Meadowlands will prevent environmental damage. But protection of the environment is not the State's primary objective—development is. An interesting feature of this regulatory system is a tax-sharing mechanism to distribute proceeds from development equitably among the area's municipalities.

Another example is the Massachusetts Zoning Appeals Law.[69] It was enacted in 1970 to permit the State to override local decisions that unduly restrict or exclude development of publicly assisted housing. Because of the severe shortage of housing for low- and moderate-income families in the Boston metropolitan area, the Legislature established a Housing Appeals Committee. It now rules on local decisions that deny permission to develop housing.

Local control over land use is left intact, and local ordinances and regulations remain in force. The statute merely superimposes procedures and standards when a qualified low-income housing developer applies for a permit. If the developer can show that a local denial or condition was not "reasonable and consistent with local needs," the Housing Appeals Committee may order the permit granted.

The key element in the statutory scheme is the definition of "consistent with local needs." Local requirements and regulations are "consistent with local needs" if they are reasonable in light of the regional need for low and moderate income housing.

The second element of the "local needs" standard aims to protect health or safety, preserve open space, promote better site and building design, and apply regulations equally to both subsidized and unsubsidized housing. The statute does not specify the exact weight which the Committee may give to local planning objections. But the effect appears to be that the Committee will overturn the local decision unless the proposed project offends neutrally applied local planning standards.

As of the end of April 1971, only four appeals had reached the Committee. Two were withdrawn and there was no final decision on the others.

Since 1968, the State of New York has sought an end similar to the Massachusetts Zoning Appeals Law through its State Urban Development Corporation, which is empowered—but has not yet acted—to override local zoning and building codes when special housing needs exist.[70] A new building code enacted in Ohio in 1970 for factory produced housing is also designed to facilitate the siting of desirable development.[71]

State laws to encourage housing development, though not strictly environmental in the traditional sense of the term, are important because they demonstrate how States can exercise their authority to assure socially desirable land use that has impact beyond the local level. However, such laws can also stir conflicts between State and local governments. A development socially desirable in one sense may impose costs for public services larger than the local tax revenues that the development will generate. Or development may be resisted because social problems are feared.

Laws curbing development for the sake of the environment also may trigger State-local conflicts when local communities balk at losing tax revenues that new construction would generate. State and local development-limiting regulations often raise the question of how far regulation may legally go before it becomes a "taking" of property—for which compensation is constitutionally required. State and local governments are wrestling with this problem throughout the country. The fear that compensation might be required has prevented much needed regulation

of wetlands and other natural areas. Nonetheless, States are moving ahead, albeit slowly, to build a framework of land use controls compatible with the need for both environmental protection and orderly growth. (For a discussion of recent case law developments, particularly with respect to the "taking" issue, see Chapter 5.)

parks and natural areas

As the pace of our society continues to quicken and as crowding and congestion continue to frustrate Americans who live in urban-suburban complexes, traditional State and local responsibility for natural resource management and public recreation becomes even more vital. Many States and their political subdivisions are moving to plan and develop parklands and to identify and preserve unique natural areas.

A recently completed survey by the National Recreation and Parks Association shows all the national statistical indicators on State park expenditures, employment, and usage up from past years (see Table 2).

Table 2

State Park and Recreation Programs

	1967	1970	Percent increase
	(in millions)		
Expenditures			
Salaries and wages	77	121	57.1
Supplies and equipment	37	59	59.5
Lands	57	72	26.3
Improvements	108	126	16.7
Grants to local agencies	16	16	0.0
Other	NA	8	NA
Total	$295	$402	36.3
Attendance			
Day visitors	355	432	21.7
Overnight visitors	36	51	41.7
Total	391	483	23.5
	(in actual figures)		
Personnel			
Year round	11,477	13,363	16.4
Seasonal	17,774	21,042	18.4
Total	29,254	33,405	17.6
Areas	3,202	3,426	7.0
Total acreage	7,352,322	8,554,940	16.4

NA=Not Applicable.

Source: National Recreation and Park Association.

State park agencies administer over 8.5 million acres of parkland—nearly 1.1 million of it newly acquired in 1970. The total spent on these lands amounted to more than $400 million in 1970, including $72 million for land acquisition, $126 million for capital improvements, and $121 million for salaries and wages. More than 34,000 individuals were employed by State park agencies in 1970—61 percent seasonal or part time.

A significant part of this progress—especially in land acquisition—traces back to the catalytic function performed by grants-in-aid under the State portion of the Federal Land and Water Conservation Fund.[72] Through the life of the program, fiscal year 1965 to fiscal year 1971, more than 700,000 acres have been bought with approximately $158 million in Federal payments, representing half the cost of each project. State, city, and county governments obligated their fiscal year 1971 apportionment under the program at a high rate to acquire roughly 150,000 acres for about $38.3 million.

Grants from the Interior Department's Bureau of Outdoor Recreation to buy special or unique areas included 239 acres at Burton Island for the Delaware Seashore State Park; the Federal share was $971,000. California acquired 320 acres for the Humboldt Redwoods State Park with a $513,000 Federal share. And Florida bought 9,219 acres of Payne's Prairie near Gainesville with a Federal matching grant of $1.05 million.

Beyond the impetus of Federal grants, States have cataloged an impressive record on their own. In Alaska, for example, citizens approved a $2.3 million bond issue for parks, and the State assembly established four new State parks covering a total of more than 1 million acres. The largest of these embraces 459,000 acres. The Louisiana Legislature approved a major bond issue to finance camping facilities and other capital improvements at four existing State parks. The bond issue also funds development of a detailed parks master plan.

Maryland has initiated an open space grants-in-aid program which will provide $86 million for land acquisition and development over the next 5 years.[73] Maryland also recently passed legislation granting property tax exemptions for land held by the Nature Conservancy (see Chapter 3, Citizen Activity) provided it is ultimately intended for public ownership.[74]

Foreshadowing the urban focus of the President's "Legacy of Parks" proposal, Oregon recently established its first sizable State park within a densely populated metropolitan area—the 257-acre Tryon Creek State Park in Portland. Spurred largely by citizen initiative, the park will grow to about 600 acres. In another innovative move, Oregon's legislature, in its 50th biennial assembly, passed a measure which will free $1.3 million in State highway funds for bicycle and hiking trails development.[75]

Pennsylvania's State park system, also sensitive to the need for

parks serving the city dweller, has one urban-oriented park under development and several more planned. Ridley Creek State Park is 45 minutes from downtown Philadelphia and when completed, will serve 25,000 people a day. Although designed to preserve a rural setting, the park will interact in many ways with a number of urban based needs: inner city youth work projects, regular and vocational school programs, and general programs in environmental education.

Another State park in southeastern Pennsylvania—Nolde Forest—will become an "environmental classroom." The entire 656-acre park will be managed to heighten knowledge and understanding of the environment.

Green River Gorge Conservation Area in the State of Washington will also be developed into an outdoor classroom. This natural area is located 20 miles from downtown Seattle, protected from damaging encroachment by steep canyon walls. The State Parks and Recreation Commission will acquire and develop adjacent areas for access and facilities while preserving the spectacular natural character of the gorge itself.

Many States have established scenic river and trail systems. Among them are California, Maine, Maryland, Michigan, Minnesota, Ohio, and Wisconsin. In addition, Alabama, Florida, Georgia, Iowa, Louisiana, Oklahoma, Oregon, Tennessee, Virginia, and West Virginia have set up scenic river systems. Alaska, Colorado, Massachusetts, and Washington have established scenic trails systems.

Oregon has brought portions of the Rogue, Illinois, Owyhee, and John Day Rivers and the entire Minam River into its scenic river system. And the Oregon Scenic Waterways Act of 1970 [76] calls for continuing studies and periodic reports to the Governor identifying and recommending other rivers for scenic designation. Oregon prohibits construction of dams and reservoirs on scenic rivers. It requires private or public owners to give 1 year's notice before mining, cutting trees, or building roads or other structures on riverfront lands.

The Michigan Natural Rivers Act of 1970 [77] establishes a system of wild, scenic, and recreational rivers regulated by the State Natural Resources Commission. The Commission may direct that lands along designated rivers be controlled by zoning and may adopt zoning ordinances if the local governments fail to do so within 1 year. Commission approval is mandatory for bridges, roads, and other buildings along scenic river lands. Florida's system of wild and scenic rivers includes a network of marked canoe trails, which have been publicized by a special brochure.

The encouraging moves noted above reflect one aspect of the larger surge of community concern about environmental quality. However, most States and localities need to do more than they

have to add to their park systems and to make them more accessible to and suitable for modern urban society. There also remains a tremendous unmet challenge in protecting natural areas for present and future generations. Unfortunately, aggressive programs are difficult to initiate as competition stiffens for funds. The situation is especially critical for municipalities. But some States, as well, have either cut back their programs to purchase and develop park and natural areas or soon will. The President's "Legacy of Parks" program, if approved by the Congress, would help sustain, and even quicken the pace of, State and local park and open space purchases.

summary

Action at the State and local levels to preserve and enhance the environment has been both varied and impressive. State and local governments are carrying out organizational reforms, increasing their enforcement activities—often with limited statutory authority, increasing the funding and manpower for environmental programs, tightening pollution control standards, and both proposing and enacting a wide range of new legislation.

In many areas of environmental concern, a spectrum of innovative approaches is being tried, while in others—such as regulation of phosphates in detergents—a common formula is widely used. There is a definite trend of increased land use regulation by States, but the form and content of such regulation differ considerably from State to State.

The many successful or promising examples of State and local environmental action belie persistent and fundamental problems: severe fund shortages in many States and in many types of environmental protection activities; glaring manpower deficiencies, often largely attributable to unattractive pay scales; and reluctance or inability of many officials to stand up to polluters and irresponsible land developers.

As the Federal Government develops more adequate data on State and local activities, more precise evaluations can be made of the extent to which these problems are being solved.

footnotes

1. Cal. Health & Safety Code §39052(a). *See also id.* §§39052.5, 39101–39106.
2. 42 U.S.C. §1857f–1 *et seq.*
3. S.745, H.R. 4152, 92nd Cong., 1st Sess. (1971).
4. Minn Stat. Ann. §16.01 *et seq.*
5. Wis. Stat. Ann. §15.34 *et seq.*
6. 42 U.S.C.A. §§1857–185a; 49 U.S.C.A. §§1421, 1430; 50 App. U.S.C.A. §456.
7. Ala. Code tit. 8, §288 *et seq.*
8. Administrative Code of City of New York, §892–1.0 *et seq.*
9. *Oriental Boulevard Co.* v. *Heller,* 27 N.Y.2d 212, 265 N.E. 2d 72 (1970).

10. 42 U.S.C.A. §§1857f–1, 1857f–6a.
11. 36 Fed. Reg. 8172 (1971).
12. Mich. Stat. Ann. §9.2607.
13. 85 P.U.R.3d 199 (Ill. Commerce Com. Docket No. 55149).
14. Ill. Ann. Stat. ch. 111 1/2, §1001 *et seq.*
15. Cal. Water Code §13000 *et seq.*
16. Ch. 177, [1971] N.J. Laws; H. 1086, [1971] Rhode Island Laws.
17. Colorado Water Pollution Control Commission Rules & Regulations for Subsurface Disposal Systems.
18. Public Act No. 248, [1971] Conn. Laws; Public Act No. 71–35, [1971] Fla. Laws; H. Bill No. 1551, [1971] Ind. Laws; Ch. 323, [1971] Me. Laws; Ch. 896, [1971] Minn. Laws; Ass. Bill No. 6963–A, [1971] New York Laws.
19. 33 U.S.C.A. §1160.
20. N.J. Stat. Ann. §13:1D–1 *et seq.*
21. Ch. 264, [1970] Kansas Laws.
22. N. C. Gen. Stat. §130–166.18.
23. 42 U.S.C. §3251.
24. 42 U.S.C.A. §325(a)(2).
25. Ore. Rev. Stat. §390.805.
26. Ch. 71–36, [1971] Fla. Laws.
27. Ch. 255, [1971] North Dakota Laws.
28. Chicago Municipal Code §§ 17–1.6 to –4.21.
29. Cal. Vel. Code §23130.
30. Conn. Gen. Stats. Ann. §14–80.
31. N.Y. Veh. & Traf. Law §386.
32. Cal. Vel. Code §27160.
33. 320 F. Supp. 172 (D. Minn. 1970), *appeal docketed,* No. 71–1093, 8th Cir., February 22, 1971.
34. Dresden Nuclear Power Station, 2 E.R.C. 1302 (Ill. Pollution Control Board, 1971), *appeals docketed,* No. 56040, Ill. 1st App. Div., June 1, 1971, and No. 71–47, Ill. 3d App. Div., June 2, 1971.
35. 42 U.S.C. §2011 *et seq.*
36. N.Y. Envir. Conserv. Law §1 *et seq.*
37. Wash. Rev. Code Ann. §43.21A.010 *et seq.*
38. Ill. Ann. Stat. ch. 111 1/2, §1001 *et seq.*
39. Mich. Stat. Ann. §14.528(202).
40. Ill. Ann. Stat. ch. 111 1/2, §1001 *et seq.*
41. *Id.*
42. Ill. Const. amend. XI, §2, effective January 1, 1972.
43. Md. Ann. Code art. 33B, §1 *et seq.*
44. N.Y. Pub. Auth. §1280 *et seq.*
45. Ohio Rev. Code Ann. §6121.01 *et seq.*
46. Vt. Stat. Ann. tit. 10, §912a.
47. Mich. Stat. Ann. §3.533.
48. Pa. Stat. Ann. tit. 35, §6001 *et seq.*
49. Mass. Ann. Laws ch. 130, §27A.
50. Mass. Ann. Laws ch. 130, §105.
51. Cal. Gov't Code §66600 *et seq.*
52. 1971 Arkansas Act. No. 297.
53. 1971 Arkansas Act. No. 142.
54. 1971 Arkansas Act No. 297.
55. Md. Ann. Code art. 66C, §718 *et seq.*
56. Fla. Stat. Ann. §258.17 *et seq.*
57. Ch. 171, Vol. 58, [1971] Delaware Acts.
58. S. Bill No. 91, [1971] Colorado Laws.
59. Ch. 479, [1971] New York Laws.
60. Cal. Pub. Util. Code §2851 *et seq.*
61. Md. Ann. Code art. 66C, §736.

62. Wash. Rev. Code §80.50.010.
63. Ore. Rev. Stat. 609.
64. N.Y. Pub. Serv. Law §120 *et seq.*
65. Minn. Stat. Ann. §360.74.
66. Vt. Stat. Ann. tit. 10, §6021 *et seq.*
67. Me. Rev. Stat. Ann. tit. 38, §481 *et seq.*
68. N.J. Stat. Ann. §13:17–1 *et seq.*
69. Mass. Ann. Laws ch. 40B, §21 *et seq.*
70. N.Y. Unconsol. Laws §6251 *et seq.*
71. Ohio Rev. Code Ann. §124.21 *et seq.*
72. 16 U.S.C. §460l–4 *et seq.*
73. Md. Ann. Code art. 66C, §357B *et seq.*
74. Md. Ann. Code art. 81, §9(54).
75. H. Bill No. 1700, [1971] Oregon Laws.
76. Ore. Rev. Stat. §390.805.
77. Mich. Stat. Ann. §11.501 *et seq.*

appendix
funding and manpower for air and water quality agencies

Table A–1

Funding and Manpower for State and Local Air Pollution Control Agencies, 1970–71

(In thousands of dollars)

State	Fiscal year 1970 funding			Fiscal year 1971 budgeted [1]			Fiscal year	
	Federal	State and local [2]	Total	Federal	State and local [2]	Total	1970 man-years	1971 man-years
Alabama	15	156	171	15	169	184	10	12
Alaska	54	21	75	54	23	77	5	6
Arizona	314	243	557	314	382	696	45	47
Arkansas	49	44	93	60	49	109	4	10
California	2,069	7,665	9,734	2,463	10,114	12,577	614	635
Colorado	567	560	1,127	611	636	1,247	71	74
Connecticut	407	272	679	448	484	932	48	56
Delaware	249	148	397	197	172	369	29	31
District of Columbia	213	107	320	234	117	351	21	21
Florida	488	658	1,146	961	734	1,695	90	123
Georgia	316	192	508	358	344	702	35	65
Hawaii	0	73	73	0	205	205	7	14
Idaho	46	37	83	47	38	85	6	2
Illinois	1,391	3,477	4,868	1,255	2,831	4,086	212	291
Indiana	380	454	834	323	580	903	61	71
Iowa	87	86	173	92	180	272	9	29
Kansas	127	61	188	141	94	235	29	31
Kentucky	341	393	734	534	529	1,063	54	76
Louisiana	120	106	226	154	182	336	15	16
Maine	54	27	81	36	18	54	2	6
Maryland	1,307	899	2,206	1,426	910	2,336	124	173
Massachusetts	415	324	739	575	436	1,011	33	61
Michigan	1,336	662	1,998	1,331	956	2,287	59	116
Minnesota	346	231	577	350	369	719	42	46
Mississippi	44	23	67	46	24	70	3	6
Missouri	733	583	1,316	761	598	1,359	104	107
Montana	106	85	191	131	97	228	10	17
Nebraska	30	15	45	90	46	136	3	8
Nevada	148	130	278	159	136	295	22	26
New Hampshire	32	34	66	45	38	83	6	7
New Jersey	788	796	1,584	1,430	1,323	2,753	149	177
New Mexico	78	87	165	217	148	365	11	23
New York	2,332	7,876	10,208	2,629	8,784	11,413	628	720
North Carolina	454	246	700	578	396	974	55	81
North Dakota	15	13	28	15	12	27	3	4
Ohio	730	1,054	1,784	904	1,422	2,326	84	129
Oklahoma	90	84	174	105	114	219	13	21
Oregon	557	420	977	547	524	1,071	55	57
Pennsylvania	1,958	1,641	3,599	2,604	2,424	5,028	204	295
Rhode Island	114	66	180	83	42	125	8	12
South Carolina	224	166	390	295	359	654	23	44
South Dakota	0	0	0	14	7	21	0	3
Tennessee	503	259	762	788	416	1,204	58	100
Texas	1,139	693	1,832	1,475	960	2,435	155	182
Utah	123	80	203	99	122	221	12	17
Vermont	21	15	36	53	26	79	3	6
Virginia	231	146	377	320	306	626	34	42

Table A–1—Continued

Funding and Manpower for State and Local Air Pollution Control Agencies, 1970–71

(In thousands of dollars)

State	Fiscal year 1970 funding			Fiscal year 1971 budgeted [1]			Fiscal year—	
	Federal	State and local [2]	Total	Federal	State and local [2]	Total	1970 man-years	1971 man-years
Washington	1,222	981	2,203	1,212	1,246	2,458	93	85
West Virginia	138	110	248	221	226	447	14	27
Wisconsin	57	34	91	100	137	237	7	14
Wyoming	16	9	25	26	14	40	3	4
Guam	0	0	0	9	7	16	0	1
Puerto Rico	144	108	252	141	104	245	25	25
Virgin Islands	30	16	46	39	20	59	4	4
Total	**22,748**	**32,666**	**55,414**	[3]**27,115**	[4]**40,630**	**67,745**	**3,414**	[5]**4,256**

[1] Data represent activities of air quality agencies, not expenditures for pollution control facilities. Most States follow the Federal July–June fiscal year, although some use the calendar year or another 12-month period.

[2] Data for State and local agencies are substantially complete although they include only agencies receiving Federal financial assistance.

[3] 19.19 percent increase over 1970 level.

[4] 24.38 percent increase over 1970 level.

[5] 24.69 percent increase over 1970 level.

Source: Environmental Protection Agency, Office of Air Programs.

Table A-2

Funding and Manpower for State Water Quality Agencies, 1970–71 [1]

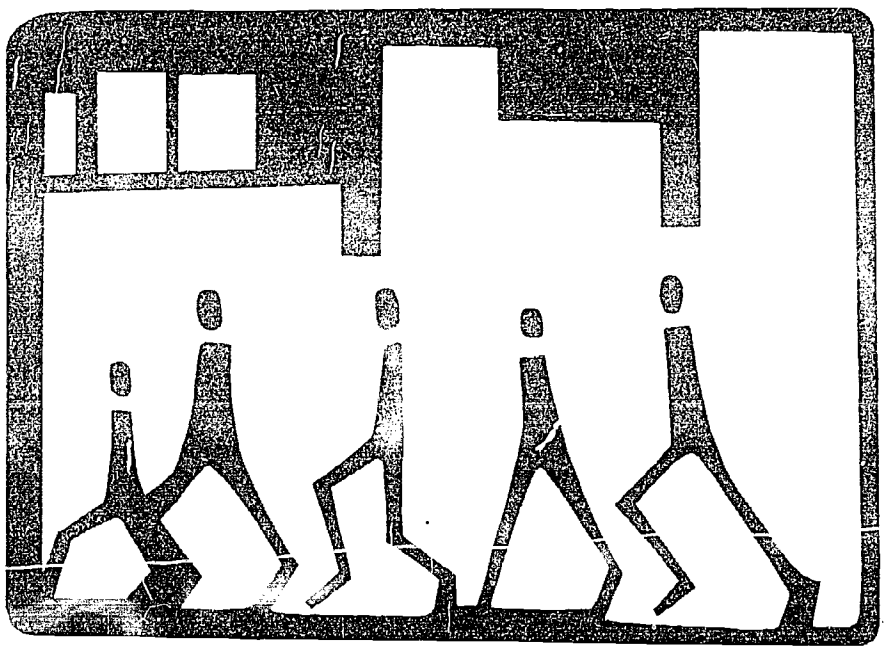
State	Fiscal year 1970 funding			Fiscal year 1971 budgeted			Fiscal year 1970 man-years	Fiscal year 1971 man-years
	Federal	State	Total	Federal	State	Total		
Alabama	185,012	58,068	243,080	190,500	158,750	349,250	21.90	22.20
Alaska	20,100	56,280	76,380	20,000	114,700	134,700	8.20	15.00
Arizona	69,377	59,003	128,380	75,500	88,117	163,617	12.75	11.00
Arkansas	118,169	182,401	300,570	115,700	275,000	390,700	27.30	35.00
California	662,460	2,314,066	2,976,526	661,100	2,801,270	3,462,370	239.00	192.30
Colorado	84,970	141,463	226,433	88,000	220,485	308,485	20.00	21.00
Connecticut	169,811	324,787	494,598	167,400	503,905	671,305	50.80	64.00
Delaware	86,267	217,312	303,579	85,900	202,200	288,100	36.33	33.20
District of Columbia	89,055	271,515	360,570	87,800	579,744	667,544	51.70	63.00
Florida	267,440	462,300	729,740	266,300	658,519	924,819	68.50	72.00
Georgia	223,337	412,894	636,231	218,700	535,544	754,244	38.00	50.00
Hawaii	65,100	114,781	179,881	71,100	184,900	256,000	24.20	31.00
Idaho	42,957	173,467	216,424	44,100	214,000	258,100	9.75	20.30
Illinois	379,097	645,359	1,024,456	428,000	2,327,340	2,755,340	95.00	188.00
Indiana	229,696	346,732	576,428	230,000	484,358	714,358	66.03	56.80
Iowa	123,699	121,309	245,008	121,200	124,580	245,780	15.25	22.75
Kansas	98,724	321,285	420,009	97,600	426,400	524,000	37.75	49.61
Kentucky	171,210	218,059	389,269	165,000	327,546	492,546	33.00	45.80
Louisiana	187,743	266,887	454,630	184,100	331,502	515,602	40.00	49.00
Maine	64,122	371,023	435,145	63,000	397,093	460,093	24.00	29.00
Maryland	183,480	1,135,869	1,319,349	181,300	1,369,830	1,551,130	69.20	82.60
Massachusetts	224,604	413,490	638,094	264,600	457,598	722,198	58.00	58.00
Michigan	358,803	659,392	1,018,195	357,800	992,200	1,350,000	91.00	95.50
Minnesota	156,651	561,030	717,681	155,400	661,955	817,355	60.40	60.00
Mississippi	149,000	123,235	272,235	145,100	72,550	217,650	25.75	25.00
Missouri	199,368	224,456	423,824	196,700	230,534	427,234	31.50	31.50
Montana	39,896	69,117	109,013	39,000	68,664	107,664	7.00	7.00

Nebraska	66,404	77,909	144,313	66,400	117,021	183,421	12.20	11.90
Nevada	21,485	32,682	54,167	23,787	34,213	58,000	5.50	5.71
New Hampshire	63,488	300,544	364,032	63,500	517,326	580,826	55.00	66.00
New Jersey	313,742	856,408	1,170,150	311,900	726,204	1,038,104	77.90	88.90
New Mexico	52,875	34,943	87,818	52,300	113,000	165,300	11.30	14.60
New York	671,175	4,349,545	5,020,720	650,400	4,564,632	5,215,032	328.00	300.00
North Carolina	269,764	438,219	707,983	264,600	509,930	774,530	58.50	57.00
North Dakota	34,398	30,454	64,852	37,200	27,700	64,900	6.00	5.85
Ohio	445,000	495,549	940,549	447,300	819,875	1,267,175	51.10	60.00
Oklahoma	119,156	138,437	257,593	117,600	181,098	298,698	19.00	31.90
Oregon	97,121	497,780	594,901	96,900	468,835	565,735	38.50	41.80
Pennsylvania	496,504	1,779,523	2,276,027	488,300	2,085,978	2,574,278	206.00	170.81
Rhode Island	110,443	163,827	274,270	111,000	187,200	298,200	29.65	32.60
South Carolina	159,749	200,631	360,380	157,400	365,474	522,874	36.50	43.00
South Dakota	41,165	58,683	99,848	38,500	66,500	105,000	11.70	8.70
Tennessee	212,537	188,780	401,317	208,200	329,320	537,520	31.50	37.50
Texas	436,951	1,796,201	2,233,152	427,000	1,771 339	2,198,339	133.00	145.00
Utah	54,592	62,455	117,047	55,400	92,052	147,452	11.15	12.67
Vermont	43,999	216,078	260,077	43,700	239,820	283,520	21.60	23.00
Virginia	212,858	625,220	838,078	210,500	1,065,740	1,276,240	78.50	100.00
Washington	131,037	997,205	1,128,242	131,037	1,025,803	1,156,840	73.50	73.50
West Virginia	111,682	173,790	285,472	111,682	233,870	345,552	28.50	28.50
Wisconsin	196,393	959,602	1,155,995	193,000	1,402,000	1,595,000	75.00	83.00
Wyoming	23,786	31,302	55,088	23,600	39,400	63,000	2.50	3.00
Guam	46,719	43,105	89,824	75,700	39,469	114,469	7.80	10.60
Puerto Rico	198,900	106,234	305,134	195,000	182,813	377,813	26.50	36.95
Virgin Islands	52,725	35,325	88,050	70,300	35,150	105,450	10.40	10.90
Total	**9,334,796**	**24,956,011**	**34,290,807**	**9,392,406**	**32,051,045**	**[2] 41,443,451**	**2709.11**	**[3] 2934.75**

[1] Data represent activities of water quality agencies, not expenditures for pollution control facilities. Fiscal year refers to the Federal July–June fisc
[2] 20.86 percent increase over 1970 expenditures.
[3] 8.3 percent increase over 1970 level.

Source: Environmental Protection Agency, Office of Water Programs.

3



the past year—private activity

Government can only do so much. The rest is up to the private sector. Our system leaves a lot to its citizens, encouraging them to seek reform directly instead of always turning to government. And even the most stringent regulation of industry will not alone succeed in moving it to meet its social and legal obligations.

This chapter provides a perspective on—and some examples of—actions by both citizens and industry on behalf of a higher quality environment.

industry action

Industry moves the Nation, but while doing so, generates a large share of its total wastes—hence its pollution. Industrial sources account for an estimated one-third of total air pollution from the five major pollutants—sulfur oxides, nitrogen oxides, hydrocarbons, particulates, and carbon monoxide—and for three-fourths of stationary source emissions, which include the most damaging air pollutants.

Industrial operations also heavily pollute the Nation's waters. Manufacturing facilities discharged in 1964, the latest estimate available, wastes with a biochemical oxygen demand (BOD) four to five times larger than that of the entire population of the United States. BOD is a measure of the oxygen needed to de-

compose organic wastes. Estimates for 1970, based on American Water Works Association data, show that industry uses 10 times more water than municipal systems. And the ratio is rising.

Industrial pollution is generally more toxic than municipal pollution. Heavy metals such as mercury and cadmium, arsenic, organic chemical compounds, and other toxic wastes come to our waterways largely from industrial operations.

Industry also generates a large percentage of the Nation's nonagricultural and nonmineral solid wastes. Compared with the 250 million tons of solid waste from residential, commercial, and institutional sources in 1969, industry generated 110 million tons. Industrial wastes often are much more toxic and difficult to dispose of than the mixed wastes of municipalities.

Large-scale reduction in the levels of the most serious pollutants requires an effective and sustained effort by industry. This means not only installing pollution control equipment and other facilities, but developing new technology. It often means major changes in management policies.

innovating with technology

Industrial innovation in manufacturing and marketing has made the United States a world leader in technology and material well-being. But industry now must also use its innovative capabilities to solve pollution problems. For some municipal and industrial pollutants, control technology has yet to be developed. Similarly, advanced technology is needed to reach levels of control not yet achievable for some common pollutants.

A number of technological innovations by industry have already contributed dramatically to our present ability to cope with pollution or soon may do so. The electrostatic precipitator, developed years ago, has made possible virtual elimination of all fly ash and dust emissions from fuel-burning facilities. The Monsanto Co., a large chemical producer, has recently developed a catalytic oxidation process—now being demonstrated at an electric power plant—to remove sulfur oxides from stack gases. General Electric is developing a radically new design for cooling towers that are used to dissipate waterborne waste heat. Its low velocity plume could prevent the localized fog that surrounds most cooling towers.

Pulp and paper mills historically have been major sources of water pollution. St. Regis Paper Co. is pioneering a closed system for water recycling. Black liquor, normally a harmful waste byproduct of paper production, is converted into activated carbon, which is then used to filter wastes out of the paper mill's water effluent. The filtered effluent water is clean enough to be recycled and reused by the mill.

Many firms have undertaken complex research and develop-

ment to provide new solid waste recycling technology. Garret Research & Development, a subsidiary of Occidental Petroleum, is developing a coal liquification process and is experimenting with the same equipment to recycle solid wastes. The potential end products will be saleable metals, low-sulfur heating oil, and a char which may be useful for waste water treatment. Several firms are experimenting with pyrolysis, a form of incineration, as a means for solid waste disposal without air pollution problems.

Despite progress, much remains to be done. Technology to control sulfur oxides and nitrogen oxides emissions is not yet commercially proven. Better technology must be developed to control heavy metals and other toxic substances, many of which only recently have become measurable in the minute quantities in which they exist in the environment. And technology still must be developed to achieve further reductions in automotive emissions. To conserve scarce natural resources and to protect the environment at the same time will require not only new technology but new marketing breakthroughs in solid waste recycling.

Yet in some industries the commitments are still relatively small. Expenditures for all types of research and development by the electric utility industry, which accounts for a large share of several of our most damaging pollutants, were only $41 million in 1969. That is less than one-quarter of 1 percent of their annual revenues and about 60 percent of their annual advertising expenditures. Yet new technology that will be needed by the power industry—sulfur oxides control equipment, the breeder reactor, and underground transmission lines—will cost billions of dollars to perfect. Although the Federal Government and electric utility suppliers are spending large sums of money, it will be necessary for the electric utility industry to provide greater support in the future. On the other hand, the electric power industry is significantly stepping up expenditures for presently available emission control equipment and facilities.

The research and development that is necessary throughout industry will require large expenditures. Table 1 lists one estimate of industrial research and development spending for 1970 and of planned expenditures for 1971. The average planned increase of 25 percent indicates a growing commitment by industry.

use of existing technology

Although control of some pollutants awaits new technology, many pollutants could be curbed drastically by more widespread use of current technology. The Environmental Protection Agency (EPA) estimates that if the best presently available technology were applied to all existing sources of particulate emissions, they would drop by 95 percent.

Table 1

Industry Research and Development Expenditures for Pollution Control, 1970 and 1971

(Dollars in millions)

Industry	Actual 1970	Planned 1971	Percent change 1970–71
Iron and steel	$1.7	$0.8	−53
Nonferrous metals	10.1	13.5	34
Machinery	177.6	186.5	5
Electrical machinery and communications	48.1	63.7	32
Aerospace	181.3	222.0	22
Autos, trucks, and parts	60.1	74.6	24
Other transportation equipment	2.2	2.1	−5
Fabricated metals and ordinance	7.0	11.0	57
Professional and scientific instruments	31.6	32.9	4
Lumber	0.4	1.2	200
Furniture	0.4	1.1	175
Chemicals	53.1	36.1	−32
Paper	8.2	8.3	1
Rubber	3.2	3.1	−3
Stone, clay and glass	15.4	19.1	24
Petroleum products	34.4	43.2	26
Food and kindred products	5.6	7.3	30
Textile mill products	5.0	4.3	−14
Apparel	<.5	<.5	NA
Other manufacturing	**15.7**	**12.4**	**−21**
All manufacturing	**661.1**	**743.2**	**12**
Nonmanufacturing	**80.4**	**182.6**	**127**
All industry	**741.5**	**925.8**	**25**

Source: McGraw-Hill Publications Co.

The level of industrial spending for pollution control facilities, compared with estimates of needs, is a good measure of industry's progress in meeting pollution control standards. Unfortunately, estimates of both needs and actual expenditures are difficult to obtain. One problem lies in separating expenditures devoted to pollution control from those made for process changes that increase productivity. Also, varying cost estimating practices (particularly with respect to inclusion of operating costs), varying estimates of the rate of return on pollution control investments, diverse interpretations of standards, and varying estimates of the costs of control all make reconciliation of different data difficult. Table 2, from figures by McGraw-Hill, estimates total industrial expenditures for air and water pollution control in 1969 and 1970 and planned investments for 1971.

The estimates in Table 2 show a 50 percent increase in expen-

Table 2

Industry Investment for Air and Water Pollution Control, 1969–71

(Dollars in millions)

Industry	Actual 1969	Actual 1970	Planned 1971	Percent change 1969–70	Planned percent change 1970–71
Iron and steel	$179	$206	$212	15	3
Nonferrous metals	41	100	152	144	52
Electrical machinery	32	52	58	63	12
Machinery	51	121	169	137	40
Autos, trucks, and parts	55	67	118	22	76
Aerospace	22	15	18	—32	20
Other transportation equipment	15	15	6	0	—60
Fabricated metals	44	53	70	20	32
Instruments	25	25	28	0	12
Stone, clay, and glass	63	64	104	2	62
Other durables	103	135	175	31	30
Total durables	**630**	**853**	**1,110**	**35**	**30**
Chemicals	140	169	263	21	56
Paper	143	153	321	7	110
Rubber	9	50	42	456	—16
Petroleum	260	337	507	30	50
Food and kindred products	58	84	151	45	80
Textiles	10	13	25	30	92
Other nondurables	31	60	37	94	—38
Total nondurables	**651**	**866**	**1,346**	**33**	**55**
All manufacturing	**1,281**	**1,719**	**2,456**	**34**	**43**
Mining	105	115	135	10	17
Railroads	NA	28	28	NA	0
Airlines	NA	21	27	NA	29
Other transportation	0	4	10	—	150
Communications	[2]	[2]	[2]	NA	NA
Electric Utilities	155	405	679	161	68
Gas Utilities	130	110	148	—15	35
Commercial [1]	0	100	158	—	58
All business	**1,671**	**2,502**	**3,641**	**50**	**46**

[1] Based on large chain, mail order, and department stores; insurance companies; banks; and other commercial businesses.
[2] Less than .5.
Source: McGraw-Hill Publications Co.

ditures between 1969 and 1970 and project a 46 percent increase in 1971. A study by the National Industrial Conference Board (NICB), based on a smaller number of industries and a selected sample of firms, shows a 24 percent growth rate. If the McGraw-Hill estimate of 1971 spending is accurate, there is reason for encouragement.

EPA estimates a need for capital investment by manufacturers

in waste water treatment facilities of $3.1 billion over 4 years to clean up their operations. Almost $1 billion must be spent for capital replacement in the same period. Hence, even without inflation, investment by manufacturers for waste treatment should average close to $1 billion a year.

Table 3 puts total investment by manufacturers for water pollution control in 1970 at $870 million. If expenditures increase as projected in Table 2, it appears that industry will meet EPA's estimates of needed investment levels.

Total air pollution control investments were estimated by McGraw-Hill at $1.3 billion for 1970 (see Table 3). In Chapter 4 of this report, CEQ estimates needed industry investment between 1970 and 1975 of approximately $8 billion, or an average of $1.33 billion a year. Although current spending is slightly below the estimated average rate necessary to meet standards, expected increases should bridge this gap.

Another way of looking at progress is to compare industry's estimates of spending with its own estimates of needs, as shown in the McGraw-Hill survey. Industry estimates of needs are based on total investment needed to meet air and water pollution standards in effect as of January 1, 1971. Table 4 indicates these estimates compared to expenditures.

If industry expenditures continued at 1970 levels, it would take more than 7 years, on the average, to meet present air and water pollution standards. If industry spends what it says it will in 1971 and continues at that level, it will take only 5 years. However, both averages understate the time that may be necessary for some industries. And they overstate it for others. For instance, if the iron and steel and nonferrous metals industries do not substantially lift their investment levels, it will take them 12.6 and 10.8 years respectively to meet standards at 1971 spending levels. On the other hand, the textiles industry will only require a little over 3 years to meet its needs at 1971 levels of spending.

Estimates of need and of expenditures for pollution control are sufficiently imprecise that no specific conclusions can be drawn from them. However, two general conclusions seem warranted. First, industrial expenditures appear to have risen dramatically in the last year, and increases in 1971 should be large. Second, however, even higher rates of spending will be required by some industries—if they expect to meet the standards established under current air and water pollution control laws.

management's commitment

Management commitment is clearly a critical factor in abating pollution and enhancing the environment. Consideration of environmental quality can and should be built into decisionmaking processes by industry—whether it be in siting a plant, investing

Table 3

Industry Expenditures for Air and Water Pollution Control, 1970

(In millions of dollars)

Industry	Actual 1970	
	Air	Water
Iron and steel	$86	$120
Nonferrous metals	80	20
Electrical machinery	25	27
Machinery	82	39
Autos, trucks, and parts	45	22
Aerospace	9	6
Other transportation equipment	12	3
Fabricated metals	25	28
Instruments	18	7
Stone, clay, and glass	39	25
Other durables	58	77
Total durables	**479**	**374**
Chemicals	79	90
Paper	5	94
Rubber	2	18
Petroleum	2	185
Food and kindred products	38	46
Textiles	4	9
Other nondurables	4	56
Total nondurables	**368**	**498**
All manufacturing	**847**	**872**
Mining	73	42
Railroads	21	7
Airlines	18	3
Other transportation	3	1
Communications	[2]	[2]
Electric utilities	256	149
Gas utilities	75	35
Commercial [1]	50	50
All business	**1,343**	**1,159**

[1] Based on large chain, mail order, and department stores; insurance companies; banks; and other commercial businesses.
[2] Less than .5.
Source: McGraw-Hill Publications Co.

in abatement facilities, or participating in community environment programs.

Advance environmental impact analysis may be one answer, especially for major actions such as plant sitings and heavy equipment purchases. Industrial impact analysis could follow the model spelled out in section 102 of the National Environmental

Table 4

Industry Requirements and Expenditures, 1970 and 1971 [1]

(In billions of dollars)

Industry	Requirements	1970 expenditures	Planned 1971 expenditures
Iron and steel	$2.64	$0.21	$0.21
Nonferrous metals	1.62	.10	.15
Electrical machinery	.21	.05	.06
Machinery	.69	.12	.17
Autos, trucks, and parts	.17	.07	.12
Aerospace	.06	.02	.02
Other transportation equipment	.21	.02	.01
Fabricated metals	.19	.05	.07
Instruments	.10	.03	.03
Stone, clay, and glass	.16	.06	.10
Other durables	.46	.14	.18
Total durables	**6.51**	**.85**	**1.11**
Chemicals	1.00	.17	.26
Paper	1.84	.15	.32
Rubber	.30	.05	.04
Petroleum	2.12	.34	.51
Food and kindred products	.40	.08	.15
Textiles	.11	.01	.03
Other nondurables	.08	.06	.04
Total nondurables	**5.85**	**.87**	**1.35**
All manufacturing	**12.36**	**1.72**	**2.46**
Mining	.74	.12	.14
Railroads	.32	.03	.03
Airlines	.08	.02	.03
Other transportation	.06	[2]	.01
Communications	[3]	[3]	[3]
Electric Utilities	3.24	.41	.68
Gas Utilities	1.04	.11	.15
Commercial [4]	.32	.10	.16
All business	**18.16**	**2.50**	**3.64**

[1] Figures may not add due to rounding.
[2] Less than .005.
[3] Less than .0005.
[4] Based on large chain, mail order, and department stores; insurance companies; banks; and other commercial businesses.
Source: McGraw-Hill Publications Co.

Policy Act (see Appendix A) which is applicable to proposed Federal agency actions. Such a procedure would help firms consciously to consider the environmental impact of their plans. It could be structured to include valuable input from government agencies and community groups before plans were adopted.

Dow Chemical Co. has already adopted the advance analysis

concept in part with its internal clearance system for new chemicals developed by its research laboratories. The aim is to guarantee the environmental safety of such chemicals before their commercial production and introduction into the environment. The procedure is similar in concept to the one spelled out in the Administration's proposed Toxic Substance Control Act of 1971 (see Chapter 1). That Act would call for extensive testing before production to reduce the likelihood of unanticipated environmental problems.

Actions by Climax Molybdenum Co., a subsidiary of American Metals Climax, indicate the potential of management and environmental citizen groups working together instead of opposing each other. Several years before the new Henderson molybdenum mine was to begin operations in the Rocky Mountain area west of Denver, company engineers and officials started meeting regularly with representatives from the Colorado Open Space Council. Company engineers accepted the challenge of finding new methods by which the ore could be mined and a mill operated with minimal harm to a spectacular scenic area heavily used by tourists. As a result of these conferences, Climax Molybdenum agreed on a number of measures, the most significant (and costly) being the construction of a 9-mile tunnel and rail line under the Continental Divide to transport the ore to a processing mill location away from a scenic highway and valuable fishing streams.

The Georgia–Pacific Corp. has put in scrubbing equipment to remove airborne gypsum dust in one of its plants. A system has been devised to collect the dust for recycling into wallboard. Whatever gypsum dust remains will be forced through a water spray into abandoned gypsum mine tunnels, eventually to accumulate in sufficient quantities to be remined.

Like the government, industrial management needs to reorganize to cope with the environment. Some companies already have done so. A study by the National Industrial Conference Board shows that 51 percent of 174 companies with heavy waste loads—including chemicals, utilities, food products, pulp and paper, mining, and petroleum—have reorganized to give increased emphasis to pollution control. Some have set up separate corporate units or assigned these activities to specific parts of the organization. General Motors Corp., for example, named a Vice President for environmental activities. The other 49 percent of the companies studied have not yet established separate corporate units to deal with pollution control. Among executives who do hold environmental responsibilities, only about 30 percent are charged with advance review of designs and plans. Yet without such pre-analysis, unwise decisions may be hard to prevent.

A recent *Fortune* magazine study shows the degree to which top management of the largest 500 companies participate in either communitywide or industrywide antipollution programs:

69 percent said they participated in such programs, 26 percent said they did not participate at all, and 5 percent were uncertain of their participation.

activities of service industries

Some service industries are pushing programs to spur faster pollution control by manufacturers. Such prodding from within the private sector—thus far quite limited—may prove a valuable adjunct to voluntary efforts and Government regulation.

For a small firm, getting capital for antipollution equipment may be a problem. The First National Bank in St. Louis has set up a $5 million fund to help companies finance control equipment. The fund will be augmented by the sale of special savings certificates. Chemical Bank in New York City loans money at prime rates to apartment house owners to purchase equipment to cut down emissions from trash incinerators and heating units. The Insurance Co. of North America has adopted a new policy that excludes insurance for claims that arise from continuous sources of pollution. Without such coverage, emitters can no longer protect themselves against suits for willful pollution.

collective industrial activities

A number of forums are springing up now through which industrial firms can conduct joint projects, discuss common problems, and advise the Government. The largest of these is the National Industrial Pollution Control Council (NIPCC). Associated with the Department of Commerce, it advises the President and the Council on Environmental Quality of industry efforts to reduce pollution. NIPCC has submitted a list of commitments to the President and has issued a variety of publications on industrial pollution control problems.

Industry-Government cooperation has been underway at the Federal level for many years in air and water pollution control research and demonstration. And it has had positive results. Industry cooperation with other levels of government has been less common, but is potentially very productive. For example, Westinghouse Corp.'s Meter Division is making its air pollution monitoring data available to the State of North Carolina. The Meter Division also has offered its technical expertise to help the State establish a statewide monitoring network.

Firms in the bottling, canning, and container industries have established the National Center for Solid Waste Disposal. Beginning with contributions of $900,000 for the first year, the Center is planning a number of studies of solid waste disposal problems.

Two firms—Bethlehem Steel Corp. and Electronic Memories & Magnetics Corp.—have jointly turned one industry's pollution

into another's valuable resource. Pickle liquor, a waste byproduct of steel production in a Bethlehem Steel plant, is now being used by Electronic Memories & Magnetics Corp. in the manufacture of its ferrities and ceramic magnetic products.

Trade associations have conducted joint research to reduce oil spills and to curb pollution from pulp and paper plants and from electric power generation. The Beet Sugar Development Foundation and EPA are jointly funding a closed-loop waste water recycling system to remove most of the BOD and suspended solids generated in a vegetable processing operation. The leftover sludge is being used to reclaim arid lands.

Collective industrial activities in environmental research and development are proving useful in some cases. They often permit economies of scale and a valuable pooling of diverse talents. Care must be taken, however, to insure that the desire to achieve these benefits does not exclude or remove the incentives for innovation by small firms, backroom inventors, and firms seeking to apply expertise in one segment of industry to the problems of another. In general, competition among a number of firms generates the best incentive to innovate and develop new technology.

citizen action

The American public became aware of its environment last year as never before. The environment has become a major national issue—a concern of Americans in all walks of life. It is impossible to predict what the staying power of citizen interest in the environment will be, but there are some hints.

Public opinion polls rate environmental quality as a top domestic concern. Bond issues for environmental improvement did extremely well at the polls in the fall of 1970. The Nation's environmental and conservation organizations are growing at rapid rates. Local groups, often dealing with a single issue, spring up daily. Environmental groups have entered political campaigns —endorsing candidates with good environmental credentials— and have influenced ballot box decisions. And citizens increasingly are turning to the courts for redress of environmental degradation. "Public interest" law firms are challenging in the courts major decisions of government and forcing industries to take cleanup actions.

environmental organizations

At the present time, best estimates show over 3,100 environmental organizations in the United States. A survey for the 1971 White House Conference on Youth identified approximately 2,500 local groups. This figure does not include civic, church, or

school groups or local chapters of national organizations. The 1971 Conservation Directory of the National Wildlife Federation lists over 250 national and regional and nearly 400 State environmental groups. The combined efforts of all these organizations have had an important influence on environmental improvement.

local groups—The variety in size, level of activity, and range of interest of local environmental groups make it impossible to generalize about their efforts and their impacts. However, the survey prepared for the White House Conference on Youth showed them most often pursuing citizen action and public information activities, with legislative and law enforcement activities not far behind. Water pollution led the list of specific problem areas, followed by solid wastes, air pollution, land use, and conservation of natural areas.

Local groups often form to concentrate on a single project—in many cases to save a particular area from ruin or degradation by pollution, construction projects, or poorly planned development. The examples of successful action by local groups during the past year are far too numerous to mention, but they have included challenges to such projects as a refinery in Maine, a

Table 5

Major Activities of Local Environmental Groups [1]

Major activity	Number of responses
General citizen action	1,027
Public information (seminars, workshops, conferences, files, bibliographies, research reports)	915
Legislative activity (referenda, lobbying, testifying, preparing proposals)	396
Water pollution	362
General ecology	304
Solid wastes/recycling	283
Air pollution	257
Land use/planning/urban conditions	237
Law enforcement (suits, injunctions, government responsibility)	231
Conservation of natural areas	219
Energy crisis and resource use	102
Transportation (highways, mass-transit, automobiles)	101
Chemicals (pesticides, herbicides, toxics)	65
Population control	52
Noise and occupational health and safety	25
SST	22
Total	[2] 4598

[1] Approximately 2,500 groups were asked to list major activities.
[2] Many groups gave multiple responses.
Source: Based on Environmental Resources, Inc. data, Yell-o Pages.

shopping center in California, a dam on the Delaware River, a road through a forest in North Carolina, a hydroelectric facility in Wisconsin, a strip mine in Arizona, a new community in Illinois, and a nuclear power plant in Michigan. The primary objective of most of the groups was not to stop the project, but rather to assure that it was properly planned, adequately designed, and the alternative with least harm to the environment.

Sometimes the work of a local group reaches far beyond the local area. Such was the case with two groups in Michigan. The Michigan Steelhead and Salmon Fishermen's Association and Thermal Environment Must Be Protected, together with the Sierra Club and the Lake Michigan Federation, challenged issuance of an operating permit by the Atomic Energy Commission for a nuclear powerplant near South Haven, Mich. They reached a detailed agreement with Consumers Power Company on the handling of thermal discharges and radioactive wastes destined for already polluted Lake Michigan. The agreement states that the license will include the new specifications as a condition for operating the plant.

The efforts of environmental groups have not always led to confrontation or legal action, as the foregoing example illustrates. Often the weight of public opinion is sufficient to bring voluntary changes. Citizens in Bordentown, N.J., for example, became concerned about the red dust filtering across the Delaware River from United States Steel's Fairless Works in Pennsylvania. They organized, publicized the problem, and discussed it with plant officials. The result was accelerated installation of emission control equipment and clean air over Bordentown for the first time in many years.

Many local groups are outgrowths of the citizen activity which grew up around Earth Day, 1970. For example, after Earth Day, the Environmental Action Coalition (EAC) in New York began a recycling program called "Trash is Cash." EAC helps community groups establish collection programs, process scrap materials, transport them to local markets, and sell them. Recycled materials include newspapers, bottles, and cans. Eleven recycling centers are now operating with EAC support. EAC recognizes that these efforts have only minimal impact on New York's solid waste problems but believes there are side benefits in increased environmental and consumer awareness and more community pride and identity.

Concern for the problems of the urban environment and particularly those of the inner city has served as the focus for a growing number of local citizen groups. Some of these are long established environmental improvement activities that have gained new support from city dwellers. An example is Youth for Service, a 12-year-old San Francisco agency. It combines work training and beautification programs, offering inner city youth

job training and work in building neighborhood parks at the same time. The program has built four minipark playgrounds on former trash dumps and has stimulated similar efforts in other cities.

national organizations—Combined membership in the five largest national environmental organizations—the National Wildlife Federation, the National Audubon Society, the Sierra Club, the Izaak Walton League of America, and the Wilderness Society—jumped by almost 33 percent during the year ending June 1, 1971. From 1.2 million, the membership went up to 1.6 million. But the swelling of membership rolls does not fully reflect the stepup in activity.

The activities of national groups now embrace new areas which previously received relatively little attention. Chief among them are expanding programs to examine international and urban environment problems. The National Wildlife Federation launched a new periodical on the international environment which now has a subscription circulation of 300,000. The Conservation Foundation began a series of studies and symposia on problems shared by both traditional conservationists and those concerned with inner city problems. Young Adults for Resources and the Environment, a task force established by the Izaak Walton League, has used community workshops in the inner city to discuss the problems of that environment.

Other groups, with more limited membership and more specialized expertise, also expanded activities. The Nature Conservancy, which seeks to preserve environmentally critical areas by purchasing or receiving land donations, doubled its acquisitions in 1970 over the previous year—to 86,000 acres. Much of this acreage was acquired to prevent intensive development and eventually will be sold or turned over to public bodies that were unable to act in time to save the lands. Critically important wetlands, including some key parcels surrounding San Francisco Bay, accounted for 16,000 of the acres. A series of barrier islands and salt marshes off the coast of Virginia that were in danger of being lost to ocean front development added 11,000 acres. Nearly half of all the land received by the Conservancy was donated.

joint action—Cooperative efforts of national environmental organizations to achieve common goals also picked up speed in the last year. In the past, when public support was minimal and public interest growing slowly, many of the organizations operated independently. But recently these groups have shown an increased ability to marshall forces and work together toward shared objectives.

The growing momentum of cooperative action achieved one of its first major victories in 1969 when over 40 conservation and other groups joined in the Citizen's Crusade for Clean Water. They successfully urged the Congress to appropriate more funds

than had been budgeted for construction of sewage treatment facilities. The next year, a combine of environmental organizations helped to secure enactment of the Clean Air Act Amendments of 1970 (see Chapter 1). That effort showed that environmental groups could generate influential nationwide support at the local level to pass major national legislation. During the past year, environmental groups joined in oppostion to further appropriations for the supersonic transport. Environment, however, was only one factor involved in congressional disapproval of the SST appropriation. Environmental groups have also banded together on a number of diverse issues such as the Cross-Florida Barge Canal and the development of power facilities in the Southwest. Increasingly, their efforts rely not only on publicity but also on continual contact with elected officials, especially by local chapters of the national organizations.

Most recently, seven major conservation organizations formed the Coalition to Tax Pollution. The Coalition, which is inviting other organizations to join with it, will provide information to citizen leaders and push for enactment of a sulfur oxides emission charge.

Conservation groups are focusing more and more on how to win objectives by cooperating on an individual project basis. For example, the Nature Conservancy, which has funds to purchase environmentally critical areas that are endangered, has worked with other conservation groups which have the expertise to identify such areas and to determine their ecological value. Part of the unique Four Hole Swamp in South Carolina was spared from timber cutting by the Conservancy acting in concert with the National Audubon Society. The Conservancy also acted jointly on programs with the Izaak Walton League and with Trout Unlimited.

Environmental groups often have successfully joined to take legal action. Most of the litigation described in Chapter 5 represents suits brought by two or more environmental groups, often combining the resources of national groups and the firsthand know-how of local groups.

professional and scientific groups

Professional and scientific societies have taken unprecedented actions during the past year to bring their expertise to bear on environmental problems and to make their scientific and professional views available to the public and to decisionmakers. During the past year there has been a series of meetings to accomplish this, such as the First National Biological Congress, held in November 1970, with the theme of "Man and Environment." Sponsored by the American Institute of Biological Sciences and the Federation of American Societies for Experimental

Biology, it brought together the public, scientists from many biological disciplines, and legislators.

Many societies have established active programs to study specific environmental problems in their area of expertise in order to provide basic information needed for policy guidance. The American Fisheries Society, for example, has more than 35 committees studying water quality, endangered species, chemicals in fish, and similar issues. The Wildlife Society has groups that have dealt with subjects such as stream alteration programs, persistent pesticides, animal control programs, and sport hunting.

legal action

Much of the news about progress on environmental fronts in the past year has been tied to court action. Citizens and environmental groups across the country have turned to legal action as a remedy. Often they have been supported by expert testimony from biologists, urban planners, and other professionals who donate their time to study the technical aspects of the issue and appear before the court. Often litigation has been handled by lawyers specializing in raising issues related to environmental protection or other areas of the public interest.

"Public interest" law is the name applied in recent years to legal practice accenting such issues as civil rights, rights of the poor, consumer protection, and environmental protection. A few of the larger national environmental organizations have small legal staffs. Often, however, environmental organizations and private citizens with environmental concerns have relied on public interest lawyers supported by contributions and foundation grants. In the fall of 1970, the Internal Revenue Service issued guidelines confirming the tax-free status of contributions to nonprofit organizations pursuing public interest litigation. Buttressing the efforts of public interest law firms, many private attorneys and law firms have donated time on environmental litigation, and law students at a number of schools have provided support for the attorneys.

Besides their court actions and appearances before pollution control regulatory bodies in specific cases, public interest lawyers have launched an even broader legal effort that is likely to change the way in which government agencies view their environmental responsibilities. Through innovative legal procedures, lawyers have injected the policy of the National Environmental Policy Act into the proceedings of many Federal agencies, where consideration of the environment had at first not appeared very important—among them the Federal Communications Commission, the Federal Trade Commission, and the Securities and Exchange Commission. They have also sought to oversee all rulemaking proceedings related to execution of the Clean Air Act

Amendments of 1970 and the Refuse Act permit program. This type of action will help to assure that administrative decisions important to environmental protection are fully aired and tested under the National Environmental Policy Act and other relevant laws.

the elections

Environmental issues ran a gamut of tests at the polls last year. Measured by dollar volume, 90 percent of all sewer and water bond issues passed, compared to only 60 percent for all bond issues. Voters in four States alone—California, Illinois, Oregon, and Wisconsin—approved $1.3 billion in State bonds for pollution control facilities. The only major environmental referenda to lose were the proposal to permit use of State gasoline tax revenues for mass transit in California and the proposal to ban nonreturnable beverage containers in Washington. The defeats followed intensive public relations campaigns by oil and auto interests in California and beverage and container interests in Washington.

Environmental quality also surfaced as an issue in election campaigns for public office last fall. Records and positions of candidates on environmental quality were important in a number of campaigns. The League of Conservation Voters endorsed 20 candidates and supported them with funds; 16 won. Environmental Action opposed 12 incumbent Congressmen; seven lost. Although it is difficult to attribute specific defeats and victories entirely to a candidate's stand on environmental issues, it appears that in some cases it was decisive. Clearly, a candidate's stand on important environmental issues can become a distinct asset or liability.

civic groups

Most Americans involved in improving the environment last year were neither active members of any environmental organization nor content merely to vote for pollution control bond issues and environment-oriented candidates on election day. Instead, the most widespread citizen involvement in environmental issues was through long-standing community groups, clubs, and other local organizations. Schools and college campuses often served as staging grounds.

Many important social and civic groups turned their attention to environmental issues. The League of Women Voters, Lions Club, Kiwanis Club, and other groups across the country launched cleanup projects and conservation programs.

Sometimes the effort was national in scope. The General Federation of Womens Clubs, with 10 million members, has chosen

"A Better Environment" as its theme for the next 2 years. On June 5, 1971, 3½ million Americans, under the auspices of the Boy Scouts of America and in league with industry's antilitter effort—Keep America Beautiful—conducted what was probably the largest 1-day litter cleanup project in history. The League of Women Voters has been active in environmental activities for years—at both the State and National levels.

These and many other civic groups have found answers to the question that puzzled many individuals only a year ago: "What can I do?" Many people have translated a simple idea into a major effort to solve an environmental problem. For instance:

—A scientist in a small Maryland suburb worked after hours with schoolchildren to mount a communitywide campaign to pass the first municipal ordinance in the Nation banning nonreturnable beer and softdrink containers. The campaign succeeded, although the ordinance is being challenged in court.

—Two women talking at a party in Washington, D.C., invited five friends to join them in forming Concern, Incorporated. The organization has mailed out more than 400,000 copies of *ECO-TIPS*, a housewife's guide to environmental buying, and has answered more than 90,000 unsolicited letters and inquiries.

—A biology teacher in Lewes, Del., conducted a door-to-door campaign with his students to save nearby beaches from pollution and development. His efforts wrought major changes. Planned sewage and industrial facilities were relocated. And some of the few remaining natural dunes along the Atlantic coast were saved. The State government has since adopted the strongest coastal land use legislation in the country.

—Two young university professors spent their summer sampling the polluted waters in the Pittsburgh area from a canoe. The evidence they collected was used by a U.S. attorney to prosecute a number of companies for pollution. The first conviction was handed down in June 1971. It was the first Refuse Act conviction based on citizen-supplied information.

—An airline captain defied threats to his job and refused to jettison accumulated flight fuel from his aircraft. His act has pressured the airlines to take steps to stop the procedure.

These few examples are dramatic evidence of the effectiveness of citizen—sometimes only single citizen—activity. Throughout the Nation, people are working together to solve the environmental problems that face their communities:

—Ecology centers are now operating in many cities. They are focal points for environmental education and a place for concerned citizens to meet.

—Recycling centers have been established in many cities, often with the support of container manufacturers.
—Many citizens have organized to identify polluters and to monitor land development activities. Pollution factfinding tours and photo contests have worked well.
—Litter cleanup efforts have cleared roadsides, parks, and beaches of bottles, cans, paper, and tires.
—Stockholders are challenging the environmental practices of major corporations by letter and at shareholders' meetings.

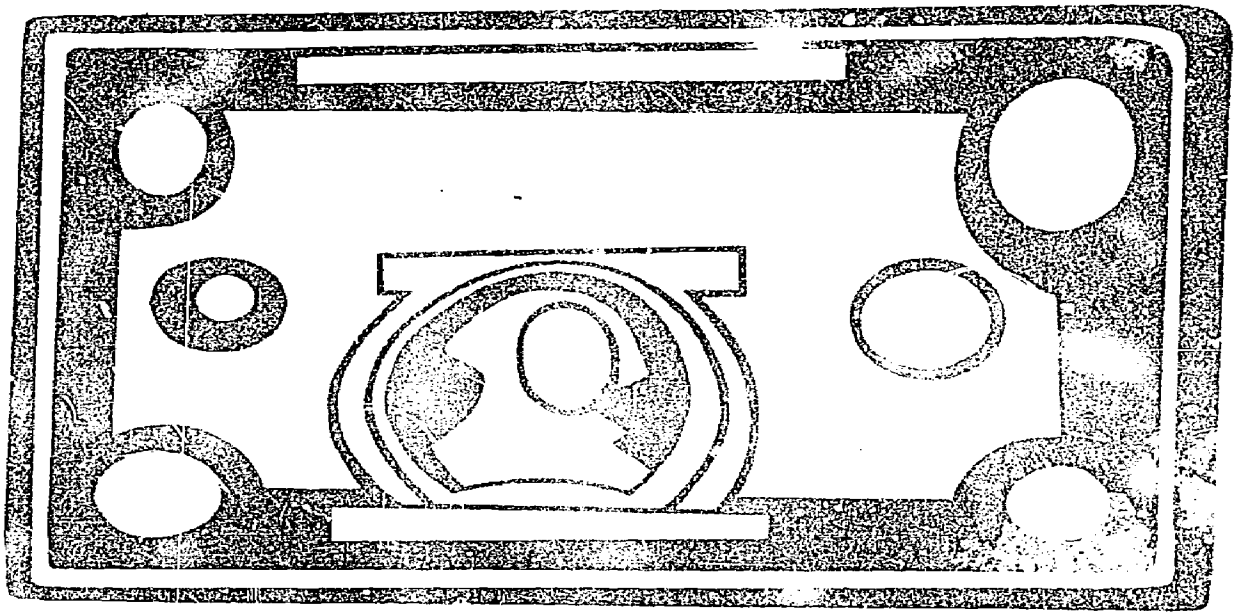
summary

American industry's progress in meeting environmental quality standards is difficult to pinpoint because of limited data and disparities in the scope of different industry expenditure analyses. However, a comparison of available information on industry's past, current, and planned expenditures for pollution control shows a steady increase. The extent to which investment levels must rise to meet pollution control goals set for the mid 1970's is not yet clear in part because estimates of needs are also imprecise. Some firms have organized to deal with pollution problems, although a recent study indicates that only half of the pollution-intensive industries have done so. The extent to which pollution control and other environmental enhancement activities become part of conducting business—as part of organization, policies, and cost decisions—will be a significant measure of the Nation's ability to achieve a high quality environment.

The American citizen is becoming better informed on the major issues of pollution, recycling, land use, and other environmental matters. His variety of activity is considerable—and growing. He is lobbying legislators, enforcing environmental standards in court, and swaying elections on the basis of environmental issues.

As he becomes more knowledgeable about the impact of the action of public bodies and private interests, the citizen will participate with still more success in the political processes that are essential to upgrading environmental policy and quality.

The private sector remains the key arena for environmental improvement. The stimulus for such improvement must come from the citizen. His approval must be won for necessary public expenditures, such as those for sewage treatment. Much of the ultimate responsibility for action—to meet pollution control standards and to take the environment into account in a wide variety of decisions that will affect it—falls upon individuals and firms in the private sector.



the economy and the environment

Environmental problems in large measure are rooted in the way the economy operates. In turn, efforts to maintain and enhance the quality of our surroundings impact on the economy. The economy and the environment do not, as some believe, present polar choices. But it is clear that adjustments in the economy will be needed if a higher quality environment is to be achieved.

the environmental demand

The size and productivity of the U.S. economy are well known. A rich endowment of natural resources, high rates of investment in technology and education, a large influx of skilled immigrants, and a fortunate political and economic history have all combined to yield a responsive economy and unequaled levels of material wealth.

American business and industry have responded to the changing demand of American consumers, and new technological developments have induced an ever widening array of goods and services. Although inequities remain, the fruits of this impressive productivity have been widely shared to yield a higher standard of living for more and more Americans.

In earlier years, scarce capital was combined with bountiful natural resources to serve a growing population with a full range of product choices. As consumer demands changed—here and

abroad—the economy, by and large, kept pace. Old products continually gave way to new—just as old methods yielded to new ones. Production of buggywhips ceased as horseless carriages rolled into the economy and the public found it could afford them. The water wheels that powered early industries bowed out to the steam engine, which then bowed out to electricity—fired first by coal, oil and gas, and now by nuclear energy.

Increasing demand for environmental quality and cleaner surroundings signals the need for still further changes in the economy. Along with material goods, the American public is placing a higher priority on the quality of its natural surroundings. Protection of natural biological communities; preservation of scenery; clean water and air; relief from noise, congestion, and monotonous city-scapes; as well as open space for active outdoor recreation have all taken on new importance. Support springs not only from the human concern for health but also from the growing desire to live, work, and play in more pleasant surroundings—the exclusive province of a small minority in the past. These changing desires stem from deeply rooted changes in economic and social factors which, rather than diminishing, show every indication of becoming more pervasive. More and more the notion that massive degradation of the environment is an essential ingredient for achieving higher levels of economic production is being sharply rejected.

Paralleling the pace of demands for esthetic enhancement is the finite capacity of the environment to absorb waste products without damaging the environment. The basic principles of physics dictate that all materials used in the productive and consumptive activities of the economy must eventually be returned to the environment. With low levels of economic activity and a sparse population, wastes could be assimilated with only minor damage to the environment. That is no longer the case. The capacity of rivers, lakes, and the atmosphere to absorb current waste loads is severely taxed. And pollution has, in many cases, reached intolerable levels.

The physical, chemical, and biological quality of the air, water, and the land have been altered on a massive scale. The immense increases in industrial production, energy conversion, and the flow of materials from nature through production and consumption processes are making enormous demands on the environment. Although these environmental insults are not all of recent origin, we are now more able to detect and describe even small changes in natural systems.

Exotic materials are entering the environment in much greater quantities. New chemical substances are confronting the world's biological systems with materials which may prove to be hazardous to certain organisms, including man. Many of these materials are now found in unexpected quantities in various life forms,

posing possible threats to the stability of whole food chains. The general public is just beginning to appreciate the persistence of some substances and their concentration in the food chain.

The sudden emergence of mercury as a menace is another reason for increased public concern about the environment. Public reaction has predictably and legitimately demanded higher margins of safety in disposing of materials into the environment, much as it has demanded improved food and drug procedures. Burden of proof requirements are shifting as people realize that they are unwilling victims of actions that affect their health and well-being and yet are beyond their control.

The American economy is now increasingly faced with changing values, which call for changes in resource commitments. These changes make a pleasing and healthful environment more prized and call for a greater use of resources directed to that end.

national economic growth

Historically, growth of the economy has yielded an unprecedented output of goods and services. Like others, however, Americans have chosen to take a part of the rewards of higher productivity in the form of more leisure time. The average workweek has fallen from about 60 hours in 1900 to less than 40 hours in 1970. This increased leisure time, as well as the rising tide of goods and services, have been the fruit of our increased productivity.

The economy, as traditionally measured by the market value of goods and services produced (the gross national product) will no doubt continue to grow. But greater attention to the environment will result in taking more of the increases in productivity in the form of enhanced environmental quality.

Traditional accounting of national income measures the market value of goods and services produced by the economy. These valuations were never intended to measure total economic welfare. The most that can be said is that a higher level of measured output is associated with what most feel to be a higher level of material well-being.

Environmental values are not easily reflected in our usual accounting systems. Many production and consumption activities degrade the environment—polluting, for instance, air or water. As people prefer cleaner air and water, the degradation becomes a real cost that is not subtracted from the previously calculated value of national output. Measures of output, then, often overstate the real value of additional production when environmental costs are ignored. Conversely, when uncounted enhancement of the environment accompanies production, the value of total output is understated.

economic incentives and the environment

Consumption and production patterns have vastly changed over the last decade. For example, the production of synthetic organic chemicals, containers and packaging, and electronics has grown rapidly while other industries have not grown or even declined. These fluctuating production patterns have been shaped by consumer demand. Demands, in turn, are shaped in large part by the prices of products. When the full production costs are included in the prices of final products, the market allocates resources efficiently. If, however, all costs are not included—for example, the costs to society of environmental degradation—then the resulting prices of the products are too low. When products are underpriced, consumption of them is higher than it would be if all costs were included. Consequently, compared with other products, too many resources are devoted to their production. To the extent that the costs of preventing undesirable environmental impacts are not reflected in the price of goods and services, the market fails to allocate resources efficiently, and too much waste is produced.

The common property resources—air and water—do not fully enter into the market exchange. They are progressively degraded because they are used as free "dumps" for consumption and production residuals. But such dumping, in fact, exacts positive social costs. It comes at a high price to society—in degraded air and water, impaired health, loss of fish and wildlife, loss of recreational opportunities and esthetic values, and added costs of treatment necessary for downstream water users. Yet these social costs are not to be found in the credit and debit ledgers of dischargers.

Excessive pollution and degradation of the environment are thereby encouraged. Indeed, little else should seriously be expected. Environmental problems stem largely from this fundamental failure of the economic system to take account of environmental costs.

The lack of incentives to promote products and processes compatible with a better environment is illustrated in the continued boom of noisy compressors and jackhammers used in construction. A quieter compressor can reduce noise levels to about 1 percent of their present intensity, but its price would increase by about 10 to 15 percent. The noise persists because there is little or no incentive to purchase the more expensive but quieter equipment.

Electric power is another example of the lack of financial incentives resulting in environmental damage. The prices of electricity to the industrial, commercial, and household consumer do not fully reflect the great damages to the environment—all the way from extraction, through transportation, production, and final transmission to the consumer. If the environmental control

costs of electric power were included in the price of electricity, marginal uses would be discouraged and less damage would be done to the environment.

The problem of the market's failure to give adequate weight to environmental values is often seriously compounded by a range of unrelated public actions. A case in point is the recycling of scrap metals. A greater amount of scrap would be used in the production of metal if certain economic policies did not act as impediments. The 15 percent tax depletion allowance gives virgin material a price advantage over reused metal. Similarly, the average freight differential of over $2 per ton for common hauls distinctly discriminates against scrap metal. For whatever reasons they were adopted, such policies discourage recycling.

The Nation's agricultural policies, at least in their present form, often encourage farmers to use excessive amounts of pesticides and fertilizers—some of which may result in damage to the environment—in order to produce higher yields on restricted acreage. Water resource projects, often the subject of intense environmental dispute, are encouraged by policies that make them available at little or no cost to the user. These cost-sharing arrangements and current evaluation procedures often encourage overly capital intensive solutions to water resources problems. Such public policies are examples of inadvertent institutional incentives that abet environmental deterioration.

Similarly, the way costs are assessed for municipal water and sewer services imposes added costs on center city users, undercharges new expansion into surrounding areas, and underprices treatment costs to industrial users. These practices generate excessive industrial loads; fail to discourage peak use; fail to provide money for financing future treatment facilities; and, to some extent, spur urban sprawl.

Local property taxes are also levied in ways which have a direct, and often detrimental, impact on land use patterns and the quality of the environment. Heavy taxation of buildings and other improvements relative to land, for example, encourages inefficient land use. Such practices encourage development away from center cities and thus encourage suburban sprawl and the "bombed out" look of many areas in the central city.

burden of cost responsibility

Property rights do not extend to the right of individuals and firms to pollute air and water. No one has a license to befoul the amenities and property rights of others. Because no one owns the environment—rather, the public does—there is little to suggest that the public is liable for costs of maintaining its quality. In fact, it can be argued that environmental degradation from private activity represents a taking of public property.

Courts distinguish between reasonable Government restrictions

the use of land and appropriation of land for public use. Restricting use of a site by requiring pollution abatement has not called for the compensation guaranteed by the Constitution for the taking of private property for public use. In the case of pollution restrictions, the public acquires nothing for which just compensation need be made.

In practical application, the courts tend to make distinctions on the extent of the loss in value sustained as a result of the implementation of regulations. If such regulations leave the properties with significant value, seldom is a taking ruled. When the uses are severely restricted and the values largely eroded as a result, compensation is more often ordered. In practice, the degree of damage necessary for a ruling of taking is an uncertain variable. Courts are clearly ruling that property rights do not extend to rights to continue polluting activities, and the responsibility for undertaking cleaner operations lies with the waste discharger.

damages from pollution

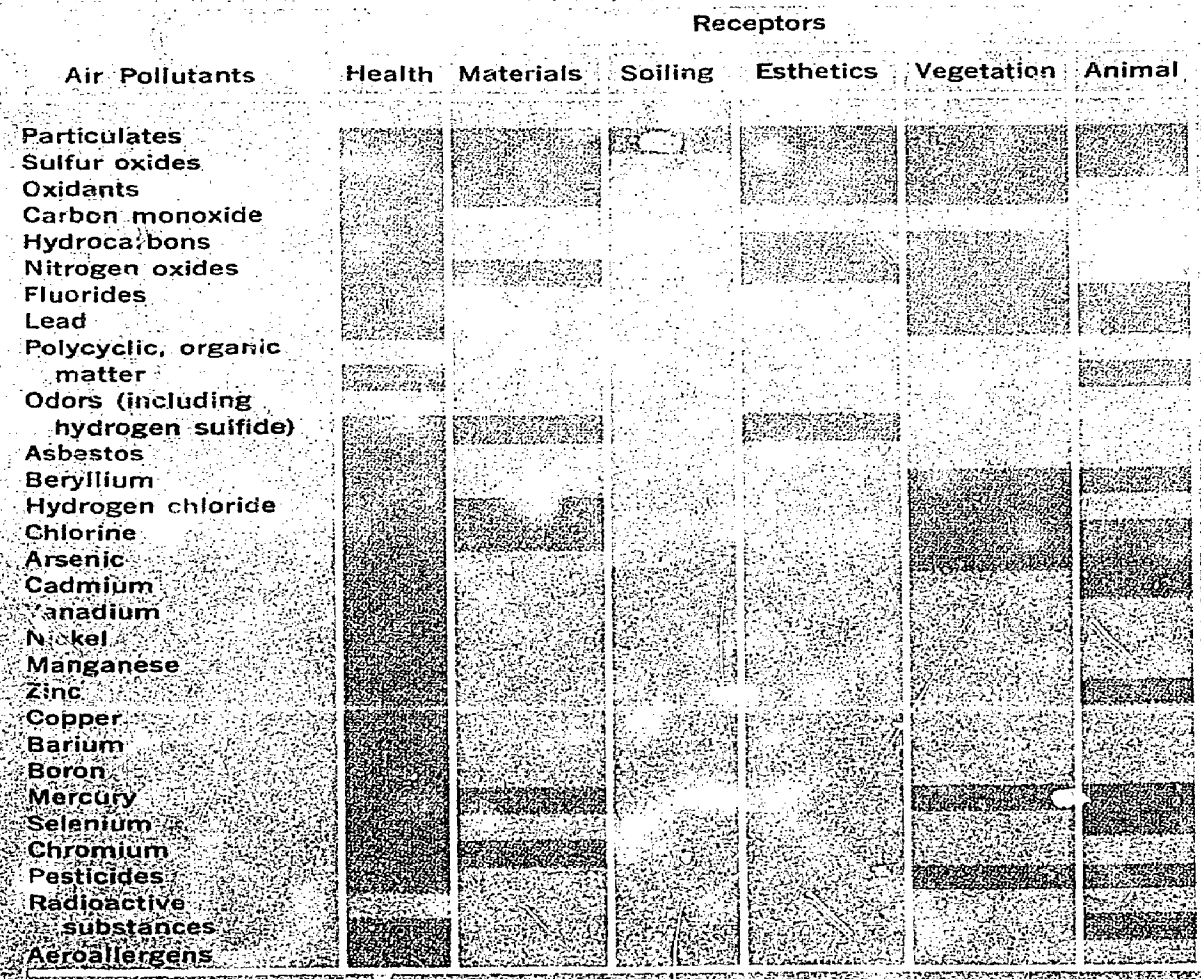
Present levels of pollution and environmental degradation result in costs to society in the form of increased health services, lost productivity, and direct damage to crops, materials, and other property. The loss of scenic values and recreational areas, destruction of valuable ecological systems, and the loss of pleasant surroundings do not enter the traditional economic calculus directly, but they are no less economic costs.

Any accounting of direct damage attributable to pollution is rudimentary at best. The evidence is not always clear cut, and research on many environmental effects is only now beginning. Further, most estimates are limited to a specific location or to a single level or type of pollution. Synergistic and cumulative, long-term effects of pollution on human health and wildlife are virtually impossible to gauge at this time. Further, minute changes, such as increases in carbon dioxide, could have profound impacts on world climate. Even if the relevant data were available, it would be difficult to place a dollar value on these impacts.

damages from air pollution

Though the total economic impact is still unclear, the costs of damages attributable to the major air pollutants—sulfur oxides, particulates, photochemical oxidants, carbon monoxide, and nitrogen oxides—have been estimated. The impacts from other pollutants have not been quantified, but effects on health, materials, and other receptors have been identified, as shown in Table 1. The damage estimates due to the major pollutants are

Table 1
Effects of Air Pollutants



Source: Environmental Protection Agency.

admittedly crude and at this stage, can only approximate the real costs of air pollution. In general, only direct monetary costs associated with air pollution damages to human health, materials, and vegetation and to property devaluations have been estimated. [illegible]ese studies rely heavily on judgment. Not yet available are data on esthetic costs, visibility, odor, soiled clothing, dirty homes, and the like. Yet these costs stir much of the public resentment to air pollution.

Scientific evidence on what air pollution does to human health is far from complete. Serious air pollution episodes have demonstrated how air pollution can severely impair health. Further research is spawning a growing body of evidence which indicates

that even the long-term effects of exposure to low concentrations of pollutants can damage health and cause chronic disease and premature death, especially for the most vulnerable—the aged and those already suffering from respiratory diseases. Major illnesses linked to air pollution include emphysema, bronchitis, asthma, and lung cancer.

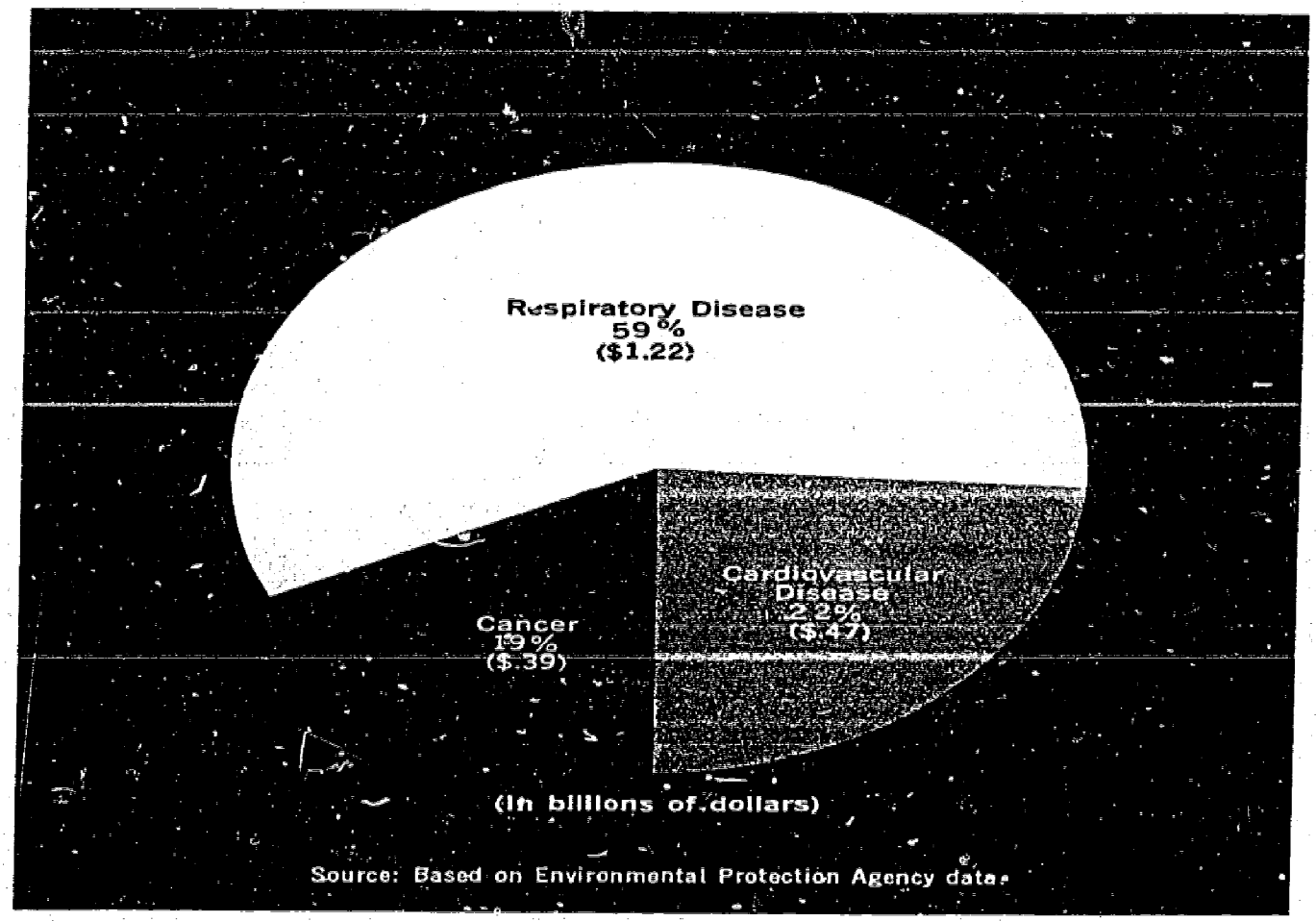
Data from 1963 suggest that a 50 percent reduction in air pollution existing in major urban areas at that time would lower the costs of damage to health by $2.08 billion in a single year. A breakdown by the types of disease responsible is shown in Figure 1 below.

The Environmental Protection Agency (EPA) estimates that the economic cost of human mortality and morbidity from all air pollution is in the neighborhood of $6 billion annually. However, these estimated health costs relate only to medical care and work loss. If the costs of discomfort, frustration, and anxiety were included, these estimates would be greatly increased.

Vegetation and materials damage have also been assessed. Air

Figure 1

Health Costs of Air Pollution



pollution corrodes and damages materials and stunts and kills trees, plants, and crops. The direct costs of air pollution on both materials and vegetation are estimated at $4.9 billion annually.

A study of property values suggests that prices are sensitive to pollution levels. Averaging the effect of increased pollution on property values in a number of cities, EPA estimates lowered nationwide values of property from air pollution at $5.2 billion annually.

The annual toll of air pollution on health, vegetation, materials, and property values has been estimated by EPA at more than $16 billion annually—over $80 for each person in the United States. In all probability, the estimates of cost will be even higher when the impact on esthetic and other values are calculated, when the cost of discomfort from illness is considered, and when damage can be more precisely traced to pollutants. Also, the estimates may increase as more is known about the damages of long-term exposure to very low levels of any one pollutant or many in combination. It must be emphasized, however, that these cost estimates only crudely approximate the damages from air pollution.

damages from water pollution

The costs of water pollution damage are even less well documented than the costs of air pollution. The prices that industries and water users pay for treating polluted water for use, although relatively small, are measurable in dollars. Further, there are clear economic losses in contaminated fish and in lost fishery resources. Costs of lost amenities and recreational opportunities are less tangible but are no less real economic costs.

The losses of ocean and coastal fisheries and shellfish production by pollution of estuarine areas are substantial. Over one-fifth of the Nation's shellfish beds have been closed because of pollution. Before 1935, between 100,000 and 300,000 pounds of soft shell crabs were commercially harvested annually in San Francisco Bay. The industry is virtually nonexistent today, largely because of pollution. Similarly, the annual commercial harvest of shrimp from coastal areas dropped from over 6.3 million pounds before 1936 to only 10,000 pounds in 1965.

Increased salinity, due chiefly to man's use of water for irrigation, imposes costs on other users. Housewives must use more detergents in order to overcome water hardness. Industries must treat or dilute river water in order to meet boiler feed or cooling water requirements. Farmers may suffer decreased yields because of water salinity. The total of these damages in the Lower Colorado River Basin and Southern California Water Service area was estimated at $16 million annually in 1970. With the expected growth in these regions and the expected increase in

salinity, these damages are estimated to climb to $28 million annually in 1980, and to over $50 million by 2010.

The value of cleaner water for recreation alone is roughly indicated by the results of a 1966 study of water quality in the Delaware estuary. Water degradation causes an estimated loss in the present value of recreational opportunities of up to $350 million. This estimate suggests that water pollution may cause recreational losses extending into many billions of dollars nationwide.

The possibility of large recreational losses is supported by recent studies of the value of outdoor recreational opportunities in a series of California reservoirs, where water quality permitted a range of recreational activities. Annual benefits from water sports ranged up to over $2 million per lake—values that would be lost with the level of deterioration that is now found in many of the Nation's water bodies. The rapidly increasing demands for recreation and scenic amenities will raise the value of losses from pollution.

other environmental damages

Costs of many other forms of pollution have not even been approximated. Esthetic losses are very difficult to quantify. Litter in parks and along roads and rivers and abandoned automobiles—rusty derelicts cluttering the landscape—seriously degrade the environment. Some uses of land also take their toll esthetically. The 300,000 miles of transmission lines that traverse the countryside occupy nearly 4 million acres of right-of-way and visually affect millions of additional acres. Three million acres of land have been surface mined, of which only one-third has been partially reclaimed. Another 8 million acres are over underground mines and subject to cave-ins. These 11 million acres also contribute large quantities of sediment and acid mine drainage to adjacent waterways.

The esthetic and health damages associated with noise pollution, trash-filled alleys, urban congestion, and lack of open space are not priced. But to many citizens they are painfully evident costs of environmental degradation.

costs of pollution control

Estimating current and prospective costs to meet environmental objectives is a hazardous exercise. The limited data available generally cover only air pollution control, water pollution control, and solid waste management expenditures. Further, even for air and water pollution, the costs of controlling all pollutants or all sources have not been estimated. And some of the data are based not on recent studies but on individual case studies and on

engineering estimates of data compiled from a variety of sources. Some estimates are drawn from questionnaires, which may include a disproportionate number of respondents facing high pollution control costs, so there may be some bias in the results.

Moreover, the basic assumptions in the cost studies vary widely. Byproduct revenues, estimated equipment life, allocation of process change costs between pollution control and increased productive capacity, and numerous other factors are not dealt with uniformly. Costs are based primarily on treatment costs, with inadequate attention given to likely alternative methods of achieving abatement—such as process changes, improved plant management, and recycling. At best, regional variations in standards and discharge requirements can only be approximated. Also, as new laws are passed, additional pollutants will be regulated, and more rigorous abatement requirements will be applied to currently controlled pollutants. As with the cost of damages, cost estimates for abatement are but rudimentary. In all probability, they underestimate the actual expenses to be incurred—probably substantially.

The cost estimates in this section cover air and water pollution control and solid waste management. The data presented in Table 2 are largely derived from the 1971 editions of the *Cost of Clean Water* and *The Economics of Clean Air*, reports submitted to the Congress by the Environmental Protection Agency. These data vary from the more detailed information in the appendix to this chapter. For example, they are consistently calculated on the basis of 1970 dollars instead of 1967 dollars. Water pollution control figures are extended beyond 1974. Air pollution control figures are extrapolated nationwide from the 298 regions evaluated in *The Economics of Clean Air*, and a 4 percent per year cost rise is added to the solid wastes estimates to account for historic increases in waste generation.

Data for water pollution control expenditures are primarily for municipal and industrial waste treatment. Data on such "nonpoint" sources as agricultural runoff and acid mine drainage are considerably less reliable. The municipal, or public, costs are usually incurred for collecting, transporting, and treating domestic sewage. Industrial waste treatment costs are primarily incurred by manufacturing activities, although thermal pollution control by the electric power industry is also included. Together they represent most of the private sector water pollution control costs.

Most air pollution control costs have been incurred to reduce particulates and automobile pollutants. The standards resulting from amendments to the Clean Air Act will soon require major additional spending to control sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, oxidants, and selected toxic substances, such as beryllium or mercury—as well as particulates.

Unlike expenditures for water pollution, public expenditures

by State and local governments for air pollution control are primarily for planning, enforcement, and monitoring rather than for facilities to reduce waste discharges. Municipal incinerators and public buildings are the major areas of direct public costs—sources which are small in the aggregate.

Significant expenditures will be required by the private sector to control both stationary and mobile sources of air pollution. Most air pollution from stationary sources is generated by fuel combustion in power plants, industries, and homes and by industrial processing. The major mobile source of air pollution is the automobile, but trucks, buses, motorcycles, and airplanes also pollute the air.

Costs for solid waste management cover collection and disposal of residential, commercial, institutional, and industrial wastes. Part is spent to collect and transport solid wastes to disposal sites; part is to operate the sites—landfills and incinerators. Although Federal funds finance research and development, demonstration grants, and personnel training, local governments will shoulder most of the public burden for collection and disposal of solid wastes. Private collection and disposal costs for handling municipal wastes are also a significant part of the total. Further, industry incurs substantial costs to transport and dispose of its own wastes —usually separate from municipal operations.

Most available estimates, regardless of media, are for either construction investment or annual operation and maintenance of facilities. The total expenditures for a given facility include the capital investment costs, the interest paid on such capital, and the operation and maintenance costs over its lifetime. The annual depreciation—each year's share of the total capital investment—interest and operation and maintenance costs are usually denoted as annualized costs. Hence, three measures exist for cost estimates: total capital investment, annual operation and maintenance costs, and annualized costs.

Table 2 summarizes the costs of air and water pollution control and solid waste management for 1970, 1975, and for the 6-year period. Limitations of the data are explained more fully in the appendix of this chapter.

If standards are met on schedule, total annualized costs of pollution control in 1975 will increase approximately 97 percent over 1970. Annual investment will more than double. These cost increases from 1970–75 vary greatly by type of medium. Air pollution annualized costs will increase 840 percent, water pollution control 87 percent, and solid waste management 37 percent (see Figure 2).

Total spending required for the major sources of environmental pollution between 1970 and 1975 is estimated at about $105 billion—23 percent for air pollution control, 36 percent for water pollution control, and 41 percent for solid waste management. Figure 3 summarizes their relative contributions.

Table 2

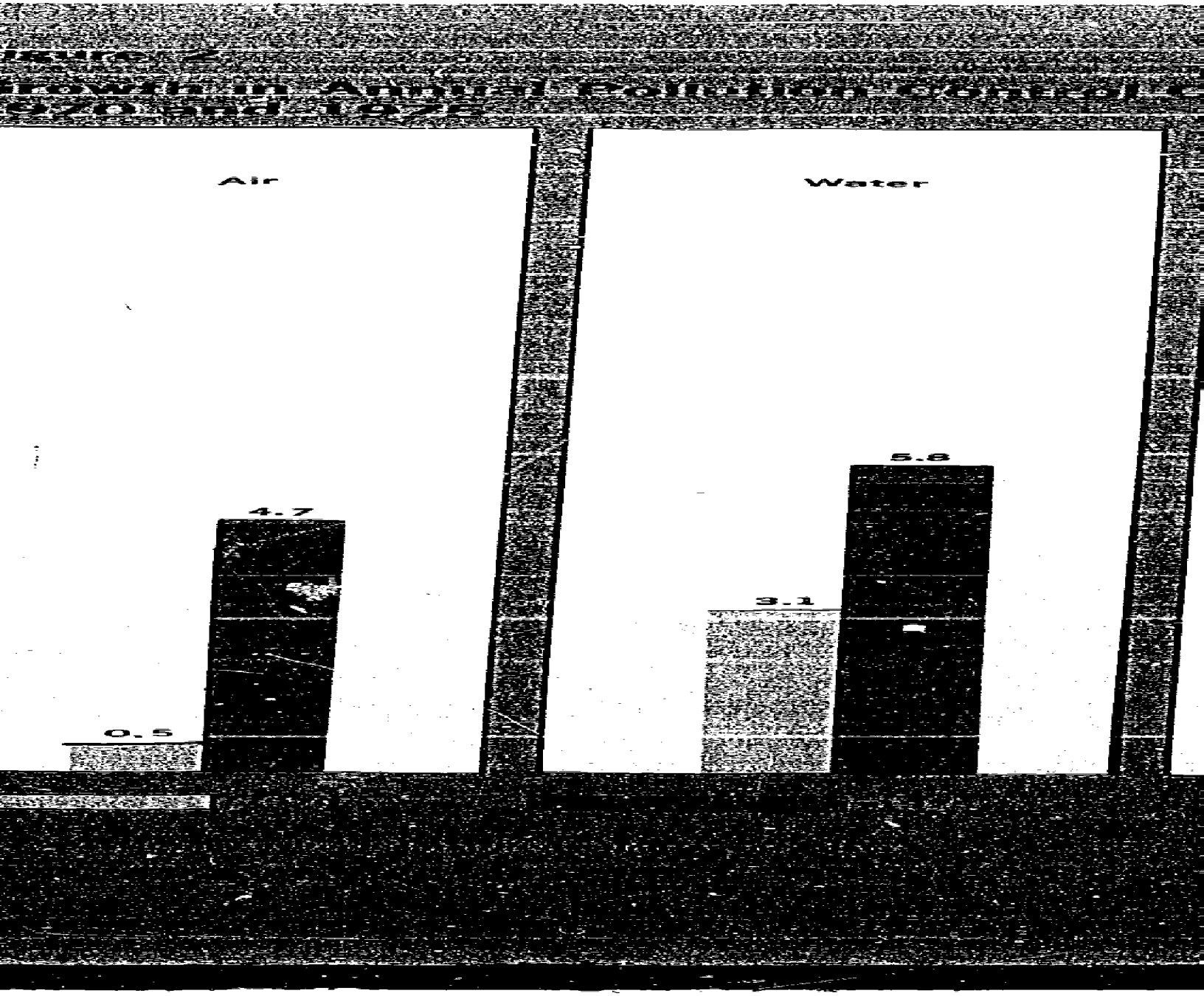
Pollution Abatement Cost Summary [1]

(In billions of dollars)

Pollutant/medium	1970 Capital investment Cumulative [2]	1970 Capital investment Annual	1970 Annualized costs	1975 Capital investment Cumulative [3]	1975 Capital investment Annual	1975 Annualized costs	Cumulative requirements 1970-75 Capital investment	Cumulative requirements 1970-75 Total operating costs	Cumulative requirements 1970-75 Total expenditures
Air pollution									
Public [4]	$ 0.2	$0.1	$0.2	$ 0.5	$0.1	$ 0.2	$ 0.4	$ 1.2	$ 1.5
Private									
Mobile	.1	.1	.2	4.3	2.9	1.5	5.4	.6	6.0
Stationary	1.0	.7	.5	7.7	1.8	3.0	8.0	8.1	16.1
Total	1.3	.9	.5	12.5	4.8	4.7	13.8	9.9	23.7
Water pollution									
Public									
Federal [5]	NA	NA	2	3	1	.3	.3	1.3	1.6
State and local									
Treatment systems	13.7	1.2	1.6	24.2	1.5	3.3	13.6	9.3	22.9
Collecting sewers [6]	(12.0)	NA	NA	(12.0)	NA	NA	(3.6)	NA	(3.6)
Combined sewers [7]	NA	NA	NA	NA	NA	NA	(26.0 (48.0)	NA	(15.0 48.0)
Private									
Manufacturing	3.9	.8	1.1	7.1	.6	1.9	4.8	7.2	12.0
Other	.9	.3	.2	1.1	.1	.3	.5	1.0	1.5
Total	18.5	2.3	3.1	32.7	2.3	5.8	19.2	18.8	38.0
Solid Waste [8]									
Municipal									
Public	NA	.1	2.1						
Private	NA	NA	2.3	NA	.3	7.8	1.5	42.0	43.5
Industrial	NA	NA	1.3						
Total	NA	.1	5.7	NA	.3	7.8	1.5	42.0	43.5
Grand Total	NA	3.3	9.3	NA	7.4	18.3	34.5	70.7	105.2

[1] For major air, water, and solid waste pollution control expenditures.
[2] Total capital in place as of the end of 1970.
[3] Total capital in place as of the end of 1975 is net of depreciation for the period.
[4] For construction and operation of Federal facilities only.
[5] For construction and operation of Federal facilities only. Does not include the Federal construction grant funds which are included under State and local.
[6] Collecting sewers are shown as a non-add item due to lack of data.
[7] Combined sewers shown as a non-add item because of lack of data.
[8] Annualized costs exclude depreciation and interest because of lack of data.
Source: Based on Environmental Protection Agency data.

When comparing these expenditures, a number of important factors must be considered. For instance, the solid waste estimate greatly overstates the costs required for meeting higher standards of environmental quality. The overwhelming bulk of those costs is for collection of wastes, a service traditionally provided in urban areas. Thus, the costs of meeting air and water pollution standards are only $62 billion, or 59 percent of the total costs.


Air
Water
0.5
4.7
3.1
5.8

Solid Waste

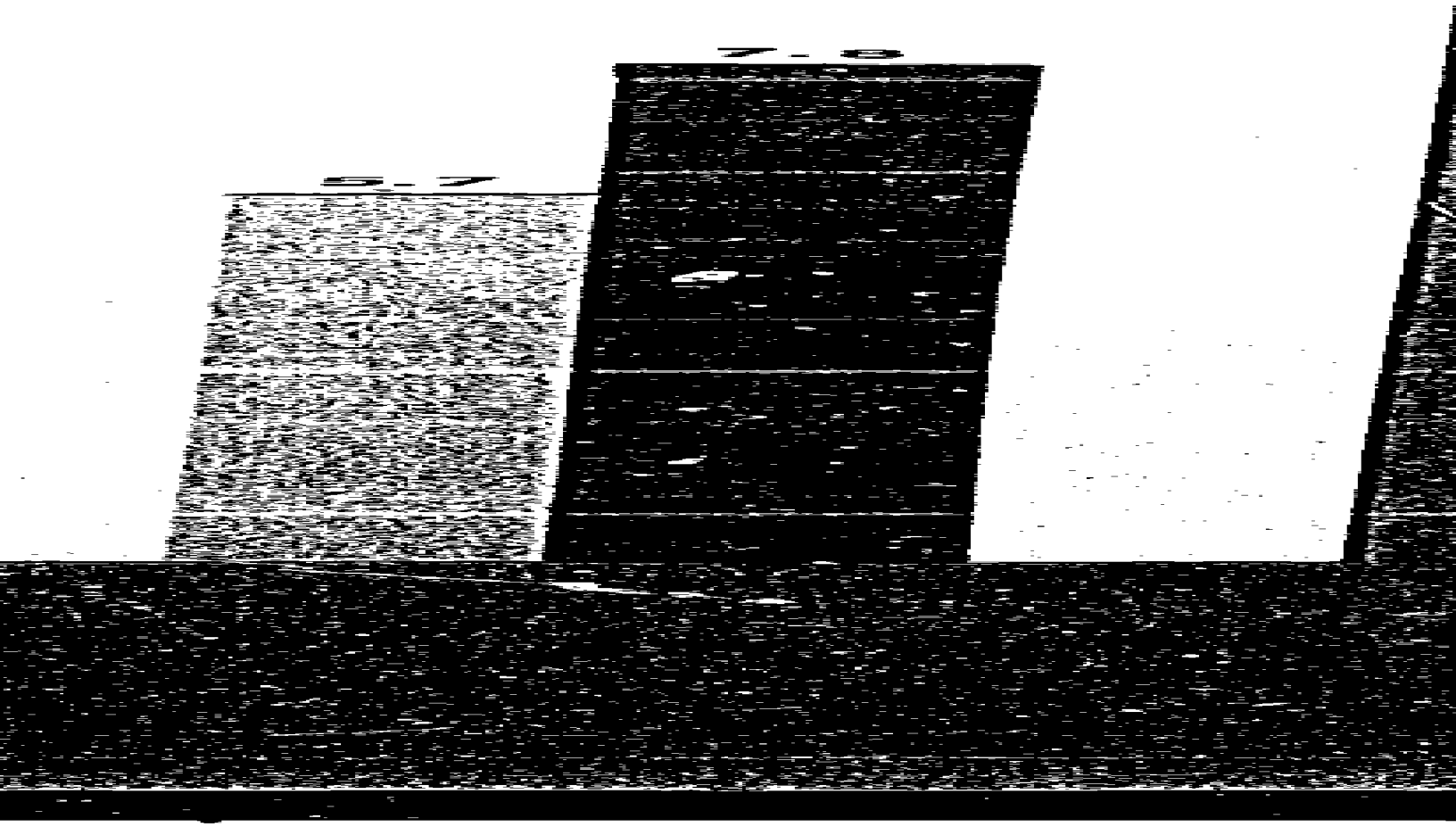
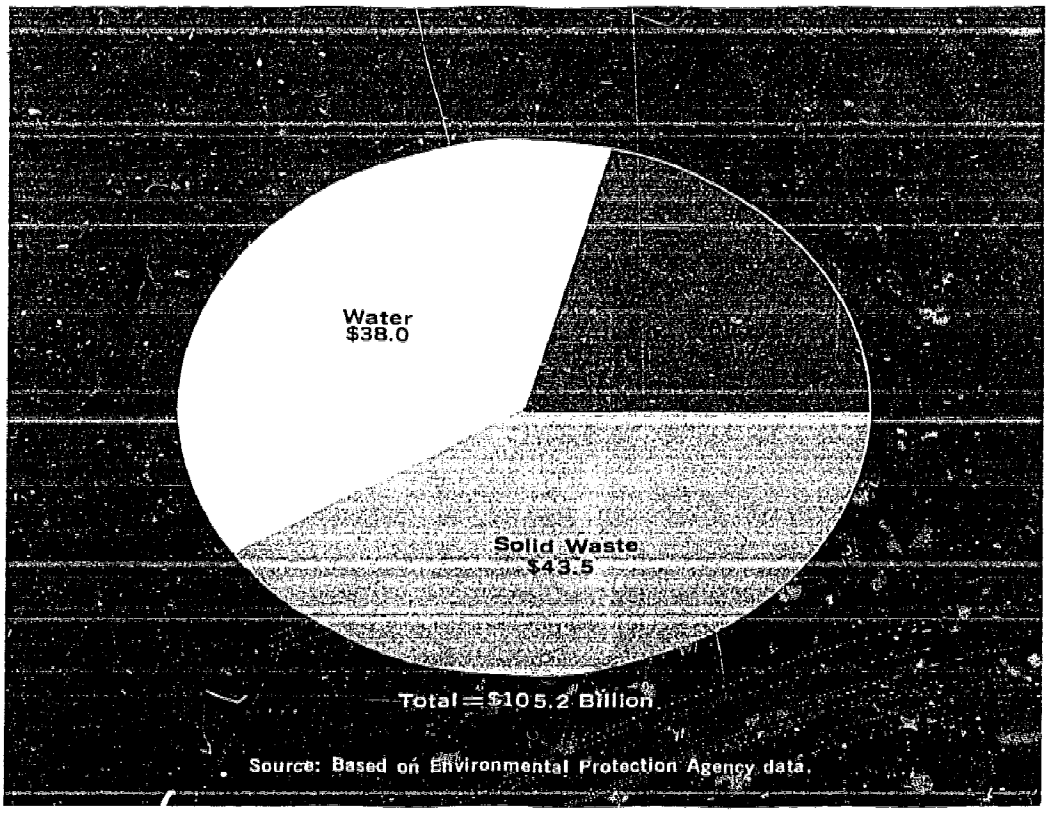


Figure 3

Cumulative Expenditures for Air, Water, and Solid Waste Pollution Control, 1970–75



The timing of spending is another important factor. Water quality standards have existed for several years; hence, to meet the standards, expenditures will be spread more evenly over the 1970–76 period. For air pollution, however, implementation plans to meet the Clean Air Act standards are currently only under development, and the stringent new automotive emission standards will not be applicable until 1975. Hence major costs will occur later, especially in 1975 and 1976. Therefore, the relative importance of air pollution costs would increase appreciably if the period used were to extend beyond 1975.

It is also important to consider the possible addition of expenditures for controlling combined sewer overflows. Sewers that carry both sanitary and storm wastes quickly fill in a rainstorm. When that occurs, sewage treatment plants cannot handle the overload, and raw sewage, including what has accumulated in the pipes, is often dumped directly into rivers and lakes. The high

bacteria count of these overflows impairs water quality and prevents water-based recreation.

Although overflows from combined sewers are an important source of pollution, there is need for new comprehensive approaches and technology that are generally only in the early stages of development. The costs of corrective actions appear very high. For example, the American Public Works Association calculates that it will cost between $15 billion and $48 billion to remedy overflows from combined sewers. The $15 billion figure would cover a variety of alternatives short of complete separation, while the $48 billion would finance complete separation of combined sewers—$30 billion in public costs and $18 billion in private costs. These latter costs do not include the massive disruption that would occur in major U.S. cities from tearing up streets to accomplish such separation.

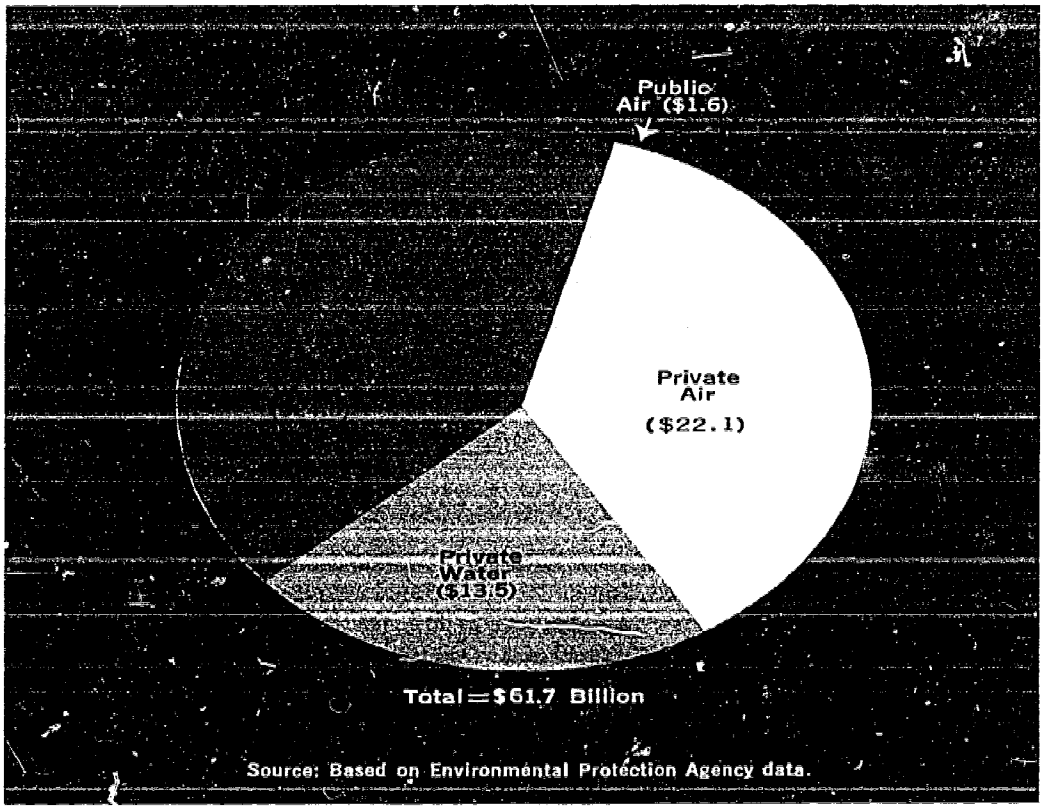
The impact of costs upon the public and private sectors differs among the pollution media. Under 25 percent of the total solid waste expenditures fall directly on the private industrial sector. The largest share is borne either by the public sector or directly by individuals. For air and water pollution control, it is a different story (see Figure 4). Almost two-thirds of the water pollution costs will be paid by the public sector while almost all of the air pollution costs will be paid by the private sector.

The estimates in Table 2, based chiefly on EPA data, may be compared with data obtained from other sources. The limited number of independent cost estimates and comparisons differ in the number of pollutants or emitters covered as well as in other basic assumptions. Using data from the National Industrial Conference Board (NICB), the International Research and Technology Corporation (IRT), and the Center for Political Research (CPR), however, some comparisons of estimates of 1970 investments, 1975 annual costs, and total costs to meet standards are possible.

The estimates of current environmental spending in Table 2 may be compared with surveys by McGraw-Hill and the National Industrial Conference Board. Although based on a large sample, the figures may be somewhat overstated because industries with high costs are more often inclined to respond to a questionnaire. Moreover, investments serving both abatement and increased productivity are often charged by industry to abatement alone. The NICB estimates were based on a smaller sampling of firms and did not include all of the industries surveyed by McGraw-Hill. The NICB study, when extrapolated by the same procedure used by McGraw-Hill, indicates investments of about 14 percent less on the average than the McGraw-Hill figures for the same industrial categories. Table 3 compares the 1969 estimated national expenditures for those industries covered by both surveys. For 1970, McGraw-Hill calculated manufacturing and electric utility

Figure 4

Cumulative Public and Private Expenditures for Air and Water Pollution Control, 1970–75



investments in air and water pollution control at $2.1 billion. If the NICB and McGraw-Hill data bore the same relative relationships in 1970 as in 1969, the NICB estimate would be $1.9 billion. This compares with $1.8 billion in Table 2.

There are a number of estimates of projected industrial pollution control costs from which to make comparisons. The McGraw-Hill study indicated that industry estimated a need for an additional $18.2 billion in expenditures to meet air and water quality standards in existence as of January 1, 1971. By contrast, the estimates in Table 2 show an additional investment of $13.3 billion by 1975, 27 percent below the estimates indicated in the McGraw-Hill survey.

Comparisons of estimated 1975 annual costs are difficult because of widely differing assumptions on the course of events over the next 5 years. IRT has estimated annual expenditures for 1975, assuming that 1970 Clean Air Act standards are met.

Table 3

Comparison of McGraw-Hill and NICB Estimates of Industrial Pollution Control Investment for Air and Water, 1969

(In millions of dollars)

Industry	McGraw-Hill	NICB[1]
Iron and steel	179	256
Nonferrous metals	41	43
Electrical machinery	32	18
Machinery	51	38
Autos, trucks, and parts	55	3
Aircraft	22	4
Fabricated metals	41	50
Instruments	25	17
Stone, clay, and glass	63	44
Chemicals	140	102
Paper	143	119
Rubber	9	27
Petroleum	260	213
Food and kindred products	58	36
Textiles	10	4
Total	1,132	974

[1] NICB data extrapolated to be comparable nationwide with McGraw-Hill data.

Source: McGraw-Hill Publications Co.

Its figures also assume secondary treatment or its equivalent for municipal and industrial effluents and adequate landfill and incinerator disposal of solid wastes. Industrial costs are based on process engineering cost estimates. The IRT figures, different from those in Table 2, are contrasted in Table 4. IRT's air pollution control costs are quite close to CEQ's. The water

Table 4

Comparison of CEQ and IRT Estimates of Annual Costs of Pollution Control, 1975

Source	CEQ		IRT	
	Billions of dollars	Percent	Billions of dollars	Percent
Air pollution (excludes [illegible])	10	18	[illegible]	25
Water pollution (excluding [illegible])	35	64	[illegible]	43
Solid waste (GDR)	10	18	[illegible]	32
Total	55	100	[illegible]	100

[illegible]

pollution estimates are almost identical, but the solid waste management estimates by IRT are much lower.

Cumulative cost for the 1970 through 1975 period may be contrasted with similar estimates by a private research firm, the Center for Political Research (CPR). It puts total expenditures for air and water pollution control and solid waste management at $84.5 billion for the 1971–1975 period. As in the case of the CEQ estimates, CPR used sketchy but available data and was aware of numerous exceptions and omissions. Nonetheless, its estimates are consistent with the CEQ estimates, which cover an additional year and slightly different activities. If the CPR data were increased by 20 percent to reflect the additional year of expenditures, it would be about $101 billion—similar to the CEQ total estimate. The comparison is summarized in Table 5.

Table 5
Comparison of CEQ and CPR Estimates of Total Expenditures for Pollution Control, 1970–75

Purpose	CEQ		CPR	
	Billions of dollars	Percent	Billions of dollars	Percent
Air pollution	$ 23.7	25	$10.5	12
Water pollution	18.0	19	39.2	47
Solid waste	42.6	56	34.1	41
Total	10[illegible]	100	83.8	100

As mentioned earlier, estimating the costs of attaining environmental quality is hazardous. For example, the industry estimates are for separate control of pollutants discharged in each medium (air, water, and land), ignoring their interdependence. The extent to which control of air pollutants adds to the burden of discharges dumped into water or adds to increased costs of solid waste disposal has not been taken into account. As control programs are accelerated in each medium, it is likely that extra costs will surface in the other media that were previously not expected.

The estimates for abatement are, to a large extent, based on waste treatment alone. However, as industries face abatement requirements, they will choose to achieve them by a combination of process changes and improved plant management as well as treatment. This will result in significant economies over treatment alone, but these economies are not generally reflected in the cost estimates.

On the other hand, increased costs, upgraded standards, new pollutants covered by standards, and other factors will doubtless raise the total costs of attaining higher levels of environmental

quality. Moreover, the estimates do not include such environmental expenses as the costs of noise control, reclamation of strip and underground mines, and control of agricultural pollution. On balance, the costs of environmental control—including just the controls over air and water pollution and solid wastes—are understated, probably significantly.

costs and benefits

Increasing quantities of waste discharge bring about increasing environmental costs in the form of losses of amenities or damages to health and welfare. While too little is known about the values that should be attached to a cleaner environment, cleaner air and water are clearly preferable to lesser degrees of purity. Losses of simple amenities are a cost, but these generally increase rapidly as degradation reaches levels that are thought to be directly damaging to health. Different values are associated with different levels of quality attainment. Added increments of quality add value to the total.

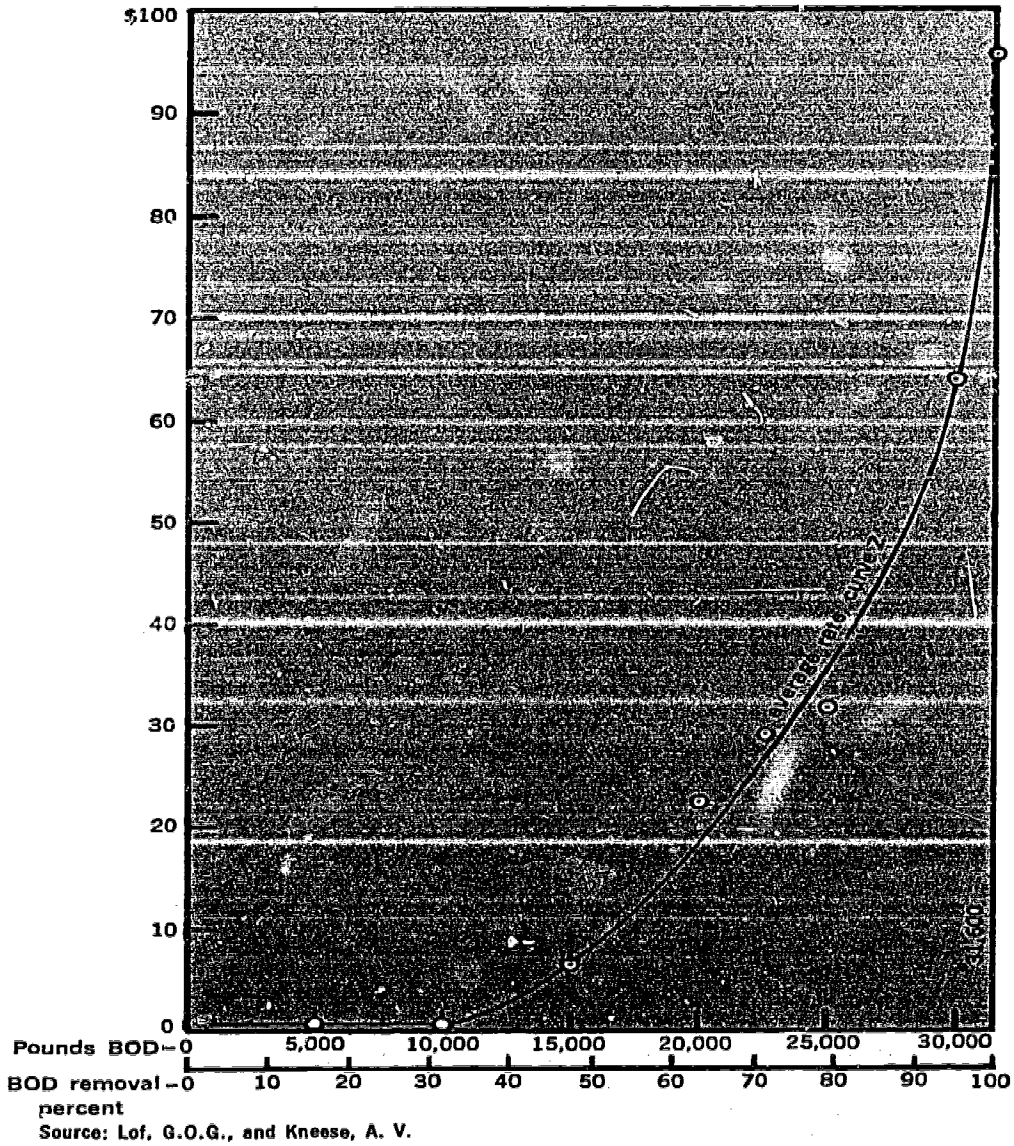
Costs of curbing the amount of discharged wastes vary at different levels of abatement. Usually the higher the proportion of waste discharge that is curtailed, the greater the cost of abatement per unit withheld. For example, in beet sugar plants, it costs less than $1 a pound to reduce BOD—a measure of the oxygen required to decompose organic wastes—up to 30 percent. But it costs an additional $20 for a one pound reduction at the 65 percent control level and an added $60 for a one pound reduction when over 95 percent control is achieved. These incremental cost increases are shown in Figure 5.

Rapidly rising incremental costs also hold true for controlling air pollution in a metropolitan area. Attaining low levels of control is relatively inexpensive but become more costly as higher levels of abatement are attained. A 1969 study of the greater Kansas City area indicated the additional costs to reach different levels of control of particulates and sulfur oxides. To reduce sulfur oxides and particulates 5 percent and 22 percent, respectively, would cost $50,000. To reduce these levels by 42 and 66 percent, respectively, would cost $7.5 million. However, to reduce sulfur oxides by only 6 percent more and particulates 3 percent more would triple the costs to over $26 million.

Decisions on attaining different levels of environmental quality need to take into account the benefits to be attained and the costs to be incurred. When the expected gains are large relative to the costs, it is clearly in our interest to move forward in cleaning up the environment. And such improvement should, of course, continue as long as the perceived added gains of attain-

Figure 5

Incremental Costs of Reducing BOD Content of Lime, Flume, and Condenser Water Wastes from 2,700-Ton-Per-Day Beet Sugar Plant



Source: Lof, G.O.G., and Kneese, A. V.

ing each higher level of environmental quality exceed the expected costs.

Our ability to precisely assess these added benefits is severely

limited. Although cost control estimation is somewhat more precise, we are only beginning to relate the necessary cost increases to different levels of environmental quality. Moreover, we cannot specify the degree to which individuals value avoiding environmental damages and especially how they value averting risks of uncertain environmental costs.

Decisions on levels of environmental quality are collective judgments increasingly made more explicit through the establishment of standards. Setting these standards implies evaluation or accounting of the added benefits and costs of higher levels of quality, with account taken of inherent uncertainties and risks.

In the case of the setting of air quality standards, evidence exists—although very rudimentary—that the benefits of higher levels of abatement clearly exceed expected costs. The annual damages from air pollution in 1968 have been estimated at about $16 billion. To reduce the bulk of these damages is estimated to result in an annualized cost of $4.7 billion by 1975. Thus, even when comparing 1968 benefits with 1975 annualized control costs, the identified benefits are over three times the costs.

Care is necessary in interpreting such analyses. The data on both costs and benefits are far from precise, and some pollutants are much more harmful than others. Moreover, these aggregate values are not complete guides on the benefits and costs of specific actions and desirable specific levels of control.

A study of the Delaware estuary illustrates how more detailed information can provide guidance for collective judgments on desired levels of environmental quality. That study estimated recreational benefits from $120 to $280 million for a level of water quality that would cost $65 to $140 million to achieve. Somewhat higher expenditures of $85 to $155 million would have yielded benefits of $130 to $310 million, while an even higher expenditure of $215 to $315 million would have yielded benefits of $140 to $320 million. The higher levels of water quality necessitated much higher levels of control costs compared to increased benefits. Although these calculations are admittedly crude and do not reflect all values and perceptions of risk, they did provide useful information upon which collective judgments were made on water quality levels for the Delaware.

Besides the overall issue of comparative benefits and costs of attaining different levels of quality, there are possibilities to achieve the same benefits at greatly differing costs, depending on how standards are attained. A number of analyses indicate wide variations in costs of achieving a given quality level. For example, the Kansas City data show that it is much cheaper to reduce air pollution the most where it costs the least than to try to cut it proportionately at every source. A proportionate reduction at each emission source would cost $16 million a year to decrease ambient particulate concentrations in Kansas City from 184 to

89 micrograms per cubic meter. But it would cost only $7.5 million—less than one-half of that—to get slightly better results with a cutback that took full advantage of the variable costs of abatement.

The Delaware Estuary study also shows that it costs less to achieve the same results by avoiding uniform treatment and using a least cost solution instead. The study indicates that a dissolved oxygen level of at least 3 parts per million would cost about twice as much with uniform treatment as a least-cost solution. The latter would demand large waste load reductions from firms with low abtatement costs and smaller reductions from firms with higher costs. To achieve a dissolved oxygen level of close to 4 parts per million in nearly all reaches of the estuary—approaching the standard actually adopted—the extra costs of equal reductions will be only about 50 percent greater than for an optimum solution. As standards are established at more stringent levels, the cost disadvantages of equal reductions are less, because most sources would require large waste load reductions. However, this analysis of the remaining cost difference at higher abatement levels understates the remaining advantage to the extent that no major processes or plant changes were taken into account even though such adjustments would be more efficient.

The cost advantages of optimum economic solutions are indeed substantial, and they indicate the priority that further research deserves. Also, these cost consequences point to the need for developing economic incentives, discussed later in this chapter, that help achieve more efficient solutions.

impacts of costs on the economy

Protecting the environment and reducing the harmful effects of pollution will not be without adjustments. Some firms and activities will find it difficult to accommodate to new rules. A few may well find it impossible. To deny that there will be transistional problems, including temporary loss of jobs, would be to deny that any major shift of resources can be accomplished without some dislocation and some turmoil.

This section discusses the impacts of pollution control costs on national growth, industries, firms, employment, consumers and taxpayers, and international trade.

impact on gnp and growth

Spending $105 billion between 1970 and 1975 may seem massive. But compared with the gross national product (GNP) and with capital investments, this amount assumes a different perspective. Annualized costs of environmental cleanup for 1970 were estimated at about $9.3 billion—about 0.9 percent of the 1970

GNP of $1 trillion. In 1975, annualized costs are estimated at $18.3 billion, or about 1.4 percent of the estimated 1975 GNP of $1.3 trillion. The cumulative environmental expenditure of $105 billion during the 6-year period—a much larger amount than the sum of annual costs because total investment rather than depreciation is included—is still only 1.6 percent of the cumulative GNP of approximately $6.7 trillion. However, as discussed earlier, only 59 percent, or $62 billion, of these costs are for meeting air and water quality standards; the rest are for solid waste disposal. Using only the estimates for meeting air and water quality standards, the annualized costs are 0.4 percent of 1970 GNP and 0.8 percent of the estimated GNP in 1975, and cumulative expenditures are 0.9 percent of the estimated total GNP over the 6-year period.

Measuring pollution control investments as a proportion of total capital investments is another way to gauge their relative impact. In 1970, nationwide investments in nonresidential structures and equipment were $103 billion. Only $3.3 billion of it was for environmental facilities. By 1975, total investment of $7.4 billion is estimated for environment control facilities. Without motor vehicle control devices, this investment would be $4.5 billion. Total pollution control investment was 3 percent of total capital investment in 1970. Even at 1975 levels of control investment, it would be 7 percent of 1970 capital investment and would be a considerably smaller percent of actual investments in 1975. The percentage would be even smaller if the costs of automobile emission control devices were excluded.

But size comparisons aside, what will be the impact of these environmental costs on total GNP and on economic growth? Their biggest impact will be to change the composition of output rather than the total value of the national product. As more resources are used for improving the environment, fewer final goods and services will be produced than otherwise. In this sense, tradeoffs will need to be made between environmental values and what has come to be regarded as traditional economic output. As heavier commitments are made to saving the environment, fewer other things will be produced, although an absolute decline is neither necessary nor likely.

The effect of diverting funds to environmental controls is to raise prices for those goods that require such controls. When total GNP is corrected for such price increases, the measured output of the economy will be slightly smaller. Considering, however, that increased air and water pollution control costs are such a small portion of GNP, the changes are slight.

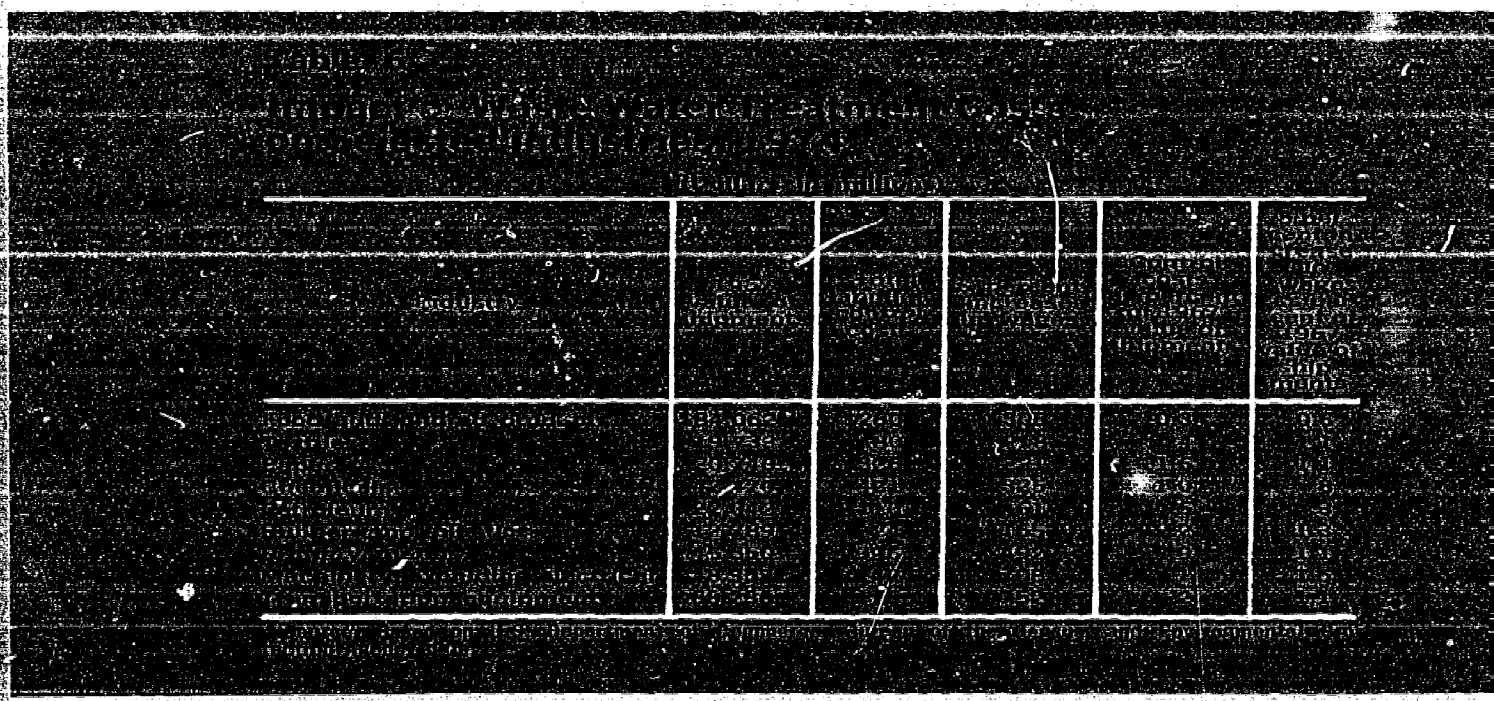
Environmental control costs of one firm represent income and revenues to other firms and workers. The aggregate levels of employment should be little different from those of a time of lesser concern with the environment. The net result from the shifts

of employment to less polluting enterprises and to abatement activities would generally be only a change in the mix of total output, not a reduction in total employment. The Nation can lose economic welfare only by making choices on abatement levels or methods which incur costs larger than the benefits derived.

impact on industries

To say that environmental controls will hurt business and industry is to confuse the interests of existing firms with the health of commerce as a whole. Some companies—particularly those that must absorb large pollution costs—will be hard hit. But many firms will benefit, and new firms and industries will emerge in response to changing environmental demands.

A few major industries account for most industrial water use and most industrial water pollution. They will bear a much bigger share of the total burden, but as Table 6 shows, in most cases their water pollution control costs will probably fall substantially below 1 percent of the value of their products shipped. These estimates are for annualized costs of control in 1974—assuming secondary treatment by all manufacturers. However, the value of shipments is for 1967; hence the percentage of pollution control costs to value of shipments is overstated. The 5 percent increase in total payroll shown in Table 6 indicates



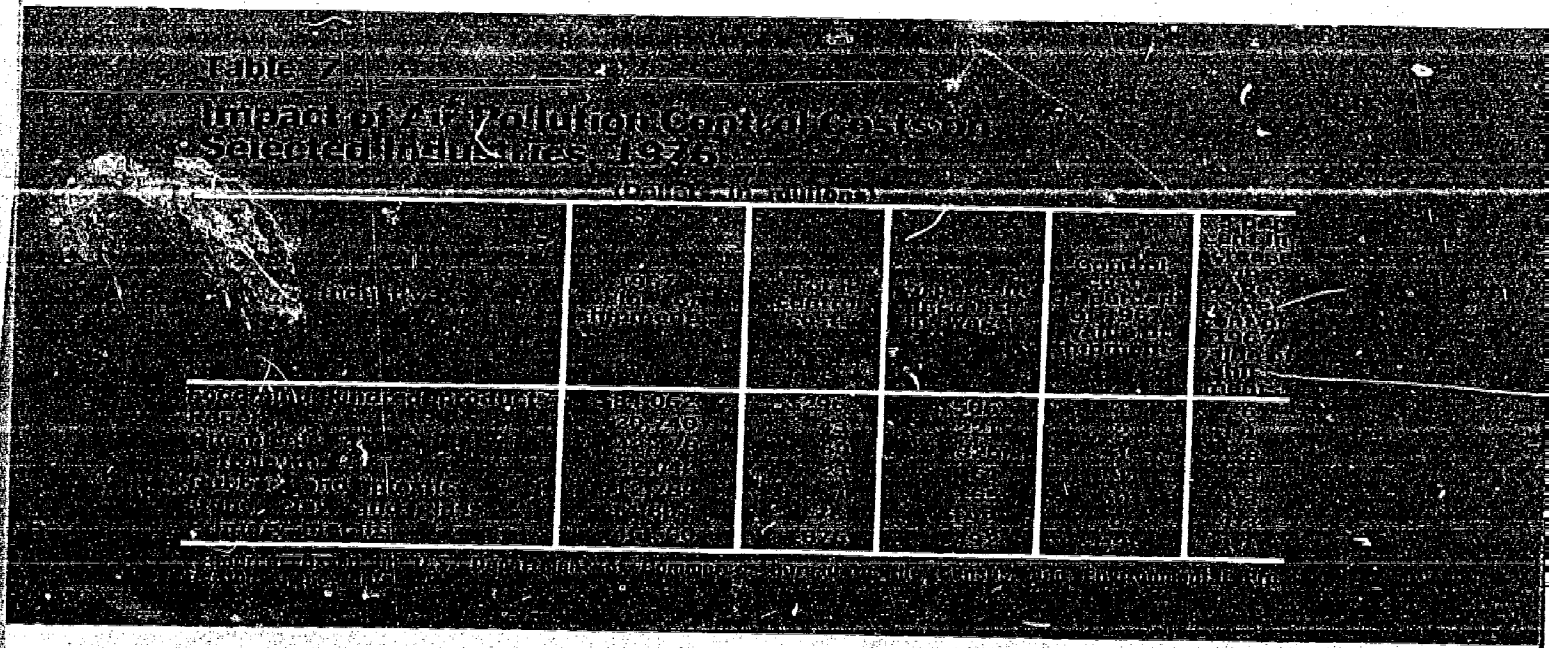
that the costs of water pollution control are generally less than historic wage increases. And once the pollution control equipment is installed, the costs of operating it will probably not rise nearly as fast as labor costs.

These estimates may, however, understate the impact on some individual industries, given the large number of different products and processes within the manufacturing categories indicated. For example, the food and kindred products category in Table 6 includes everything from bakeries—with almost no problems of water pollution—to dairy and cannery operations, which must control huge amounts of waste water effluents. Consequently, average costs for broadly defined groups overstate costs for some and seriously understate costs for others.

Rapidly changing requirements and technologies make cost projections for air pollution control even more difficult. Table 7 compares industrial costs for anticipated control in 1976—when the 1970 Clean Air Act standards fully take hold—with values of shipments in 1967 and with historic wage increases. As in the case of water pollution, these estimates are for broad categories. Impact on specific industries can vary greatly from these averages. Although the petroleum category in Table 7 indicates pollution control costs of only 0.1 percent of value of shipments, these ratios vary greatly among industries under that heading. For example, petroleum refineries would incur costs of under 0.05 percent, while asphalt batching would incur costs up to 1.25 percent of 1967 value of shipments. For primary metals, the

Table 7

Impact of Air Pollution Control Costs on Selected Industries, 1976



overall increase in value of shipments is estimated at 1.9 percent, but it is 2.3 percent for iron and steel companies and over 5 percent for the primary nonferrous industries.

Besides the stationary sources of emissions, the automobile will be heavily affected by air pollution controls. The cost of emission control devices alone is conservatively estimated to raise the average new car costs in 1975 by about $240, and the actual costs will probably be higher. These controls will result in increased automobile operation and maintenance costs of about $20.70 per year. The impact of the cost on 1976 models, the year in which nitrogen oxides must be controlled, has not been calculated because nitrogen oxide control technology has not yet been developed.

Total pollution control investment as a percentage of current total capital expenditures is large and rising. In 1970, the $2.5 billion that business and industry estimated they invested in air and water pollution control facilities was about 3.1 percent of their expenditures in new plant and equipment. The data in Table 8, based on McGraw-Hill figures, indicate that in the industry with the highest percentage—iron and steel—pollution control investments were 10 percent of total capital spending in 1970.

The effects of pollution control regulations on many industries and on prices are difficult to gauge because of the interdependence of many aspects of the economy. For example, the initial force of added costs, particularly for water pollution control, will strike the pulp and paper, chemicals, and primary metals industries heavily. They supply other manufacturing sectors rather than the ultimate consumer. Thus the added cost of waste treatment that begins with the first-stage processors will be passed on as the output moves upward through the production chain to the ultimate consumer. Based on the markups characteristic of each industry and other conditions, these increases may be magnified. However, many industries have already incurred large pollution control costs, which may mean that future adjustments will be less severe than might have been expected.

Not all industries are adversely affected by pollution control measures. Indeed, as the economy gears to higher levels of environmental protection and enhancement, some industries will be better off. Obvious examples are the suppliers of waste water control equipment and the construction industry. Similar effects can be expected from air pollution controls. But because of the technologies employed, expansion associated with air pollution control will center not only on construction but also heavily on the manufacture of equipment.

In 1970, investment for air, water, and solid waste pollution control is estimated at over $3 billion. By 1975, this investment will reach $7.4 billion, with cumulative investments for needed

Table 8

Total Capital Expenditures for Pollution Control as Percentage of Total Capital Expenditures

Industry	Actual 1970 (percent)
Iron and steel	10.3
Nonferrous metals	8.1
Electrical machinery	2.3
Machinery	3.5
Autos, trucks, and parts	4.2
Aerospace	2.8
Other transportation equipment	5.0
Fabricated metals	4.3
Instruments	3.6
Stone, clay, and glass	6.4
Other durables	9.2
Total durables	5.4
Chemicals	4.9
Paper	5.3
Rubber	5.3
Petroleum	6.0
Food and beverages	3.0
Textiles	2.3
Other nondurables	5.5
Total nondurables	5.4
All manufacturing	5.4
Mining	6.1
Railroads	1.6
Airlines	0.7
Other transportation	0.3
Communications	0
Electric utilities	13.8
Gas utilities	4.4
Commercial*	0.6
All business	3.1

Source: McGraw-Hill Publications Co.

*Based on large chain, mail order, and department stores, insurance companies, banks, and other commercial businesses.

equipment and construction of almost $35 billion. These expenditures mean sales and production in the constuction industry, equipment manufacturing industries, and numerous related industries.

Industries and firms that produce goods and services that incur little or no abatement costs will also profit. Many such industries and firms, depending on market conditions, will gain new business from buyers shifting from high pollution goods which will become more expensive. One example is natural gas—the cleanest of the fossil fuels—which is used in home heating, industrial heating, and electric power plants. The drive for a cleaner environment gives the natural gas and pipeline companies an advantage over coal and oil companies. And due to limited supplies, entire new industries may be generated to produce gas from coal.

impact on firms

As in the case of differences among industries, certain firms—and particularly certain plants—may fare better than others in the drive for environmental cleanup. Within any given industry there are efficient plants and inefficient plants. The new pollution abatement requirements are likely to fall with different impact among single plants in an industry, even though the same control requirements may apply to all. Different impacts will come from differing control costs and from different abilities to pass the added costs on to buyers or back to suppliers and shareholders.

The degree to which individual companies will encounter economic difficulties depends largely upon the costs that they will be compelled to absorb. This in turn will depend on market conditions for both sale of products and purchase of supplies.

Much of the cost increases will be reflected in price changes. How much of the increased costs can be passed directly to consumers, however, will depend on a demand for a firm's product and the position of that firm in the industry. A company may be able to raise prices without greatly reducing sales—if its products have few close substitutes.

More severe competitive conditions may force some firms to absorb at least part of the higher costs by production cutbacks and lower profits. As this occurs, the ability of such companies to command capital needed for operations will decline and a shift in their competitive position will follow. An individual company experiencing higher costs than others in an industry because of older or more obsolete plants may not be able to pass on as large a share of the costs in increased prices. Thus, competitive positions of firms are a major consideration in appraising detailed economic impacts.

specific adjustment problems

The U.S. economy is flexible and adjustable. Capital and other resources move quickly to exploit new situations, shifting from less profitable enterprises. This process is continuous in a dynamic economy, and business failures are not uncommon. In 1970, 10,748 commercial and industrial firms failed in the United States, 2,729 with liabilities exceeding $100,000. Failures over the past decade have averaged almost 13,000 a year.

Some weak or poorly situated plants or companies will unquestionably have difficulty gearing to environmental requirements. That weakness does not necessarily indicate bad management. It tends instead to be a function of obsolescence. In almost all industries, newer technologies not only are more efficient but they generally create less air and water pollution. Some old or small plants and those badly located are in trouble, in part, because

they have avoided environmental control measures adopted by others as a matter of course over the past decade.

Pollution control requirements will hasten the closing of some older, inefficient plants which have continued to operate because of capital expenditures already invested, tradition, and community ties—especially where the plant provides the principal payroll on which the area is dependent. Eventually nearly all will be closed for a combination of reasons. Companies often will close one or several marginal plants, making up production losses by building a larger, new plant. Some companies, indeed, can use pollution control as an excuse to shut down a plant they have long wanted to close.

Smaller firms operating single plants will tend to be more vulnerable to failure than large corporations with multiple plants and technologies. However, industries burdened with the highest environmental costs, such as chemicals, iron and steel, and pulp and paper, are mostly characterized by bigger companies' operating many plants, old and new. Hence, the impacts of pollution control expenditures on small business are not as severe as they would first appear.

Pollution control will represent added costs of production and when a plant is operating near the break-even point, even a slight incremental cost can tip the profit balance against it. A company must then decide whether to invest further in an obsolete facility in order to meet environmental standards or build a new facility. In many cases, it will choose to do the latter.

In the pulp and paper industry, it is not unusual for water pollution control to account for 25 percent of the capital invested in a new mill. Nor is it unusual that plants built early in this century—or even late in the last—are still operating. They frequently remain profitable because of fully depreciated capital which offsets higher per unit costs of operations. But although a plant may be very nearly fully depreciated, labor and raw material costs per unit of output tend to be considerably higher than in a modern plant.

If a manufacturer operates four old plants for which he must provide waste treatment, conceivably he could invest the same amount of capital in one new plant—and have not only adequate waste treatment but more capacity than with the four put together.

Eventually the more obsolete plants would probably close in any event. But waste treatment requirements alter the possible rates of return on investments, hasten closings, and tend to make the closings more immediate rather than spread out over a longer period of time. Recent case studies undertaken by EPA have demonstrated that pollution control requirements accelerated the rate at which firms failed. But in most instances studied, a large

number of other factors was chiefly responsible for the failures, and the plants would eventually have closed anyway.

One way to gauge how employment may be hit by a speedup of environmental spending is to look at the total number of jobs in pollution-intensive industries. Manufacturing is the major segment of the economy affected. It accounts for 20.2 million employees out of a total labor force of 84.2 million—or 24 percent. Manufacturing industries with the most intensive pollution problems account for almost 28 percent of total manufacturing employment. Therefore the employment in those industries that will be impacted to any significant degree by pollution control amounts to about 7 percent of the current work force. And of that, only a small percentage will be in those plants which would be so severely hit as to face possible layoffs. This possible unemployment is largely in the primary industries and hence does not include the effects in other industries whose costs increase because of pollution control expenditures by suppliers. Such secondary effects are expected to be small.

The major problem regarding employment is not one of aggregate unemployment brought about by pollution control. For one firm's pollution control cost represents another firm's profits and payroll. Although individual plants may shut down because of pollution control costs, other firms, industries, and professions will flourish. One reported estimate of future employment opportunities in environmentally linked fields predicts almost a doubling of career opportunities from about 660,000 in 1970 to about 1,180,000 in 1980. And this is only for employment in ecology, earth sciences, resources and recreation, environmental design, and environmental protection. It does not include much of the employment opportunities in construction and related areas.

effect on consumers and taxpayers

The incidence of costs of environmental improvement is important. Minor amounts of environmental costs may be absorbed in lower profits to firms, but generally the costs will be passed on in higher prices. Necessary public expenditures will be reflected in higher service charges, taxes, or decreases in other public services.

Over three-fourths of the solid waste collection and disposal costs will either be paid through taxes and service charges or will be paid directly to private firms for domestic and commercial disposal. About 42 percent of the 6-year costs for cleaning up air and water pollution, detailed in Figure 4, will be public costs—almost all of it for water pollution. Almost all the waste treatment operating costs and part of the capital costs are borne by local governments. These, generally, are funded from property

taxes and sewer service charges. However, a significant portion of the capital costs are paid for with Federal and State grants.

The other 58 percent of the air and water pollution control costs will initially be borne by industry. Most of that will be passed on to consumers in the form of higher prices. As stated earlier, increases in the value of shipments from pollution control requirements is usually a small percentage of the total. However, as primary industries supply other manufacturing sectors, the ultimate costs to the consumer may be larger than this initial burden.

To date, there are no detailed estimates of this cumulation of costs for water pollution control. However, some preliminary assessments for air pollution costs are available. The following table reflects the percentage of total production of other industries sold to the motor vehicle industry:

	Percent
Gray iron foundaries	25
Rubber	24
Iron and Steel	11
Petroleum	6
Primary lead	1
Powerplants	1

The increased costs to the auto industry of making automobiles—because of air pollution control costs incurred by its suppliers—is put at $225 million in 1976, approximately $22.50 additional per vehicle. Other additions to the cost of vehicles because of increased costs incurred by suppliers will, in all probability, also occur, but this impact should be minor.

Construction is another major industry whose dependence on other industries will cause a rise in costs greater than its own control costs. Increased air pollution control costs, particularly in the varnish, asphalt, cement, brick and tile, lime, and iron and steel industries may increase the price per average housing unit by $100. The complete cumulative impacts of all environmental control costs as they affect the cost of a house cannot be calculated with current data.

The funds for pollution control that come from the Federal Government are largely the product of progressive taxes, so a greater portion of the cost is borne by higher income taxpayers. State taxes are mixed: income taxes tend to be progressive, but sales taxes are not. Local government's share, based largely on property taxes and sewer service charges, however, tends to burden lower income taxpayers more. To the extent that environmental control costs are reflected in higher prices of products, those costs will be borne disproportionately by those with lower incomes because they spend a larger percentage of their incomes on such products.

Although there are burdens on low income groups, there are great advantages to achieving environmental programs at less cost to society through greater use of sewer service charges, for

example, and assuring that the prices of products reflect environmental control costs. A cleaner environment—particularly air over the cities and improved sanitation—will greatly benefit low income groups. And considering that cost increases will not be a significant part of the personal budget, the concern that the low income groups bear a heavier share of the cost for a cleaner environment is eased although not eliminated. This illustrates the desirability of dealing directly with income distribution problems rather than through subsidizing the costs of services or products.

the international impact

As nations move forward with environmental quality programs, competitive changes may well develop in international as well as domestic markets. Governments of trading nations will adopt various measures to assign the costs of pollution control. These measures may have different effects on production costs and on product prices. They may, therefore, have implications for international trade and investment flows.

Some U.S. firms will be faced with increased costs for their products which may not be matched by similar increases for foreign goods. However, environmental costs are but one among many international competitive factors and are often dwarfed by others.

A primary issue is whether the costs of pollution control will be borne by the goods whose production pollutes or whether they will be paid for from general tax revenues. In the United States, the primary responsibility for preserving and cleaning up the environment rests with those who degrade it, and prices of products reflect environmental cleanup costs. Not only is this policy fair and consistent with our system of assigning costs, but it leads to lower total pollution costs as consumers shift purchases toward goods that make fewer demands on the environment.

Although nations are bound to differ in their method of assigning costs, some agreement on principle is emerging. For example, at the Second U.S.-Japan Ministerial Conference on Environmental Pollution in June 1971, both countries confirmed "that the cost of control of pollution, including pollution control equipment, incurred in the production process by industry in order to meet emission standards necessary to achieve environmental quality standards established by each country in accordance with scientific criteria, should be borne by industry."

To impose direct costs on society as a whole through subsidies would relieve some industries but would be more costly to the whole economy. Such subsidies would have a similar effect on goods entering international trade, as would a tariff or export subsidy. The effect of such a shift or trade subsidy is that too many goods with high environmental costs would be domestically produced.

Even if there were international agreement that product prices absorb environmental control costs, shifts in international trade patterns would only be reduced, not eliminated. For many reasons—for example, differences in product mix, absolute levels of production, climatological and topographic factors—countries are likely to experience different costs for environmental controls. Those countries with low costs obviously benefit most in international trade.

Another factor is that environmental control standards will not be the same for every nation. With the exception of persistent pollutants that accumulate in the environment or pollutants that traverse international boundaries, the setting of standards will generally be a matter for each sovereign nation to decide for itself. Such choices will reflect the capabilities and preferences of each nation, which may vary depending upon different environmental, social, and economic circumstances.

Still another problem is that nations may use product standards as disguised nontariff barriers. For example, one country may set a standard more easily met by its own producers. As long as the standard is applied uniformly and is designed to minimize environmental costs, the barrier that it creates to imports is appropriate. However, a standard may discriminate against foreign products. The problems for trade policy are how to distinguish discriminatory standards from nondiscriminatory standards and to prevent the imposition of such trade barriers.

Some domestic U.S. industries will certainly be placed at a disadvantage as new standards are implemented. But most industries that will be affected will be those already suffering from outmoded production methods. However, most U.S. exports and imports are not goods with high pollution control costs. For example, of the total imports into the United States in 1969, less than 20 percent compete with products of the major U.S. industries with high pollution control costs. The breakdown is shown below.

Industry	*Total U.S. exports (millions)*	*Percent*
Pulp, paper, and manufacturing	$1,588	4
Petroleum products	1,115	3
Chemicals	1,232	3
Iron and steel products	1,724	5
Nonferrous base metals	1,374	4
Subtotal	7,033	19
Other imports	29,019	81
Total	36,052	100

Likewise, because of the composition of U.S. exports, a large share of our exports will be relatively unaffected. Of the total U.S. exports in 1969, under 20 percent was from industries with high pollution control costs. The breakdown by industry is shown below.

Industry	*Total U.S. exports (millions)*	*Percent*
Petroleum products	$428	1
Chemicals	3,383	9
Pulp, paper, and manufacturing	892	2
Metals and manufacturing	2,536	7
Subtotals	7,239	19
Other exports	30,749	81
Total	37,988	100

These estimates do not include all industries facing foreign competition that have large control costs. Nonetheless, there does appear to be little likelihood that the U.S. balance of payments will change significantly because of pollution abatement efforts.

Studies by Ralph C. d'Arge, sponsored by Resources for the Future, Inc., suggest that even relatively large cost increases for U.S. products in the absence of comparable price increases for its foreign competitors—an unlikely circumstance as more nations impose environmental quality requirements—would change the U.S. domestic economy little.

Whatever competitive advantages foreign products enjoy in the near term will shift as all nations begin to upgrade environmental quality. All of the industrialized nations are actively engaged in environmental protection programs of some sort. However, the United States is generally conceded to be considerably ahead—both in the degree of control and the quality of control technology. In the future, as other countries begin to make large investments in pollution control facilities, the U.S. position in world trade markets should improve. Moreover, its technological lead should establish the United States as an exporter of pollution control devices and engineering competence.

strategies for attaining environmental goals

Government faces two challenges: to find ways to control pollution most efficiently, fairly, and effectively and while doing so to develop strategies to cope with the transitional impacts of higher pollution control costs.

A number of strategies may be used, individually or in combination, to achieve environmental goals. Persuasion—relying on

community pride and responsibility—is one. Although it often works in prodding individual actions, such as anti-littering or beautification, it does not work well with a manufacturer worried about his competition and profits.

Enforcement has been the keystone of environmental quality control efforts in the United States. Many have suggested a mix of financial aids to supplement regulation, ranging from tax write-offs to guaranteed loans or grants. Another approach is to use economic incentives, such as the proposed lead tax and the sulfur oxides emissions charge.

Only regulatory authority and economic incentives are discussed as strategies for attaining environmental goals. Proposals for tax, loan, and grant assistance to industry cover only part of the full cost of pollution control, which by any particular firm is viewed as a basically nonproductive investment. So they provide little or no incentive for industry to pursue control activities. Therefore, subsidies are discussed later as policy options to aid transitional problems.

environmental standards

The most common strategy currently being used to deal with environmental problems is to set and enforce environmental quality standards. By and large, the principles are simple, straightforward, and build upon existing legal structure.

Police powers have been used to handle many questions of public nuisance. Environmental quality legislation enacted in recent decades has simply followed suit. The two principal Federal laws are the Clean Air Act, as amended, and the Federal Water Pollution Control Act, as amended.

Historically, Federal law has deferred to State and local governments to set air and water quality objectives. This approach still holds in the Federal Water Pollution Control Act and in the Administration's legislative proposals for water pollution. However, the President's proposals add new dimensions to the Act. They call for national effluent standards for hazardous pollutants. They also require effluent standards for each discharge source to meet ambient water quality standards and demand the best practicable treatment for new sources of water pollution.

The Clean Air Act of 1970 departs sharply from the past. It requires national ambient air quality standards for the chief air pollutants. Primary standards are set at levels to protect human health from air pollution. Secondary standards, even more stringent, protect crops, property, and esthetics. The Act calls for national emission standards for significant new sources of air pollution, such as power plants and nonferrous smelters. And it establishes national emission standards for new and old sources

of hazardous pollutants. States have the responsibility for developing implementation plans to meet ambient standards for existing facilities.

Both the Clean Air Act and the Administration's proposed water quality legislation recognize the need for specific standards to protect human health. They also recognize the need for using the best available technology to control new sources of pollution. Finally, both pieces of legislation greatly expand the geographic scope of Federal concern and the Federal Government's enforcement authority.

Absolute prohibitions of some pollutants are justified. For example, discharging extremely dangerous and persistent materials may need to be entirely forbidden. For other waste discharges not crippling to human health, it is more reasonable to curtail but not outlaw them.

Setting standards is an attempt to enforce a collective judgment. Total prohibition of many substances is as unwarranted as total freedom to discharge unlimited quantities. Desired uses of the environment—such as swimming and breathing air free from damaging health effects—are dictated collectively by the political process. Standards of quality are established to meet the uses, such as determining the quantity of a pollutant which can be in the ambient air or water and still achieve the uses. These standards or criteria are based on available scientific evidence of the toxicity, persistence, and other effects of pollutants. Implementation plans, usually specifying emission or effluent limitations, are then designed for each source to achieve the ambient standards.

Environmental quality standards are vital. For pollutants especially harmful to health, they give across-the-board protection to the population. Though explicit information on benefits and costs leaves much to be desired, standard-setting does provide mechanisms for collective decisions of their value in determining desired levels of environmental quality. And unlike some subsidy measures, they do not discourage firms from using a variety of alternative abatement measures. Once a standard is set, a firm can chart its own course by choosing the best mix of process changes, improved management, and treatment to meet the standards.

However, total reliance on regulatory authority raises a number of problems. Public agencies must not only specify standards and implementation plans, judging technical and economic feasibility, but they must also prove violations of standards. These responsibilities delay enforcement—sometimes for several years or even a decade or more. Some companies and municipalities which have been ordered to undertake specified control activities have been able, at a minimum of cost, either to delay or

circumvent the orders entirely. Granting variances for a wide variety of reasons has been commonplace.

Enforcing reductions in waste discharge levels remains an uncertain and continuing problem. Ambient pollution levels must first be measured. Then the sources of pollution must be traced. Eventually each discharger must be notified of his compliance requirements.

The ease and cost of pollution reduction hinge on several sets of variables—the industry, its product mix, its processes, age of plants, and operational controls. These differences raise important questions regarding whether the costs of any abatement scheme are fair, efficient, and reasonable.

Typically, environmental standards are implemented by setting approximate levels of abatement for each source. Usually these limits call for uniform or proportionate reductions by all dischargers. That is, if the total discharges exceed the ambient standards, each source is required to reduce discharges in proportion to its contribution to the total.

Though the equal-proportionate scheme has an air of equity and is fairly straightforward, it is also inefficient and expensive. In terms of equity, equal-proportionate reductions often have an unequal impact on profit rates or sales. A study of the gray iron foundry industry revealed that nearly equal percentage reductions in air pollution had about a fifth the economic impact on large foundries as on small foundries. Also, new plants have the advantage, especially for waste water discharges, of being able to design their processes to minimize pollution, while existing plants do not always have that option.

The same pollution control results can be achieved at far less cost if instead of making all existing sources cut back proportionately, those with low costs treat to high levels and vice versa. But this would require regulators to develop detailed information on the costs of reduction for each individual source—information that is not available and would be costly to obtain. Even if a least-cost standard-setting procedure were technically and administratively feasible—which it is not with current institutions for dealing with pollution—it would still raise serious equity problems. It would call for greater reductions from sources with low abatement costs and allow operators of plants with high abatement costs to escape responsibility.

pollution charges

Clearly, standard setting and enforcement is the primary way the Federal Government addresses most environmental problems. Certainly that strategy alone is especially useful for dealing with hazardous pollutants. It is also clear, however, that because of the enforcement, efficiency, and equity problems of the regula-

tory approach, other means of achieving pollution abatement must also be probed.

A promising possibility is to levy financial charges against dumping of waste materials into the environment. With little doubt, a well-constructed charge system tied to the amount and type of pollutants would quickly curb waste discharges because it would significantly change the basic costs facing individual polluters. Pollution charges would provide a strong abatement incentive and would tie environmental costs to the processes that generate the pollution.

Charge levels could be set to stimulate each discharger toward positive and effective action to cut pollution. Manufacturers would have an incentive to change production processes, improve internal plant management of wastes, and rely more heavily on recycling and recovery to reduce waste discharge. They would be encouraged to seek out and use new technologies rather than debating their technical feasibility.

Limited experience with sewer service charges buttresses such expectations. A Springfield, Mo., packing plant faced with a waste treatment charge of $1,400 per month, so modified its production processes that its monthly payment was scaled down to $225. When its treatment plant became seriously overloaded, Otsego, Mich., decided to charge a large industrial user. In response, the company cut its waste discharges from 1,500 pounds of BOD a day prior to the charge down to 900 pounds daily during the first month the charge became effective. In the second month, it reduced discharges to 733 pounds. Within 90 days, daily discharges were down to 500 pounds—a level the plant could treat effectively. These examples illustrate the effectiveness and desirability of assessing users of treatment facilities the full costs of their treatment. This principle is being expanded through EPA regulations and through the Administration's proposed amendments to the Federal Water Pollution Control Act.

With present rules, polluters can delay abatement. Pollution charges would create a positive incentive to accelerate abatement efforts and discourage delay. Moreover, a charge scheme would be continuous and predictable, not sporadic. In a sense, a pollution charge is a 24-hour "automatic enforcer." An incentive now lacking would be provided to install facilities and, most important, maintain and operate them efficiently.

As the costs of pollution control are incorporated into the market structure, producers and consumers of high pollution goods would carry their share of the burden. And as prices of goods reflect the relative costs of pollution abatement, consumers would, to some extent, shift to goods that embody lower environmental costs.

By placing the cost responsibility on the polluters, charge systems are equitable. The operator of a plant where reductions are

possible only at high costs is not forced to make large reductions. But neither does he continue to pollute without bearing the burden of the charge and thereby win a competitive advantage over those who undertake control and incur the costs. By placing an equal charge on all dischargers, the charge system provides an equitable basis for achieving greater efficiency in meeting environmental standards.

regulation and charges—a new strategy

Advocates of regulatory authority and advocates of pollution charges often considered the approaches as mutually exclusive. The two strategies were viewed as an "either/or" proposition instead of their being used together to attain desired standards of environmental quality.

However, first the lead tax proposal and then the proposed sulfur oxides emissions charge show the way to a new strategy combining elements of both approaches. Regulatory authority can be used to establish ambient standards and back-up enforcement, while pollution charges provide the economic incentive to achieve these standards.

The tax on lead used in gasoline complements the authority to control lead use in gasoline. Under the Clean Air Act, the Administrator of EPA has power to regulate additives in gasoline—including lead. But because some leaded gas will be necessary for older vehicles for many years, it will continue to be marketed. Yet the need exists for an economic spur for consumers who can use low- or unleaded gasoline now to do so. Consumer demand would then induce the oil industry to produce more low- and unleaded gasolines. Without the tax, gasoline buyers would continue to buy the cheaper leaded gasoline, and it would be difficult to develop the supply of unleaded gasoline needed to avoid fouling pollution control devices that will almost surely be required to meet the 1975 standards.

The sulfur oxides emissions charge, which the President directed the Council on Environmental Quality and the Treasury Department jointly to develop, would also combine regulatory authority with an economic incentive. The Clean Air Act of 1970 tightened the legal authority to control air pollution, including sulfur oxides emissions. But the necessary control technology still lags. And debate continues about the commercial availability of devices to curb sulfur oxides from stack gases. Enforcement often is hamstrung by this basic conflict over availability of control equipment and the feasibility of installing it.

The sulfur oxides charge will stimulate industry to develop and install the necessary control equipment. Because it acts as a continuous economic incentive to achieve the standards, it should also reduce the need for thousands of ad hoc enforcement actions.

It thereby strengthens the capacity of the regulatory process by paring enforcement actions to a manageable number.

If the charge is not adequate to achieve the ambient standards—as may be the case in some heavily congested urban areas—the regulatory authority will assure that the standards will still be met.

Because the charge can achieve the standard and still accommodate different levels of emission reduction from different sources, it could lead to significant cost savings. In blending regulatory authority and charges, it is critical to do so in a way that does not diminish the economic efficiency gains attainable with the charge.

Standard setting and enforcement coupled with complementary economic incentives provide two powerful tools to achieve a high quality environment. As successful experience with charge systems builds up, it will be appropriate to reevaluate which mixes of strategies are most appropriate to achieve environmental goals.

strategies to deal with economic adjustments

National efficiency and social well-being are best served by public measures that aid the adjustment to change—not by policies that prevent change. Higher costs for pollution control raise the same kind of adjustment questions as a shift in demand for a firm's products or any other increase in factor costs—for instance, increased costs for labor, land, capital, equipment, or raw materials.

The value of productive assets depend on profits. When profits fall because of increased costs of production or decreased sales, the value of the firm's fixed assets, which cannot be easily transferred, generally fall. When such assets decline in value, it is a signal of their economic obsolescence. The economy as a whole does not suffer because of it, for their continued use has little or no value. There is no economic reason for the public to subsidize an owner of fixed assets which have fallen victim to changing demand or increased costs. It is all part of necessary adjustments in the economy. However, factors in the economy that have alternative uses and keep their productivity regardless of demand and supply shifts are another matter. Society as a whole has an interest in using them promptly in other productive ways. Labor represents the major factor that has such alternative productive uses.

Minimum unemployment and maximum output of the economy can best be accomplished by assuring that those factors which have alternative employments are aided in transition and by disregarding those specialized or fixed factors which have no alternative uses. Indeed, social justice demands greater concern for individuals suffering disproportionate losses from dislocation, especially those who will be unemployed because of environ-

mental control actions. This principle might also hold true for small businesses and proprietors more than for large corporations whose losses are generally shared among many stockholders.

The major means to ease economic adjustment problems during the environmental transition are Government policies to promote overall growth, employment, and stability. Chief among them is the repertoire of fiscal and monetary policies the Government can call upon. Properly employed, they can create favorable aggregate demand levels, full employment, and stable prices.

The Government also encourages education and training, which aid mobility of human resources, and discourages monopolies, which tend to lock labor and capital into pursuits yielding lower levels of real output. Government programs also protect those severely disadvantaged by economic growth and change. Unemployment compensation, retraining assistance, small business loans, technical assistance, and aid to depressed areas—are examples of such programs. To both industry and labor, another major aid to adjustment is the phasing of environmental expenditures required to meet prescribed standards.

Special adjustment assistance to individual companies would tend to perpetrate obsolete facilities and would create undesirable incentives. Additionally, competitors could claim unfair competition in public financing of abatement measures, and it may reward those who have lagged in their abatement efforts. Such special assistance would also give rise to difficult problems in deciding which plant qualifies for special aid. This could open a Panadora's box of cost scrutiny and judgment of rates of return approaching that of public utility regulation.

There may be times when public assistance to firms is justifiable on economic grounds—for instance, in chronically depressed regions, where pollution abatement requirements would close several companies and lay off most of the labor force in a town. But the rationale for assistance would be to maintain employment rather than shore up fixed assets with little or no value.

The Congress and others have suggested several assistance programs to deal with transitional problems. They are broadly of two types: across-the-board assistance, such as tax write-offs, grants, or loans; and targeted assistance to workers, small businesses, or heavily disadvantaged firms.

across-the-board assistance

tax aid—Greater use of tax devices has been suggested to help ease industry's transitional problems. The Federal Government currently offers rapid amortization of capital expenditures for pollution control equipment under some circumstances. Over 30 States also offer rapid amortization, exemption from sales

and use taxes, exemption of facilities from property taxes, or some combination thereof. In at least one State, plants which principally use waste materials are valued at 25 percent of assessed valuation for property tax purposes. In many States, industrial development bonds can provide an interest subsidy that equals the difference between municipal and industrial costs of capital. The Tax Reform Act of 1969 exempts pollution control facilities from the general prohibitions on the use of industrial development bonds.

Although these financial incentives can help individual companies faced with increased pollution control costs, they also raise problems. One of the major arguments for tax relief is that some firms cannot make the required expenditures for pollution abatement and still stay in business. But if tax relief comes in the form of an income tax shelter, the benefit falls primarily to those firms enjoying net income flows. It tends then not to help firms most in need—those which are truly marginal and have little or no profits to be offset.

Further difficulty arises because of the bias that is created in favor of capital facilities. Almost of necessity, tax relief is tied to capital spending—such as for treatment facilities. If it were not, the Internal Revenue Service would be forced to make plant-by-plant decisions on whether a part of the industrial process is related to pollution control or just to production. Detailed industry studies indicate that for the most part, the cheapest way to reduce waste is through process changes, improved plant management, and reuse and recycling of materials—instead of almost total dependence on capital intensive waste treatment. Because tax advantages subsidize capital expenditure and do not—and in the main cannot—provide assistance for other expenditures, firms would be encouraged to undertake wasteful abatement techniques. And to the degree that pollution control costs are subsidized and not reflected in product prices, too many environmentally costly products will continue to be produced.

grants—All or part of industry's costs for pollution control could be met through direct Federal grants. Indirectly, this has been the case with the Federal grant program for construction of municipal waste treatment plants, where 50 percent of wastes treated are from industrial sources. More recently, however, municipalities receiving Federal grants are being required by EPA regulations to institute user charge systems for industrial waste treatment.

A one-time subsidy to waste dischargers has several advantages over tax relief. More subject to legislative and executive review, grant subsidies avoid the less scrutinized "backdoor financing" of tax assistance. Moreover, grants are less likely to become a more permanent feature of the cost structure of industry,

thereby not disrupting efficient resource allocation as much. Grants, however, do contain most of the disadvantages of tax subsidies, such as encouraging overly expensive capital facilities and failing to assure that the full costs of environmental improvement are reflected in the prices of products.

Grants may seriously inhibit progress in waste discharge abatement. There is evidence to suggest that until recently, the Federal municipal waste treatment plant construction program may have slowed construction in some parts of the country, although in total it stimulated a greater amount of overall construction. There is certainly reason to think that a grant program may, at least initially, encourage industries to wait in line for grants—instead of act.

loans—Loans are another way suggested to blunt the economic impact of pollution abatement. A guaranteed loan would not necessarily increase the availability of capital for a company, but it would reduce interest rates. A Government-subsidized loan could even reduce a company's costs further.

A loan program would not appreciably help a marginal firm whose problem is lack of profit, which would essentially preclude it from amortizing a loan, guaranteed or otherwise. And loans suffer most of the problems of subsidy and grant programs discussed above. Further, guaranteed loans will compete with other capital needs—such as Government securities, mortgages, and State and local bonds. It is not clear that another distortion in capital markets in order to assist industry to meet pollution control requirements is desirable in light of other goals: to maintain low Federal interest costs and to provide acceptable capital markets to encourage home building and improvement of State and local facilities—including sewage treatment plants.

targeted assistance

Some current Federal programs already can be tapped to help with the environmental transition. Programs administered by the Department of Labor under the Manpower Development and Training Act (MDTA) and the Economic Opportunity Act can retrain and reemploy workers laid off because of pollution control requirements. In fiscal year 1971, total training and related services administered by the Labor Department will reach more than 1 million individuals at a cost of $1.5 billion.

Small Business Administration (SBA) loans are available to help small firms. Section 7(a) of the Small Business Act authorizes SBA to make, participate in, or guarantee loans of up to $350,000 for the SBA share, with interest rates on that portion of up to 5.5 percent. The loans, which can be used for land acquisition, machinery, or equipment and plant construction,

conversion, or expansion, can assist in financing pollution control facilities.

The Economic Development Administration (EDA) can provide loans, grants, and technical assistance to local governments or industry for the purpose of promoting economic development in economically depressed areas. If environmental control costs are a barrier to economic development, or will cause severe unemployment, then this assistance can be for municipal public works projects or industrial pollution control facilities.

Although these programs can help with transitional problems, they are limited. Funding for all of them has been set thus far without reflecting specific requirements for adjusting to the environmental transition. The MDTA programs are geared to disadvantaged workers, not necessarily to those laid off by plant closings due to pollution control requirements. SBA programs help only a small segment of the economy. EDA has broad authority to aid economically depressed areas, but this aid can be used only to help meet environmental transitional problems when they are a significant barrier to the economic well-being of an area.

Under the present Trade Expansion Act (TEA), the Tariff Commission and the Secretary of Commerce or of Labor can vouch that imports stemming from trade concession hurt workers or firms, entitling them to special assistance. At present, increased pollution control costs alone are not grounds for eligibility. The TEA model has been suggested for a special pollution control assistance program. Although attractive in its flexibility in determining eligibility and the types of assistance, it leaves the difficult decisions to adminstrative discretion.

Some have suggested that small businesses lack knowledge about pollution control requirements. Therefore, a pollution control technical assistance program has been suggested to help small firms minimize costs for pollution control. This might be particularly helpful to firms with little in-house expertise.

Another alternative in dealing with the transition is to expand current programs especially to meet pollution control adjustment problems. However, without better knowledge of probable impacts—on companies, industries, and regions—it is difficult to decide about appropriate budget levels and mixes among the programs.

Lack of accurate data on pollution control costs is still a barrier to intelligent policy development. The Council on Environmental Quality is working with the Environmental Protection Agency, the Department of Commerce, and other agencies on a study to determine more accurately the impact of pollution control expenditures on industries, companies, regions, and workers. The Administration is evaluating a range of possible

assistance measures to aid in overcoming transitional problems brought about by environmental expenditures.

conclusions

The costs of pollution control will be high overall but not great when compared with the gross national product, value of shipments by industry, or even total investment in capital facilities by industry. In general, U.S. business and industry will adjust to these costs just as they have adjusted to other changes in the cost of doing business. The most difficult adjustments will be to solve the temporary dislocation of workers made jobless by plant closings.

The Council believes that an optimum strategy for dealing with environmental problems is to employ both regulatory authority and pollution charges. Regulatory authority insures that legal remedies are ready to meet agreed-upon standards; pollution charges guarantee a strong incentive to install the necessary equipment and operate it efficiently. Use of charges and regulatory authority in tandem can achieve environmental standards faster and cheaper. As more experience with charge systems builds up, it will be appropriate to re-evaluate which mixes of strategies are most appropriate to achieve environmental goals.

Clearly, economics plays a major role in our effort to achieve a high quality environment. Intelligent economic decisions and the wise allocation of resources are essential to achieving environmental goals. While the aggregate costs of pollution control appear well within the capacity of the American economy to absorb, there will be some transitional problems. But there is every reason to believe that our Nation's commitment to environmental quality can be achieved within the context of a healthy, dynamic economy. Failure to take the necessary steps would cost the Nation much more in terms of health impairment, loss of recreational resources, and a decline in the quality of life.

appendix

costs of air and water pollution control and solid waste management

The summary data presented in the text were largely derived from the supporting data presented in this appendix. It provides a more detailed assessment and analysis of costs for air and water pollution control and solid waste management. The general limitations of the data are discussed in the chapter.

water pollution costs

Current data for water pollution control expenditures are primarily for

municipal and industrial waste treatment. Data on such "nonpoint" sources as agricultural runoff and acid mine drainage are considerably less reliable.

public treatment costs—During 1970, municipal waste treatment facilities serviced about 95 percent of the sewered population (70 percent of the total population). These municipal operations also provided waste treatment for most small non-water-intensive industries; for some heavy industry; and nearly all commercial, institutional and financial establishments. Over 60 percent of the total sewered population is receiving at least secondary (biological) treatment, and 35 percent is receiving only primary (settling) treatment. Only 5 percent of the sewered population is receiving no treatment at all.

The current replacement value of municipal treatment plants amounts to about $6.1 billion. Interceptor sewers, pumping stations, and outfalls associated with the waste treatment plants add a replacement value of approximately $7.6 billion, for a total of $13.7 billion. These figures do not include the estimated value of sanitary, storm, or combined sewers which feed into municipal systems—about $12 billion additional capital.

Much of this treatment plant investment has been made in recent years. Annual costs to operate, maintain, service, and replace this growing system have been rising steadily. In 1970, they were close to $1.6 billion, compared to $800 to $900 million in 1965.

In spite of the sharp rise in the levels of investment and their magnitude, far more capital will be required to keep municipal treatment in step with national water quality objectives. Estimates indicate that slightly more than $4 billion will be required to eliminate deficiencies in existing treatment facilities. Another $8 billion will be necessary between 1971 and 1974 to meet replacement and population growth needs.

This EPA estimate of $12 billion total is for treatment and related facilities, eligible for Federal grants. The National League of Cities/U.S. Conference of Mayors made another estimate of municipal waste treatment needs of between $33 and $37 billion. That estimate was calculated from responses from its member cities. However, when costs ineligible for funds under the Federal grant program are deducted and double counting eliminated, the National League of Cities/U.S. Conference of Mayors estimate becomes about $11 billion on a comparable basis with EPA estimates.

Based on 1968 data, additional costs have been estimated for capital investment needed to alleviate the problems of overflows from combined sewers. The American Public Works Association calculates that it will cost between $15 billion and $48 billion to remedy overflows from combined sewers. The $15 billion figure would cover a variety of alternatives short of complete separation, and the $48 billion would finance complete separation of combined sewers—$30 billion in public costs and $18 billion in private costs.

The accumulated investment in treatment systems by 1974 will be accompanied by substantially increased costs of operation. The 1974 annualized costs of municipal water treatment are projected at $3.2 billion. Table A–1 compares these municipal annual investments, cumulative investments, and annualized expenditures for 1970 and 1974. Costs will continue to increase even after 1974, but at less dramatic rates.

These annual expenditures can be compared with expenditures for other municipal services. The annual costs for municipal waste treatment will amount to about $20 to $22 per person served, compared to 1969 municipal per capita expenditures of $22 for police, $34 for education, and $18 for public welfare.

private treatment costs—The Bureau of the Census reports that of the 240,000 manufacturing establishments in the U.S. in 1968, fewer than 10,000 used 20 million or more gallons of water. Ninety-one percent of the 35.7 trillion gallons of water used by major manufacturers in 1968 was used by 5,000 food, pulp and paper, chemicals, petroleum, and primary metals firms. Their

Table A–1

Current and Projected Expenditures for Public Waste Water Treatment Systems, 1970 and 1974

(In millions of dollars)

Type of expenditure	1970	1974
Cumulative investment		
Waste treatment	$ 6,100	$ 9,400
Waste transmission	7,600	14,000
Total	13,700	23,400
Annual investment		
Replacement of existing facilities	400	800
New investment	800	3,200
Total	1,200	4,000
Annualized costs		
Operation	310	900
Replacement	410	760
Interest[1]	840	1,520
Total	1,560	3,180

[1] Expressed as an opportunity cost of carrying replacement value at average 1970 rate for high grade local government bonds: 6.51 percent.

waste water discharge was several times the amount discharged by the sewered population of the United States. The bio-chemical oxygen demand (BOD)—a measure of oxygen needed to decompose the wastes—was roughly four to five times that of total domestic liquid wastes.

The waste loads of many of the smaller manufacturers do not significantly differ from other sources of municipal waste loads. The overwhelming number of these companies discharge directly to municipal systems. Yet because they are relatively small water users, they account for only about 10 percent of all manufacturing waste water discharges.

There are significant differences in the economics of pollution abatement for municipal and industrial operations. Industrial investment is usually far smaller to achieve the same level of treatment. In most cases, a manufacturer does not incur the collection and intercepting sewer costs which represent a majority of municipal costs. In addition, the more concentrated nature and greater volume of their wastes result in lower unit investment costs for treatment. However, industrial operating costs are higher than municipal operating costs—averaging twice as much per unit of invested capacity.

Another difference between municipal and industrial abatement costs is the wider range of alternatives available to industry. Unlike municipalities, industries can reduce waste discharges through process changes and better internal management as well as through treatment. Industrial expenditures for process changes that reduce pollution often result in more efficient production. Accordingly, it is often difficult—and sometimes impossible—to allocate costs between pollution abatement and increased production.

Nationwide, an estimated 50 percent of the wastes treated in municipal plants are from industrial sources, although the percentage of municipal capacity so used varies greatly from plant to plant. The costs of such capacity are included within the estimates of capital and operating costs for municipal waste treatment plants.

Most existing industrial waste treatment facilities have probably been built over the last decade. As estimated by McGraw-Hill, investments by manufacturing plants were about $870 million in 1970 and $600 million in 1969—compared with less than $200 million in 1960. Industries other than manufacturing—mining, electric utilities, commercial establishments, etc.—estimate their 1970 investment for water pollution control at $287 million. The total 1970 investment, then, is approximately $1.2 billion. The McGraw-Hill survey indicated that industry planned to spend $1.6 billion for water pollution control investments in 1971. A breakdown of 1970 investments by industry is shown in Table A–2. Although most of this investment is for treating

Table A–2

Total Investment for Water Pollution Control, 1970

(In millions of dollars)

Industry	Investments
Food and kindred products	$46
Textiles	9
Paper	94
Chemicals	90
Petroleum	185
Rubber	18
Primary metals	140
Machinery	66
Transportation	31
Other manufacturing	193
Total manufacturing	872
Mining	42
Electric utilities	149
Other business	96
All business	1,159

Source: McGraw-Hill Publications Co.

process wastes, it also includes the costs for electric utilities to reduce thermal pollution. These figures do not include investment in municipal systems specifically for treating industrial wastes.

This large investment in treatment facilities requires significant expenditures for operation and maintenance. EPA estimates that the annualized costs—which include both capital and operation and maintenance costs—of manufacturing related water pollution treatment may amount to slightly over $1 billion for 1970 alone. About $575 million of it was operation and maintenance costs, and about $475 million was annualized capital costs. These figures do not include the user charges paid by many smaller firms for waste treatment by municipal systems. Nor do they include the operating costs associated with electric power generation, mining and a number of small industries.

EPA estimates that manufacturers' investments for waste treatment equipment should average about $1 billion per year between 1971 and 1974—$3.1 billion for new waste treatment facilities and another $1 billion for capital

replacement. Annualized costs of control in 1974 would also substantially increase, to over $1.8 billion.

EPA estimates that up to $2 billion additional investment will be needed to control thermal pollution from electric power plants. This estimate assumes complete use of recirculation or closed systems for cooling water.

Table A–3 contrasts current manufacturing expenditures with those required by 1974 water quality standards. As the table indicates, four industries—paper, food, chemicals, and primary metals—spent two-thirds of the money in 1970. By 1974, they will account for almost 80 percent of the total.

Table A–3

Estimated Costs of Industrial Waste Treatment, 1970 and 1974 [1]

(Dollars in millions)

Industry	1970 Annual costs	1970 Percent of total	1974 Annual costs	1974 Percent of total	Percent increase 1970–74
Primary metals	239.1	23	425.0	23	78
Chemicals	187.2	18	421.4	23	125
Food and kindred products	158.4	15	260.0	14	64
Paper	116.9	11	325.9	18	179
Transportation equipment	107.9	10	115.4	6	7
Petroleum	95.5	9	110.2	6	15
Machinery	60.1	5	42.3	2	(30)
Textiles	50.2	5	79.9	4	59
Rubber and plastics	8.9	1	23.5	1	164
All other manufacturing	29.2	3	57.2	3	96
Total	1,053.6	100	1,861.8	100	77

[1] Interest costs based on average 1970 rate of Aaa + Baa corporate bonds, 7.42 percent.
[2] Assumes 1954–70 rate of increase in output and 1954–68 shift in water use per unit of output.

Source: Environmental Protection Agency.

other water pollution control costs—Although erosion contributes more pollutants by weight than any other source, estimated control costs are unavailable, incomplete or rudimentary. Costs for erosion control on farms are unknown. EPA estimates of highway erosion control costs range from $130 million up to $7 billion. Increased costs for erosion control at urban construction projects has been esimated at between $140 million and $1.4 billion a year. Sediment control for 300,000 miles of stream banks is estimated at between $200 million and $3 billion.

Estimates of costs to curb pollution from mining also vary widely. One study estimated that to curtail acid mine drainage from the most severe cases of unreclaimed surface mines may cost upwards of $300 million. To reclaim the total 2 million acres of unreclaimed or inadequately reclaimed lands would cost an estimated $750 million. To upgrade these lands further to farming, grazing, and recreational quality levels might bring total costs to at least $1.2 billion. But even these estimates may be too low. For example, to control acid mine drainage in Appalachia alone—from both surface and underground sources—is estimated in another study to cost over $5 billion, which might raise the national bill to $7 billion.

Costs for control of vessel pollution have also been estimated. In 1971, EPA estimated that the initial costs of meeting marine secondary waste treatment standards would range between $1.1 and $2.3 billion.

These various estimates do not cover the costs of water pollution control from a number of other sources. For example, there are no reliable estimates of the costs of controlling feedlot or other animal wastes or oil spills and intentional discharges of oil.

air pollution costs

Most of the funds for air pollution control have been spent on reducing particulates and automotive pollutants. The standards resulting from amendments to the Clean Air Act will soon require major additional spending to control sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, oxidants and selected toxic substances such as beryllium or mercury, as well as particulates.

public costs—State and local government expenditures for air pollution control are primarily for planning, enforcement, and monitoring rather than for facilities to control emissions. Municipal incinerators and public buildings are the major areas of direct public costs—sources which are small in the aggregate.

Public spending on air pollution control programs has increased steadily in recent years, much of it in Federal grant funds under the Clean Air Act. For fiscal year 1970, agencies receiving Federal grant support budgeted $64.4 million for air pollution control activities. Of this, $38.4 million was non-Federal, which represented a fourfold increase over fiscal year 1965. Future expenditures are projected to rise steeply as the new Clean Air Act Amendments are implemented. Federal expenditures are also expected to rise as research, planning, and enforcement activities are accelerated.

By 1976, over $200 million must be invested in capital equipment for municipal incinerators to meet air quality standards. Annualized costs of these facilities will amount to over $100 million by 1976. These expenditures will control only incinerator emissions. They do not include the large expenditures needed to close all open burning dumps or convert them to sanitary landfills.

private costs—Significant expenditures will be required by the private sector to control both stationary and mobile sources of air pollution. Most air pollution from stationary sources is generated from fuel combustion in power plants, industries, and homes and from industrial processing. The major mobile source of air pollution is the ubiquitous automobile, but trucks, buses, motorcycles, and airplanes also pollute the air. Controls over mobile and stationary sources differ greatly because of inherent differences in physical operation and types of pollutants emitted. Consequently, costs of control differ greatly.

stationary sources—Data on current costs of air pollution control at stationary sources are limited. With some exceptions, these costs are incurred by the industrial segment of the economy. The McGraw-Hill study estimated a total investment in air pollution control of over $1.3 billion in 1970. The study indicated that industry planned to spend $2.1 billion in 1971 on capital investments to reduce air pollution. A breakdown by major industrial sectors is shown in Table A–4.

Estimates for future air pollution control costs are very rough. No comprehensive annual cost estimates are available, either for the past or future. Rather, EPA estimates are based on cumulative costs between 1967 and 1976, the year when compliance with air quality standards is required under the Clean Air Act. *The Economics of Clean Air* report fails to take fully into account the costs of implementing the Clean Air Act Amendments of 1970. Data are available for only six pollutants—particulates, sulfur oxides, carbon monoxide, hydrocarbons, fluorides, and lead—and only for 298 metropolitan areas. These areas were identified by EPA as including most of the U.S. population and industry, although a significant portion of air pollution occurs outside those areas. These cost data appear in Table A–5.

Table A–4

Estimated Industrial Investment in Air Pollution Control Equipment, 1970

(In millions of dollars)

Industry	Costs
Iron and steel	$ 86
Nonferrous metals	80
Machinery	107
Transportation	66
Chemicals	79
Paper	59
Rubber	32
Petroleum	152
Food and kindred products	38
Other manufacturing	148
Total manufacturing	847
Mining	73
Utilities	331
Other	92
Total business	1343

Source: McGraw-Hill Publications Co.

EPA estimates that total investment for control of air pollutants from stationary sources in these 298 regions will total approximately $6.3 billion for the 10-year period 1967–1976. Most of that amount, roughly $5.3 billion, would be required from 1970 to 1975 to meet the standards set by the 1970 Clean Air Act Amendments. By 1976 annual costs of control are projected to reach $2.1 billion.

Control of emissions from fuel combustion at stationary sources, a large part of the total, will run to $2.4 billion by the end of fiscal 1976. The associated annualized cost will be $1 billion in that year. Steam-electric power plants and industrial heating each account for about one-half of the total. The costs of reducing emissions from commercial and institutional heating sources will be slight. The remaining control costs of about $3.9 billion, with annualized expenses of about $1.1 billion in 1976, are for industrial process sources, particularly for metal production.

Some of the projected costs for control of industrial air pollution have been disputed. For example, EPA had estimated investment costs of $87 million to control sulfur oxides from copper smelters in the 298 regions studied. In a study by Fluor Utah, Inc., however, investment costs of between $264 and $607 million were estimated. Some of this discrepancy can be explained by different coverage, cost allocation, control strategies, and other assumptions, but certainly not the bulk of it. These differences only highlight the need for more comprehensive and uniform analyses.

Although these data indicate large expenditures by 1976, they do not include total emissions as shown on Table A–6. Also to the extent that actual emission reductions required differ from the averages used, costs incurred will vary. These reductions are also shown in Table A–6. Further, as indicated by the McGraw-Hill survey, most of the types of sources with large costs are covered in the 298 regions, but not all of them.

mobile sources—Mobile sources are the other major area in which control costs will be incurred. The Clean Air Act requires a 90 percent reduction

Table A–5

Estimated Industrial Costs of Air Pollution Control at Stationary Sources, in 298 Metropolitan Areas, 1976

(In billions of dollars)

Source	Annualized Costs [1]	Cumulative Investments [2]
Stationary fuel combustion:		
Commercial institutional heating	25	42
Industrial boilers	555	1,050
Steam-electric power	426	1,340
Subtotal	1,006	2,432
Industrial process:		
Asphalt batching	12	15
Brick and tile	12	41
Coal cleaning	5	13
Cement	30	110
Elemental phosphorous	3	7
Grain plants	164	463
Gray iron foundries	108	317
Iron and steel	507	981
Kraft (sulfate) pulp	30	73
Lime	15	11
Petroleum	7	1,242
Phosphate fertilizer	10	32
Primary nonferrous metals:		
Aluminum	76	223
Copper	42	87
Lead	7	16
Zinc	2	5
Rubber (tires)	1	2
Secondary nonferrous metals	22	62
Sulfuric acid	41	176
Varnish	1	1
Subtotal	1,095	3,877
Total	2,101	6,309

[1] Incremental costs above 1967 levels, assuming negligible offset annual expenses.
[2] Cumulative investment from 1967 to 1976, excluding previously installed equipment.

Source: Environmental Protection Agency.

below current controlled levels of hydrocarbons and carbon monoxide by 1975. It also requires a 90 percent reduction of nitrogen oxides by 1976. The Administrator of EPA may allow a 1-year extension if he finds that a workable device for automobiles has not been produced in time and that industry has made a good faith attempt to develop such technology. The new standards will probably require not only changes in design and operation of the internal combustion engine but also control devices not yet fully developed for mass production. And they will demand a supply of unleaded gasoline that will not foul the control devices. The standards will result in increased costs for automobiles and in increased fuel consumption. But it may cost somewhat less to maintain a car using unleaded gasoline.

The estimated investment costs of implementing auto and truck standards for model years 1967 through 1976 are estimated at nearly $6.3 billion—$5.1 billion for 1975 and 1976 alone (see Table A–7). The operating costs for the 1967 to 1976 period would be $800 million. However, this low total is largely due to expected operating savings in the early years. For 1975 and 1976, the increased operating expenses are estimated at about $1.7 billion.

The projected per auto costs of meeting the 1975 auto standards are in dispute. The figures in Table A–7 are probably at the low range of estimates. The total costs of meeting the 1976 standards on nitrogen oxides are unknown, because no feasible control technology has yet been developed. Table A–7

Table A–6

Emissions of Air Pollutants from Stationary Sources in 298 Metropolitan Areas and in Total United States

(Tons in thousands)

Pollutant	Emissions in 298 areas (tons)	Total U.S. emissions (tons)	Percent covered in 298 areas	Percent reduction expected in 1976
Process Sources				
Particulates	4,601	6,915	67	93
Sulfur oxides	5,156	6,695	77	72
Carbon monoxide	7,520	9,400	80	95
Hydrocarbons	1,412	2,034	69	51
Fluorides	53	72	74	88
Lead	21	22	95	67
Combustion Sources				
Particulates	3,247	8,937	36	76
Sulfur oxides	11,416	22,130	52	67

Source: Environmental Protection Agency.

also does not estimate capital costs and increased production cost to the petroleum industry of switching to lead-free gasoline.

solid waste costs

Costs for solid waste management cover collection and disposal of residential, commercial, institutional, and industrial wastes. Part is spent to collect and transport solid wastes to disposal sites; part is to operate the sites—landfills and incinerators.

public costs—Local governments bear most of the public costs of solid waste management. Although Federal funds finance research and development,

Table A–7

Estimated Investment and Operating Costs for Mobile Sources of Air Pollution, 1971–76

Year	Investment cost (per vehicle)		Additional operating costs (per year)		Total annual investment for mobile sources (millions)	Annual operating cost (millions)
	Autos and light trucks	Heavy duty trucks	Autos and light trucks	Heavy duty trucks		
1971	$ 17	$ 9	—$ 2.70	0	$ 131.1	—$175
1972	17	9	—2.70	0	136.6	—209
1973	42	21	—7.90	$ 3.50	346.3	—154
1974	42	21	—7.90	3.50	498.5	—50
1975	240	46	—20.70	13.50	2,068.7	744
1976	240	46	—20.70	13.50	3,031.7	909

Negative values indicate savings in operating costs.

Source: Environmental Protection Agency.

demonstration grants, and personnel training, local governments will shoulder most of the public burden for collection and disposal of solid wastes. Private collection and disposal costs are also a significant part of the total.

Current data on municipal disposal costs are imprecise. But data based on a 1968 national survey show their order of magnitude. In 1967, collection and disposal of 190 million tons of residential, commercial, and institutional solid waste cost more than $3.5 billion. Of that amount, municipalities spent $1.7 billion—$1.6 billion in operating costs and $100 million in new capital expenditures. Private collection and disposal costs accounted for the rest—$1.8 billion. These cost data on public and private expenditures also include the handling of some industrial wastes, but the extent of this is unknown.

Total annualized costs for the Nation are not available because estimates of the investment in facilities and equipment are not available. Clearly, the $3.5 billion would be exceeded if interest and depreciation on all currently in-place equipment were to be included. However, operating costs are clearly the major share of annual waste collection and disposal costs.

Roughly 75 percent or more of municipal solid waste disposal spending is for collection and the remainder for disposal. Disposal costs can range from $1 to $3 per ton for sanitary landfill and from $3 to $10 for incineration. Collection costs average roughly $15 per ton, although they vary widely. In heavily populated urban areas, collection can go even higher. For example, in New York City, costs ran to $32 per ton in 1969, not including many employee benefits and depreciation.

Spending by municipalities in the future will probably continue to rise, because wastes are projected to increase even faster than population. Also, because collection is labor intensive, those costs will rise with wage increases, which are rising faster than other costs. As open dumps are replaced by sanitary landfills and incinerators, disposal will take even more of the municipal dollar. New York City estimated that a new incinerator would cost $30 per ton of wastes burned, largely because of air quality requirements and high construction costs. And sanitary landfills become more expensive as available sites are used up and they must be located farther from urban centers. A transfer station and rail haul of 100 miles, for example, increases disposal costs by between $5 and $7 per ton.

industrial costs—The most recent data on total industrial spending for solid waste management are for 1967. In that year, EPA estimates that industry spent $1 billion to handle its solid wastes. Although collection costs are not so large as for municipalities, per-unit disposal costs are probably higher because many industrial wastes require costly treatment prior to disposal due to their toxicity and concentration.

Solid waste management promises to become a larger part of industry's future total pollution control spending. Not only will total quantities and per unit costs of disposal increase, but air and water pollution control requirements may result in additional solid wastes which are even more troublesome to dispose of.

Although detailed data by the public and the private sector are not available, EPA estimates the cost of upgrading national solid waste collection activities at another $540 million annually in operating costs and $20 million annually in capital spending. To upgrade disposal sites and facilities will cost another $95 million annually in capital expenditures. Operating costs will run to an additional $180 million a year. Hence total additional spending needed for adequate national solid waste management may reach over $800 million annually.

Recycling, an alternative to disposal, could cut both municipal and industrial solid waste management costs dramatically as well as recover and conserve resources. As the full cost impact of adequate disposal techniques is felt, pressures should arise to recycle a greater amount of wastes. However, new technology and significant changes in current economic relationships will also be required before recycling is widely used.

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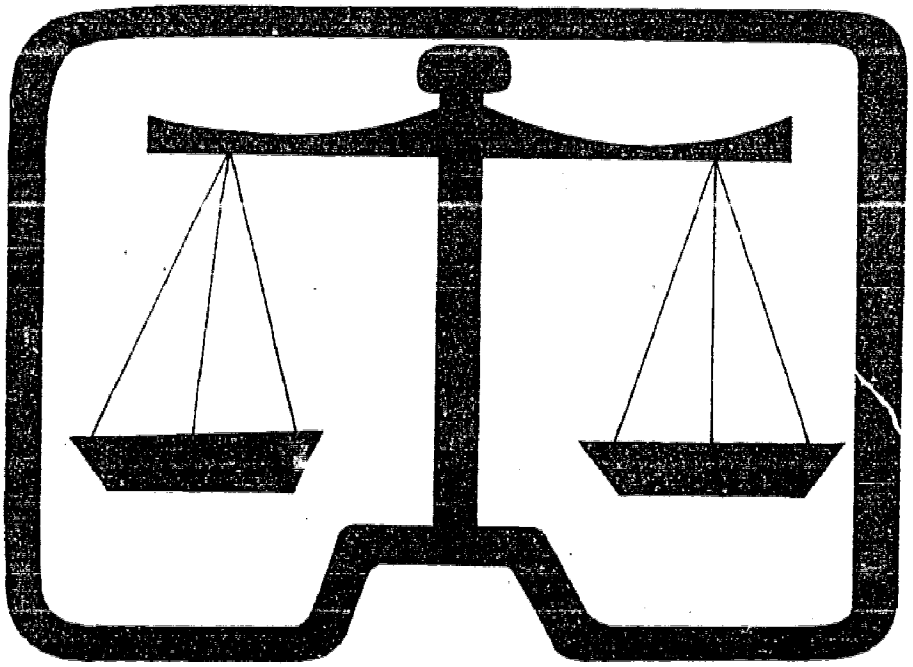

the law and the environment

On January 1, 1970, as his first official act of the new decade, the President signed into law the National Environmental Policy Act (NEPA). That symbolic step has highlighted a year and a half of unprecedented development of the law relating to protection of the environment.

There have followed: court decisions giving force to NEPA and similar Federal laws, actions forcing more consideration of environmental factors in Federal administrative decisions, stronger Federal pollution control laws, and a host of innovative environmental actions by the States. Together they furnish important evidence that the Nation is beginning to institutionalize its concern for the quality of life.

Perhaps the most striking recent legal development has been the step-up in citizen "public interest" litigation to halt degradation of the environment. In the face of a history of administrative decisions that ignored environmental impacts and against a tide of legislative delays in developing pollution control law, citizens concluded that they must use the courts to cure the neglect. The citizen litigation has not only challenged specific government and private actions which were environmentally undesirable. It has speeded court definition of what is required of Federal agencies under environmental protection statutes. The suits have forced greater sensitivity in both government and industry to environmental considerations. And they have educated

lawmakers and the public to the need for new environmental legislation.

Citizens in environmental suits have: stopped construction of a road and oil pipeline across the Alaska wilderness, pending thorough environmental studies; prompted cancellation proceedings against the pesticide DDT; halted construction of an expressway on the banks of the Hudson River; shielded wildlife habitats in Texas and Arizona from development; suspended construction of a Corps of Engineers dam in Arkansas until NEPA was complied with; postponed highway encroachment on Overton Park in Memphis, Tenn., pending review of its necessity; and protected parts of the National Forests until it was decided whether they should be saved as wilderness areas. In this litigation, the courts have broadened the concept of a citizen's right to bring suit and the scope of court review of administrative actions.

A less dramatic development—but perhaps of more long-term significance—has been the trend in government toward tighter systems of environmental regulation. There has come with it a greater Federal recognition of the breadth of the areas needing protection. Already the progress indicates that development of the law may be as important to environmental quality as it has been, for example, to civil rights.

federal law

federal agencies and the environment—a framework emerges

A key trend in Federal legislation is the series of provisions—of which NEPA is the broadest and most important—which write environmental interests into Federal Government decision-making.

NEPA laid down the environmental impact statement requirement in section 102(2)(C),[1] since supplemented by guidelines from the Council on Environmental Quality.[2] An agency proposing a major action with significant environmental impact must: describe the impact; study and describe alternatives to its proposal; obtain comments from environmentally expert Federal, State, and local agencies; and make public, in advance, its environmental analysis and the comments of other agencies. This process—and the advance public response to these environmental analyses—are making Federal agencies far more sensitive to the environment.

Most courts have concluded that the NEPA "102" environmental statement procedure is court enforceable at the suit of interested citizens. This provides a new basis for judicial review of Federal administrative action affecting the environment. In the year and a half since enactment of NEPA, there have been

over 20 reported Federal district court decisions involving citizen challenges to Federal action under the Act. They involved, for example, federally financed highway projects,[3] Interior Department permits for the Alaska pipeline and its related haul road,[4] an Interior Department contract termination,[5] a Bonneville Administration powerline,[6] Forest Service management of National Forests,[7] Department of Agriculture use of the pesticide Mirex against fire ants,[8] Corps of Engineers water resource projects,[9] a Corps of Engineers permit action,[10] a Farmers' Home Administration loan,[11] and a Justice Department grant for a prison facility.[12] Although one decision, arising from a somewhat special set of circumstances, states that NEPA does not impose court-enforceable duties,[13] the great bulk of district court decisions have allowed citizens to enforce the "102" procedure.

In a number of early cases, the Federal activities challenged had been commenced prior to the enactment of NEPA, and the question arose whether the "102" procedure applied to them. In several instances, the courts held that it did, because there remained further major Federal actions to which the procedure could be applied.[14] In other instances, courts ruled that the procedure did not apply because all significant Federal decisions with respect to the activity were made before NEPA took effect.[15]

Significantly, several district court NEPA decisions indicate that the courts will do more than just determine whether the required impact statement has been filed. They will also review whether agency compliance with the necessary analytical procedures is adequate.[16] In this review the courts have taken evidence from the plaintiffs on the environmental impact of, and alternatives to, a proposed action. These aspects of NEPA will receive more definitive interpretation as NEPA cases move into the Federal appellate courts.

NEPA has a further important effect through its requirement in section 102(1)—that "the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act." That section arms Federal agencies with the authority and duty to exercise their powers to promote environmental ends. In a leading case, *Zabel* v. *Tabb*,[17] the Corps of Engineers denied a permit, on ecological grounds, to a developer who wished to fill a portion of Florida's Boca Ciega Bay for a trailer park. A Federal district court held that the Corps could deny a permit only to protect navigation, which was the original concern of the permit statute. However, the Court of Appeals for the Fifth Circuit reversed the decision, relying in part on the conclusion that NEPA "essentially states that every Federal agency shall consider ecological factors when dealing with activities which may have an impact on man's environment." [18]

A second key case, *Calvert Cliffs*,[19] involved Atomic Energy

Commission (AEC) responsibility under NEPA to consider environmental factors beyond radiological health and safety in nuclear plant licensing. Although AEC began applying procedures for considering environmental factors after March 1971, the Federal appeals court was not satisfied. It criticized AEC for not implementing such procedures earlier and for the limitations built into them. The court ordered the Commission to conduct an environmental review of the Calvert Cliffs plant already under consruction on Chesapeake Bay, for which a license had been granted.

Other agencies now include environmental considerations in exercising their regulatory authority. The Coast Guard now considers land use and pollution factors when it reviews bridge permit requests. And the Interstate Commerce Commission considers what freight rates for scrap metal will do to the economics of recycling. The Securities and Exchange Commission is moving to require that corporate reports now include environmental information. NEPA also buttresses the President's decision to institute a Corps of Engineers permit program to enforce water quality standards under the Refuse Act of 1899.

NEPA is the major statutory lever for environmental quality in Federal Government actions. But it is neither the first nor the only one.

The Congress, more and more in recent years, has enacted environmental protection laws aimed at particular Federal programs. Some of these predate NEPA and served as models for its broader directives. All of them apply some safeguard against environmentally adverse decisions in specific programs. And many of the key court decisions to protect environmental values are based on them. (For relevant sections of these environmental protection provisions, see the appendix to this chapter.)

Section 4(f) of the Department of Transportation Act of 1966 [20] broadly protects public parks, wildlife refuges, and historic sites against encroaching federally approved transportation projects. It prohibits such encroachment unless there is no feasible and prudent alternative and unless the project is shaped to minimize harm to the environment. The Supreme Court this year in *Citizens to Preserve Overton Park* v. *Volpe*,[21] citing the strong congressional policy against encroachment upon parkland expressed in section 4(f), ruled:

> The few green havens that were public parks were not to be lost unless there were truly unusual factors present in a particular case or the cost or community disruption resulting from alternative routes reached extraordinary magnitudes.

The Fish and Wildlife Coordination Act,[22] as amended in 1958, bars water resource projects undertaken by a Federal agency, or with a Federal permit, from running roughshod over wildlife. It requires that wildlife be given "equal consideration"

with other aspects of water resource development. It further requires that Interior's Fish and Wildlife Service and State wildlife agencies be consulted prior to project approval. In its 1970 decision in *Zabel* v. *Tabb*,[23] the Court of Appeals for the Fifth Circuit ruled in effect that a Federal agency could deny or condition a permit if the action threatened wildlife. The Court observed:

> Common sense and reason dictate that it would be incongruous for Congress, in light of the fact that it intends conservation to be considered in private dredge and fill operations . . . not to direct the only Federal agency concerned with licensing such projects both to consult and to take such factors into account.

The Wilderness Act[24] establishes a National Wilderness Preservation System of Federal lands and legally protects it against inroads. The Act itself puts certain Federal lands within the System and creates a mechanism to review further tracts in the National Forests, National Parks, and National Wildlife Refuges for the same protection. Over 10 million acres have been set aside as wilderness so far. President Nixon has recommended 3 million acres more for congressional approval. In *Parker* v. *United States*,[25] a Federal district court barred the sale of lumber rights in a relatively untouched tract of a National Forest—until a study is completed and the wilderness character of the tract determined.

The Federal Power Act[26] requires the Federal Power Commission to insure that any dam or related project for which it issues a license be adapted to a comprehensive plan which considers commerce, water power, and "other beneficial public uses, including recreational purposes." In *Scenic Hudson Preservation Conference* v. *FPC*,[27] local groups challenged licensing of the Storm King powerplant on the Hudson River. They argued that the FPC had failed to consider the plant's impact on the scenic beauty of the river. The Second Circuit Court held that "recreational purposes" includes conservation of natural resources and maintenance of natural beauty. It directed the FPC to reconsider the application with an eye to these factors and to possible alternatives to the project. Two years later, in *Udall* v. *FPC*,[28] the Supreme Court gave the statute the same reading and overturned a license for the High Mountain Sheep Dam on the Snake River—because the FPC failed to consider, among other things, its impact on fish and wildlife and the relative desirability of private and Federal development.

Section 1 of the National Park Service Act[29] is another potentially important piece of environmental protection legislation. It requires that park areas be kept "unimpaired" for future enjoyment. The National Historic Preservation Act of 1966[30] is another. It establishes a register of historic places and requires consultation prior to any Federal action potentially damaging to

them. The Multiple Use-Sustained Yield Act of 1960 [31] is still another. It directs the Forest Service to combine environmental and economic purposes in administering the National Forests.

A growing number of other environmental protection provisions have yet to go before the courts. The most recent are: section 136 of the Federal-Aid Highway Act of 1970,[32] requiring that final decisions on Federal-aid highway projects reflect environmental factors to be outlined by the Secretary of Transportation; section 16(c)(4) of the Airport and Airway Development Act,[33] prohibiting Federal approval of airport projects that hurt the environment except under stringent conditions; and section 14 of the Urban Mass Transportation Act of 1964, as amended,[34] requiring a detailed statement of environmental impact plus public hearings prior to project approval.

The court decisions on environmental protection legislation have had and will have a much more lasting impact than merely clarifying particular legislation. *Scenic Hudson,* by placing a positive responsibility on the FPC to consider less environmentally damaging alternatives, laid a foundation for the obligation to develop alternatives imposed by NEPA. *Overton Park, Parker, Zabel* v. *Tabb, Scenic Hudson,* and *Udall* v. *FPC* confirm that courts will apply congressional expressions of environmental policy to overturn agency actions when environmental values are not adequately considered, or, conversely, to uphold agency authority to take action based on these values.

federal pollution control—new legal techniques

New legal techniques of pollution control have accompanied tighter Federal pollution control standards. The Congress has authorized the Federal Government to set national standards of its own for ambient air quality and for certain emissions—moving away from the former approach in which States set standards based on Federal criteria. New provisions in the air pollution laws and other proposed pollution control legislation signal a change in the burden of proof. Now those discharging certain materials into the environment will be required to show that their actions will not be harmful, rather than the Government having to prove the danger after the fact. Federal air and water quality laws have been changed to place new legal restrictions on pollution from Federal facilities. New legislation now permits citizens to augment Government enforcement (see Chapter 1) by suing polluters in Federal court if they do not meet Federal-State air quality standards. Finally, the Federal Government is strongly backing international efforts to control marine pollution.

national antipollution standards—Nationwide controls have previously existed on pollution from certain mobile sources—motor vehicles, aircraft, and vessels—and pesticides and radiation. Fed-

eral control over mobile sources is necessary because no State or local government or individual can protect against environmental degradation from a moving source without creating an unacceptable burden on commerce. Pesticides and radiation have been subjected to nationwide controls because they are inherently dangerous.

The Clean Air Amendments of 1970 [35] set a variety of legal precedents. In the past, air pollution was regulated primarily in airsheds by State and local authorities. The Clean Air Act authorized national standards. The Act calls for national air quality standards on certain pollutants designated by the Environmental Protection Agency (EPA). It sets a deadline for primary standards—those designed to protect health. Significant new sources of air pollution, such as new powerplants and smelters, and both new and old sources of hazardous air pollutants will fall under national emission standards. The President's water pollution control legislation sent to the Congress also calls for national effluent standards on hazardous materials.[36]

Federal authority was also extended to include every area of the Nation under the requirements of the Clean Air Act.[37] Similar extension is requested in the Administration's proposed water pollution legislation. That legislation would require that the States or EPA establish water quality standards for all intrastate as well as interstate waters—and would give EPA new muscle to enforce them. Current Federal law requires federally approved water quality standards on interstate waters only and authorizes Federal enforcement ordinarily only when pollution from one State damages the health and welfare of citizens in another.

burden of proof—on the polluter—The Clean Air Amendments of 1970 [38] are an example of a recent shift in burden of proof in pollution control. Once the EPA Administrator tags an air pollutant as hazardous, he may, after giving notice, publish emission standards. Then any objector must establish "that such pollutant clearly is not a hazardous air pollutant." When EPA believes that an air pollutant is a health hazard, industry must either comply with the emission standards or prove that the hazard does not exist.

The Administration's proposed bill to regulate ocean dumping [39] further illustrates this new approach to burden of proof. The bill would place the burden on the applicant for a dumping permit. He would be obliged to show that the proposed dumping will not unreasonably degrade or unreasonably endanger human health or other specified environmental values.

The Administration's proposed Toxic Substances Control Act [40] would require industry to perform tests prescribed by the Administrator of EPA prior to marketing any new chemical substance. The Administrator could request information on the

results of these tests. Based on EPA's analysis of the tests or other information, it could ban or prohibit uses of a chemical substance if necessary to protect human health or the environment.

abatement of pollution from federal facilities—The Congress has enacted into law the policy of an earlier Executive Order aimed at pollution from Federal facilities. It amended both the Federal Water Pollution Control Act [41] and the Clean Air Act [42] to make Federal facilities fall in line with air and water quality standards. In addition, the new vessel sewage control provisions in the Federal Water Pollution Control Act were made to apply to Federal vessels. [43]

The Clean Air Amendments also limit the exemptions that may be granted. No exemption is now permitted from the performance standards set for new stationary sources, and hazardous emission standards may be postponed only if the technology is lacking or if the polluting operation is necessary to the national security.[44] No exemption may be granted on the basis of lack of an appropriation unless the President "shall have specifically requested such appropriation . . . and the Congress shall have failed to make available such requested appropriation." [45] By expressly waiving sovereign immunity, the Amendments also permit State or local government—or citizens—to enforce Clean Air Act rules against Federal facilities.[46]

citizen enforcement of pollution standards—Citizens may sue to enforce air pollution standards against Government and private entities. In the Clean Air Amendments, the Congress set a major precedent when it created this power of citizen enforcement.[47]

Concurring that citizen enforcement suits can provide a valuable supplement to Federal enforcement efforts in areas in which clearly established Federal or Federal-State pollution control standards exist, the Administration has proposed that similar provisions be added to the Federal Water Pollution Control Act.[48]

international controls over marine pollution—Just as Federal antipollution laws are trending strongly toward nationwide standards and enforcement, there is now movement to set certain international controls. These first international measures relate to marine pollution.

The *Torrey Canyon* stranding dramatically spotlighted oil spills—both large and small—and spurred international efforts to prevent and cope with oil pollution. President Nixon has forwarded three treaty actions on this subject to the Senate.[49] And the United States, together with other nations, is actively pursuing efforts to secure other international agreements. The U.N.'s Intergovernmental Maritime Consultative Organization (IMCO), NATO's Committee on the Challenges of Modern Society, and

the U.N.'s 1972 Conference on the Human Environment all have important marine pollution control items on their agendas.

The Administration's proposed legislation on ocean dumping[50] would order the Secretary of State to "seek effective international action and cooperation" to support the policy of that Act. In 1972, the U.N. Conference on the Human Environment at Stockholm may consider an international agreement on ocean dumping. The International Seabeds Convention, proposed by the United States, also contains environmental control provisions.

Finally, the United States and Canada are negotiating a bilateral agreement to control pollution of the Great Lakes. The agreement would establish common water quality objectives for the Lakes to be overseen by the International Joint Commission.[51]

citizen checks on agency action affecting the environment—the law responds

The ability of citizens and citizen groups to make their views known and to participate in government decisionmaking on the environment is critically important. Often individuals and groups can contribute data and insights beyond the expertise of the agency involved. In some cases, citizen groups are seeking—and making—significant changes in agency policy.

There has been a marked expansion in citizen rights to know about, to participate in, and ultimately to challenge Federal agency actions, particularly those affecting the environment. This new citizen's role has evolved in many different forums. The courts have contributed—through new interpretations of such existing laws as the Freedom of Information Act and the Administrative Procedure Act. And a variety of administrative agencies have instituted procedural changes to implement NEPA.

The new openness to citizen involvement is bound to check, stimulate, and test future Federal agency activities. Citizen concern cannot substitute for assumption of environmental responsibilities by government and industry. Nor can it provide the mechanism to resolve the many policy issues involved. What it can provide, however, is a highly potent quality control and "feedback." This citizen role has been greatly developed in the last year and a half.

the citizen's right to know—The Freedom of Information Act,[52] passed in 1966, predates the upwelling of citizen environmental action. It laid down a general rule that all agency data must be available to the public, with certain exceptions, and is basic, therefore, to public availability of environmental data. The exception most likely to enter into environmental controversies permits agencies to refuse to disclose any internal papers with

opinions or advice on matters of policy. But in a recent decision on whether the public could see a scientific report on the SST, a U.S. court of appeals held that the exemption does not protect "purely factual or investigatory reports." [53] Factual information is exempted "only if it is inextricably intertwined with policy-making processes." Read thus, the Act should open to the public factual studies and analyses of environmental issues used by Federal agencies in preparing environmental impact statements, as well as the statements themselves.

NEPA recognizes the importance of public access as a force for corrective action. It does so by requiring public availability of environmental impact statements and of agency comments, regardless of whether they contain advice on matters of policy. An Executive Order and the guidelines issued by the Council on Environmental Quality have both implemented this policy. Executive Order 11514, of March 5, 1970, directs Federal agencies to maximize public information about environmentally significant programs so that the public's views can be considered.[54] The Council guidelines generally require that draft and final environmental impact statements be available to the public for minimum periods of 90 and 30 days, respectively, before the agency acts.[55] The guidelines also require that draft statements be made public at least 15 days before hearings. As described in Chapter 1, various channels of distribution are being set up to make the environmental impact statements and agency comments more easily available to the public.

Section 309 of the Clean Air Act,[56] added in 1970, gives the public an additional right to information on the environmental aspects of Federal action. It requires the Administrator of EPA to comment on any proposed legislation, regulation, or agency action affecting air or water quality, pesticides, solid waste disposal, radiation, or noise control. These comments must be publicly available in writing at the end of EPA's review.

Together, these legal provisions greatly expand the citizen's right to the environmental information on which proposed Government actions are based. Opening the decisionmaking process to public scrutiny should help insure that Federal agencies act in the public interest. It should also guarantee that actions not responsive to the national environmental goals set in NEPA receive timely attention.

the citizen's right to participate—Citizens and citizen groups have obtained ever increasing rights and opportunities to participate meaningfully in Federal agency decisionmaking. The extent of participation varies considerably, depending chiefly on whether the agency determination is made formally or informally. Formal procedures are prescribed by the Administrative Procedure Act (APA) [57] and by similar provisions in other acts.

A wide variety of Government decisions are made informally, without legislatively set procedures.

NEPA has enhanced the citizen's possible role, whether or not statutory formalities apply to the agency action. It ensures more detailed and easily available notice to citizens of environmental issues. It permits the public to focus on the agency's environmental findings and conclusions through the environmental impact statement.

formal proceedings under the apa—The Administrative Procedure Act defines and prescribes procedures for two types of formal agency proceedings: adjudications and rulemaking.[58] An *adjudication* is a formal process in which the agency's decision must be made on the record of a hearing similar to a trial. Parties to the proceeding are allowed to submit evidence, rebut opposing evidence, and cross examine opposing witnesses. Examples of agency adjudications are: the assessment by the Coast Guard of a civil penalty against a person who knowingly discharges oil into U.S. navigable waters, contrary to the Federal Water Pollution Control Act;[59] and the refusal by the Environmental Protection Agency to register a new pesticide for a particular use under the pesticide laws.[60] The agency must provide a statement of "findings and conclusions, and the reasons or basis therefor," on all issues involved. The decision can be reviewed and set aside by a court if the record does not contain substantial evidence to support it.[61]

The public's right to participate in adjudications has received wide recognition. The APA leaves the agencies free to decide who may participate in the proceedings. Initially, agencies limited participation to persons who would be the direct objects of the agency action or regulation. Spurred by a 1966 landmark Federal circuit court decision in *Church of Christ* v. *FCC*,[62] emphasizing agency obligations to take cognizance of a wider spectrum of public interests, the agencies that conduct APA adjudications have, by and large, considerably expanded public participation.

Rulemaking is the agency process for formulating, amending, or repealing a rule. It involves major Federal regulations, such as EPA's setting air and water quality standards. Because of the broad and pervasive nature of rulemaking, participation in developing agency rules is a key opportunity for citizen input into Government decisions.

The APA requires an agency generally to give advance notice of rulemaking in the *Federal Register*. Then the agency must allow 30 or more days between the notice and adoption of a rule. During this time, any interested person may "participate in the rulemaking through submission of written data, views, or arguments." The agency may hold an informational hearing but need not unless required by another statute.[63] An interested per-

son does not have to depend on the agency to initiate action. He may "petition for the issuance, amendment, or repeal of a rule." [64] An agency's failure to act on such a petition is an "agency action" reviewable in court.[65]

When an adjudication or a rulemaking falls within section 102(2)(C)'s requirement for an environmental impact statement, NEPA strengthens the citizen's right to present relevant environmental information to the agency. It has also increased the amount of detailed environmental information that must be included in the advance notice.

determinations made informally—Thousands of Federal agency determinations take place without the formalities of adjudications or rulemaking. These include the day-to-day decisions of a Federal agency as well as performance of specific duties—such as consulting under the National Historic Preservation Act of 1966.[66] The APA does not specify procedures for these decisions but merely provides for court review. Generally no law requires a public hearing, but in some instances agencies hold an informational hearing on their own initiative.

When a hearing is held, citizens may object and make suggestions. For example, an interested person may testify at the public hearings held by the Corps of Engineers for proposed water resource projects. Agency practices, however, are not yet uniform in notifying the public of hearings.

Traditionally, citizens have had particularly little voice in the innumerable decisions made by agencies without public hearings. In the past, Defense Department decisions on the ocean disposal of surplus munitions and many Interior Department decisions to grant mineral leases on Federal lands have been made without public notice and without any means, other than by letter, for citizens to be heard.

NEPA'S requirements are particularly important in informal agency decisions. Without APA proceedings or other public hearings, the environmental impact statement is the only way the public can learn of an impending action—or of the environmental issues raised. Even more important, NEPA and the Council's revised guidelines require agencies, when appropriate, to consider the comments of citizens as well as those of government agencies.[67] Another effect of NEPA and the Executive Order which implements it is its influence on agencies to hold hearings when they would not otherwise have done so.

the citizen's right to challenge in court—One of the most striking and significant developments in environmental law is the right of citizens to take to court Federal agency actions affecting the environment. NEPA and other laws require agencies to consider the environment in their actions. And citizens are now initiating lawsuits when they believe an agency has failed to do that.

The citizen's success in challenging an agency decision depends in part on a number of legal doctrines that limit court intervention in agency affairs. These doctrines determine the citizen's standing to bring suit. They regulate the extent to which a court may review an agency decision. They determine the evidence the court may consider beyond that developed by the agency. And they dictate whether the plaintiff must participate in the agency decision before seeking court review. Citizen suits to protect the environment are bringing evolution in all of these doctrines.

standing—Citizens do not automatically have standing to seek review of agency decisions in court. In the past, lack of standing has been a significant impediment to a citizen's right to challenge Federal agency actions. The law generally allows only persons who are "aggrieved" by agency action to seek court review.[68] Several court review provisions give standing to "aggrieved" persons, and despite earlier uncertainty, the courts have concluded that the APA permits "aggrieved" persons to seek review of agency actions in almost every case in which a specific review provision is lacking.[69]

The Supreme Court, in *Data Processing Service* v. *Camp*,[70] recently held that to be "aggrieved," a person must have suffered "injury in fact" from the agency action, and the interest he seeks to assert must be an interest intended to be protected by the specific statute invoked. Environmental plaintiffs have usually been successful in meeting both requirements.

In *Data Processing*, the Court did not clearly define "injury in fact." But it did stress that the injury need not be economic but may be "aesthetic, conservational or recreational." This may mean that any responsible citizen or group may sue to protect an environmental resource, such as a recreational area, that exists for the benefit of the public.

Three U.S. Courts of Appeals, for the Second, Fourth, and District of Columbia Circuits, seem to have reached this conclusion.[71] The Second Circuit concluded "that the public interest in environmental resources . . . is a legally protected interest affording these [environmental groups] . . . standing to obtain judicial review of agency action . . . ." [72] On the other hand, the Ninth Circuit, in *Sierra Club* v. *Morton* [73] (known as the *Mineral King* case), refused to permit the Sierra Club to sue to protect Sequoia National Park. It did so because neither the Club nor its members had property threatened by the action and the Club's status as an organization was not threatened. In a later decision,[74] the Ninth Circuit refused to permit an environmental group to sue to protect San Francisco Bay on the same grounds. The court, however, did permit individual members of the organization to stay in the suit. The conflict between the

courts of appeals will be resolved when the Supreme Court reviews the *Mineral King* case in the fall of 1971.

The Ninth Circuit's rule that citizen groups lack a sufficient interest to sue to enforce environmental laws threatens to leave such enforcement exclusively to Government—whose actions may on occasion conflict with those laws. As the Federal District Court for Alaska has noted, denying citizen groups standing to raise environmental issues "would have the practical effect of preempting many meritorious actions, as one individual, or a small number of individuals, would have to sustain the entire financial burden of the lawsuit." The costs of effective litigation are so high that "few members of the general public will have resources or courage to face such odds for the sake of vindicating a right to which all are entitled as a matter of law." [75]

Because environmental lawsuits are usually brought under statutes clearly intended to protect environmental values, they easily meet the protected-interest test of *Data Processing*. Citizen groups have successfully won standing not only under NEPA but also under the Federal Power Act, the Department of Transportation Act, the Multiple Use-Sustained Yield Act, the Wilderness Act, and Federal pesticide laws.[76] Court decisions under NEPA, which has a broadly stated environmental purpose, indicate that virtually any environmental interest falls within the protection of that Act.

court review of agency decisions—The courts do not hesitate to review questions of law decided by Federal agencies. But traditionally they have deferred to the agency for determinations of fact. As a general rule, particularly for informal decisions, the courts overturn agency "factual" findings only if they are "arbitrary or capricious." [77] This rule makes it primarily the agencies' job to find the basic, objective facts.

Interpreting facts is a subjective process, however. And an agency's "factual" conclusions may involve weighing environmental values against other policies important to the agency. Recognizing this, the courts have recently begun to broaden the meaning of "arbitrary or capricious." It now includes agency decisions that disregard the policies of environmental laws.

In *Overton Park,* the Supreme Court confirmed this recent trend to give greater bite to review under the arbitrary-or-capricious test. Such review "is to be searching and careful," and action should be reversed when "there has been a clear error of judgment." Although the Court also gave the reassurance that the reviewing court "is not empowered to substitute its judgment for that of the agency," its discussion indicated that court review of the facts will be exacting.[78]

evidence outside the agency record—In reviewing an agency's adjudication or formal rulemaking, the courts are required to decide whether the agency record supports the agency action.[79]

If it does not, the action is set aside. If the agency failed to consider relevant factors, the court directs it to consider evidence and then to make a new decision. The citizen is not, however, allowed to present new evidence to the court to discredit the agency's decision.

An agency decision made without formal APA proceedings may be backed by little or no written record to explain it. So unless the court receives some evidence, it has little against which to test the agency's action. By prodding the agency to make a more complete record and by permitting the citizen to submit his own evidence, the courts are making citizen review more effective.

In *Overton Park,* the Court said that in reviewing informal agency decisions, courts must examine the "full administrative record" on which the agency acted. They cannot be satisfied with after-the-fact "rationalizations" alone. When the record does not disclose all the factors considered, the reviewing court may require the responsible officials to explain their action. The agencies thus are encouraged to produce thorough, contemporaneous written records backing their decisions.[80]

The Supreme Court did not discuss the extent to which a plaintiff may submit his own evidence to discredit an agency action. However, in cases under NEPA the lower courts have freely admitted evidence bearing on the legality of action under the Act. For example, evidence was admitted in *Environmental Defense Fund, Inc.* v. *Corps of Engineers*[81] to show the inadequacy of the Corps' section 102 statement in considering the danger posed for the environment by the Gillham Dam project. In the recent *Mirex* case,[82] the court received evidence on the fire ant situation and determined that the Department of Agriculture's environmental study was adequate. Similarly, in *Parker* v. *United States,*[83] the court heard evidence to show that an area was protected by the Wilderness Act until a study of its wilderness character was finished.[84] Further litigation will define the limits of the citizen's right to introduce evidence that was not considered by the agency.

exhaustion of administrative remedies--The citizen's expanded right to challenge Federal agency decisions in court complements his right to participate in agency decisions; together, they give him a new role in shaping the environmental impact of government activity. However, the citizen may not always be free to choose the stage at which to interject his views. Generally, one who foregoes an opportunity to make his claims before an agency cannot later go into court, because he failed to "exhaust administrative remedies."

The reason for this rule is that failure to object to the agency initially deprives it of the chance to consider the objections and perhaps modify its action without judicial intervention.

The exhaustion rule supports the form of decisionmaking created by the Congress. By permitting the agency to make a factual record, it also promotes more effective judicial review.[85]

The exhaustion requirement applies primarily when the agency has followed formal procedures allowing for citizen participation. However, it may apply more and more to informal decisions now that citizens receive notice and can participate. An example is the recent decision in *Sierra Club* v. *Hardin*.[86] There the Sierra Club challenged a Forest Service timber sale in the Tongass National Forest. Although it knew of the impending timber sale, the Club did not invoke Forest Service procedures for protest and review, and the court therefore refused to consider its claims. Similarly, the Audubon Society was foreclosed from challenging Corps of Engineers permits for dredging in Texas waters because it did not show that it had objected to the appropriate agencies first.[87]

state law

State governments have responded to environmental problems with a variety of legal innovations.

constitutional changes

Constitutional amendments are a fundamental form of expression of legal policy. A number of States have added environmental protection provisions to their constitutions. Other States are considering doing so. Some State constitutions already contain provisions dealing with conservation of natural resources. However, recent proposals focus on the individual's right to environmental protection and raise the possibility of increased resort to the courts to vindicate that right.

New York's constitutional amendment, effective January 1, 1970, was one of the first recent changes. Popularly called the "Conservation Bill of Rights," it declares a State policy "to conserve and protect its natural resources and scenic beauty." It directs the State legislature to act to carry out that policy. The amendment addresses legislative responsibility more than individual rights, but another provision of the State constitution permits citizen suits to restrain its violation.[88]

A constitutional provision adopted by the Illinois electorate in December 1970 is more directly oriented toward individual rights and obligations. Besides declaring a state policy to protect the environment, it provides that "[e]ach person has the right to a healthful environment." The Illinois amendment authorizes every person to sue to enforce this right against "any party, governmental or private." The right is subject to reasonable limitation and regulation by the State legislature.[89]

Pennsylvania's and Rhode Island's new constitutional amendments also declare environmental "rights" in the people, but they do not expressly authorize private suits.[90] Amendments of these several types are under consideration in a number of other States.

Experience under these State constitutional amendments is still too short to determine how well they work to protect the environment. It is unclear whether the New York amendment was intended to be enforceable by private citizens or merely a declaration of policy to be implemented by the legislature. Even where direct private enforcement is clearly contemplated, as in Illinois, the courts may take years to define the constitutionally protected rights. Despite these difficulties, support appears to be growing for writing environmental guarantees into State charters.

environmental statements for state agency actions

Since enactment of NEPA, a number of State legislatures have passed "action forcing" requirements similar to NEPA's environmental impact statement requirement. At least four State legislatures and the Commonwealth of Puerto Rico have established such procedures.

In June 1970, only 6 months after passage of NEPA, the Commonwealth of Puerto Rico enacted a law directing agencies to consider the environment in their actions. It created an environmental statement procedure identical to NEPA's.[91] The law also creates in the Governor's Office an Environmental Quality Board, which has both policymaking and regulatory authority over air and water pollution, solid waste disposal, and other environmental problems. The law also authorizes citizen suits for violation of its regulatory provisions.

Montana enacted legislation in March 1971 that adopts the environmental statement procedure of NEPA and creates a State Environmental Quality Council.[92] The Montana Council's role differs from that of either the Federal Council or the Puerto Rican body. Its 13 members include the Governor or his representative, four gubernatorial appointees, and four members of each house of the State legislature. It thus serves as a joint arm of the executive and legislative branches to review and formulate State environmental policy. Legislation derived from NEPA has also been enacted in California,[93] Washington,[94] and Delaware [95] and is under consideration elsewhere.[96]

State government activities, no less than Federal, have far-reaching, often unanticipated, environmental impacts. The recent State statutes are new efforts to control those consequences. Other States may be expected to make similar efforts—either

by adopting the environmental statement mechanism or by developing new and and as yet untried procedures.

citizen suit legislation

State legislatures, like the U.S. Congress, have moved to bolster the citizen's right to challenge activities detrimental to the environment in court. The Michigan Environmental Protection Act of 1970 is one of the most publicized of these measures.[97] It authorizes any private or public entity to sue any other private or public entity for equitable relief from "pollution, impairment or destruction" of the "air, water, and other natural resources and the public trust therein."

Like section 304 of the Federal Clean Air Act,[98] the Michigan Act eliminates the defenses of lack of standing and sovereign immunity. However, although the Federal law provides a mechanism for private citizens to enforce antipollution standards established by Government agencies, the Michigan statute takes a different approach. It directs State courts to develop a common law of environmental degradation through case-by-case definition of "pollution, impairment or destruction" of the environment. Antipollution standards fixed by State agencies can be challenged. If found deficient, they may be replaced by a court-ordered substitute.

Both the Michigan Act and section 304 of the Federal Clean Air Act affirm the importance of the citizen's role before the courts. However, the Michigan Act transfers to the courts much of the standard-setting authority traditionally exercised by the other two branches of government. It thus places this authority in the branch most insulated from the elective process. In contrast, the Federal provision reaffirms the role of Congress and the executive in setting standards and enlists the citizen's aid in enforcing those standards.

Legislation similar to the Michigan Act was passed recently in Connecticut.[99] New citizen suit statutes in Indiana and Minnesota, like the Federal provision, direct the courts to look to the antipollution standards adopted by State agencies.[100]

invoking nuisance law

All States maintain programs to control air and water pollution under the Federal Clean Air Act and Water Pollution Control Act. Yet many continue to provide alternative pollution control remedies under older, court-evolved, common law doctrines. One of these, the law of public nuisance, has been used more and more as an antipollution tool. A public nuisance is generally defined as conduct causing "an unreasonable interference with a right common to the general public." [101] It may

be enjoined in a suit by State authorities or, in some cases, by private citizens.

Resort to the public nuisance doctrine in the aftermath of a 5-day air pollution crisis in Birmingham, Ala., during April 1971 is discussed in Chapter 2. There the State attorney general sought an injunction against 13 major industrial corporations to require them to curb their emissions within 6 months. He charged that they endangered Birmingham citizens.

Public nuisance law arms State officials with an enforcement tool free of cumbersome pollution control procedures. But it has certain shortcomings that limit its effectiveness. Because the concept of public nuisance is general and nonquantitative, the courts have no way to assess permissible limits of polluting activities. Rather, they must try to weigh the gravity of the harm against the social utility of the defendant's conduct.[102] In nuisance cases involving pollution, the problem could be overcome with pollution control standards as the measure of conduct amounting to a nuisance.[103]

The courts now are being asked more and more to entertain public nuisance suits brought by private citizens. Under the common law, if all members of the community suffered equally, none could sue. Their elected officials were expected to sue for them—on behalf of the State. However, very recently, there have been signs that the courts may permit private persons to sue to abate a public nuisance when only prospective relief, and not monetary damages, is sought.[104] In a proposed study of the law on this subject, the American Law Institute has noted that this development is consistent with expanded concepts of the standing of citizen groups generally.[105]

state suits in the supreme court

The U.S. Constitution empowers the Supreme Court of the United States to exercise original (trial court) jurisdiction over "all Cases, in Law and Equity . . . between a State and Citizens of another State."[106] The States have invoked this authority rarely on pollution matters. But growing concern about interstate pollution has triggered increased State interest in this direct resort to the Supreme Court.

In the first of several recent cases, *Ohio* v. *Wyandotte Chemicals Corp.*,[107] Ohio sought an order to abate mercury pollution of Lake Erie by several Michigan and Canadian chemical companies. Ohio charged that this was a public nuisance. The Supreme Court declined to adjudicate the case, explaining that State courts were a more suitable and generally better equipped trial forum. The Court also implied that current State, Federal, and international government efforts to deal with mercury pollution were "a more practical basis" for solving the problem

than a nuisance action in any court. The Court's position on the availability of its original jurisdiction in interstate pollution matters may be further clarified in three other cases which it will hear this fall.[108]

state authority to control land use

The States are growing more concerned about protecting the public interest in valuable land resources. Chapter 2 describes new State laws passed to provide this protection. As in Maine and Vermont, these laws often increase restrictions on the way private landowners use their property. They do this under the authority of broad State "police powers" to protect the general welfare. However, the Fifth and Fourteenth Amendments to the U.S. Constitution forbid States to take property for public purposes without paying the owner "just compensation." Landowners often challenge restrictions on their rights on the basis that the regulations amount to a State "taking" of property, which requires compensation. Obviously, the States may be inhibited from pursuing new regulatory approaches if the courts too freely find the new restrictions to be a "taking" of property. The States cannot protect all critical areas and control major development if they must compensate for—or purchase—the land whose use they seek to regulate.

The Supreme Court upheld State authority to control land use through general zoning in 1926.[109] It has not yet ruled on more modern land use control techniques. Although some State courts have been skeptical,[110] other recent decisions are giving fairly broad latitude to States to channel private land use decisions along State policy lines. For example, in 1970, a California court upheld the power of the State's new Bay Conservation and Development Commission to control filling of San Francisco Bay.[111] The Commission had refused to permit a corporation to fill submerged land that it had purchased for disposal of debris. The court rejected the corporation's claim that this refusal amounted to a taking of its property. The court stressed that the State law creating the Commission "clearly define[d] the public interest in San Francisco Bay." It held that prevention of filling was not an "undue restriction" on the landowner's property rights.

Other forms of land use control present a similar problem. For example, some States have tried to preserve open space by requiring that subdividers dedicate a portion of each new development to public recreational use. Landowners have challenged this type of measure, also, as a taking of property. A recent decision by the California Supreme Court rejected such a challenge. The developers insisted that a city ordinance designed to preserve for park use 2½ acres of land for each 1,000

new subdivision residents was a taking of property.[112] The ordinance required each subdivider either to dedicate a portion of his tract or to pay a fee. The court held that because new subdivisions both increase city population and diminish available open space, the city's measure was a legitimate way to maintain a balance between population and park areas. The court implied that the ordinance would be valid even if the new park were not located near the subdivision.

Although too few to establish a trend, these decisions suggest that the Fifth Amendment permits innovative land use control without compensation when a clear State interest exists.

conclusions

Development of the law by itself cannot achieve environmental quality. It will require concerted use of economic, scientific, and management tools—along with application of law. But the recent pace of development in the law's handling of environmental issues has been encouraging. It is both a sign of progress on environmental problems and evidence of the responsiveness of our legal system.

The successes of citizen participation in this development owe much to the groundwork laid in other areas of public concern. The experience of groups litigating for civil rights, consumer protection, and other "public interest" issues set the stage for environmental litigation. So did previous work in implementing the Administrative Procedure Act and the Freedom of Information Act. Also, what has been done to develop the concept of citizen standing to present intangible concerns is highly relevant to environmental litigation. In turn, environmental suits can be expected to increase the effectiveness of other citizen public interest litigation.

As in other areas of public concern, the organized legal profession is providing aid and guidance in the development of environmental law. National and local bar associations have spawned new committees to study, recommend, and testify before the Congress on environmental issues. Law schools have broadened their curricula to include environmental law, and new law students' organizations are devoting themselves to environmental protection.

What is unique about current citizen environmental litigation is that the considerable resources, nationwide attention, and judicial receptivity accorded it have created, in effect, an "environmental ombudsman" for the Nation. Rather than creating a new public officer to challenge official actions on environmental issues publicly, citizen groups are now doing it themselves—and are being effective. Legal developments have fostered this, and the environment has stirred widespread public support as an

issue. No other country has yet experienced this development. In the United States, the process will lead to the most rigorous probing of the environmental impacts of government action and private action subject to governmental regulation.

The attention now given citizen litigation should not, however, be allowed to overshadow the need for systematic administrative action. Nor should it upstage the strides taken by the Federal Government in controlling the environmental impact of its own actions and in improving the regulation of pollution. Nor can litigation be a substitute for legislative authority to deal with the basic problems of air and water quality and land use.

There are serious limits to what citizen litigation can do. The courts, deciding only the particular cases that reach them, are not in a position to develop coordinated policies or to provide consistent implementation. Insulated from the elective process, they are not equipped to develop standards responsive to public preferences when values conflict.

Ultimately, government, to which NEPA and the other environmental protection legislation assign clear responsibility, must supply the responsive and systematic action needed for effective environmental management. Undoubtedly this calls for major reform in agency attitudes and procedures and difficult decisions for legislatures. Citizen litigation makes its greatest contribution by forcing the pace of reform and by acting as one quality control over government programs. Currently this litigation helps compel agencies to come to grips with the need for new environmental policies. And it fuels the move for more open and responsive agency procedures and highlights the need for comprehensive legislative solutions.

NEPA has brought about a basic policy commitment by the Federal Government comparable to the Full Employment Act of 1946,[115] which created the Council of Economic Advisers, upon which the Council on Environmental Quality was patterned. It has also supplied tools for implementing that commitment. Its environmental statement requirement has proved an effective "action forcing" procedure. And its expansion of agency authority to act on the basis of environmental considerations is having steadily growing impact.

Important innovations in Federal and State environmental regulation are taking place. At both the Federal and State levels, the pace of new institutional development in environmental management has quickened beyond expectation. The broadest program of environmental legislation ever transmitted to the Congress is now awaiting action.

The Court of Appeals for the District of Columbia recently observed:

> A new public sensitivity to issues of environmental protection has im-

posed new responsibilities on the courts, the legislature, and the administrative agencies.[114]

Recent developments in the law of environmental protection indicate that all three branches are facing up to these responsibilities.

footnotes

1. The full text of NEPA appears in Appendix A.
2. The full text of the Council's guidelines, as revised April 23, 1971, appears in Appendix G.
3. E.g., *Brooks* v. *Volpe,* 319 F. Supp. 90 (W.D. Wash. 1970); *Bucklein* v. *Volpe,* 2 ERC 1082, 1 ELR 20045 (N.D. Calif. 1970); *Pennsylvania Environmental Council* v. *Bartlett,* 315 F. Supp. 238 (M.D. Pa. 1970).
4. *Wilderness Society* v. *Hickel,* 325 F. Supp. 422 (D.D.C. 1970).
5. *National Helium Corp.* v. *Morton,* 326 F. Supp. 151 (D. Kan. 1971).
6. *Investment Syndicates, Inc.* v. *Richmond,* 318 F. Supp. 1038 (D. Ore. 1970).
7. *Sierra Club* v. *Hardin,* 325 F. Supp. 99 (D. Alaska 1971); see also *West Virginia Highlands Conservancy* v. *Island Creek Coal Co.,* 441 F.2d 232 (4th Cir. 1971).
8. *Environmental Defense Fund, Inc.* v. *Hardin,* 325 F. Supp. 1401 (D.D.C. 1971).
9. *Environmental Defense Fund, Inc.* v. *Corps of Engineers,* 324 F. Supp. 878 (D.D.C. 1971); *Environmental Defense Fund, Inc.* v. *Corps of Engineers,* 325 F. Supp. 728, 749 (E.D. Ark. 1971); *Sierra Club* v. *Laird,* 1 ELR 20085 (D. Ariz. 1970).
10. *Delaware* v. *Pennsylvania New York Central Transp. Co.,* 323 F. Supp. 487 (D. Del. 1971).
11. *Texas Committee* v. *United States,* 1 ERC 1303 (W.D. Tex.), *dismissed as moot,* ___F.2d___ (5th Cir. 1970).
12. *Ely* v. *Velde,* 321 F. Supp. 1088 (E.D. Va. 1971), on appeal to the Court of Appeals for the Fourth Circuit.
13. *Bucklein* v. *Volpe, supra* note 3.
14. E.g., *Environmental Defense Fund, Inc.* v. *Corps of Engineers,* 325 F. Supp. 728, 749 (E.D. Ark. 1971); *Sierra Club* v. *Laird, supra* note 9; *Texas Committee* v. *United States, supra* note 11.
15. E.g., *Pennsylvania Environmental Council* v. *Bartlett, supra* note 3; *Elliott* v. *Volpe,* 2 ERC 1498, 1 ELR 20243 (D. Mass. 1970); *cf. Daly* v. *Volpe,* 2 ERC 1506, 1 ELR 20242 (W.D. Wash. 1971); *Sierra Club* v. *Hardin, supra* note 7.
16. E.g., *Wilderness Society* v. *Hickel, supra* note 4; *Environmental Defense Fund, Inc.* v. *Corps of Engineers,* 324 F. Supp. 878 (D.D.C. 1971); *Environmental Defense Fund, Inc.* v. *Corps of Engineers,* 325 F. Supp. 728, 749 (E.D. Ark. 1971); *Environmental Defense Fund, Inc.* v. *Hardin, supra* note 8.
17. 430 F.2d 199 (1970), *cert. denied,* 39 U.S.L.W. 3360 (1971).
18. *Id.* at 211; see also Peterson, An Analysis of the National Environmental Policy Act, 1 ELR 50035.
19. *Calvert Cliffs' Coordinating Committee, Inc.* v. *AEC,* No. 24, 839 (D.C. Cir., decided July 23, 1971).
20. 49 U. S. C. §1653(f).
21. 401 U.S. 402 (1971).
22. 16 U.S.C. §§661, *et seq.*
23. 430 F.2d at 209; see also *Udall* v. *FPC,* 387 U.S. 428, 443–44 (1967).
24. 16 U.S.C. §§1131, *et seq.*
25. 1 ERC 1163 (D. Colo. 1970), on appeal to the Court of Appeals for the

Tenth Circuit; see also *West Virginia Highlands Conservancy* v. *Island Creek Coal Co., supra* note 7.

26. 16 U.S.C. §803(a).
27. 354 F.2d 608, 614 (2d Cir. 1965).
28. 387 U.S. 428 (1967).
29. 16 U.S.C. §1.
30. 16 U.S.C. §§470, *et seq.*
31. 16 U.S.C. §§528, *et seq.*
32. 23 U.S.C. §§109 (g)-(j).
33. 49 U.S.C. §1716(c)(4).
34. 49 U.S.C. §1610; see Primer for the Practice of Federal Environmental Law, 1 ELR 50001 (1971).
35. P.L. 91–604, 91st Cong., 2d Sess. (December 31, 1970).
36. S. 1014, H.R. 5966, 92d Cong., 1st Sess. (1971).
37. 42 U.S.C. §§1857, *et seq.*
38. P.L. 91–604, 91st Cong., 2d Sess. (December 31, 1970).
39. S. 1238, H.R. 4247, H.R. 4723, 92d Cong., 1st Sess. (1971).
40. S. 1478, H.R. 5276, H.R. 5390, 92d Cong., 1st Sess. (1971).
41. 33 U.S.C. §1171(a).
42. 42 U.S.C. §1857f.
43. 33 U.S.C. §1163.
44. 42 U.S.C. §1857(c)(2).
45. 42 U.S.C. §1857f.
46. 42 U.S.C. §1857h-2.
47. *Id.*
48. *Supra* note 36.
49. Executive G, 91st Cong., 2d Sess. (May 20, 1970).
50. S. 1238, H.R. 4247, H.R. 4723, 92d Cong., 1st Sess. (1971).
51. For further discussion of international developments, see Chapter 1.
52. P.L. 89–554, as amended, 5 U.S.C. §552.
53. *Soucie* v. *David,* 2 ERC 1626, 1 ELR 20147 (D.C. Cir. 1971).
54. Executive Order No. 11514, 3 C.F.R. chap. II, at 104 (March 5, 1970).
55. CEQ, Guidelines §10(b), reproduced in Appendix C.
56. 42 U.S.C. §1857h-7.
57. Act of June 11, 1946, ch. 324, 60 Stat. 237, as amended and codified, 5 U.S.C. §§551, *et seq.*
58. 5 U.S.C. §§551(5), (7).
59. 33 U.S.C. §1161(b)(2).
60. 7 U.S.C. §§135, *et seq.*
61. 5 U.S.C. §706(2)(E).
62. 359 F.2d 994 (D.C. Cir. 1966) (opinion by Burger, J.).
63. 5 U.S.C. §[illegible].
64. 5 U.S.C. §553(e).
65. 5 U.S.C. §551(13).
66. 16 U.S.C. §470f.
67. CEQ, Guidelines §6(a)(vii), reproduced in Appendix C.
68. 5 U.S.C. §702.
69. *Data Processing Service* v. *Camp,* 397 U.S. 150 (1970); *Abbott Laboratories v. Gardner,* 387 U.S. 136 (1967); *Citizens Committee for the Hudson Valley* v. *Volpe,* 425 F.2d 97 (2d Cir.), *cert. denied,* 400 U.S. 949 (1970); *Sierra Club* v. *Hardin, supra* note 7; *Road Review League* v. *Boyd,* 270 F. Supp. 650 (S.D.N.Y. 1967).
70. 397 U.S. 150 (1970).
71. *Citizens Committee for the Hudson Valley* v. *Volpe, supra* note 69; *West Virginia Highlands Conservancy* v. *Island Creek Coal Co., supra* note 7; *Environmental Defense Fund, Inc.* v. *Hardin,* 428 F.2d 1093 (D.C. Cir. 1970).
72. *Citizens Committee for the Hudson Valley* v. *Volpe, supra* note 69, at 105.

73. 433 F.2d 24 (9th Cir. 1970) (Hamley, J., dissented on the issue of standing).
74. *Alameda Conservation Association* v. *California*, 2 ERC 1175, 1 ELR 20097 (1971).
75. *Sierra Club* v. *Hardin*, *supra* note 7, at 111.
76. See, e.g., *Scenic Hudson Preservation Conference* v. *FPC*, *supra* note 27; *Citizens to Preserve Overton Park* v. *Volpe*, *supra* note 21; *Sierra Club* v. *Hardin*, *supra* note 7; *Parker* v. *United States*, *supra* note 25; *Environmental Defense Fund, Inc.* v. *Ruckelshaus*, 439 F.2d 584 (D.C. Cir. 1971).
77. 5 U.S.C. §706(2)(A).
78. See also *Environmental Defense Fund, Inc.* v. *Ruckelshaus*, *supra* note 76.
79. 5 U.S.C. §706(2)(E).
80. *Supra* note 21; see also *Environmental Defense Fund, Inc.* v. *Hardin*, *supra* note 71, at 1099–100.
81. 325 F. Supp. 728, 749 (E.D. Ark. 1971).
82. *Environmental Defense Fund, Inc.* v. *Hardin*, *supra* note 8.
83. *Supra* note 25.
84. See also *Sierra Club* v. *Hardin*, *supra* note 7, at 124.
85. *McGee* v. *United States*, 39 U.S.L.W. 4571 (U.S. 1971).
86. *Supra* note 7, at 115–17.
87. *National Audubon Society* v. *Johnson*, 1 ERC 1709 (S.D. Tex. 1970).
88. N.Y. Const., Art. XIV, §§4, 5.
89. Pa. Const. art. 1, §27 (approved by electorate May 18, 1971, but not yet certified); Ill. Const., Art. XI, §§1, 2, effective January 1, 1972.
90. Rhode Island Const. §17, adopted November 3, 1970.
91. Public Environmental Policy Act, Law No. 9, [1971] Puerto Rico Laws (Senate Law 258 and 703), June 18, 1970.
92. Montana Environmental Policy Act, Ch. 238, [1971] Montana Laws (House Bill 66), March 9, 1971.
93. Cal. Public Resources Code §§21000 *et seq.*
94. Ch. 109, [1971] Washington Laws (Senate Bill 545), Aug. 9, 1971.
95. Ch. 70, Title 7, [1971] Delaware Laws (House Bill 300), June 28, 1971.
96. E.g., Calif. Assembly Bill 1056, introduced Mar. 18, 1971 (bill to modify existing California statute); Mass. House Bill 5144, introduced Mar. 10, 1971.
97. Mich. Stat. Ann. §§14.528(201), *et seq.*, reprinted in 1 ELR 43001.
98. 42 U.S.C. §1857h-2.
99. House Bill No. 5037, [1971] Conn. Laws, May 9, 1971.
100. Senate Enrolled Act 345, [1971] Ind. Laws; Minnesota Environmental Rights Act, Ch. 952, [1971] Minn. Laws (S.F. No. 418), June 7, 1971.
101. American Law Institute, Restatement (Second) of the Law of Torts §821B(1) (Tent. Draft No. 17, April 26, 1971).
102. American Law Institute, *supra* note 101, §821B comment e.
103. Note, Water Quality Standards in Private Nuisance Actions, 79 *Yale L.J.* 102 (1969).
104. E.g., *Miami* v. *Coral Gables*, 1 ERC 1184 (Fla. Dist. Ct. App. 1970); American Law Institute, *supra* note 101, §821C.
105. American Law Institute, *supra* note 101, §821C comment j.
106. U.S. Const., Art. III, §2; Eleventh Amendment; see also 28 U.S.C. §1251(b).
107. 39 U.S.L.W. 4323, 2 ERC 1331, 1 ELR 20124; see also Comment, 1 ELR 10038 (U.S. 1971).
108. *Illinois* v. *Milwaukee*, 49 Orig.; *Vermont* v. *New York*, 50 Orig.; *Washington* v. *General Motors*, 45 Orig., 39 U.S.L.W. 3486 (U.S. 1971); see also Comment, 1 ELR 10018.
109. *Euclid* v. *Ambler Realty Co.*, 272 U.S. 365 (1926).
110. E.g., *MacGibbon* v. *Duxbury*, 1 ERC 1122 (Mass. Sup. Jud. Ct. 1970);

Bartlett v. *Zoning Commission*, 2 ERC 1684, 1 ELR 20177 (Conn. Sup. Ct. 1971).

111. *Candlestick Properties, Inc.* v. *San Francisco Bay Conservation and Development Commission*, 2 ERC 1075 (Cal. Dist. Ct. App. 1970).

112. *Associated Home Builders* v. *Walnut Creek*, 484 P.2d 606, 94 Cal. Rptr. 630, 2 ERC 1490, 1 ELR 20223 (1971).

113. 15 U.S.C. §§1021–25.

114. *Welford* v. *Ruckelshaus*, 2 ERC 1123, 1125, 1 ELR 20065, 20067 (1971).

appendix

selected environmental protection legislative provisions [1]

section 4(f) of the department of transportation act, 49 u.s.c. 1653(f)

SEC. 4. (f) It is hereby declared to be the national policy that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of the lands traversed. After August 23, 1968, the Secretary shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance as determined by the Federal, State, or local officials having jurisdiction thereof, any land from an historic site of national, State, or local significance as determined by such officials unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use.

sections 1, 2(a), (b) of the fish and wildlife coordination act, 16 u.s.c. 661, 662(a), (b)

SEC. 1. For the purpose of recognizing the vital contribution of our wildlife resources to the Nation, the increasing public interest and significance thereof due to expansion of our national economy and other factors, and to provide that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation for the purposes of this Act in the United States, its Territories and possessions, the Secretary of the Interior is authorized (1) to provide assistance to, and cooperate with, Federal, State, and public or private agencies and organizations in the development, protection, rearing, and stocking of all species of wildlife, resources thereof, and their habitat, in controlling losses of the same from disease or other causes, in minimizing damages from overabundant species, in providing public shooting and fishing areas, including easements across public lands for access thereto, and in carrying out other measures necessary to effectuate the purposes of this Act; (2) to make surveys and investigations of the wildlife of the public domain, including lands and waters or interests therein acquired or controlled by any agency of the United States; and (3) to accept donations of land and contributions of funds in furtherance of the purposes of this Act.

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[1] Federal law contains many provisions guiding Government action with respect to the environment. This appendix includes only a selection of the important provisions cited in the text.

SEC. 2. (a) Except as hereafter stated in subsection (h) of this section, whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the United States, or by any public or private agency under Federal permit or license, such department or agency first shall consult with the United States Fish and Wildlife Service, Department of the Interior, and with the head of the agency exercising administration over the wildlife resources of the particular State wherein the impoundment, diversion, or other control facility is to be constructed, with a view to the conservation of wildlife resources by preventing loss of and damage to such resources as well as providing for the development and improvement thereof in connection with such water-resource development.

(b) In furtherance of such purposes, the reports and recommendations of the Secretary of the Interior on the wildlife aspects of such projects, and any report of the head of the State agency exercising administration over the wildlife resources of the State, based on surveys and investigations conducted by the United States Fish and Wildlife Service and such State agency for the purpose of determining the possible damage to wildlife resources and for the purpose of determining means and measures that should be adopted to prevent the loss of or damage to such wildlife resources, as well as to provide concurrently for the development and improvement of such resources, shall be made an integral part of any report prepared or submitted by any agency of the Federal Government responsible for engineering surveys and construction of such projects when such reports are presented to the Congress or to any agency or person having the authority or the power, by administrative action or otherwise, (1) to authorize the construction or water-resource development projects or (2) to approve a report on the modification or supplementation of plans for previously authorized projects, to which this Act applies. Recommendations of the Secretary of the Interior shall be as specific as is practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. The reporting officers in project reports of the Federal agencies shall give full consideration to the report and recommendations of the Secretary of the Interior and to any report of the State agency on the wildlife aspects of such projects, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits.

sections 2 (a), (c), 3 of the wilderness act, 16 u.s.c. 1131 (a), (c), 1132

SEC. 2. (a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be desig-

nated as "wilderness areas" except as provided for in this Act or by a subsequent Act.

(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

SEC. 3. (a) All areas within the national forests classified at least 30 days before September 3, 1964 by the Secretary of Agriculture or the Chief of the Forest Service as "wilderness", "wild", or "canoe" are hereby designated as wilderness areas. The Secretary of Agriculture shall—

(1) Within one year after September 3, 1964, file a map and legal description of each wilderness area with the Interior and Insular Affairs Committees of the United States Senate and the House of Representatives, and such descriptions shall have the same force and effect as if included in this chapter: *Provided, however,* That correction of clerical and typographical errors in such legal descriptions and maps may be made.

(2) Maintain, available to the public, records pertaining to said wilderness areas, including maps and legal descriptions, copies of regulations governing them, copies of public notices of, and reports submitted to Congress regarding pending additions, eliminations, or modifications. Maps, legal descriptions, and regulations pertaining to wilderness areas within their respective jurisdictions also shall be available to the public in the offices of regional foresters, national forest supervisors, and forest rangers.

(b) The Secretary of Agriculture shall, within ten years after September 3, 1964, review, as to its suitability or nonsuitability for preservation as wilderness, each area in the national forests classified on September 3, 1964 by the Secretary of Agriculture or the Chief of the Forest Service as "primitive" and report his findings to the President. The President shall advise the United States Senate and House of Representatives of his recommendations with respect to the designation as "wilderness" or other reclassification of each area on which review has been completed, together with maps and a definition of boundaries. Such advice shall be given with respect to not less than one-third of all the areas now classified as "primitive" within three years after September 3, 1964, not less than two-thirds within seven years after September 3, 1964, and the remaining areas within ten years after September 3, 1964. Each recommendation of the President for designation as "wilderness" shall become effective only if so provided by an Act of Congress. Areas classified as "primitive" on September 3, 1964 shall continue to be administered under the rules and regulations affecting such areas on September 3, 1964 until Congress has determined otherwise. Any such area may be increased in size by the President at the time he submits his recommendations to the Congress by not more than five thousand acres with no more than one thousand two hundred and eighty acres of such increase in any one compact unit; if it is proposed to increase the size of any such area by more than five thousand acres or by more than one thousand two hundred and

eighty acres in any one compact unit the increase in size shall not become effective until acted upon by Congress. Nothing herein contained shall limit the President in proposing, as part of his recommendations to Congress, the alteration of existing boundaries of primitive areas or recommending the addition of any contiguous area of national forest lands predominantly of wilderness value. Notwithstanding any other provisions of this Act, the Secretary of Agriculture may complete his review and delete such area as may be necessary, but not to exceed seven thousand acres, from the southern tip of the Gore Range-Eagles Nest Primitive Area, Colorado, if the Secretary determines that such action is in the public interest.

(c) Within ten years after September 3, 1964 the Secretary of the Interior shall review every roadless area of five thousand contiguous acres or more in the national parks, monuments and other units of the national park system and every such area of, and every roadless island within, the national wildlife refuges and game ranges, under his jurisdiction on September 3, 1964 and shall report to the President his recommendation as to the suitability or nonsuitability of each such area or island for preservation as wilderness. The President shall advise the President of the Senate and the Speaker of the House of Representatives of his recommendation with respect to the designation as wilderness of each such area or island on which review has been completed, together with a map thereof and a definition of its boundaries. Such advice shall be given with respect to not less than one-third of the areas and islands to be reviewed under this subsection within three years after September 3, 1964, not less than two-thirds within seven years of September 3, 1964, and the remainder within ten years of September 3, 1964. A recommendation of the President for designation as wilderness shall become effective only if so provided by an Act of Congress. Nothing contained herein shall, by implication or otherwise, be construed to lessen the present statutory authority of the Secretary of the Interior with respect to the maintenance of roadless areas within units of the national park system.

(d) (1) The Secretary of Agriculture and the Secretary of the Interior shall, prior to submitting any recommendations to the President with respect to the suitability of any area for preservation as wilderness—

(A) give such public notice of the proposed action as they deem appropriate, including publication in the Federal Register and in a newspaper having general circulation in the area or areas in the vicinity of the affected land;

(B) hold a public hearing or hearings at a location or locations convenient to the area affected. The hearings shall be announced through such means as the respective Secretaries involved deem appropriate, including notices in the Federal Register and in newspapers of general circulation in the area: *Provided,* That if the lands involved are located in more than one State, at least one hearing shall be held in each State in which a portion of the land lies;

(C) at least thirty days before the date of a hearing advise the Governor of each State and the governing board of each county, or in Alaska the borough, in which the lands are located, and Federal departments and agencies concerned, and invite such officials and Federal agencies to submit their views on the proposed action at the hearing or by no later than thirty days following the date of the hearing.

(2) Any views submitted to the appropriate Secretary under the provisions of (1) of this subsection with respect to any area shall be included with any recommendations to the President and to Congress with respect to such area.

(e) Any modification or adjustment of boundaries of any wilderness area shall be recommended by the appropriate Secretary after public notice of such proposal and public hearing or hearings as provided in subsection (d) of this section. The proposed modification or adjustment shall then be recommended with map and description thereof to the President. The President

shall advise the United States Senate and the House of Representatives of his recommendations with respect to such modification or adjustment and such recommendations shall become effective only in the same manner as provided for in subsections (b) and (c) of this section.

section 10(a) of the federal power act, 16 u.s.c. 803(a)

SEC. 10. All licenses issued under this Part shall be on the following conditions:

(a) That the project adopted, including the maps, plans, and specifications, shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of waterpower development, and for other beneficial public uses, including recreational purposes; and if necessary in order to secure such plan the Commission shall have authority to require the modification of any project and of the plans and specifications of the project works before approval.

sections 1, 20 of the national park service act, as amended, 16 u.s.c. 1, 20

SEC. 1. There is created in the Department of the Interior a service to be called the National Park Service, which shall be under the charge of a director. The Secretary of the Interior shall appoint the director, and there shall also be in said service such subordinate officers, clerks, and employees as may be appropriated for by Congress. The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified, except such as are under the jurisdiction of the Secretary of the Army, as provided by law, by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

SEC. 20. In furtherance of the Act of August 25, 1916 [the National Park Service Act], as amended, which directs the Secretary of the Interior to administer national park system areas in accordance with the fundamental purpose of conserving their scenery, wildlife, natural and historic objects, and providing for their enjoyment in a manner that will leave them unimpaired for the enjoyment of future generations, the Congress hereby finds that the preservation of park values requires that such public accommodations, facilities, and services as have to be provided within those areas should be provided only under carefully controlled safeguards against unregulated and indiscriminate use, so that the heavy visitation will not unduly impair these values and so that development of such facilities can best be limited to locations where the least damage to park values will be caused. It is the policy of the Congress that such development shall be limited to those that are necessary and appropriate for public use and enjoyment of the national park area in which they are located and that are consistent to the highest practicable degree with the preservation and conservation of the areas.

sections 1, 106 of the national historic preservation act of 1966, 16 u.s.c. 470, 470f

SEC. 1. The Congress finds and declares—

(a) that the spirit and direction of the Nation are founded upon and reflected in its historic past;

(b) that the historical and cultural foundations of the Nation should

be preserved as a living part of our community life and development in order to give a sense of orientation to the American people;

(c) that, in the face of ever-increasing extensions of urban centers, highways, and residential, commercial, and industrial developments, the present governmental and nongovernmental historic preservation programs and activities are inadequate to insure future generations a genuine opportunity to appreciate and enjoy the rich heritage of our Nation; and

(d) that, although the major burdens of historic preservation have been borne and major efforts initiated by private agencies and individuals, and both should continue to play a vital role, it is nevertheless necessary and appropriate for the Federal Government to accelerate its historic preservation programs and activities, to give maximum encouragement to agencies and individuals undertaking preservation by private means, and to assist State and local governments and the National Trust for Historic Preservation in the United States to expand and accelerate their historic preservation programs and activities.

SEC. 106. The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under title II of this Act a reasonable opportunity to comment with regard to such undertaking.

sections 1, 2, 4 of the multiple use-sustained yield act of 1960, 16 u.s.c. 528, 529, 531

SEC. 1. It is the policy of the Congress that the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The purposes of this Act are declared to be supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in section 475 of this title. Nothing herein shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish on the national forests. Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest lands or to affect the use or administration of Federal lands not within national forests.

SEC. 2. The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained therefrom. In the administration of the national forests due consideration shall be given to the relative values of the various resources in particular areas. The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

SEC. 4. As used in this Act, the following terms shall have the following meanings:

(a) "Multiple use" means: The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the

other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

(b) "Sustained yield of the several products and services" means the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

section 136 of the federal-aid highway act of 1970, 23 u.s.c. 109 (g)-(j)

(g) The Secretary shall issue within 30 days after the day of enactment of the Federal-Aid Highway Act of 1970 guidelines for minimizing possible soil erosion from highway construction. Such guidelines shall apply to all proposed projects with respect to which plans, specifications, and estimates are approved by the Secretary after the issuance of such guidelines.

(h) Not later than July 1, 1972, the Secretary, after consultation with appropriate Federal and State officials, shall submit to Congress, and not later than 90 days after such submission, promulgate guidelines designed to assure that possible adverse economic, social, and environmental effects relating to any proposed project on any Federal-aid system have been fully considered in developing such project, and that the final decisions on the project are made in the best overall public interest, taking into consideration the need for fast, safe and efficient transportation, public services, and the costs of eliminating or minimizing such adverse effects and the following:

(1) air, noise, and water pollution;

(2) destruction or disruption of man-made and natural resources, aesthetic values, community cohesion and the availability of public facilities and services;

(3) adverse employment effects, and tax and property value losses;

(4) injurious displacement of people, businesses and farms; and

(5) disruption of desirable community and regional growth.

Such guidelines shall apply to all proposed projects with respect to which plans, specifications, and estimates are approved by the Secretary after the issuance of such guidelines.

(i) The Secretary, after consultation with appropriate Federal, State, and local officials, shall develop and promulgate standards for highway noise levels compatible with different land uses and after July 1, 1972, shall not approve plans and specifications for any proposed project on any Federal-aid system for which location approval has not yet been secured unless he determines that such plans and specifications include adequate measures to implement the appropriate noise level standards.

(j) The Secretary, after consultation with the Administrator of the Environmental Protection Agency, shall develop and promulgate guidelines to assure that highways constructed pursuant to this title are consistent with any approved plan for the implementation of any ambient air quality standard for any air quality control region designated pursuant to the Clean Air Act, as amended.

section 16 (c) (4) of the airport and airway development act, 49 u.s.c. 1716 (c) (4)

SEC. 16. (c) (4) It is declared to be national policy that airport development projects authorized pursuant to this Part shall provide for the protection and enhancement of the natural resources and the quality of environment of the Nation. In implementing this policy, the Secretary shall consult with the Secretaries of the Interior and Health, Education, and Welfare with regard to the effect that any project involving airport location, a major runway ex-

tension, or runway location may have on natural resources including, but not limited to, fish and wildlife, natural, scenic, and recreational assets, water and air quality, and other factors affecting the environment, and shall authorize no such project found to have adverse effect unless the Secretary shall render a finding, in writing, following a full and complete review, which shall be a matter of public record, that no feasible and prudent alternative exists and that all possible steps have been taken to minimize such adverse effect.

section 14 of the urban mass transportation act of 1964, as amended, 49 u.s.c. 1610

SEC. 14. (a) It is hereby declared to be the national policy that special effort shall be made to preserve the natural beauty of the countryside, public park and recreation lands, wildlife and waterfowl refuges, and important historical and cultural assets, in the planning, designing, and construction of urban mass transportation projects for which Federal assistance is provided pursuant to section 3 of this Act. In implementing this policy the Secretary shall cooperate and consult with the Secretaries of Agriculture, Health, Education, and Welfare, Housing and Urban Development, and Interior, and with the Council on Environmental Quality with regard to each project that many have a substantial impact on the environment.

(b) The Secretary shall review each transcript of hearing submitted pursuant to section 3(d) to assure that an adequate opportunity was afforded for the presentation of views by all parties with a significant economic, social, or environmental interest, and that the project application includes a detailed statement on—

(1) the environmental impact of the proposed project,

(2) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(3) alternatives to the proposed project, and

(4) irreversible and irretrievable impact on the environment which may be involved in the proposed project should it be implemented.

(c) The Secretary shall not approve any application for assistance under section 3 unless he finds in writing, after a full and complete review of the application and of any hearings held before the State or local public agency pursuant to section 3(d), that (1) adequate opportunity was afforded for the presentation of views by all parties with a significant economic, social, or environmental interest, and fair consideration has been given to the preservation and enhancement of the environment and to the interest of the community in which the project is located, and (2) either no adverse environmental effect is likely to result from such project, or there exists no feasible and prudent alternative to such effect and all reasonable steps have been taken to minimize such effect. In any case in which a hearing has not been held before the State or local agency pursuant to section 3(d), or in which the Secretary determines that the record of hearings before the State or local public agency is inadequate to permit him to make the findings required under the preceding sentence, he shall conduct hearings, after giving adequate notice to interested persons, on any environment issues raised by such application. Findings of the Secretary under this subsection shall be made a matter of public record.

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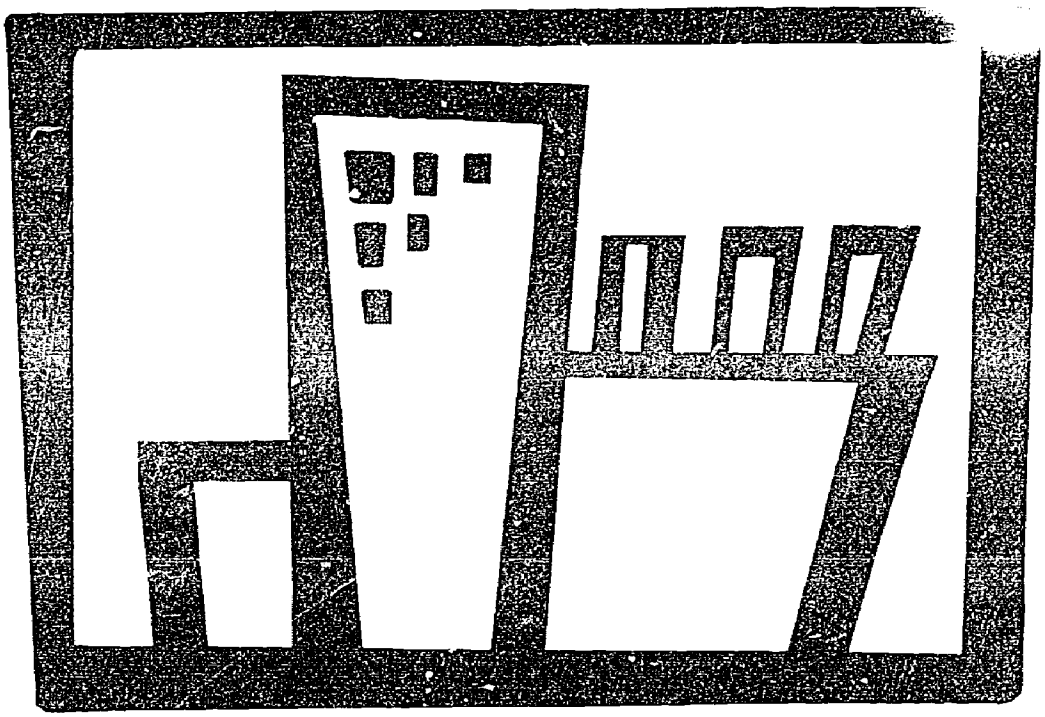


the inner city environment

Life in the inner city embraces a range of environmental problems, some starkly evident, some disguised, some acknowledged as environmental, some wearing other labels. The inner city has no classifiable boundaries setting it apart from the rest of the urban area, but it generally includes the decaying, older areas which usually intertwine with or encircle the center of the city. The term is also applied to areas away from the central core which share similar environmental characteristics.

The inner city, whatever its precise boundaries, is recognized by its inferior environment. Air pollution, a problem for nearly all of the Nation, lays its pall most heavily over the inner city in many metropolitan areas. Open space, parks, and recreational opportunity are high priorities for a better environment. Yet in the inner city they are lacking to a higher degree than in other parts of the urban complex. Problems of noise, sanitation, and congestion affect nearly all sectors of the larger cities. But overcrowding, rats, flaking leaded paint, deteriorating housing, and everpresent litter and garbage are afflictions more typical of the inner city.

Although an annual report cannot hope to cover the entire range of environmental factors in all of America, it was felt that special attention this year should be given to the inner city where many of our most severe environmental problems interact with social and economic conditions which the Nation is also seeking to improve.

This chapter is thus an attempt to focus on some of the acute environmental problems faced by the inner city. It is necessarily

incomplete and inconclusive because environmental problems in the urban setting cannot be sharply differentiated from nonenvironmental problems; because for many of the problems affecting the inner city, there are no acceptable, quick answers; and because the afflictions of the inner city are closely related to the difficulties which beset the entire urban area. The chapter highlights a series of problems different in many respects from those of traditional conservation. It attempts to lay a preliminary basis for a broader dialogue on the problems of the urban environment, many of which are most severe in the inner city.

The environmental decay of the inner city, of course, affects more than the poor. Middle and upper income families residing within inner city sanctuaries are not spared the health and economic toll of air pollution, noise, and traffic congestion. Yet they can insulate themselves from some of the environmental burdens of life in the city: Air conditioners screen the air and shut out street noise, housing is kept in repair against the assaults of weather and rodents, much more living space is available, and mobility and higher income make it possible to escape periodically to more pleasant environments. For the inner city poor, however, there is little relief and limited opportunity for escape.

The traditional environmental objectives of clean air and water and preservation of national parks and wilderness are not the central concerns of most inner city poor. They focus instead on more immediate economic and social interests. Some spokesmen for inner city areas fear that the environmental movement may divert public attention and funds from these issues to more traditional environmental issues. For many inner city residents, the overwhelming concern is poverty and its accompanying ills—inadequate housing, high crime rates, poor health, unsanitary conditions, inadequate education and recreation, and drug addiction—all of which are exacerbated by racial discrimination. These factors may not be environmental when looked at individually. But their net effect is to lower the quality of life.

Nevertheless, there is growing evidence that among the urban poor—those with the most to gain from environmental improvements—are some who have decided to embrace environmentalism in their own distinct way. Their use of the term environment is broader than the traditional definition. Their concept embraces not only more parks, but better housing; not only cleaner air and water, but rat extermination.

The environmental movement in the inner city is still in its infancy, although inner city groups and established environmental organizations are beginning to identify some shared objectives. In a number of cities—Boston, Cleveland, Detroit, Los Angeles, New York, Philadelphia, St. Louis, Washington, D.C.—community groups and new organizations are attacking environmental problems of the inner city. At the same time, some traditional conservation groups are developing programs to assist in

improving the quality of life in inner city neighborhoods. An example is Young Adults for Resources and the Environment (YARE). A small spinoff from the Izaak Walton League of America, it is intended to open channels of communication between inner city young adults and citizen conservation organizations through environmental workshops and citizen action projects such as antilitter programs, and organization of people to participate in hearings on local issues which affect their interests. YARE is working in Cleveland, Duluth, New York City, and Washington, D.C.

At the White House Conference on Youth in April, an environmental task force concluded:

> Although environmental degradation has become recognized in recent years as a major social crisis, the public focus on this issue has usually been directed towards problems that are important to middle-class Americans. The issues of urban transportation, slum housing, inadequate health care, recreation and education, and unemployment are vital to urban poor people; but have not been properly understood in an environmental context or dealt with from an ecological perspective.

Conference delegates passed a resolution "that national priority be given to the actions necessary to improve the quality of the environment of the people of America's inner cities."

Several existing Federal programs deal with the physical circumstances of the inner city environment. Some of these, such as air and water pollution control or parkland development, are directed toward all citizens. A few programs, such as Federal assistance to urban areas for rat control, are aimed primarily at inner city problems.

The variety of environmental problems of the inner city and the absence of simple answers to these problems make it particularly important that efforts to overcome them be tailored to the needs and priorities of each locality. This becomes even more important when it is recognized that most of the resources used for coping with the broad environmental problems of a city are raised within the locality itself. Federal assistance, although large and continuing to grow, is only a fraction of the total resources available for dealing with local problems. A solution to these problems requires, first of all, that the significant local resources be used in a planned, effective way to meet locally determined priorities. Federal aid can be most effective when it helps the locality to meet its own recognized needs rather than impeding or distorting local priorities.

air pollution

Air pollution generally hangs more heavily over the inner city than the rest of the urban area, and far more heavily than over most suburban and rural areas. In some cities the central business district absorbs the most severe air pollution; in other cities close-in industrial areas bear the heaviest pollution loads.

The largest concentrations of the urban poor often live near these two areas. A 1969 study conducted for the National Air Pollution Control Administration (NAPCA, now a part of the Environmental Protection Agency) confirmed that concentrations of particulate matter, carbon monoxide, and sulfur oxides decline steadily out from urban areas (urban measuring points are all located in downtown areas). This may be seen in Table 1.

Based on samples collected over a 2-year period, the study shows that average concentrations of particulates in nonurban areas are between 10 and 50 percent of the average in urban areas. Moreover, within metropolitan regions, similar variations hold between suburbia and the central city.

A study of the St. Louis area made in 1966 by NAPCA reported that suspended particulates, dust fall, and concentrations of sulfur dioxide were higher in the predominantly poor black neighborhoods of St. Louis and East St. Louis than elsewhere in the metropolitan area.

A recent air pollution computer model of the Chicago region, when correlated with census data, indicates that the lowest income neighborhoods are in the areas of highest pollution concentrations (see Figures 1 and 2). Similar conclusions surface in

Table 1
Selected Particulate Constituents as Percentage of Gross Suspended Particulates, 19[illegible]

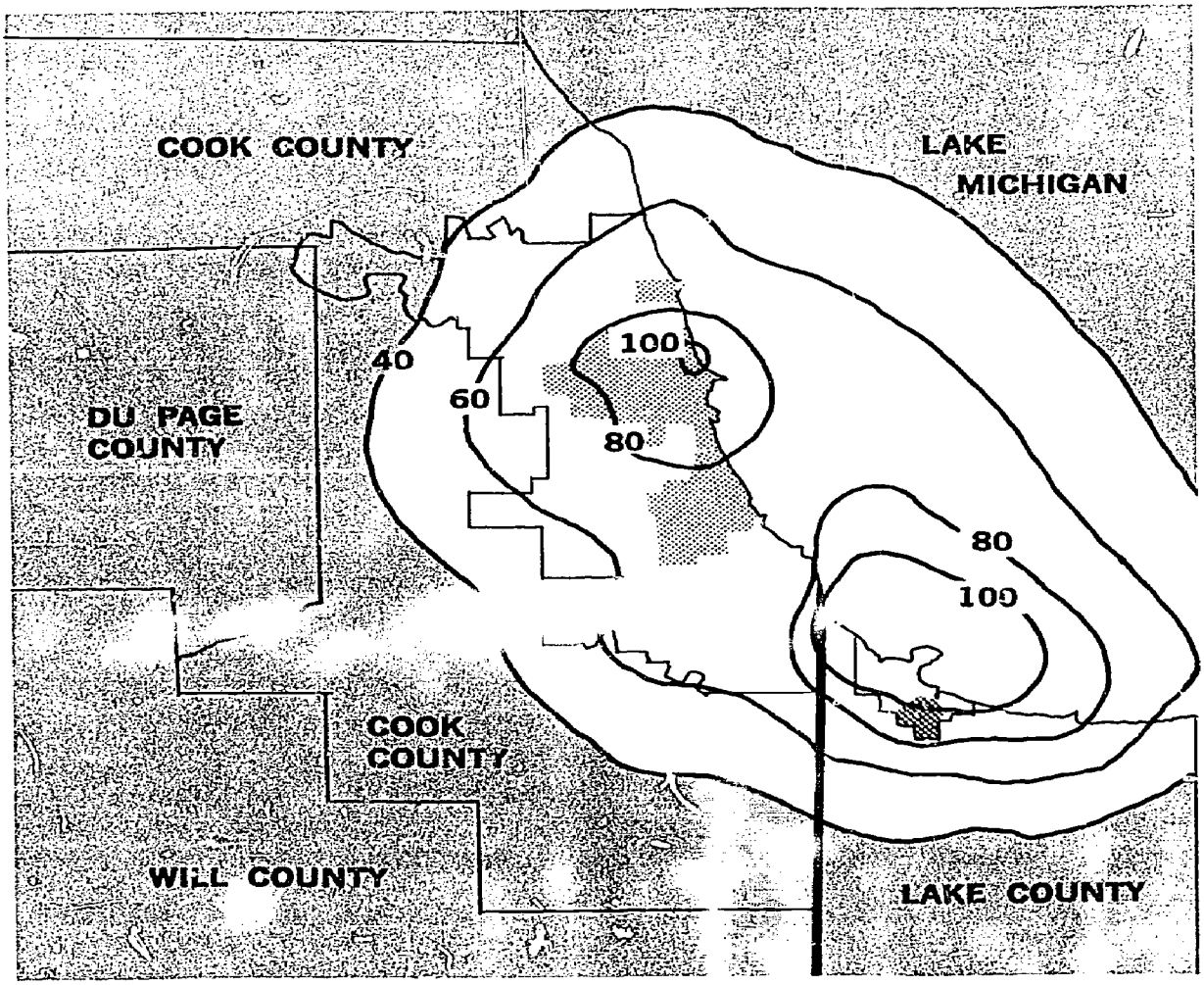
	Urban		Nonurban					
	(217 stations)		Proximate (5)[1]		(Intermediate (15)[2]		Remote (10)[3]	
	µg/m³	Percent	µg/m³	Percent	µg/m³	Percent	µg/m³	Percent
Suspended particulates	102.0	----	45.0	----	40.0	----	21.0	----
Benzene soluble organics	6.7	6.6	2.5	5.6	2.2	5.4	1.1	5.1
Ammonium ion	0.9	0.9	1.22	2.7	0.28	0.7	0.15	0.7
Nitrate ion	2.4	2.4	1.40	3.1	0.85	2.1	0.46	2.2
Sulfate ion	10.1	9.9	10.0	22.2	5.29	13.1	2.51	1.8
Copper	0.16	0.15	0.16	0.36	0.078	0.19	0.060	0.28
Iron	1.43	1.38	0.56	1.24	0.27	0.67	0.15	0.71
Manganese	0.073	0.07	0.026	0.06	0.012	0.03	0.005	0.02
Nickel	0.017	0.02	0.008	0.02	0.004	0.01	0.002	0.01
Lead	1.11	1.07	0.21	0.47	0.096	0.24	0.022	0.10

[1] Technically in nonurban areas, but conspicuously influenced by proximity to city, i.e., Cape Vincent, N.Y.; Kent County, Del.; Washington County, Miss.
[2] Closer to urban areas, usually with agricultural activity, i.e., Jackson County, Miss.; Humboldt, Calif.
[3] Farthest from large population center, i.e., Glacier National Park; White Pine County, Nev.
Source: Environmental Protection Agency.

Figure 1

Current Expected Mean Concentrations of Sulfur Dioxide, Chicago, Ill., and Gary, Ind.

(In micrograms per cubic meter)



Source: Based on computer simulation model of data from Atomic Energy Commission, Argonne National Laboratory, and on U.S. Department of Commerce Bureau of the Census data.

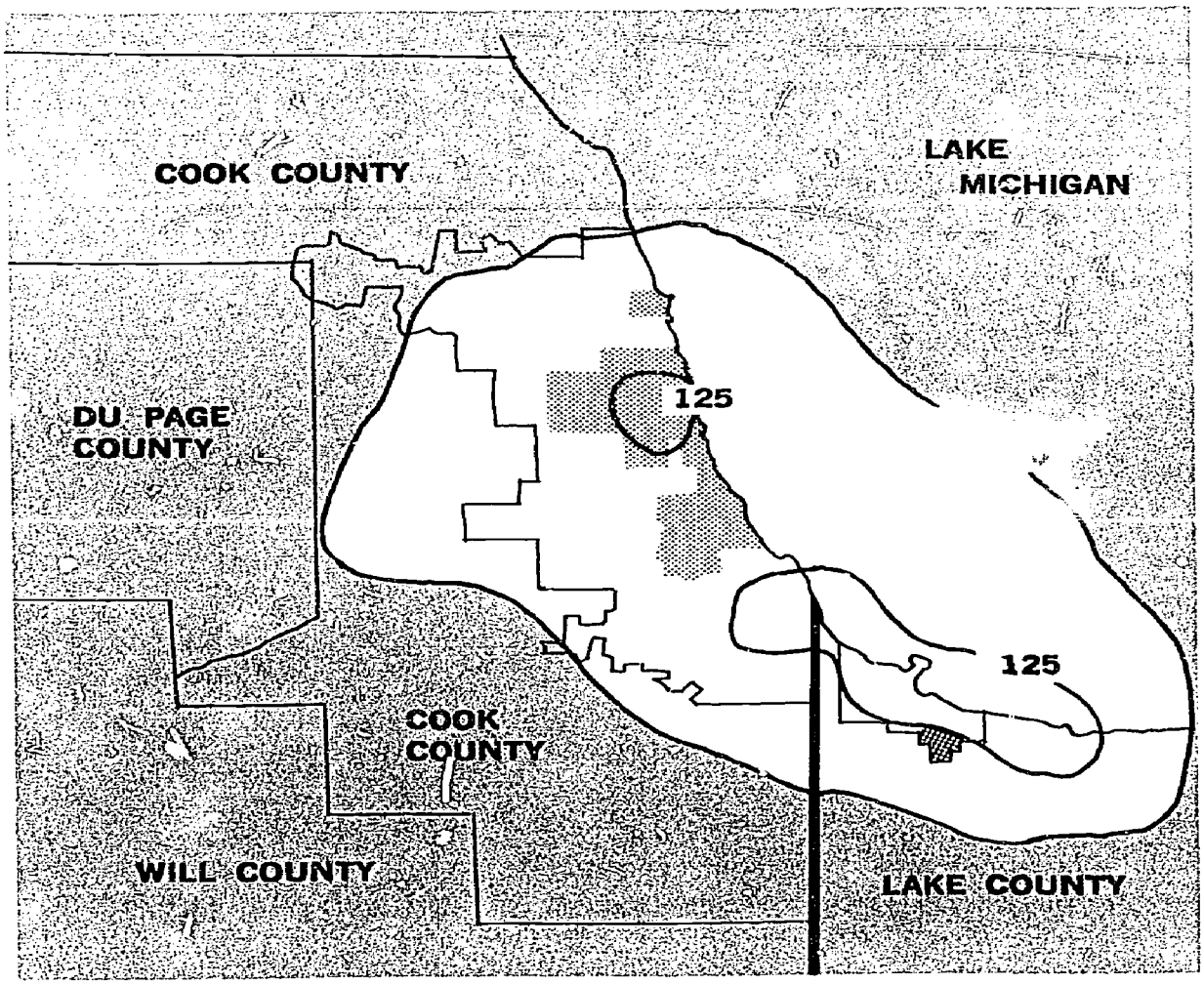
data drawn from Kansas City, Mo., St. Louis, and Washington, D.C. (see Table 2).

Another survey conducted by NAPCA of 22 other metropolitan areas, including Cincinnati, Dallas-Fort Worth, Denver, Indianapolis, Louisville, New York City-Northern New Jersey, Pittsburgh, Providence, San Antonio, and Seattle substantiates unequal geographical distribution of certain pollutants within metropolitan

Figure 2

Current Expected Particulate Concentrations for Chicago, Ill., and Gary, Ind.

(In micrograms per cubic meter)



1970 Poverty Areas, Chicago

1960 Poverty Areas, Gary (1970 census statistics not available)

Source: Based on computer simulation model of data from Atomic Energy Commission, Argonne National Laboratory, and on U.S. Department of Commerce, Bureau of the Census data.

areas. Emissions of carbon monoxide, sulfur oxides, and particulate matter in these areas were measured by source and proximity to heavy population centers. Emissions of carbon monoxide result from vehicles; sulfur oxides and particulate emissions come from residential and commercial burning of coal and oil. For each of the three pollutants, the pattern is the same: Emission densities are highest in the core city and diminish with distance outward. Overall, the areas of highest emissions within the tested cities coincide with the areas of highest population density.

Table 2
Air Pollution Exposure Indices by Income

Income	Suspended particulates	Sulfation	Mean
Kansas City			
0–2,999	76.7	0.22	1.16
3,000–4,999	72.4	.20	1.09
5,000–6,999	66.5	.18	.98
7,000–9,999	63.5	.17	.93
10,000–14,999	60.1	.15	.86
15,000–24,999	57.6	.14	.80
25,000–over	58.1	.12	.76
St. Louis			
0–2,999	91.3	.97	1.19
3,000–4,999	85.3	.88	1.10
5,000–6,999	79.2	.78	1.00
7,000–9,999	75.4	.72	.93
10,000–14,999	73.0	.68	.89
15,000–24,999	68.8	.60	.82
25,000–over	64.9	.52	.74
Washington, D.C.			
0–2,999	64.6	.82	1.19
3,000–4,999	61.7	.82	1.16
5,000–6,999	53.9	.75	1.04
7,000–9,999	49.7	.69	.96
10,000–14,999	45.5	.64	.88
15,000–24,999	43.2	.58	.82
25,000–over	42.0	.53	.77

Source: Freeman, A.M., based on U.S. Department of Commerce, Bureau of the Census, and U.S. Department of Health, Education, and Welfare, Public Health Service data.

Other pollutants confirm this pattern. Lead, for example, is a potentially poisonous metal commonly found in the atmosphere and in the soil near heavily traveled roadways. Data vary widely among sampling sites, but lead levels in the blood appear particularly high among urban area dwellers. A study of major cities by the Environmental Protection Agency reported that atmospheric lead had increased significantly in the seven years ending in 1969. In Cincinnati, the increase ranged from 13 to 33 percent; in Los Angeles, from 33 to 64 percent; and in Philadelphia, from 2 to 36 percent.

Blood specimens of three groups of persons in the Philadelphia area were taken to determine the amount of lead in their systems. The groups were divided into those who had lived and worked within a 25-block radius of City Hall for 5 years, those who commuted regularly from the suburbs to work in the downtown area, and those who lived in the same neighborhood as the suburban commuters but also worked in the suburbs. For both men and women, lead was significantly highest in the city

dwellers. The suburbanites who worked in the city showed higher lead concentrations than those who lived and worked in the suburbs.

water pollution

Inner city residents are delivered the same water as any other urban residents. But they frequently face added problems. Water pipes in inner city housing are sometimes old and ill-kept and often contain pipe or joint cementing compound made of lead (no longer used in construction). Under such conditions, water containing as much as 920 micrograms of lead per liter has been found in inner city areas, compared to an average of 20 micrograms per liter elsewhere.

Inner city residents have limited access to water recreation. Conclusive data are lacking on how often the urban poor use nearby water bodies. River courses and harbors located within and next to large cities often contain dangerously high levels of bacteria and other pollutants. Yet they often constitute the only source of water recreation easily accessible to the urban poor. The cleaner waters are for many inner city dwellers more distant than a convenient 1-day round trip will allow, and thus out of reach for those not able to afford overnight accommodations.

solid waste

Junk and litter accumulated in streets, on sidewalks, and in vacant lots and doorways are a familiar sight in poverty areas and cannot help having a psychological effect on those who live there. The resident often despairs of keeping his small living space clean when all around him are litter and garbage. He may conclude that since refuse collection is a public service, the abundance of uncollected litter indicates that his neighborhood is being discriminated against. Residents in 9 of 20 cities surveyed by the National Advisory Commission on Civil Disorders listed inadequate sanitation and garbage removal as significant grievances. Many cities able to set their own priorities with Federal funds have placed emphasis on sanitation services such as collecting garbage, buying trash and garbage containers for the city poor, removing abandoned automobiles, cleaning up littered vacant lots, and increasing the number of sanitation workers.

Solving the problem involves more than merely upgrading municipal services. Some New York City poverty areas have garbage pickups six times a week, compared to three times a week elsewhere in the city. In Chicago, inner city poor are served by three collections a week, compared to one collection in the rest of the city. Yet inner city littering and unsanitary conditions continue, and there is widespread disenchantment at the failure of cleanup campaigns to have any lasting effect.

The reasons for this failure to maintain sanitary conditions in

the inner city are complex and interrelated. Frustration over limited opportunities for housing, employment, and education can lead residents of the inner city to withdraw from active efforts to improve conditions around them. This psychological impact is worsened by physical conditions which work against sanitation. Buildings designed in earlier days have been subdivided into numerous crowded living units, with little provision for storage areas, common spaces, or refuse collection systems. Receptacles are often nonexistent, makeshift, or in poor condition—all leading to a situation in which wind, animals, and vandals spread litter throughout houses and neighborhoods. The abundance of vacant lots and abandoned structures, already strewn with refuse, encourage further junk, garbage, and other debris. Together these forces work to frustrate even the most willing city sanitation department in working with residents toward a cleaner neighborhood. Also, sanitation collection services have been criticized as perfunctory in some poverty areas. Often such services are confined to curbside collection of packaged refuse, ignoring litter in lots, sidewalks, and gutters.

Strewn garbage, besides being unattractive and odorous, also invites rodents. Rats feed on easily accessible garbage and present a health problem to inner city residents. Greater than the danger of the diseases they carry is the insecurity and fear they inspire, especially in parents with small children.

An estimated 60 to 90 percent of rat bites occurs in inner city neighborhoods. Eighty percent occurs after midnight when most victims are asleep. The problem is intensified by large-scale building demolition in old, inner city areas, where rats are dislodged and then flee to other parts of the city. The presence of rats in an apartment often has nothing to do with the particular building's cleanliness. Substandard housing often is replete with holes in basement walls or around windows and pipes, giving rats entry points from which they fan out through a building.

neighborhood deterioration

Landlord abandonment of buildings, widespread dilapidation, and health effects of lead paint chips on children are all problems characteristic of many inner city neighborhoods. Some inner city areas show their scars openly with vacant stores, burned-out buildings, and boarded-up windows. Deteriorating on the inside, litter-strewn on the outside, block after block of decay provides a depressing setting for life.

When a landlord no longer provides services and upkeep for an occupied building and defaults on taxes or mortgage payments, a building is often on the way to abandonment, a major phenomenon of inner city poverty areas. The economics of abandonment can be traced back to the time immediately after World War II when a rural-to-urban migration swelled the tide of black

families to the Northern and Midwestern cities. The exodus of middle class whites to the suburbs, which started in the 1920's, was already in full swing, and large, older homes in the inner city were subdivided by speculators hoping to capitalize on the growing demand for low-rent housing for the migrants. There was little new building in the depression and war years. Urban renewal, highway construction, and other programs of the post-war period, which resulted in clearing large numbers of living units, increased the pressures as more low-income, nonwhite families competed for the remaining affordable housing. For a time, it was a lucrative market for landlords. They could invest little, give minimum services, and still collect rent.

After further dividing units and reducing maintenance, landlords often begin to run into hard economic going because of higher property taxes, higher mortgage rates, and increased costs attributable to intensive use and an accumulation of unattended maintenance problems. If rents are raised too high, families simply cannot pay; if rents are too low, landlords have little incentive to maintain the buildings. Becoming delinquent in his ever rising city property taxes is often the last attempt by a landlord to make a profit. In some cities, actions on tax delinquency may take as long as 2 to 5 years. Complete failure to provide services is soon followed by an exodus of tenants and thus by abandonment. Often the abandoned units are then illegally occupied by addicts and derelicts and are vandalized. Many are destroyed by fire.

It is estimated that there are more than 100,000 abandoned dwelling units in New York City, between 20,000 and 30,000 in Philadelphia, more than 10,000 in St. Louis, 4,000 or more in Baltimore, and 5,000 or more in Chicago. Abandonment often occurs even in cities with relatively limited supplies of available housing. The percentage of dwelling units for rent or sale in New York City is only 1.7, in Philadelphia, only 2.8. These low vacancy rates, coupled with a heavy rate of abandonment, indicate that buildings are being abandoned even when people need homes. Moreover, the problem is not confined to the biggest cities. Erie, Pa., for instance, has a vacancy rate of 2.3 percent and 5,000 abandoned units.

A survey of seven cities conducted in 1970 by the Urban League and the Center for Community Change indicates the extent to which abandonment is concentrated in the inner city. A study of typical inner city neighborhoods in seven cities showed that five had "serious" abandonment problems. In a St. Louis Model Cities area, 16 percent of all residential structures were abandoned. In a Brooklyn area, 6 to 10 percent of the buildings were found abandoned, and in the Woodlawn area of Chicago, by 1970, abandonment and demolition reached 15 to 20 percent of the total structures existing in 1960.

Two cities which did not have a serious abandonment problem in the neighborhoods surveyed were Atlanta and Detroit. The rea-

sons given were a relatively high incidence of home ownership and banks willing to supply conventional mortgage funds for repair or purchase to any qualified borrower in any part of the city. In both Atlanta and Detroit the causal factor for these observations appears to be the emergence of a strong black middle class. Neighborhood stability was further promoted in Detroit by the fact that economically mixed neighborhoods were in close physical proximity and in Atlanta by the fact that economic groups were mixed within neighborhoods.

As the abandonment rate approaches 5 percent, it appears to accelerate. A New York study documents the speed with which abandonment can overtake structurally sound dwellings. In the Brownsville area of Brooklyn, 448 units—one entire city block—which were classified as sound in the 1960 census, were abandoned by 1969.

Overcrowding in urban areas is another problem confined largely to the inner city. In 1966, poverty areas of Oakland, Calif., recorded 13.2 percent of all households as overcrowded—averaging more than one person per room. More than one-fifth of Oakland's families classified below the poverty level lived in overcrowded housing, compared with 5 percent of the city's nonpoverty families. Overcrowding leads to greater maintenance requirements and faster deterioration.

It is important to understand clearly the dual problems of abandonment and crowding in inner city housing. Abandonment pockmarks neighborhoods with dilapidated structures and rubble-filled lots. It works against the feeling of community that derives from solid blocks of homes and stores. Crowding in housing, on the other hand, affects the home environment. Abandonment and crowding go together because the loss of housing through abandonment means more crowding in remaining structures. Thus occurs the incongruous phenomenon of lower densities per acre in the inner city caused in part by abandonment, but higher densities in some buildings as the poor crowd into the limited remaining affordable housing.

Another element of deteriorating housing in the inner city is lead poisoning. Lead in gasoline, which adds to air pollution, is generally recognized as an environmental hazard, but lead in paint is a less known and more immediate problem for the poor. Lead is present in the paint, plaster, and caulking of some older houses and apartments which are now in decaying neighborhoods. About 30 years ago, nontoxic paint was developed, and today the sale of interior paint in excess of 1 percent lead is illegal in most urban areas. The newer paints, however, only cover the old toxic paints. Flaking and chipping make leaded paint, along with the newer coat, available to the unwitting grasp of a child.

Ingestion of lead occurs mostly among children between the ages of 1 and 3 who exhibit pica, a craving for nonfood sub-

stances. Prolonged or recurrent ingestion of this lead produces abnormal levels of lead in the blood and, in a significant number of cases, lead poisoning. According to a policy statement of the Surgeon General of the U.S. Public Health Service, "A growing body of data from studies in many cities has established beyond doubt that lead intake by children from paint—particularly in the slums of the cities—is an important and widespread problem. Estimates of the number of children in the United States with dangerous blood lead levels range as high as 400,000. Lead poisoning has caused mental retardation and sometimes death."

In the past, lead poisoning among children has largely been undetected and unreported. As late as 1964, before an intensive program of testing was begun in New York City, only 500 confirmed lead poisoning cases were reported citywide. A 1970 New York City test of 87,000 inner city children showed that 2,649 suffered from lead poisoning. Even when poisoning has not been confirmed, tests indicate an abnormally high level of lead in blood among children from urban poverty neighborhoods. In a 1967 Chicago test of 28,000 children under five years of age, 2,380 had elevated levels of lead in their blood.

open space and recreation

Of 491 million acres of public recreation area in the United States, less than 3 percent is within 40 miles, or 1-hour driving time, from the center of metropolitan areas with more than 500,000 population; yet 90 million people live in these areas. No national data have been collected on the availability of parks to people in the inner city. However, a 1970 study of recreation problems in urban impact areas in California showed an inverse relationship between family income and desire for recreation. For example, in families with an annual income under $2,000, the desire to participate in outdoor activities was almost double that of families with an income above $9,000.

And while the Nation's population grows and new parks are being acquired, many areas are suffering a decrease in available urban parkland. Studies now underway for the U.S. Department of Interior and the U.S. Department of Housing and Urban Development show a loss of more than 22,000 acres of urban parkland in the last 6 years, much of the parkland close to the inner city. The studies have disclosed that this land is being taken for highways, utilities, schools, housing, and other projects. Besides removing parkland from present users, this loss frequently brings an even greater number of people into an area to share a reduced supply of parks.

In addition, transportation corridors and industries along river and lake fronts have eliminated or cut off access to many locations suitable for public recreation. And the classic playground

of the urban poor, the street, is now often congested by both increasing traffic and parked cars.

The Open Space Land Program of the Department of Housing and Urban Development (HUD) has encouraged central cities to acquire and develop parks and recreation areas that are easily accessible to the residents. For example, five sites were acquired and developed in Montgomery, Ala., with HUD assistance. They ranged in size from 3 to 5 acres in neighborhoods where median family income varied from $3,500 to $4,200. One park is in an area where 96 percent of the dwellings are substandard, and another is in an older section of the city where there was no place to play except the streets. In Lowell, Mass., four vest-pocket parks were built with HUD grants. One of the parks is in a Model Cities area where the median family income is $4,000 and approximately 40 percent of the dwellings are substandard or dilapidated. Between 1969 and 1970, the percentage of HUD Open Space funds allocated to the purchase of parks in low-income neighborhoods increased from 6 to 33 percent. The President, as part of his "Legacy of Parks" program, has asked Congress to increase the HUD Open Space Program from $75 million to $200 million to assist cities in purchasing open space and developing parks in or near urban areas.

The President's "Legacy of Parks" concept, announced in his Environmental Message to Congress in February, is a multifaceted approach to increase substantially the open space, parklands, and recreation areas of the Nation and to redirect Federal programs in a way that will place the new areas closer to where most people live. The Legacy of Parks seeks to bring "parks to people" through actions which involve both direct Federal involvement and federally supported State and local grant programs.

In 1971, the President established the Property Review Board to evaluate federally owned properties to determine those which are underutilized and could be turned over to State or local governments for park use. Of the more than 60 properties already identified, 13 properties containing 8,905 acres have been declared excess and are being conveyed to the appropriate State or local agencies. Most are in or near large urban areas where they can provide recreation opportunity for residents of the inner city. They include the Naval Devices Training Center, Sands Point, N.Y., with a beach area located 16 miles northeast of Manhattan; 116 acres of the Cleveland Support Facility; Camp Pendleton and Border Field near San Diego, Calif.; and Fort Tilden and Fort Hancock, which will be part of the Gateway National Recreation Area near New York City (see Chapter 1).

The Gateway National Recreation Area proposal, which the President has sent to Congress, will provide a 23,000-acre land and water park capable of serving 20 million visitors annually with indoor and outdoor recreational and cultural facilities, and will be linked with New York City's rapid transit service.

The Administration's proposed amendments to the Land and Water Conservation Fund Act now before the Congress would apportion more money from the Interior Department's fund to the most populous States and would strengthen the Secretary of the Interior's overview powers to assure that urban residents are receiving their share. The amendments would authorize up to 25 percent of any State's allocated funds for indoor recreational facilities where climate and lack of space make moving indoors necessary.

transportation

Automobile ownership often makes the difference between access to outdoor recreation areas and confinement to the limited parklands of many inner city areas. On the other hand, new highways which serve the car owner further diminish urban open space. Highway construction can also cost the city dweller his home, increase the pollution of his air, and add to the noise from which he suffers. In some cases, resistance to proposed new highway construction has knitted inner city groups and environmental organizations into new coalitions. For example, the Greater Boston Committee on the Transportation Crisis, a broadly based coalition of inner city and conservation groups, played an important part in winning the support of the Governor and the Mayor for an extensive review of Boston's transportation needs. Construction on a major segment of Interstate 95, on portions of the Inner Belt Interstate 695 (one section of which would split the Model Cities area in Cambridge), and on several other Boston area highway projects has been halted while the entire range of transportation alternatives is being explored.

If a new highway severs a neighborhood, it decreases casual, social interaction between the two severed sides. It creates a psychological or visual barrier and often a physical obstacle. More than liberal vehicular access and an occasional pedestrian crossing are necessary to overcome the highway barrier. Even when continuous across-highway access is provided—as in the case of elevated structure construction—the highway's uninhabited strip remains a psychological and social barricade.

The presence of a highway near a neighborhood may have other impacts beyond the border or barrier effect. Noise, increased dirt, and fumes tend to make outdoor activities less pleasant and thus, to some degree, diminish the contacts needed to produce neighborhood cohesion.

Heightened surface traffic can also develop from changes in traffic patterns after a new highway is built. Feeder streets in the vicinity of an interchange often suffer enormously increased loads. The effects of this increased traffic may turn the street into a greater barrier to social interaction.

During the past few years, federally aided highway construction

has displaced an average 60,000 people from their homes and businesses each year. Of the people displaced, three-fourths were urban dwellers. Most displacement occurred in areas of middle- or low-income housing units that cost less than $15,000 or rented for less than $110 a month. Displacement often has a heavier impact on minority groups than on others.

The impact of displacement varies according to how effective relocation efforts are. The Uniform Relocation Assistance Act promises to improve the treatment provided displacees, and the Department of Transportation has adopted a policy of "no displacement without available relocation housing." But adequate relocation facilities are often not considered a substitute for long-standing neighborhood attachment. When the north leg of a proposed Inner Loop in Washington, D.C., was announced, individuals with sentimental attachments to the affected neighborhood began to crowd into adjacent, similar neighborhoods.

Growing opposition to urban highways has caused transportation planners to try to bring community advocates into the planning process. Transportation planners are also paying more attention to the social and environmental impact that the building of roads and mass transit systems has on inner city neighborhoods. For example, in the San Francisco-Oakland region, the Bay Area Rapid Transit System will offer a linear, landscaped park to several communities over a considerable distance by using the space under and adjacent to the elevated tracks.

In recent years, the Department of Transportation, aided by a specific congressional mandate in section 4(f) of the Department of Transportation Act, has developed procedures designed to reduce to a minimum the use of public parkland for new highways. The Supreme Court recently emphasized the thrust of congressional intent to protect parks from encroachments by transportation projects.

One indication of a movement toward greater balance in U.S. transportation is the fact that rapid transit rail systems are being considered, currently planned, or under construction in 16 American cities. Two are now under construction in the District of Columbia and San Francisco. Pittsburgh has such a system in the engineering stage, and 13 other cities are considering or planning such systems: Atlanta, Baltimore, Buffalo, Dallas-Fort Worth, Detroit, Honolulu, Houston, Los Angeles, Miami, Minneapolis-St. Paul, St. Louis, San Juan, and Seattle. The eventual success of mass transit systems is rooted in new design concepts, new sources of funding, and possibly incentives and sanctions involving the use of automobiles in the city. Few localities have yet come to grips with these realities. Federal revenue sharing would help resolve some of the financial obstacles not only by providing a specific fund for mass transit capital expenditures but also by

giving States and localities the choice of distributing other shared revenue among various alternative modes, including mass transit operating expenditures.

comprehensive approaches and citizen action

Inner city residents and Federal, State, and local officials all have found that the fragmented approach—dealing separately with causes and effects—is generally inadequate to deal with the interdependent nature of the inner city environment. Programs have also faltered when they failed to involve the residents themselves. And the way the financial assistance was provided often impeded the effort.

One method of obtaining more funds for meeting inner city problems, but without the restrictions that distort local efforts, is revenue sharing, especially the Administration's proposed General Revenue Sharing and Urban Community Development Revenue Sharing proposals sent to the Congress earlier this year. In requesting $2 billion for Urban Revenue Sharing, President Nixon pointed out that the inflexibility of the present system often means that money cannot be used where the need is the greatest. Federal categorical grant programs, often criticized because they limit the power of cities to decide how to spend Federal assistance funds, proliferated from 44 to nearly 500 between 1960 and 1970. Grant programs have denied cities the choice of setting their own priorities and forced them instead to choose among priorities offered by the Federal Government. Furthermore, many Federal programs require matching funds which are unavailable or which the city prefers to use on other programs not federally assisted.

One Federal program which was designed to be responsive to local priorities and to support a multifaceted attack on inner city problems is HUD's Model Cities Program, which President Nixon characterized as "one of the most important existing stepping stones to revenue sharing," and which grew out of a mounting frustration with traditional categorical grants. The Model Cities Program has afforded some of the participating neighborhoods limited but promising opportunity to engage in comprehensive approaches to environmental problems. Low-income housing construction, home rehabilitation, and demolition of dilapidated structures to make room for new housing are assisted in many Model Cities projects. So are recreation and cleanup projects. Rat control programs are funded in about one-third of the model neighborhoods. A cross section of Model Cities activities would show that trash collection services were extended in Gainesville, Ga.; 31 vest-pocket parks were acquired and developed in St. Louis; a lead paint poisoning prevention program was funded in Washington, D.C.; San Juan, P.R., was assisted

in a major sewage treatment connection project; and in the Fresno, Calif., Model Cities neighborhood, a comprehensive cleanup and maintenance campaign was started, encouraging self-help by providing physical and technical assistance, lending tools to residents, and buying garden equipment.

The Model Cities Program, however, suffers from certain restrictions such as the need to negotiate projects with Washington and the requirement that programs be limited to certain neighborhoods. The activities carried out in the past under Model Cities or other auspices could be continued under revenue sharing where recipients have found them useful.

One comparatively new Federal program devised to help local communities identify their problems in an interrelated way and set their priorities for solving them is the comprehensive, action-oriented Neighborhood Environmental Evaluation and Decision System (NEEDS) in the Department of Health, Education, and Welfare's Bureau of Community Environmental Management. NEEDS is designed to help recognize the cause-effect relationship of environmental and social stresses—whether poor air, poor water, noise, crowding, bad housing, or neighborhood instability —on individual health, both physical and mental.

NEEDS conducts physical surveys and household interviews to determine the particular needs of a community. Locally recruited interviewers are trained and sent out to contact the families, conduct the interviews, and seek community participation. Once information is obtained, a computer analysis is developed to produce information leading to solutions tailored to the specific problems and priorities within the target area. The NEEDS program gives the city the on-going capability to analyze both the severity of existing problems and the areas of potential crisis.

A Federal program which has been administered to permit substantial local flexibility in dealing with related inner city problems is the rat control program also sponsored by the Bureau of Community Environmental Management. As implemented in Philadelphia, for instance, the program attempts to answer other needs of inner city families—as well as to eradicate rats. The key to the program in Philadelphia is its 60 health educator aides, all hired by a Citizens Advisory Board, and all residents of the inner city. After being trained in home care and available local, Federal, and charitable services, the aides go door to door in north central, west, and south Philadelphia neighborhoods. Although rat control is the basis for initial contact of neighborhood residents, the aides also determine the range of a family's problems and seek ways to help.

If, for example, the family desperately needs better housing, the health aide will contact the local public housing agency or some other source of assistance. Or the aide will show people how to contact agencies, go to clinics for health care, prepare garbage for collection, or improve their sanitation. The health aide will

bring in housing inspectors to do what is necessary about rat control, such as calling in eradicators or improving basic sanitation. The program recognizes that "solutions" are long range, that basically attitudes must change and people must be motivated to help themselves.

With varied sources of support, several community-based organizations are developing innovative programs aimed at comprehensive environmental improvement in inner city areas. One example is the Watts Labor Community Action Committee (WLCAC) formed in the wake of the 1965 riot. The Committee's original motive was to beautify Watts and to make it a better place to live. Now in its seventh year, WLCAC has expanded from beautification efforts to a program involving recreation, education, job training, community business development, transportation, housing improvement, and youth activities projects. Money has come from Federal and State agencies, labor unions, and the Ford and Rockefeller Foundations. WLCAC's approach is to build the economic power of the community while upgrading and maintaining its environment. The Committee operates seven supermarkets (stocked largely with produce from a WLCAC-run farm and manned by inner city residents), two gas stations, a credit union, a restaurant, a construction company, and a large U.S. Labor Department residential job center with extensive vocational training programs. WLCAC has also established vest-pocket parks and has sponsored recreation and cleanup activities throughout Watts.

Another comprehensive community-based program is the East Harlem Environmental Extension Service in New York City. It offers repair and maintenance services to inner city landlords at prices considerably below market rates. The Extension Service, which developed from a coalition of community and housing groups and a local hospital, is jointly funded by the City and the State. Forty-five environmental extension agents provide maintenance services. The agents—all from the community and trained locally by personnel from a vocational school, the local hospital, and city agencies—talk with and counsel the residents regarding proper home care. The agents begin with minor household repair and follow up with regular supervision, stressing the relationships among health, housing, rats, and other factors. The service workers are trained in carpentry, electrical wiring, plumbing, plastering, rodent control, sanitation, heating repairs, fire prevention, and other general maintenance subjects as well as tenant-landlord relations. A board composed of community people, with representation from a landlord's organization, oversees the service. The program's success is due largely to its integrated approach, including employment, counseling, and intensive training of community workers as part of an effort to build resident trust, win cooperation, and deliver needed services.

conclusions

This chapter has focused largely on the immediate needs and views of the inner city residents. This is appropriate, for the sometimes bitter experience of the past years has taught the lesson that improvements in the daily environment of people must be sought with their help and guidance, not imposed on them by those who claim to know what is best. However, this focus should not obscure the fact that many of the forces that shape the intimate environment of the inner city resident are often beyond his knowledge and control.

The inadequate services provided by city governments generally can be traced to the inadequate tax base which provides the city's revenues. The major source of income for most cities is the property tax, which is often inefficient and inequitable. As the quality of the city environment deteriorates, middle class residents move out, and income from the property tax declines, leading to more deterioration and plunging the city's fiscal base and public services into further decline.

The lack of funds for essential public services is in many cases made worse by limitations on the use of available funds, such as those which come through Federal grants. Welfare reform and revenue sharing will help alleviate the shortage of money and will be particularly helpful to the cities by permitting them to initiate more flexible approaches to solving urban problems. As President Nixon noted in his proposal for a $5 billion general revenue sharing program, Federal aid to States and localities has not provided an effective answer to State and local problems. The purpose of revenue sharing proposals is to set States and localities free to assign their own priorities.

More and more industries have moved to the suburbs for a variety of reasons, and this poses another difficulty for the inner city. It reduces job availability for residents, and city governments are denied tax income. When local governments in suburban areas accommodate new employers but fail to revise land use plans to make room for lower-income employees, they intensify the pressures on the central city.

The experience of the past 10 years in trying to deal with inner city problems has demonstrated the need for an approach that fully takes into account the interrelationship among many varied factors. As the environmental perspective of all citizens matures to embrace greater concern for the quality of life, it is hoped that the plight of the inner city may command—in government and in the private sector—more broadly based efforts of a Nation growing more intent upon improving the life setting for people, wherever they may live.

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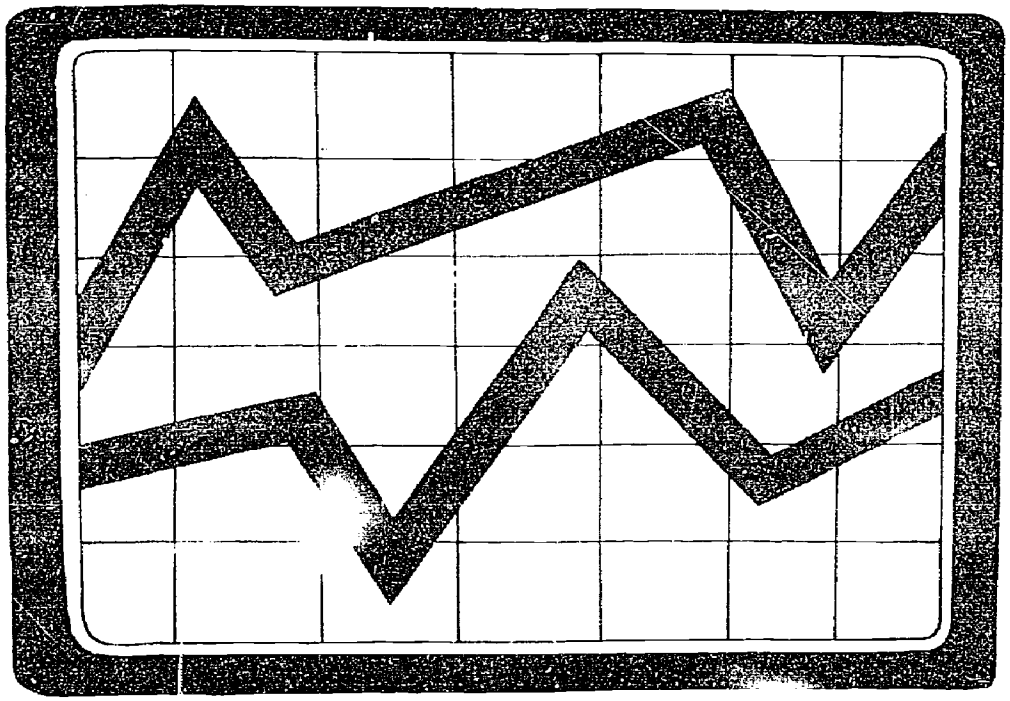


status and trends

Achieving environmental quality is not a revolutionary act, it is evolutionary. Only now are we beginning to marshall the arsenal of data, technology, and concern that leads to change. Many problems exist in making the arsenal adequate to the task.

One of the problems the Council must wrestle with now is stated in its very mandate. The National Environmental Policy Act requires the Council on Environmental Quality "to gather timely and authoritative information concerning the conditions and trends in the quality of the environment," and "to report at least once each year to the President on the state and condition of the environment."

This is an extremely complex and difficult charge to fulfill, because presentation of meaningful data on environmental quality conditions and trends is dependent on several important considerations that are currently satisfied only in part. We lack understanding of environmental phenomena sufficient to permit agreement on all the elements to measure and describe; we lack a comprehensive definition and evaluation of environmental data requirements and priorities; and technology is inadequate to permit collection of some types of data.

the status of monitoring

Monitoring the environment is one of the keys to effective management for environmental quality. One cannot detect environmental changes, desirable or undesirable, natural or man-

made, without established base lines and repeated observations. Such measurements are essential for the identification of environmental needs and the establishment of program priorities, as well as for the evaluation of program effectiveness, and they provide an early warning system for environmental problems which allows corrective action to be taken before the problems become serious.

Recognizing the importance of monitoring to the accomplishment of its responsibilities, shortly after CEQ was created, it contracted for a study on environmental monitoring. This study was the first step in the Council's overall effort to upgrade environmental monitoring, and as such, it reviewed current monitoring efforts and programs; it sought to identify indices and indicators of environmental quality and the data needed to obtain such indices; and it considered alternative methods to obtain and utilize these data. The study was recently completed and the contract report has been circulated to executive agencies for review.

The results of this preliminary study confirm the Council's earlier convictions that to measure status and trends in the environment is an exceedingly complex problem, and that a major effort still remains to be done to identify data requirements.

Because of the variety of types of requirements as well as the variety of definitions or ways of perceiving environmental quality, there is no general agreement on the requirements for or nature of environmental quality indices. The study proposed more than 100 environmental indices to promote the discussion needed to arrive at a generally acceptable set of indices that could be widely used and understood. The large number indicates the complexity of the problem and underlines the need for careful definition of the requirements. The difficulty of determining such requirements and of obtaining data for these indices must not be underestimated. It has taken over 100 years to develop our weather monitoring system. Yet weather is only a small—and a relatively simple—part of the entire array of environmental factors on which information is required.

By next year the choice of appropriate initial environmental indices should be made. It may take several years before a comprehensive set of indices has been determined, and it will take a number of years before truly reliable data can be obtained for all of these indices. Major changes probably will be necessary in such basic matters as selection of monitoring sites, instrumentation, and frequency of samples taken.

CEQ has identified some 56 major monitoring programs in 16 different Federal agencies. Some are quite extensive. For example, approximately 24,000 water quantity (hydrological data) stations and 10,000 water quality (chemical composition) stations operated by local, State or Federal agencies monitor the

Nation's surface waters. The Office of Management and Budget (OMB) estimates that the Federal Government in fiscal year 1971 spent approximately $40 million on pollution monitoring and surveillance activities. This figure does not include extensive pollution monitoring and surveillance activities by State and local governments—part of which are supported by Federal grants to State and local pollution control agencies. Nor does it include activities by industry to monitor its emissions.

In addition, OMB estimates that a total of $810 million was spent in fiscal year 1971 for a variety of other activities to understand, describe, and predict the environment. This includes $343 million for operational activities and $128 million for research and development to observe and predict weather and ocean conditions and disturbances; $74 million for other operational activities; and $124 million for miscellaneous activities such as physical environmental surveys, weather modification research and development, and ecological and other basic environmental research.

The Environmental Protection Agency (EPA) has undertaken a broad study of its environmental data requirements and of its existing monitoring systems. EPA hopes to develop an integrated system to provide data required for pollution control.

The choice of appropriate environmental indices involves many difficult decisions. Apart from the problem of indices, there are problems with many existing monitoring systems themselves: Coverage of systems, both geographically and as to pollutants or parameters measured, is not adequate; sensors are not optimally located; many measurement instruments are not accurate or calibrated so that measurements from one location may not be comparable to another; data collected in various systems often are not comparable; and there are delays in compiling and analyzing data.

All of these difficulties do not lessen the vital need to collect and analyze environmental data. Without valid data we cannot accurately determine the most important problems or the most cost-effective methods of attacking them. Nor can we evaluate the success of efforts to correct problems. Monitoring is not a substitute for action. But in the long run, action without the knowledge provided by adequate monitoring is more likely to be ineffective.

Despite the inadequacies of existing efforts, the Council has attempted to collect and present in this chapter some gauges of environmental quality. This is only one step in an evolving program. The goal is to be able to paint an accurate picture of the status and trends of the Nation's environment. To do that will necessitate deciding upon adequate indicators of environmental quality, determining and evaluating specific data requirements, and improving data collection methods.

This chapter presents data on the traditional pollution problems of air and water pollution, solid waste, radiation, and pesticides. It deals with newer problems, such as toxic substances, and with conservation concerns, such as wildlife. Finally, there are data on factors underlying many of our environmental problems, particularly population and land use.

trends in air pollution

Overall trends in air pollution present a mixed picture. Ambient levels of some of the major pollutants have dropped in urban areas over the past several years. However, estimated nationwide emissions of air pollutants rose in 1969 (see Table 1). (For a more detailed explanation of the tables and figures in this chapter, see the chapter appendix.) The total increase in pollutants by weight, was 3.2 percent above 1968. Air pollution data are not yet available for 1970, and the data we do have often lack the desired degree of reliability.

More of every major pollutant was emitted in 1969. Emissions from fuel combustion in stationary sources, from industrial processes, and from "miscellaneous" sources all increased. The large (18.5 percent) jump under "miscellaneous" was due pri-

Table 1

Estimated Emissions of Air Pollutants by Weight, Nationwide, 1969

(In millions of tons per year)

Source	CO	Particulates	SO_x	HC	NO_x	Total	Percent change, 1968–69[1]
Transportation	111.5	0.8	1.1	19.8	11.2	144.4	−1.0
Fuel combustion in stationary sources	1.8	7.2	24.4	.8	10.0	44.3	+2.5
Industrial processes	12.0	14.4	7.5	5.5	2	39.6	+7.3
Solid waste disposal	7.9	1.4	.2	2.0	.4	11.9	−1.0
Miscellaneous	18.2	11.4	.2	9.2	2.0	41.0	+18.5
Total	151.4	35.2	33.4	37.4	23.8	281.2	+3.2
Percent change	+1.3	+10.7	+5.7	+1.1	+4.8		

[1] Computed by the 1969 method from the difference between 1969 estimates and 1968 estimates. The new method results in higher values for 1968 than those computed by EPA for 1968.

Source: The Mitre Corp., MTR-6013. Based on Environmental Protection Agency data.

marily to the increased number and size of forest fires. The contribution to air pollution from transportation and solid waste disposal declined slightly.

Transportation emissions, primarily from the automobile, generate most of the carbon monoxide. Fuel combustion—the burning of coal and oil—creates the majority of sulfur oxides emissions. Transportation and fuel combustion contribute jointly to emissions of nitrogen oxides.

The greatest single source of air pollution, when measured by pollutant weight, is the automobile. Transportation contributed more pollution than all other sources together, and carbon monoxide alone, primarily from automobiles, outweighed the other four major pollutants combined. However, it is significant that the contribution of transportation sources declined slightly in 1969. We have apparently reached the peak level of automobile pollution, and as older cars are replaced by newer ones with pollution devices, which were first installed in the 1967 models in California and in the 1968 models nationwide, we can expect automobile-related pollution to decline. The 1975 and 1976 emission standards will quicken this decline. But in the long run, if the number of cars on the road continues to increase at the present rate, even the effect of these controls eventually could be negated—unless something else is done.

There are no firm data on the reasons for the slight decline in solid waste emissions. However, it is probably due to a reduction in open burning at municipal dumps.

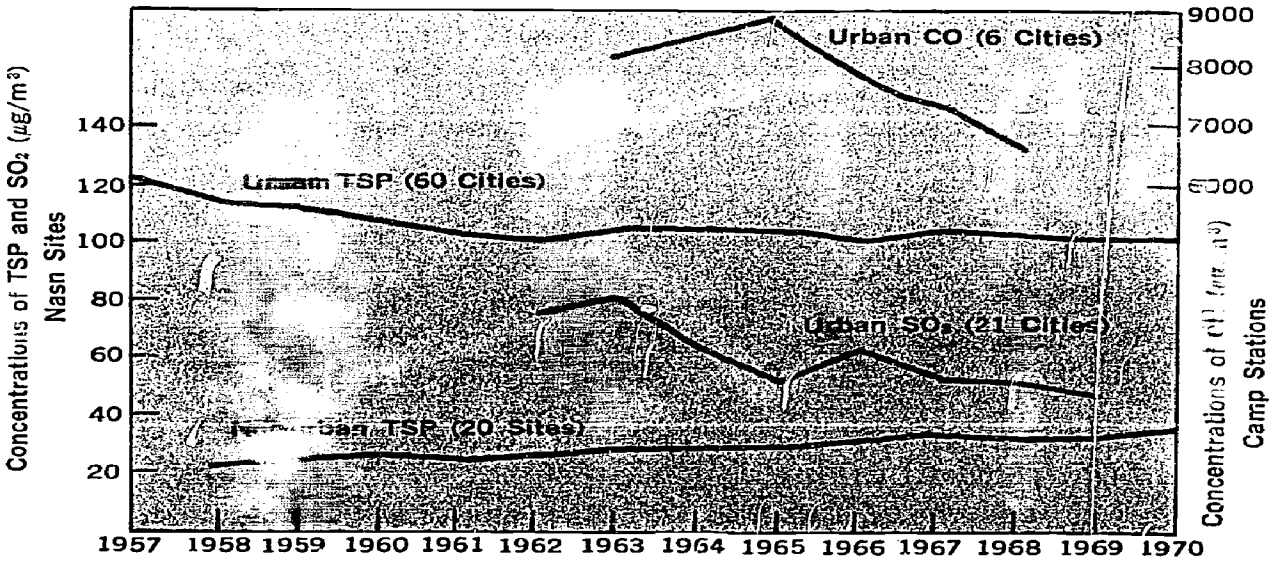
It is somewhat misleading to consider air pollutants in terms of their aggregate weight. We worry about pollutants because of their effects, and, other things being equal, a pound of sulfur oxides is a far more serious threat to health and welfare than a pound of carbon monoxide.

Measuring pollutants by tons emitted also ignores their geographical distribution. We are generally concerned with the concentration of pollutants in a particular place, but measuring total weight of emissions tells us nothing about their concentration. One might expect that the increase in total emissions over the past several years would cause corresponding increases in ambient concentration levels (often referred to as air quality). But, in fact, this has not been the case, as Figure 1 shows. Ambient levels of sulfur dioxide and carbon monoxide have decreased. Levels of particulate matter (TSP—total suspended particulates) have stayed about the same.

The disparity between weight of emissions and ambient levels is due partly to the application of controls in the larger cities where ambient levels are measured. New York City, the State of New Jersey, and other locations have succeeded in lowering emissions of sulfur oxides and particulates through stringent enforcement of standards. Thus the air quality in the urban areas

Figure 1

Trends in Ambient Levels of Selected Air Pollutants



Source: The Mitre Corp. MTR–6013. Based on Environmental Protection Agency data.

has improved, but total weight of emissions has continued to increase outside these areas.

The disparity is also due partly to the method by which ambient levels are measured. The trends in Figure 1 are based on only one sampling station in each city. Thus it is uncertain how well the figures for each city actually represent the air quality in the entire community. The movement of heavy industry to locations outside the central city improves air quality in the city but does not reduce the total amount of pollutants emitted. On the other hand, the figures for total weight of pollutants emitted are based on extrapolations from a variety of data sources and not on actual measurements. Therefore their validity is also uncertain.

The importance of where the monitoring site is located within a particular community cannot be overemphasized. Wide variations in recorded ambient air levels can occur from site to site within the same city, depending on the location of the sites. For example, although EPA's National Air Sampling Network (NASN) sites are generally located in the central city, State and local sites may be closer to major pollutant sources, because such stations are often sited for possible enforcement actions. Thus the NASN data often show much cleaner air conditions than the State and local data.

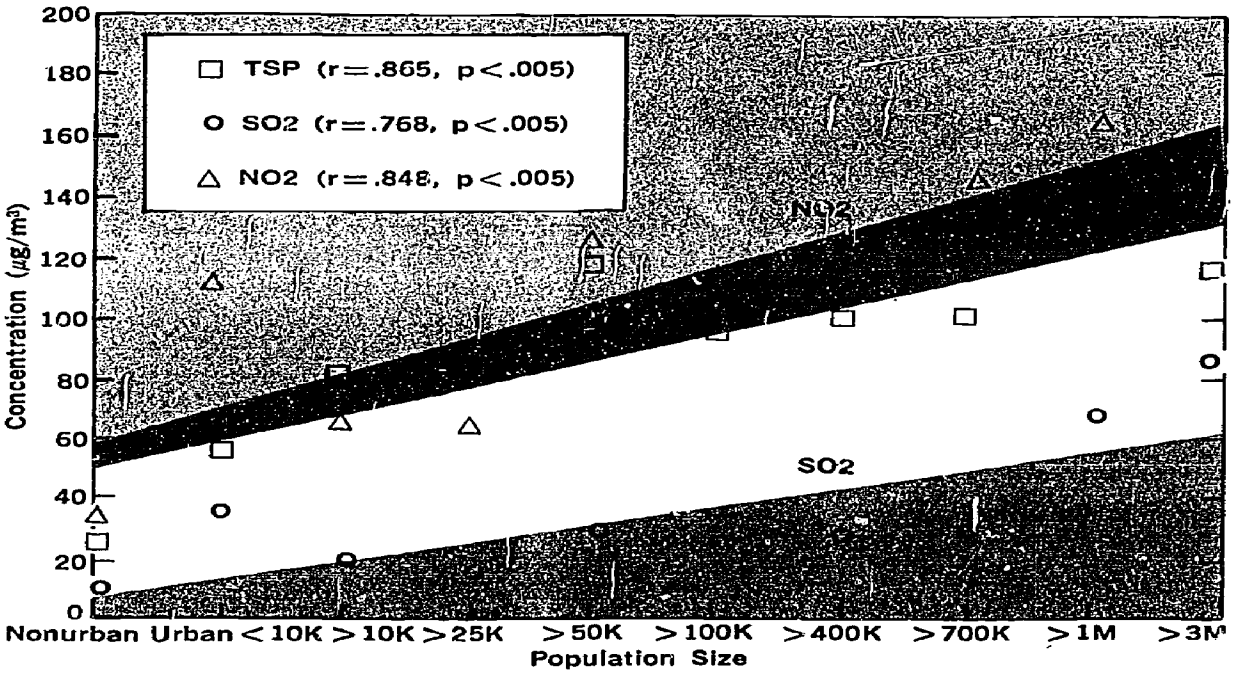
The dispersion of pollutants may create other problems, such as changes in global climate or atmospheric conditions. It has

been hypothesized, for example, that an increase in carbon dioxide levels could raise the global temperature enough to raise the level of the ocean because of melting of the polar icecaps. Measurements at the National Oceanographic and Atmospheric Agency's Mauna Loa Observatory indicate that compared with 1958 through 1968, the rate of increase of atmospheric carbon dioxide nearly doubled during 1969 and 1970. The earlier data point to an average annual increase of 0.7 parts per million. But the recent measurements show that the carbon dioxide content at Mauna Loa has climbed 1.35 parts per million during each of the last 2 years. Scientists now are investigating the reasons for this accelerated rate of change. The complete carbon dioxide cycle must be studied intensely and mathematical models must be developed to simulate the effects of changes in the atmospheric content upon climate.

Figure 1 shows that levels of total suspended particulates are much higher in urban than in nonurban areas. However, the differences seem to be diminishing, perhaps because of greater dispersion of industrial plants and the movement of population out of central cities. Figure 2 shows that the ambient levels of

Figure 2

Relationship of Air Pollution and Population, Second Half 1969—First Half 1970



Source: The Mitre Corp. MTR–6013. Based on Environmental Protection Agency data.

particulates, sulfur dioxide, and nitrogen oxides correlate with population size: the larger the population of the community, the higher the levels of pollution.

Figures 1 and 2 both give values which are aggregated for many communities. However, there are wide variations in levels of air pollution from city to city. The variation can be seen from Table 2, which shows the levels of major air pollutants in six large cities. There are also regional variations in pollution levels because of the type of fuels used and the patterns of population distribution.

Another indicator of variations in pollution levels from city to city and of the problems with using *average* air quality figures

Table 2

Annual Average Levels of Selected Air Pollutants in Selected Cities[1]

Location and pollutant (mg/m³)	1962	1963	1964	1965	1966	1967	1968
Chicago:							
SO_2	282	393	458	341	215	327	307
NO_2	91	77	87	81	105	94	90
CO	[2]NA	9,430	13,915	19,665	14,375	10,120	7,130
Cincinnati:							
SO_2	92	68	100	79	81	55	44
NO_2	56	56	60	66	68	53	60
CO	NA	8,050	7,015	4,600	5,635	6,440	6,440
Denver:							
SO_2	NA	NA	NA	55	29	13	34
NO_2	NA	NA	NA	68	64	70	58
CO	NA	NA	NA	8,280	9,085	8,740	6,210
Philadelphia:							
SO_2	231	181	215	223	238	257	212
NO_2	73	71	71	68	71	81	73
CO	NA	NA	8,165	9,315	7,820	7,245	9,890
St. Louis:							
SO_2	NA	NA	155	123	113	76	73
NO_2	NA	NA	62	64	64	45	43
CO	NA	NA	7,245	7,475	6,670	6,440	5,270
Washington, D.C.:							
SO_2	144	131	126	121	115	126	97
NO_2	55	66	68	66	66	81	88
CO	6,095	7,705	6,555	4,255	3,795	5,635	3,910

[1] Data for 1969 and 1970 not available until December 1971 because of change in computer processing methods.

[2] NA—not available.

Source: The Mitre Corp., MTR-6013. Based on Environmental Protection Agency data.

are so-called "episodes." These are periods when the air pollution in a particular community reaches dangerously high levels. A good example of such an episode occurred in Birmingham, Ala., this year. In previous years, levels of particulate matter, measured in micrograms per cubic meter of air, had averaged 155 during April in Birmingham. From April 15 to 21, 1971, they soared to an average of 372, reaching a peak of 607 during April 19–20. Families living in high exposure areas suffered from increased respiratory irritation symptoms, including cough, burning of throat or chest, and shortness of breath. Calls or visits to physicians were more frequent, and more persons reported restricted activity. Most pollution episodes are due to a combination of high continuous levels of pollution output aggravated by meteorological conditions, particularly inversions, which prevent the pollutants from dispersing.

The data in this section do not provide any easy answer to the question of whether air pollution in the United States is getting better or worse. Overall emissions, measured by weight, are still increasing along with increases in population and production, although the expected reduction in automobile emissions probably will begin to reverse this trend. Ambient air quality levels seem to be generally improving, at least in the places where the sampling stations are located. Most large cities still must make a major effort to reach newly set national air quality standards.

trends in water pollution

The same problems that beset nationwide air pollution figures beset water pollution monitoring. The geographical coverage, the wide variation in local conditions, the assimilative capacity of water bodies, and the interaction of pollutants complicate any attempt to give a picture of the status and trends of water pollution in the United States. Given these difficulties, EPA has relied on statistical extrapolations and on judgments by personnel in the field to arrive at an estimate of the quality of the Nation's water.

The most commonly used measure of the effect of wastes on water quality is 5-day biochemical oxygen demand, referred to as BOD. This is the measure of the amount of oxygen used in 5 days by the biological processes involved in the stabilization of organic matter. Lack of oxygen (produced by high BOD) may make the water unusable for recreation and other purposes. EPA estimates that the BOD of wastes actually discharged into receiving waters in 1968 was only slightly larger than the BOD of wastes discharged in 1957. The total BOD produced—but not necessarily discharged—during this period doubled, due primarily to the great increase in manufacturing activities. But the doubling of the production of wastes was just about canceled by increased waste treatment capacity. ("Production" of BOD is

the amount which would have been discharged if there had not been any treatment.)

Between 1964 and 1968, the increase in BOD produced annually is estimated to have been 8.1 billion pounds. Almost 90 percent, or 7.2 billion pounds, came from increased production. About 12 percent of the increase attributable to industrial production was due to increased demand for products resulting from population growth. The remaining 88 percent was due to increased per capita consumption of goods.

Many other measures of pollution, aside from BOD, are being monitored and are relevant in assessing water quality. For example, BOD does not measure the rate of eutrophication—or aging—of the Nation's lakes and rivers. Nor does it tell the extent to which toxic materials, such as mercury and other heavy metals and pesticides, are entering the water. Nor does it measure the amount of nonbiodegradable chemical wastes polluting the water.

Although the BOD level of wastes actually discharged has remained roughly constant in recent years, the overall quality of the Nation's waters probably has deteriorated because of accelerated eutrophication, increased discharges of toxic materials, greater loads of sediment, and other factors. The increase in these pollutants has been generated by greater use of phosphates in laundry detergents, pesticides and fertilizers in agriculture, chemicals and metals in industrial processes, and increased construction. The Environmental Protection Agency estimates that almost one-third of U.S. stream-miles are characteristically polluted, in the sense that they violate Federal water quality criteria (see Figure 3 and Table 3). Less than 10 percent of U.S. watersheds were characterized by EPA regional offices as unpolluted or even moderately polluted. However, these estimates are quite subjective and are not based on actual monitoring data.

Although the data conflict, it appears that industrial wastes are the largest source of organic water pollution nationwide. Municipal and agricultural wastes are the next two largest sources. However, on the Pacific Coast and in the Plains States, agriculture is the prime cause of water pollution. In the Central States, municipal wastes are the major contributor, and in the Southeast and Northeast, industrial wastes predominate.

Agricultural pollution differs markedly from municipal pollution. Municipal sources discharge a relatively constant addition of pollutants to the Nation's waters. Agricultural pollution from feedlots and crop growing practices send out "slug loads" (large amounts at irregular time intervals) of organic pollutants plus nitrates, sediments, and sediment-associated phosphates which enter water bodies together with rainfall runoff. Irrigation discharges large quantities of nitrates plus millions of tons of other dissolved inorganic salts.

Figure 3

Estimated Prevalence of Water Pollution, by Drainage Basin, 1970

Source: Environmental Protection Agency

Data have been collected for several years on the number of fish killed each year by water pollution. These figures generally have shown an increase, from 6 million in 1960 to 15 million in 1968 and 41 million in 1969. However, this increase is accounted for, at least in part, by improved reporting of such kills. Many of the fish killed are "trash fish," such as carp. Because these fish can live in highly polluted waters, massive kills of these species emphasize the severity of the pollution and its impact on the environment.

Another measure of a particular form of water pollution is the number of significant oil spills. The figures for such spills are strongly influenced by changes in reporting requirements. But it is significant that the number of reported spills of over 100 barrels of oil in U.S. waters increased from approximately 67 in 1969 to 92 in 1970. The 1969 spills of over 100 barrels totaled 380,000 barrels of oil. This declined to about 185,000 barrels in 1970. A major part of the difference is traceable to a single spill of 218,000 barrels from the collapse of an onshore storage tank in Seewarren, N.J., in 1969. The dominant influence of very large spills can also be seen by comparing these figures to the 715,000 barrels discharged when the *Torrey Canyon* crashed off the

Table 3

Estimated Prevalence of Water Pollution, by Region, 1970

Region	Percent of stream miles polluted	Percent of watersheds polluted			
		Predominantly polluted [1]	Extensively polluted [2]	Locally polluted [3]	Slightly polluted [4]
Pacific Coast	33.9	14.8	59.3	22.2	3.7
Northern Plains	40.0	37.5	33.3	25.0	4.2
Southern Plains	38.8	27.3	51.5	18.2	6.1
Southeast	23.3	14.3	41.1	16.1	28.6
Central	36.6	23.2	51.8	21.4	3.6
Northeast	43.9	36.1	55.6	5.6	2.8
East of Mississippi River	31.6	23.0	48.7	15.5	12.8
West of Mississippi River	35.5	24.1	47.1	20.7	4.6
United States	32.6	23.7	48.5	17.7	9.9

[1] Predominantly polluted: ≥ 50% of stream miles polluted.
[2] Extensively polluted: 20—49.9% of stream miles polluted.
[3] Locally polluted: 10—19.9% of stream miles polluted.
[4] Slightly polluted: ≤ 10% of stream miles polluted.
Source: Environmental Protection Agency, Water Quality Office.

English coast in 1967. However, the amount of oil spilled accidentally on a worldwide basis probably accounts for less than 10 percent of all oil introduced directly into the earth's waters. The other 90 percent comes from routine activities of oil tankers, refineries, and gasoline filling stations.

According to the one study conducted recently, dumping wastes in the ocean apparently has declined over the past 2 years in the United States. This study examined ocean dumping (excluding dredge spoils) for the U.S. Pacific Coast. It determined that dumping has decreased sharply from 1 million tons in 1968 to 24,000 tons in 1971. A similar decrease is predicted for the rest of the United States. The decline in ocean dumping seems due to more stringent State and local regulation, particularly by the State of California, and the voluntary cessation of dumping in anticipation of Federal legislation.

radiation

For the general population the most significant amounts of radiation exposure are from natural background sources and medical applications. Background radiation comes from cosmic rays and radioactive material naturally existing in the soil, water, and air as well as within our bodies. The average background level is in the range of 100 to 125 millirems per year. (One millirem equals 1/1,000th of a rem. Rem stands for "roentgen equivalent man" and reflects the amount of radiation absorbed in human tissues and also the quality of the type of radiation.)

The current Federal radiation protection guides call for maximum limits of 500 millirems per year (for whole body exposure) from all manmade sources excluding medical sources for individual members of the general public, and 170 millirems per capita per year for population groups—based upon a suitable sample of those exposed. Keeping exposures as low as practicable below these numerical values is a fundamental aim of radiation protection measures.

Manmade sources of radiation include medical devices and pharmaceuticals, nuclear weapons tests and nuclear power facilities, devices used in industry and science, and radiation-releasing consumer products such as color TV sets and luminous dial watches. The National Academy of Sciences is now conducting an extensive study for the Environmental Protection Agency which will include an analysis of the contribution of various sources to man's total radiation exposure. The study will be completed within the next year.

Environmental radiation levels have declined markedly since the early 1960's because of the moratorium on nuclear weapons tests in the atmosphere (see Figure 4). The peaking in the early

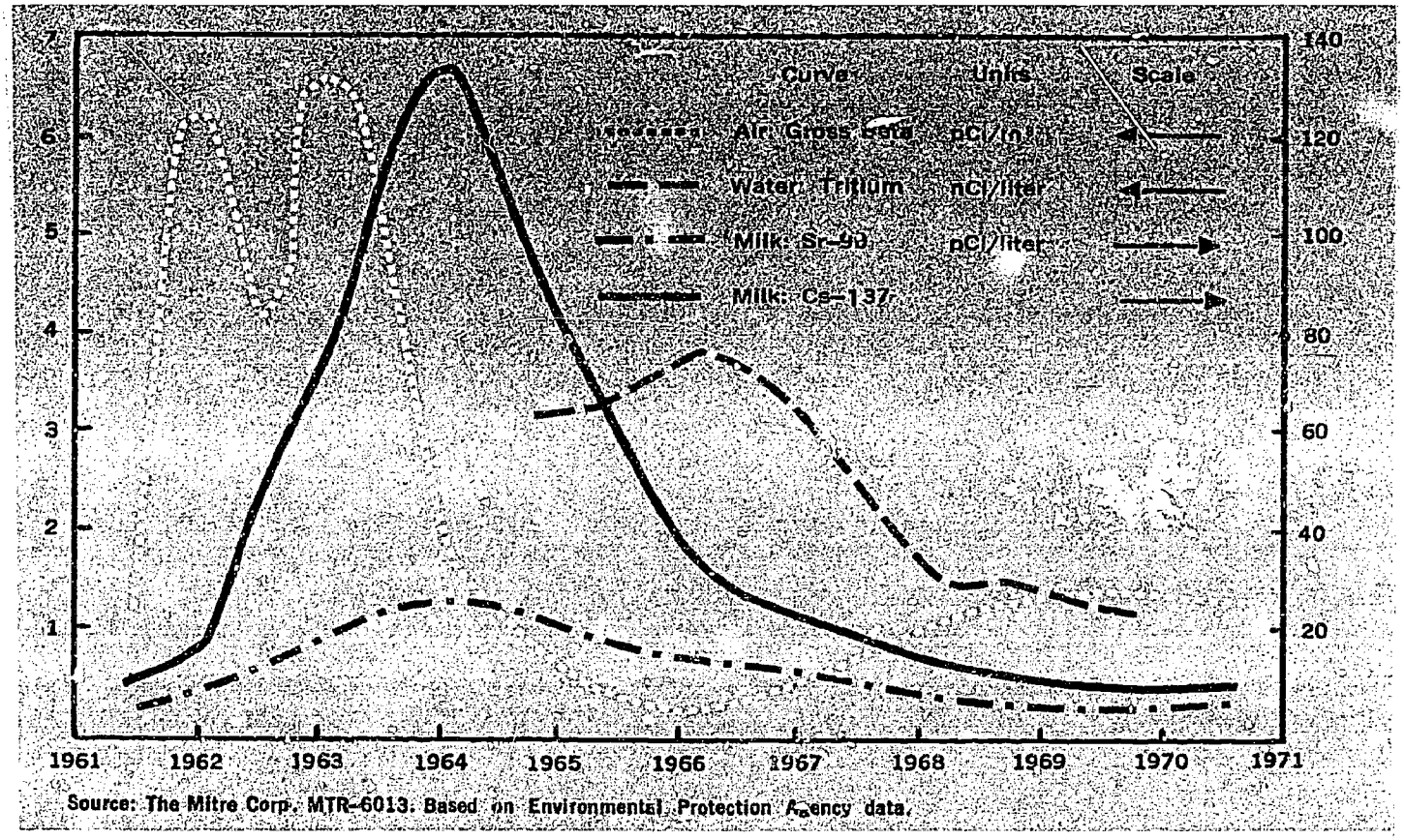
1960's was due largely to an increase in nuclear testing just before the moratorium.

Although nuclear powerplants have increased over the last decade in terms of electrical energy output, their contribution to environmental radiation remains relatively small. A 1969 study of 13 operating powerplants concluded that the annual dose to the total population living within 50 miles of these sites averaged about 0.01 millirems. This compares to a typical additional exposure dose of 2 to 4 millirems for a coast-to-coast airplane flight and is well below 1 percent of both the radiation protection guides and typical natural background exposure. As discussed in Chapter 1, the Atomic Energy Commission has recently proposed new regulations limiting radioactivity in effluents from nuclear powerplants.

The largest source of manmade radiation stems from X-rays and other medical uses of radiation. In 1964 the average annual genetically significant dose from diagnostic medical X-rays was 55 millirems per person. The "genetically significant dose" means the average dose to the sexual organs of persons of child-bearing age. It is generally believed that radiation exposure from medical

Figure 4

Selected Radioactivity Trends



Source: The Mitre Corp., MTR-6013. Based on Environmental Protection Agency data.

sources has increased over the past 7 years because of increased use of X-rays. Estimates for the 1970 genetically significant dose based on such factors as hospital examination rates and X-ray film sales range from 60 to 95 millirems. A better value will be available next year after an extensive HEW field survey of X-ray exposures is completed.

pesticides

Since the publication of Rachel Carson's *Silent Spring* 10 years ago, the use of chemical pesticides has stirred intense controversy and concern. The major concerns fall into three categories: acute toxicity to humans, chronic (or delayed) toxicity to humans, and adverse effects on the natural environment.

An acutely toxic effect is immediate injury to a person who comes in contact with chemicals, either accidentally or in crop harvesting or while applying the chemical without exercising proper caution. Delayed health effects, which have been produced experimentally in laboratory animals, are those such as liver injury, damage to the nervous system, or cancer. In man it may be many years before actual symptoms appear.

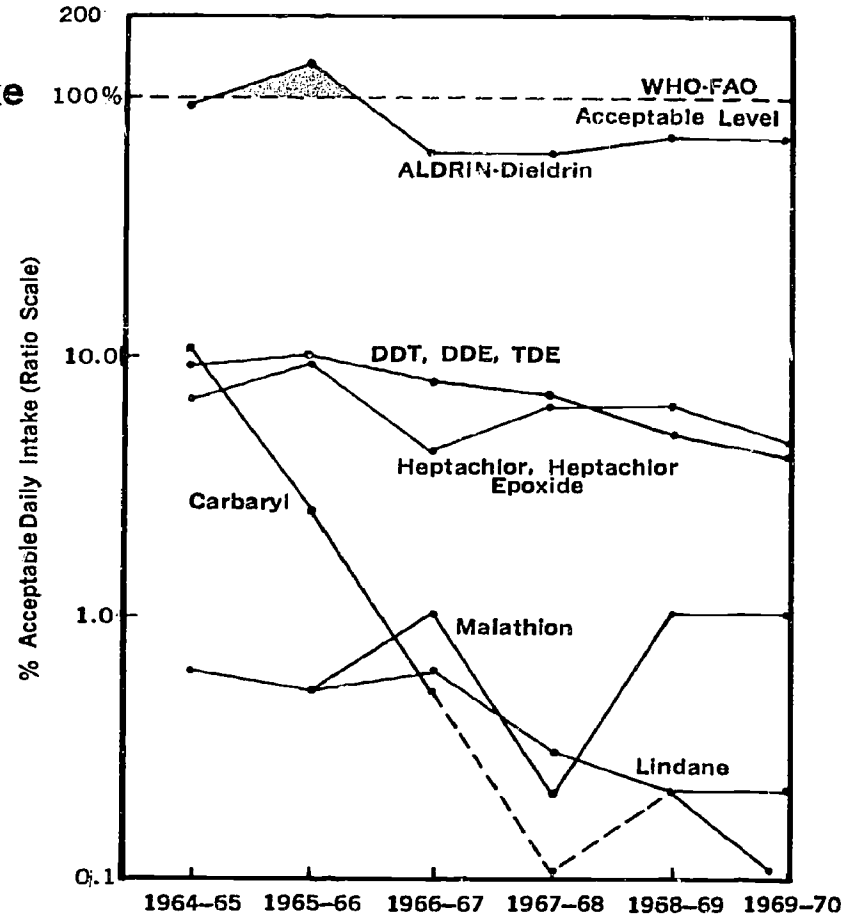
It has been well established that human beings have accumulated pesticide residues in their bodies. The average young American child contains about 5 parts per million DDT. The content in older persons is slightly higher. DDT and other pesticides have been observed to cause measurable changes in body chemistry. However, there is no conclusive evidence that pesticide dosages found in the environment, or even doses several times the normal exposure, lead to any increase in disease or illness.

There is information about the movement of pesticides through the environment and the routes by which man is exposed to particular chemicals, but even these data are scanty. We do not know how much of human exposure to pesticides is via air, water, or food. The amounts of particular pesticides in food are subject to detailed regulation and thus have been fairly carefully monitored. The results of this monitoring are shown in Figure 5. It shows the level of particular pesticides found in a typical diet, as a percentage of the standards established by the World Health Organization. With one exception (aldrin-dieldrin), the dietary intake for each pesticide is well below the allowable standards. This general finding is reinforced by the fact that the foods examined by the Food and Drug Administration (FDA) in recent years have generally contained far less pesticide residue than is allowed by FDA—and now EPA—tolerances.

The principal documented ill effects of pesticides have been on the environment—specifically on birds, shellfish, wildlife, and beneficial insects. Like humans, these creatures can be sickened

Figure 5

Dietary Intake of Selected Pesticide Chemicals



Source: Inner City Fund. Based on U.S. Department of Health, Education, and Welfare, Federal Drug Administration data.

or killed by acute exposure to pesticides. Of 69 bald eagles found dead in 25 States between 1966 and 1968, eight had lethal levels of dieldrin in the brain and another probably died of DDT poisoning. In May 1971, 48 bald eagles were discovered dead in Wyoming. It was determined in the wake of a public outcry that many of the eagles had been killed by thallium, a highly persistent and toxic poison used in animal control.

Less visible, but of greater ecological importance than the deaths of individual creatures, is the impact on whole wildlife populations by chronic environmental exposure to pesticides. This is discussed later in this chapter in the section on wildlife.

U.S. production of pesticides totaled 1,133 million pounds in 1969. Another 6 million pounds was imported, while 409 million pounds was exported, making a net domestic usage of 730 million pounds. This represents a slight decline from previous years.

Pesticides are grouped into classes according to their chemical composition and the type of pest they are designed to control. About half of U.S. pesticides production was insecticides, among them chlorinated hydrocarbons (e.g., DDT, dieldrin, toxaphene,

Mirex), organophosphates (e.g., malathion, parathion), carbamates (e.g., carbaryl), botanicals (e.g., pyrethrins), and inorganics (e.g., lead arsenate).

The three types of pesticides which have caused the most worry in recent years are the chlorinated hydrocarbon and organophosphate insecticides and the phenoxy herbicides. Although the chlorinated hydrocarbon insecticides are low in acute toxicity, they degrade slowly in the environment and are soluble in body fat. Therefore, they persist in the environment and are concentrated by animals and man through the food chain. Low environmental concentrations may be multiplied many times by this phenomenon, resulting in the effects discussed above. The organophosphate insecticides are generally not very persistent. They are, however, much more acutely toxic and more dangerous to formulators, applicators, and persons accidentally ingesting the chemical. They are also more expensive, and because they are nonpersistent require repeated applications to achieve adequate control.

In recent years there has been a trend away from the use of persistent pesticides and toward the substitution of organophosphate chemicals for insect control. There has also been a significant increase in the use of herbicidal chemicals. These trends are partially illustrated in Figure 6, which is based on production of pesticide chemicals. However, the figure does not show the increased use of organophosphates. The data on herbicide use include military use, and thus much of the increased consumption between 1965 and 1968 is from use of 2, 4–D and 2, 4, 5–T in Vietnam. The reasons for the sharp drop in the aldrin-toxaphene group in 1968 are not clear.

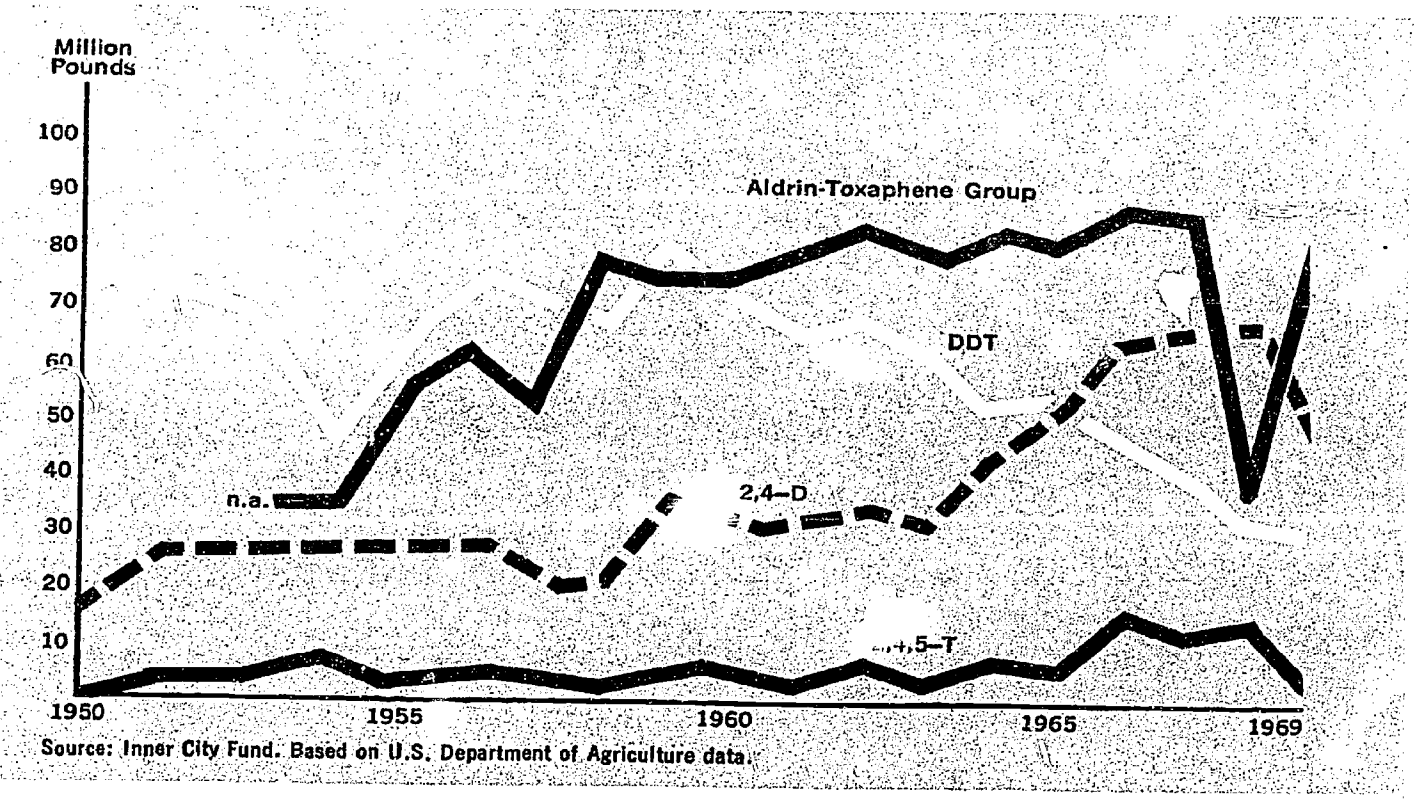
The trend toward using less persistent but more toxic pesticides should eventually alleviate some of the adverse environmental effects which have been caused by pesticides. However, it will probably also result in a higher incidence of accidental poisonings. Several deaths were reported last year in North Carolina as due to exposure to parathion, an organophosphate insecticide used as a substitute for DDT.

toxic substances

Within the past months, increasing concern has surfaced over the problems of metals and small amounts of organic chemicals in the environment. Primary attention has focused on metals—particularly mercury. The increasing consumption of some metals with known toxic properties is shown in Table 4.

High levels of mercury have been reported in both salt and freshwater fish. There is evidence to indicate that the mercury problem may become even more acute and that the levels in fresh water fish will rise over the coming years. There is a great

Figure 6
Domestic Use of Selected Pesticides Estimated from Production Levels, 1950–69



Source: Inner City Fund. Based on U.S. Department of Agriculture data.

amount of mercury deposited in bottom sediments, and the rate at which these deposits are absorbed by micro-organisms will increase. This is because a larger number of micro-organisms are being produced by the increase in amounts of nutrients entering U.S. waters. Thus more mercury will be available to the fish which feed on the micro-organisms, and in turn, to humans who feed on the fish. Some of the efforts to stem the flow of mercury into the environment have been described in Chapter 1.

Lead, another heavy metal potentially dangerous to health, has been increasing in the environment. A 1971 EPA-supported study found that lead levels in the air have increased significantly over the past 7 years at several locations in Cincinnati, Los Angeles, and Philadelphia. All the sites monitored for lead in these cities showed increases ranging from 2 to 64 percent over the 7-year span. Another study showed lead levels in the air in San Diego, Calif., rising at the rate of 5 percent a year. Another study states that the upper layers of the oceans seem to be polluted with industrial lead and that lead seems to be entering the oceans through rivers at greater rates today than was common in the past. Atmospheric levels of lead may be reaching the point at which widespread adverse health effects are likely, although the

Table 4

Estimated U.S. Consumption of Selected Metals, 1948 and 1968

Metal	Total estimated consumption [1] (in tons)		Percent increase 1948–1968
	1948	1968	
Arsenic (As_2O_3)	24,000	<25,000	<4
Barium (barite)	894,309	1,590,000	78
Beryllium (beryl)	1,438	8,719	507
Cadmium	3,909	6,664	70
Chromium (chromite)	875,033	1,316,000	50
Copper	1,214,000	1,576,000	30
Lead	1,133,895	1,328,790	17
Manganese (ores, 35% or more Mn)	1,538,398	2,228,412	45
Mercury	1,758	2,866	63
Nickel	93,558	159,306	70
Selenium	419	762	82
Silver [2]	3,611	4,983	38
Vanadium	[3] NA	5,495	
Zinc	<1,200,000	1,728,400	44

[1] Includes stocks released to the open market by the Federal Government and imports; does not include exports.
[2] Consumption by industry and arts; monetary consumption not included because much was stockpiled.
[3] Figures not available between 1946 and 1955; consumption in 1946 was about 748 tons, in 1955 about 1,700 tons.
Source: U.S. Department of the Interior, Bureau of Mines.

relationship between atmospheric levels and levels in the blood has not been determined, and the danger posed by current levels of lead in the atmosphere is uncertain.

Overall monitoring of particular toxic substances in the environment requires knowledge of all sources of exposure. Such data have not yet been collected in a systematic fashion. However, steps are underway to build an integrated framework for such monitoring. Also, as our knowledge of heavy metals and other toxic substances expands, new problems will become apparent. For example, it has been suggested that other elements, such as cadmium and arsenic, may concentrate in highly toxic forms in a fashion similar to mercury. The existence of such processes has not been proved, but the possibility illustrates the need for much greater knowledge about the paths of pollutants through the environment.

solid waste

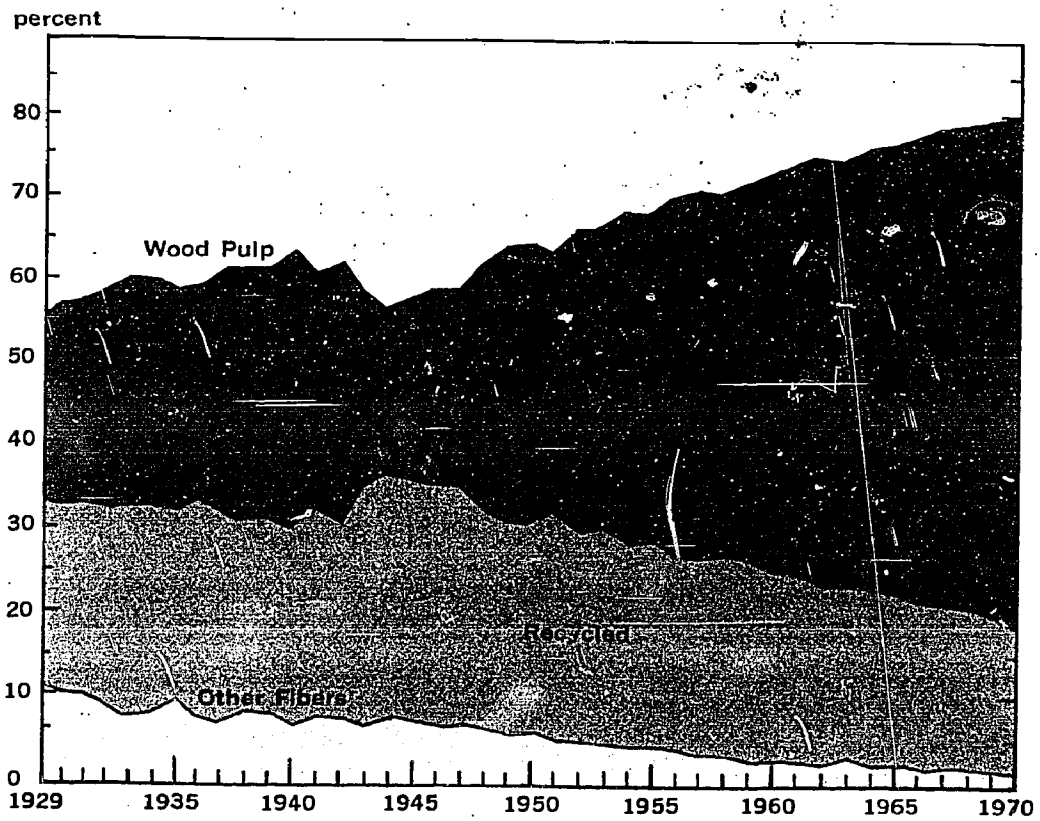
It is generally assumed that the per capita production of solid waste has increased over the past few years. There are few data

to measure this increase—nor are there sufficient data on how adequate the disposal methods are. The figures which do exist relate primarily to the amount of wastes collected. And even these are incomplete and difficult to analyze in a meaningful way. For example, the amount of wastes collected in a community may be increased by outlawing backyard burners. It may be decreased by installing home garbage grinders, although grinders will increase liquid wastes and put greater pressure on the capacity of the community's sewage treatment facilities.

Any truly satisfactory solution to the problems of waste must involve changes in our definition of what "waste" is. We now have the technology to recycle much of the material that is treated as waste and thereby return it to useful purposes. However, market and other incentives in recent years have tended to work against recycling. As a result we reuse less and less as population, per capita consumption, and changes in production processes add increasingly more and more to the amount of material which must be disposed. Figure 7 indicates the steadily decreasing reliance on recycled materials in the manufacture of paper. The trends in many other major industries are similar.

Figure 7

Trends in Composition of Paper



Source: Midwest Research Institute.

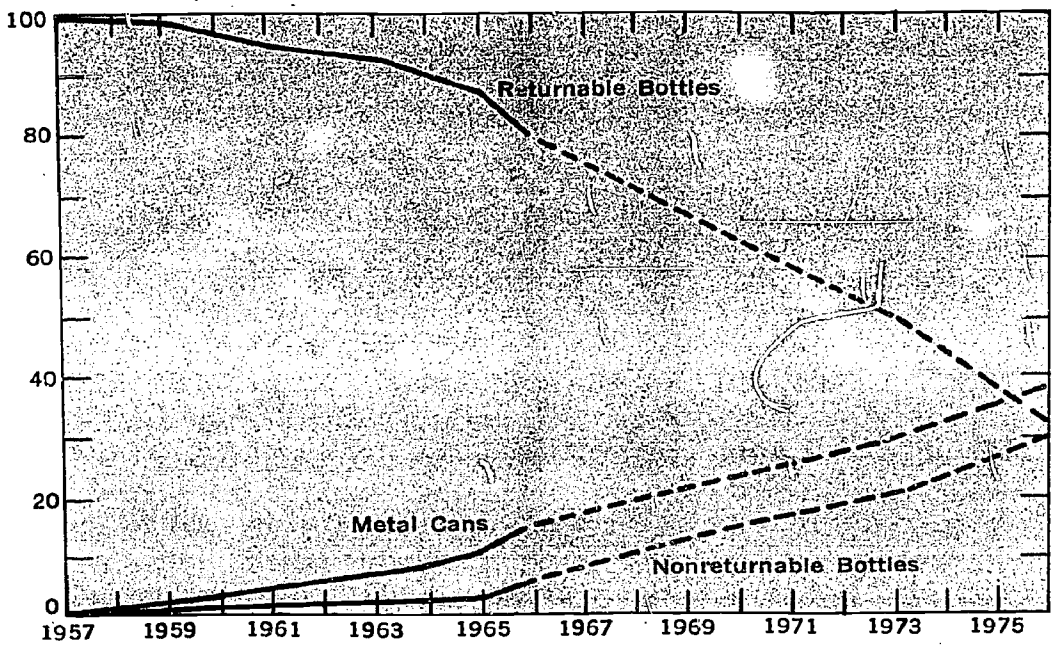
The use of scrap in making aluminum, copper, zinc, and lead increased between 1963 and 1965, reached 40.9 percent of material used in 1965, and then declined to 38.6 percent in 1967, the last year analyzed. Retreaded tires used as a percentage of total tire consumption declined from 27.3 percent in 1958 to 18.5 percent in 1969.

In some industries, the amount of material recycled has stayed generally constant. However, there has been increasing reliance on reusing wastes produced in the factory and thus a decrease in the waste materials purchased. For the past 15 years, scrap has provided about 50 percent of the total material used in iron and steel production. But the percentage of scrap purchased has declined because of greater utilization of factory wastes.

The same trends away from reuse and toward higher per capita consumption can be seen at the consumer level. The consumption of packaging materials has increased from 404 pounds per capita in 1948 to 578 pounds per capita in 1970. It is expected to rise to more than 660 pounds per capita by 1976. Figures 8 and 9 confirm the visual evidence along our highways—that more and more packaging is nonreturnable, and a portion will end up as litter. The projections indicate that this trend will continue for

Figure 8

Soft Drink Containers by Type, 1957–76

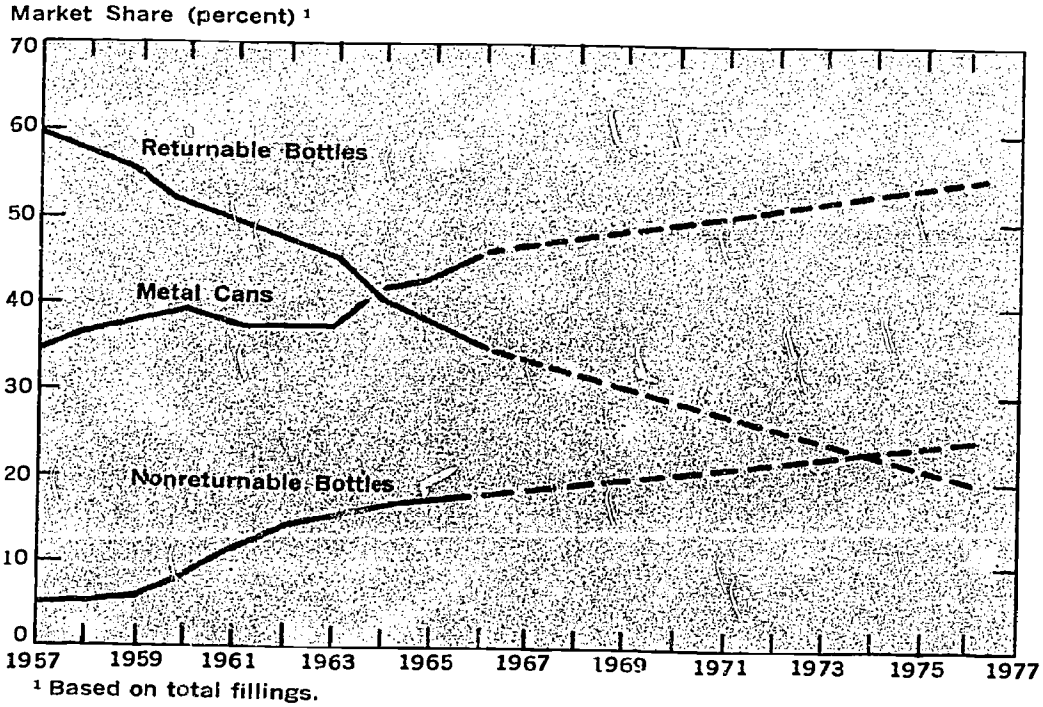


[1] Based on total fillings.

Source: Midwest Research Institute.

Figure 9

Beer Containers by Type, 1957–76



1 Based on total fillings.

Source: Midwest Research Institute.

the foreseeable future. But there have been recent efforts to reduce some portion of these wastes by establishing redemption centers from which containers are recycled.

wildlife

All forms of wildlife play some role in the ecosystem, so that their survival, in adequate numbers, may be important to the health and stability of the environment. Removing predators, for example, may result in a population explosion of rodents that the predators formerly helped control. Consequently, the status of the Nation's wildlife is of significance not only for its esthetic, scientific, recreation, or resource values but also for the role it plays in maintaining environmental quality and for what it indicates about that quality.

During the past year there has been increasing recognition of the broader environmental significance of wildlife. In October 1970, the New York State Court of Appeals ruled in favor of the Mason Act (an Act to protect depleted and endangered species of wildlife) on the grounds that it was necessary to protect the animals not only for their esthetic value and for scientific study but for their key ecological role. The court ruled, therefore, that

the protection of these animals is essential for the welfare of society. In June this year at the meetings of the International Whaling Commission, the United States took the position that the status of the world's whale populations is of American concern because of their role in maintaining the health of the marine environment as well as their potential commercial value.

There has been a significant trend toward increased public use of wildlife for nonhunting, noneating purposes—mostly viewing and photographing. The largest area of wildlife habitat on public lands in the country is managed by the Bureau of Land Management, and its visitor use data provide a good indicator of this trend. During the past year there has been more than a 10 percent increase over 1969 in total visitor days, and 88.2 percent of this increase was in visits for nonconsumptive wildlife uses. Hunting visits dropped nearly 2 percent, fishing visits increased 6.4 percent, and nonconsumptive visits increased by 25 percent (Table 5).

Table 5

Use of and Estimated Demand for Bureau of Land Management Lands, 1968–70 and 1980

(In millions of visitor days)

Year	Use			
	Hunting	Fishing	Nonconsumptive	Total
1968	5.2	4.4	6.0	16.4
1969	5.7	4.7	7.5	18.1
1970	5.6	5.0		
1980 estimates:				
Low	7.1	6.2	9.8	23.1
Medium	7.5	8.1	11.3	26.9
High	10.1	9.2	13.5	32.8

Source: Department of the Interior, Bureau of Land Management.

This trend is apparent on other public lands. In America's National Forests big game populations and the hunter visitor days have remained almost static in recent years (Table 6). Sport fishing has shown a similar trend. However, while hunting and fishing use has remained relatively constant, the total use of these lands has increased significantly, indicating again the trend toward increasing nonconsumptive use of wildlife resources.

Traditionally, however, wildlife has been equated with "game." Most use of wildlife, and consequently, most research and management effort, have been associated with harvest. Wildlife provided an important food source in pioneer times, and sport hunting has been an important recreation activity since then. Today nearly 14 million Americans are hunters of big and small game.

Table 6

Sportsman Use of National Forests, 1966–70 [1]

(In millions of visitor days)

Year	Use		
	Hunting	Fishing	Total
1966	14.1	16.2	30.3
1967	13.1	14.7	27.8
1968	13.2	14.0	27.2
1969	14.0	14.5	28.5
1970	14.1	14.9	29.0

[1] Does not reflect non-consumptive visitor days.

Source: Department of the Interior, Bureau of Land Management.

Fishing is pursued by other millions as a form of recreation, and it also supports a sizable commercial industry. The West Coast and Alaskan shellfish and finfish industries, for example, produce an annual catch valued in excess of $160 million and employ 56,000 people.

The traditional game animals include most of the larger North American mammals—blacktail, whitetail, and mule deer, elk, moose, antelope, caribou, mountain goat, bighorn sheep, wild pigs, and bears. Small game includes squirrels, rabbits, and many furbearers, such as muskrat, raccoon, mink, and fox, which are widely trapped for their pelts. Game birds include ducks, geese, doves, pheasants, pigeons, turkey, quail, grouse, and partridges. In the United States and its adjacent waters, there are about 400 species and subspecies of native mammals and just under 800 species of birds. Consequently, although they receive nearly all the direct research and management attention, the game birds and mammals constitute a very small percentage of the total number of species of American wild birds and mammals.

There is far more information available on the status of game than on nongame species. On a nationwide basis during the past year, the populations of most big game mammals have remained relatively stable, as have most other game species. Exceptions include the mourning dove and the black duck, both of which have been declining in numbers since the 1950's in spite of intensive management.

In most cases data on the status and recent trends of nongame species are relatively poor. Rare and endangered species have received special attention, in part because of the passage of the Endangered Species Conservation Act of 1969. The Bureau of Sport Fisheries and Wildlife published a revised list of endangered native species in October 1970. Compared with the previ-

ous list, five species had been removed but 21 had been added, bringing to 101 the total number of species of birds, mammals, fishes, reptiles, and amphibians on the present list. In the case of mammals, about 17 percent of the total wild species of the United States and surrounding waters are now listed as "rare," "endangered," or "status undetermined." Some mammalogists have estimated that if more complete data were available, about one third of the mammal species of the United States would be on this list.

From the available evidence, it would appear that populations of many—but by no means all—species of nongame wildlife are declining to some degree. The species high on the food chains, particularly the large predatory mammals and birds, appear to be deeply affected. Animal control activities, especially those using poisons, combined with pesticides and other toxic substances in the environment also contribute to the decline. Pesticide residues and other toxic substances are concentrated as they pass up through the food chain. This means that top predators receive particularly high dosages. Either this is lethal in itself or it may affect reproduction by causing a thinning in egg shells of birds. Research in 1970 showed thinning of egg shells in 21 bird species, most of which are fish eaters. Declining populations have been related to this thinning in six or seven species. The nearly total reproductive failure of the Brown Pelican off California and the current decline among Eastern Brown Pelicans has been traced to shell thinning and pesticide residue content. A 1970 survey by Cade and Fyfe (published in the *Canadian Field Naturalist*) of the Peregrine Falcons in North America concluded that the falcon population was continuing its marked decline because of exposure to chlorinated hydrocarbons and that "at the current rate of decline, the peregrine may become extinct in North America in this decade."

The average residue of organic chlorinated compounds in American eagles did not increase in 1970. However, environmental poisons (aldrin, dieldrin, lead, mercury) now rank third as a causal agent in the deaths of these birds.

Animal control activities, particularly those involving the unrestricted use of persistent poisons, pose a serious threat to bird and mammal predators. The eagles poisoned in Wyoming, discussed above under pesticides, illustrate well the nature of this problem.

Habitat changes impact on all wildlife populations. Losses of wetlands, open space, and other environmentally critical areas are discussed below in the section on land use. Drainage programs, channelization, and changes to more intensive agricultural practices continue to reduce or alter wildlife habitat, particularly on the Nation's private lands. Water pollution continues to damage the habitats of fish and some other kinds of

wildlife, and there are increasing numbers of pollution-related fish kills.

Finally, a new and serious threat to wildlife comes from the rapidly increasing use of off-the-road vehicles—large numbers of pickup trucks, four-wheel-drive cars, snowmobiles, dune buggies, motorcycles, trail bikes, and others. The unrestricted use of these vehicles has already seriously altered the fragile desert environments and is affecting all other habitats they touch. They affect wildlife both by tearing up the habitat and by hunting or disturbing it directly. Snowmobiles are particularly destructive to wildlife, because they let their riders chase down and kill, intentionally or otherwise, animals already weakened by winter conditions.

Diversity is an important environmental factor in part because of the stability it gives to ecosystems. As we progressively simplify the ecosystem through such activities as single-crop agriculture, we make our environment more vulnerable to sudden and often disastrous changes. The diversity of wildlife thus serves as a significant component and indicator of environmental quality.

population

Population is a critical environmental factor. Its growth contributes to most other environmental problems. Moreover, the density and distribution of population are intrinsically important in determining the quality of the environment.

The 1970 population of the United States was 204 million. This is double the population in 1920. At the current rate of growth, we will reach 300 million around the year 2008.

The large number of persons now in the child-bearing-age range makes continued population growth all but inevitable. The Commission on Population Growth and the American Future reports:

> Even if immigration from abroad ceased and families had only two children on the average—just enough to replace themselves—our population would continue to grow until the year 2037, when it would be a third larger than it is now.

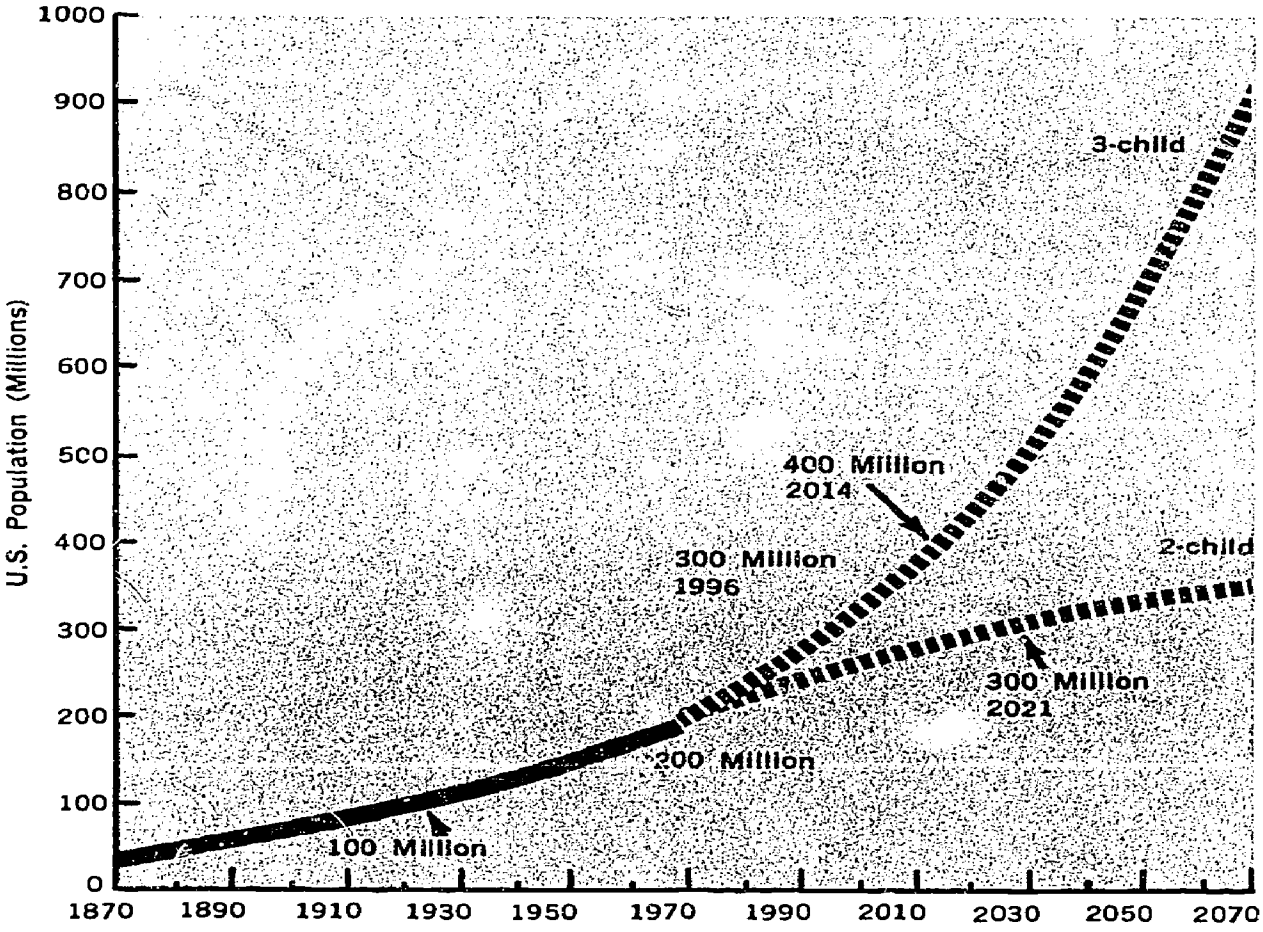
The effects of a three-child family versus a two-child family are shown in Figure 10.

The Commission has also commented on the difficulties of achieving zero population growth now:

> Our past rapid growth has given us so many young couples that they would have to limit their childbearing to an average of only about one child to produce the number of births consistent with immediate zero growth. Ten years from now, the population under 10 years old would be only 43% of what it now is, with disruptive effects on the school system and ultimately on the number of persons entering the labor force. Thereafter, a constant total population could be maintained only if this small generation in turn

Figure 10

Projected U.S. Population: Effects of 3-Child and 2-Child Families



Source: Commission on Population Growth and the American Future.

had two children and their grandchildren had nearly three children on the average. And then the process would again have to reverse, so that the overall effect for many years would be that of an accordion-like mechanism requiring continuous expansion and contraction.

Although stabilization of population at the current levels does not seem possible, there is widespread recognition that population growth is a problem that must be explicitly considered in government planning and policy. It is particularly essential that population growth be considered with respect to its impact on the availability of natural resources. The report of the Commission on Population Growth and the American Future, due next year, should provide a benchmark for further efforts.

land use

The characteristics of land use, whether of the manmade or the natural environment, are an essential part of environmental quality. In themselves they are a major factor in the quality of

our environmental experience. They are also important influences on many other environmental factors ranging from air pollution to the preservation of fish and wildlife.

Two categories of land—wetlands and open space—are under particular pressure from development.

Wetlands are the major food source and habitat for an enormous variety of birds, fish, and other wildlife. At least two-thirds of the world's entire fisheries harvest spends an essential portion of its life cycle in estuarine wetlands or is dependent on species that do. Open space is a critical resource for human enjoyment.

Unfortunately, it is impossible to give an adequate account of trends in these areas. Aggregate data do not show anything more than the general direction of movement. They fail to differentiate among particularly valuable wetland ecosystems and do not express the true losses or gains in animal or plant life as a consequence of destruction or conservation of a particular wetland. The students of a particular animal species may know that the elimination of a relatively few specific areas can eliminate the species. But gross data do not speak to losses of the rare or unique.

Similarly, open space data, even differentiated between recreation lands in urban and nonurban areas, fail to address the problems of convenient access, adequacy of facilities, or proximity to homes. But such data are necessary to indicate the contours of change—whether things are getting better or worse as leisure time, population, and use of outdoor areas increase.

The last comprehensive survey of the Nation's wetlands was conducted in 1955 by the Fish and Wildlife Service of the Department of the Interior. Not only are the figures from the survey now dated, but also it was oriented primarily toward waterfowl productivity and thus may not have covered all wetlands. It reported that 85 percent of the country's wetlands were inland fresh water areas, 5 percent were coastal fresh water areas, and 7 percent were coastal saline areas (see Table 7). The smaller acreage of the coastal wetlands should not obscure the fact that they provide most of the food for marine life. The inland wetlands serve primarily as places for waterfowl to nest and as critical factors in natural flood and drought control.

During the early years when America was first settled, there was an estimated 127 million acres of wetlands. By 1955 an estimated 75 million acres remained, and with each passing year the total acreage of wetlands declines. The two big causes of wetlands loss are drainage of land for agricultural purposes and dredging and filling for housing and other urban development. Between 1959 and 1966, nearly 138,000 acres of wetlands were drained each year for agricultural purposes just in the States of North Dakota, South Dakota, and Minnesota. This loss of wet-

Table 7

Inventory of Wetlands, by Type and by Region, 1955

(In millions of acres)

Region	Inland fresh	Inland saline	Coastal fresh	Coastal saline	Totals	Percent of total
Pacific North	0.3	0.3	<0.05	0.2	0.8	1
Pacific South	.6	1.2	<.05	.2	2.0	3
Central North	3.1	<.05	—	—	3.1	4
Central South	3.2	.1	.4	1.0	4.7	6
Mississippi North	12.0	—	—	—	12.0	16
Mississippi South	15.3	—	3.1	.7	19.1	26
Atlantic North	.8	—	.2	.6	1.7	2
Atlantic South	28.2	<.05	.3	2.6	31.1	42
Total[1]	**63.5**	**1.6**	**4.0**	**5.3**	**74.5**	—
Percent of total	**85.0**	**2.0**	**5.0**	**7.0**	—	**100**

[1] Totals may not add due to rounding.

Source: U.S. Department of the Interior, Fish and Wildlife Service.

lands, however, has been partially offset by the creation of new wetlands. According to the Department of Agriculture, approximately 239,000 acres of wetlands have been established for improved habitat for wetland wildlife in the United States. However, the wetlands that are created often are ecologically quite different from those lost and may not serve the same ecological functions or provide for the same type of wildlife use.

Gross data indicate that during the period 1954–64, New York and Connecticut lost more than 29 percent and 12 percent, respectively, of their coastal wetlands (see Table 8). An analysis of wetlands destruction resulting in estuarine habitat losses in New York, Florida, and California reveals that more than 200,000 acres valuable as habitat were lost to dredging and filling for various purposes between 1950 and 1969 (see Table 9).

Five hundred and seventy-five million acres of open land was available for public recreation in 1965, when the last comprehensive survey was completed; 447 million acres was Federal land, 45 million acres was State and local public land, and 83 million acres was privately owned.

Acquisitions by the Federal Government of land for National Forests and Parks have grown steadily in recent years: 241,000 acres of open space were acquired in fiscal 1969 through the use of funds from the Land and Water Conservation Fund—com-

Table 8

Loss of Coastal Wetlands, 1954–64

(In thousands of acres)

	1954		1964	Total losses (1954–64)	Percent lost (1954–64)
Maine	96.4	NA	96.4	<0.05	0.1
New Hampshire	9.9	NA	9.8	.1	1.4
Massachusetts	41.6	40.9	40.6	1.0	2.4
Connecticut	17.2	15.9	14.8	2.2	12.8
Rhode Island	2.3	2.2	2.2	.1	3.3
New York [1]	43.2	37.5	30.6	2.6	29.2
New Jersey	257.3	244.3	232.7	24.6	9.6
Delaware	120.1	116.9	115.5	4.6	3.8
Total	**588.0**	**NA**	**542.6**	**45.2**	**7.7**

[1] Long Island only.

Source: Inner City Fund. Based on U.S. Department of the Interior, Fish and Wildlife Service data.

Table 9

Loss of Estuarine Habitat to Dredging and Filling in Selected States, by Purpose, 1950-69 [1]

Purpose	New York		Florida		California	
	Acres	Percent of total	Acres	Percent of total	Acres	Percent of total
Industrial and commercial	7,693	43	[2] 37,181	21	[2] 40,736	85
Housing developments	2,148	12	15,750	10	2,261	5
Navigation	4,000	24	6,099	4	1,773	4
Nonboating recreation	1,359	8	.....	.....	51	.....
Sanitary landfill	974	5	.....	.....	.....	.....
Roads and airports	740	4	6,103	4	1,802	4
Marsh dike or drain	.....	.....	103,771	61	419	1
Total	**17,900**	.....	**168,904**	.....	**47,082**	.....

[1] New York, Florida, and California are representative of States experiencing heavy losses to dredge and fill operations.

[2] Includes miscellaneous private developments.

Source: Department of the Interior, Bureau of Sport Fisheries and Wildlife.

pared with only 33,800 acres in fiscal 1966 (see Table 10). However, this is only a very partial picture of Federal open space activities. Land for recreation and other purposes is acquired by several agencies of the Government under a variety of legal authorities. To some extent these acquisitions may be offset by Federal disposal of lands by a variety of agencies under a large number of separate legal authorities. The total acreage available for public recreation is shown in Table 11.

The enjoyment of open space does not necessarily require public access. Private farming and forestry activities near urban areas often provide scenic beauty and visual relief. Agricultural activities in metropolitan areas often supply sound and visual buffering and even pollution control. Seventeen percent of all farms in the contiguous 48 States are located within metropolitan counties. As farmland located in these areas is urbanized, the countryside withdraws farther from the central city, and the pattern of urban sprawl is re-enforced.

Among cities there is wide variation in the availability of parks. As shown in Table 12, per capita availability of parks in New York, Chicago, and Los Angeles was 4.6, 2.0, and 4.5 acres per 1,000 residents, respectively. Minneapolis and Nashville had

Table 10

Federal Land Acquisition for Outdoor Recreation Financed by Land and Water Conservation Fund, 1966–69

	1966	1967	1968	1969
Federal acquisitions (1,000 acres):				
National Park Service	4.4	52.6	56.2	117.6
Forest Service	29.4	78.4	87.2	162.4
Bureau of Sport Fisheries and Wildlife	—	—	2.6	.8
Total	**33.8**	**131.0**	**146.0**	**280.8**
Total costs (millions of dollars):				
National Park Service	5.5	26.1	19.2	69.3
Forest Service	2.5	13.6	9.2	16.1
Bureau of Sport Fisheries and Wildlife	—	—	1.2	1.2
Total	**8.0**	**39.7**	**29.6**	**86.6**
Costs per acre acquired (dollars per acre):				
National Park Service	1,250	500	342	590
Forest Service	85	173	106	99
Bureau of Sport Fisheries and Wildlife	—	—	462	1,500
Overall	**236**	**304**	**202**	**308**

Source: U.S. Department of Commerce, Bureau of the Census.

Table 11

Public Recreation Areas, by Location and by Level of Government, 1965

(In millions of acres)

	Urban [1]	Nonurban	Total
Federal	36.0	410.7	446.6
State	4.3	35.4	39.7
County	.7	2.3	3.0
Municipal	1.4	.6	2.0
	42.3	449.0	491.3

[1] Within standard metropolitan statistical areas.

Source: U.S. Department of the Interior, Bureau of Outdoor Recreation.

Table 12

Park Acreage in Selected Cities, 1968

City	Population (1,000)	Area (1,000 acres)	Population density per acre	Parks (1,000 acres)	Parks percent of total area	Park acreage per 1,000 residents
New York	8,171	192	42.6	38.0	19.8	4.6
Chicago	3,587	142	25.2	6.9	4.8	2.0
Los Angeles	2,874	296	9.7	11.9	4.0	4.5
Baltimore	924	48	19.3	6.1	12.8	6.2
San Antonio	722	39	18.5	2.9	7.5	5.8
St. Louis	685	116	5.9	2.7	2.3	4.2
Pittsburgh	564	35	16.1	2.4	6.7	4.1
Atlanta	517	87	5.9	2.3	2.7	4.9
Minneapolis	493	34	14.5	5.3	15.7	11.4
Nashville [1]	458	337	1.4	4.9	1.5	11.5
Oakland	391	33	11.6	2.0	6.0	6.2
Tampa	325	54	6.0	1.1	2.1	3.7
Dayton	281	24	11.7	3.1	13.2	10.5
Peoria	138	24	5.7	[2] 6.6	28.1	46.0
Portland	71	14	5.1	.7	4.7	9.8
Averages [3]	1,347	98	13.7	6.5	8.8	9.0

[1] Data for Nashville-Davidson County consolidated government.
[2] Includes acreage owned by the Park District beyond the district boundaries.
[3] Unweighted.

Source: National League of Cities.

more than 11 per 1,000. The park land to people ratio is remaining constant or rising slightly in a number of cities, partly because of diminishing populations in some central cities.

A number of important developments have taken place in land use over the past year. These have been described in Chapter 2.

conclusions

Although trends in a number of areas are promising, this chapter has not answered the question of whether overall environmental quality is getting better or worse. Probably any answer which could be given would be deceptive, because of the large number of factors that contribute to environmental quality and because these factors often vary independently, some getting better, others worse. However, we have also not provided definitive answers to the many subsidiary questions which could be asked. Is pollution getting worse? Is available open space increasing? And so forth. For these questions there should be answers, but the data are either not available or are not reliable enough to provide definitive answers. Efforts to collect additional data will have to be preceded by better definition and evaluation of requirements. In many cases, improved instrumentation and better understanding of natural phenomena are also necessary so that the measurements made will be meaningful.

A major part of the responsibility for providing an accurate picture of status and trends in the environment rests with the Council. We intend to place major emphasis in the coming year, working with EPA, NOAA, and other agencies, on improving environmental data collection and analysis. By next year the choice of appropriate environmental indices should be made. However, it will take a number of years before truly reliable data can be obtained for all of the indices. Major changes probably will be necessary in such basic matters as selection of monitoring sites, instrumentation, and frequency of samples taken. Implementation of these changes will then take several years.

appendix

explanation of figures and tables

The following explanations are given for those readers interested in more detail on how the figures and tables were derived.

figures

figure 1: trends in ambient levels of selected air pollutants—The values which are plotted in Figure 1 are listed in Table A–1. The TSP and SO_2 data were derived from EPA's National Air Surveillance Network (NASN) sites. These data were chosen because they were the only available

recent data for several pollutants and a number of sites. TSP values prior to 1967 and SO_2 values prior to 1966 have been published. (Ludwig, J. H., Morgan, G. B., and T. B. McMullen 1970. Trends in Urban Air Quality. *EOS,* Transactions. American Geophysical Union 51:468–475.) The remaining values were supplied by EPA personnel. (McMullen, T. B. 1971. Environmental Protection Agency, Division of Atmospheric Surveillance, Cincinnati, Ohio.)

TSP values prior to 1967 were based on the Whittaker-Henderson smoothing formula as applied to the o[illegible]l data. (Spires, R., and H. J. Levin. 1970. Characteristics of Particula[illegible]tterns, 1957–66. U.S. Department of Health, Education and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Raleigh, N.C.) Unfortunately, data were missing for some of the 60 urban and 20 nonurban stations. When this occurred, site values were supplied by averaging the value for the preceding year and the following year. This procedure appeared more desirable than either dropping stations with a missing or incomplete year or averaging the remaining values without regard to the missing sites. Dropping stations would rapidly decrease the number of sites available for analysis, whereas ignoring missing stations might cause spurious "trends" due to the exclusion of stations with relatively high or low values rather than to any real change.

The CO data were derived from EPA's Continuous Air Monitoring Program (CAMP) sites. The values prior to 1967 were derived from published summaries. (U.S. Department of Health, Education and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration. 1968. Air Quality Data from the National Air Sampling Network. NAPCA Pub. No. APTD 68–9.)

The existing data for various pollutants, years, and sites are extremely plentiful, but there are many changes in sites and pollutants from year to

Table A–1
Mean Annual Values (μg/m³) for TSP, SO_2, and CO

Year	TSP		SO_2	CO
	Urban	Nonurban		
1957	120.5	22.6		
1958	114.4	25.6		
1959	110.7	26.0		
1960	109.1	25.7		
1961	103.3	26.4		
1962	101.0	28.2	66.4	
1963	103.6	28.9	59.4	8360
1964	105.6	29.1	55.1	8690
1965	104.7	30.8	45.4	8930
1966	100.7	33.9	55.8	7900
1967	105.2	30.7	49.2	7450
1968	104.9	32.1	45.1	6530
1969	100.6	37.2	42.5	
1970	101.7			
Number of sites	60	20	21	6

Source: The Mitre Corp.

year. Currently there are a number of Federal networks and numerous State and local networks. These networks were established for different purposes; consequently, their data may also differ. The NASN urban sites are located in downtown, central city areas. The nonurban sites are generally located in parks. The CAMP sites are located in center-city areas. However, locations of sites for State and local networks vary. Often there are sites downwind of major polluters. It is important to recognize that such differences in site location will result in major differences in reported concentrations. Many of the State and local readings are higher by an order of magnitude than the NASN data used in this report, especially for gaseous pollutants.

figure 2: relationship of air pollution and population, second half 1969–first half 1970—The values plotted in Figure 2 are derived from NASN data for July 1969–June 1970. The two half-years were used to provide the most up-to-date data, because full-year figures for 1970 were not available. The values used in Figure 2 are given in Table A–2. The population class column in Table A–2 represents the end point of the ranges.

figure 3: estimated prevalence of water pollution, by drainage basin, 1970—The data in Figure 3 are the results of an effort by the Federal Water Quality Administration (FWQA, now the Office of Water Quality in EPA) in the summer of 1970 to make the first nationwide assessment of water quality. Field offices in the nine FWQA regions estimated the percentage of stream miles in each of the 233 second order watersheds in the contiguous United States (in addition to Alaska, Hawaii, Puerto Rico, Guam, the Virgin Islands, and American Samoa) that could be said to be polluted. Pollution was defined as a demonstrable and recurrent breach of any of the physical or chemical criteria applying to water bodies, and not merely as violation of regulatory requirements imposed upon waste dischargers. However, it should be stressed that Figure 3 is not based on actual measurements. It

Table A–2

Values for Pollutant Concentration Versus Population Class

Population class	Concentration (μg./m.³)			Number of sites
	TSP	SO_2	NO_2	
Nonurban	25	10	33	5
Urban, <10,000	57	35	116	2
>10,000	81	18	64	2
>25,000	87	14	63	2
>50,000	118	29	127	9
>100,000	95	26	114	37
>400,000	100	28	127	17
>700,000	101	29	146	9
>1,000,000	134	69	163	2
>3,000,000	120	85	153	2
Slope	9.152	6.103	12.109	
Intercept	41.467	.733	44.000	
Correlation coefficient	.865	.768	.848	
T Statistic	4.874	3.392	4.526	
P Value	<.005	<.005	<.005	

Source: The Mitre Corp.

represents simply the best judgement of the professionals in the FWQA regional offices.

figure 4: selected radioactivity trends—For many years, various national and State networks have been monitoring radiation due mostly to the fallout from atmospheric nuclear testing. (See Federal Radiation Council. 1965. Background Material for the Development of Radiation Protection Standards. Report No. 7.) Trends for several of the national networks have been plotted in Figure 4. When many of these data were plotted, the trend curves exhibited many small, more or less random fluctuations. Therefore, a smoothing technique known as "moving averages" was employed. This involved taking values, say A, B, and C, for three successive time periods, finding their average, and plotting it in B's place. The values were then advanced by one to consider B, C, and D, with their average being plotted in C's place, and so on through the list of values. A minor disadvantage of this technique is that two data points, one at either end of the curve, are lost. However, in this report the trends are not appreciably affected. It should also be noted that all the data in this graph are arithmetic averages without regard to population weighting. For example, a given concentration of Cs-137 in milk for New York City is equally important as the same concentration found in milk for Laramie, Wyo. Details of the networks and the graphical procedures are given below.

pasteurized milk network (pmn)—This network, sponsored by the Office of Radiation Programs, EPA, consists of 63 sampling sites. For each site, a monthly composite of weekly samples is analyzed for several radionuclides (K-40, Sr-89, Ba-140, Sr-90, I-131, and Cs-137). For most of the last decade, only the last three nuclides have consistently shown appreciable values.

Monthly network values appear in *Radiological Health Data and Reports* about 4 months after the reporting month. These values were aggregated into quarterly averages, given in Table A-3, which were smoothed by a moving average of order three.

radiation alert network (ran)—Originally known as the Radiation Surveillance Network, this program is administered by the Office of Air Programs, EPA. The nework samples airborne particulates daily at 73 sites for gross beta activity. Monthly network averages also appear in *Radiological Health Data and Reports,* with about a 4-month lag time. The monthly values were aggregated into quarterly averages, which are listed in Table A–4 along with similar quarterly averages of precipitation data gathered by the same network. After the data were smoothed by a moving average technique of order three, they were plotted to give the time profile as in Figure 4.

The double peak in 1962 and 1963 is characteristic of I-131, a shortlived beta emitter. As tempting as it may be to worry about the rise in the RAN data from 1966 on, apparently these data are in the region of poor detectability (or noise region). Moreover, in 1968 there was a change in the way the site data were reported: The significant digits were reduced from three to one. These two factors render any trend speculation at the observed low levels relatively meaningless.

tritium in surface water network—This network (in existence since May 1964) was established by the Public Health Service in cooperation with the Federal Water Pollution Control Administration (now the Office of Water Programs, EPA). Monthly composites of weekly samples are reported in six-month groupings (with about a year's lag time). For this report, semi-annual averages, given in Table A–5, were smoothed with a moving average of order three. The reliability of these data suffers from the small number of stations involved (10 originally, eight later) and the fact that there were many months when two or three sites did not provide a sample.

figure 5: dietary intake of selected pesticide chemicals—The values plotted in Figure 5 are based on the Food and Drug Administration's

Table A–3
Pasteurized Milk Network Quarterly Values

Quarter	Concentrations (pCi/liter) [1]		
	Sr-90	I-131	Cs-137
1961—1st	6	0	5
2d	8	0	15
3d	8	30	15
4th	9	61	11
1962—1st	8.7	10	11
2d	14.4	19	42
3d	14.8	40	62
4th	15.1	61	62
1963—1st	15.6	10	70
2d	25.9	0	112
3d	28.4	0	147
4th	24.2	- -	123
1964—1st	24.8	- -	136
2d	28.9	- -	133
3d	22.3	- -	94
4th	18.8	- -	73
1965—1st	19.9	- -	79
2d	20.7	- -	72
3d	15.3	- -	44
4th	14.6	- -	35
1966—1st	13.8	- -	35
2d	15.2	- -	36
3d	12.5	- -	25
4th	11.7	- -	20
1967—1st	10.8	- -	20
2d	10.9	- -	20
3d	9.9	- -	15
4th	8.8	- -	10.3
1968—1st	8.3	- -	10
2d	9.7	- -	12.3
3d	9.9	- -	12.4
4th	8	- -	11.2
1969—1st	7.3	- -	9.3
2d	8	- -	8.3
3d	7.8	- -	9
4th	7	- -	7.3
1970—1st	6.7	- -	6.7
2d	7.7	- -	8.3
3d	7.3	- -	10.7
4th	7.3	- -	7.7

[1] pCi = picocuries = 10^{-12} curies.
curie = unit of activity = 3.7×10^{10} disintegrations per second.

Source: The Mitre Corp.

Table A-4
Radiation Alert Network, Quarterly Values

Quarter	Concentrations	
	RAN (pCi/m³)	Precipitation (nCi/m²) [1]
1961—1st	----	----
2d	0.14	----
3d	4.24	34
4th	7.8	123.5
1962—1st	5.96	84.8
2d	3.87	82.3
3d	2.9	69.2
4th	7.3	89.6
1963—1st	6.3	74.4
2d	6.6	102.4
3d	3.1	51.9
4th	1.14	28.3
1964—1st	1.2	24.2
2d	1.69	33.9
3d	.59	17.3
4th	.50	15.7
1965—1st	.24	11.4
2d	.45	17.5
3d	.14	14.7
4th	.10	10
1966—1st	.10	11
2d	.27	24.3
3d	.11	14
4th	.21	13.7
1967—1st	.59	36
2d	.7	16
3d	.82	15.7
4th	1.01	18.3
1968—1st	.97	10.3
2d	1.12	51
3d	1.13	27.7
4th	1.23	20.3
1969—1st	1	13.7
2d	1	20.3
3d	2	16
4th	1	6.3
1970—1st	1	6
2d	1	10
3d	1.7	8.7
4th	.7	7.3

[1] nCi = nanocuries = 10^{-9} curies.

Source: The Mitre Corp.

Market Basket Survey (also known as the Total Diet Study). The Survey collects food samples from retail grocery stores six times a year in each of five geographic areas. The samples are collected from communities of varying size. The food is prepared for consumption and then analyzed.

The results obtained from this network are published periodically in the *Pesticides Monitoring Journal*. The latest results, covering through June 30, 1969, will appear in the September 1971 issue of the Journal. (Duggan, R. E., et al. Pesticide Residue Levels in Foods in the U.S. from July 1, 1963, to June 30, 1969.) The values plotted in Figure 5 and the figures on which they are based are given in Table A–6.

figure 6: domestic use of selected pesticides estimated from production levels, 1950–69—No nationwide figures are collected routinely on use of pesticide chemicals. Figure 6 is an attempt to approximate use for selected pesticides by taking the amount of a particular chemical produced in a given year, subtracting the net amount added to producers' inventories (or adding the amount lost from such inventories, if a net loss occurred), and subtracting the amount of exports. The data for the figure were obtained from U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. The Pesticide Review [1963–70] and The Pesticide Situation for [1963–70] (issued annually). The values plotted in Figure 6 are given in Table A–7.

figure 7: trends in composition of paper—The figure is from Midwest Research Institute. 1970. Economics of Salvage Markets for Commodities Entering the Solid Waste Stream. Report to U.S. Department of Health, Education, and Welfare. Bureau of Solid Waste Management (now in EPA) (unpublished).

Table A–5

Tritium in Surface Water Network, Half Year Values

Half year period	Tritium concentrations (nCi/liter)
1964	3.67
	2.98
1965	2.74
	3.30
1966	4.65
	3.76
1967	2.31
	1.85
1968	1.69
	.81
1969	2.35
	.81
1970	.66

Source: The Mitre Corp.

Table A-6
Dietary Intake of Selected Pesticides

			1964–65			1965–66			1966–67			1967–68			1968–69			1969–70		
Compound	FAO/WHO acceptable daily level mg./kg.	Daily intake mg./kg.	Percent acceptable intake	Daily mg.	Daily intake mg./kg.	Percent acceptable intake	Daily mg.	Daily intake mg./kg.	Percent acceptable intake	Daily mg.	Daily intake mg./kg.	Percent acceptable intake	Daily mg.	Daily intake mg./kg.	Percent acceptable intake	Daily mg.	Daily intake mg./kg.	Percent acceptable intake
Aldrin	.001	.002		.001			T			T			T			T	.0004	4.00
Dieldrin	.005	.007		.004			.004			.005			.005			.005		
Total	.0001	.0029	90.0	.0013	.00006	60.0	.00006	.00007	70.0		.00007	70.0		.0007	70.0			
Cabaryl	.02	.150	10.5	.026	.0005	2.50	.007	.0001	.500									
DDT		.0021		.041			.026			.019								
DDE		.031		.028			.017			.015								
TDE		.018		.018			.013			.011								
Total	.01	.0009	9.00	.0010	.0008	8.00	.0007	.0007	7.00		.0005	5.00		.0004	4.00			
Lindane	.0125	.004	.560	.004	.00006	.480	.005	.00007	.560	.003	.00004	.320	.001	.00002	.160	.001	.00002	.160
Heptachlor	> .001	.001					> .001			> .001			> .001			> .001		
Heptachlor epoxide		.002		.003			.001			.002			.002			.001		
Total	.0005	.00033	6.60	.0005	.00005	10.0	.00021	.00021	4.20		.00031	6.20		.00032	6.20		.00021	4.20
Malathion	.02	—	0	.009	.001	.500	.010	.0002	1.00	.003	.00004	.200	.012	.0002	1.00	.003	.0002	1.00

1 mg./kg. = 1 mg. daily intake ÷ 69 kg. (average weight of 16 to 19-year-old male).

Percent acceptable intake = (mg./kg. actual ÷ mg./kg. FAO–WHO) × 100

Source: Inter City Fund

figure 8: soft drink containers by type, 1957–76—Figures 8 and 9 are taken from Darnay, A., and W. E. Franklin, 1969. The Role of Packaging in Solid Waste Management 1966 to 1976. Public Health Service Pub. No. 1855. Figure 8 appears on page 43 of the report, Figure 9 on page 45.

In both figures, the 1957–66 data are from industry sources. The 1967–76 projections were developed by Darnay and Franklin.

figure 9: beer containers by type, 1957–76—See Figure 8.

figure 10: projected U.S. population: effects of 3-child and 2-child families—Figure 10 is from page 10 of An Interim Report from the Commission on Population Growth and the American Future. The 1890 to 2020 values are based on U.S. Bureau of the Census figures. Beyond 2020, values are based on projections made by the Commission.

tables

table 1: estimated emissions of air pollutants, by weight, nationwide, 1969—The 1969 estimated emissions in Table 1 are EPA data based on a revised computation procedure which includes additional sources, improved emission factors, and better information on control technology. The most significant changes are:

(1) Motor vehicle emissions are now estimated by a new test cycle, which results in much higher emission values for carbon monoxide.

(2) Aircraft emissions are now estimated for cruise altitudes as well as below 3,500 feet.

Table A-7

Values for Domestic Use of Selected Pesticides[1]

(In thousands of pounds)

Year	Aldrin-toxaphene group	DDT	2,4-D	2,4,5-T
1950	NA	57,638	17,600	1,261
1951	NA	72,688	23,494	2,822
1952	NA	70,074	25,298	2,93[illegible]
1953	34,050	62,500	26,634	4,645
1954	35,420	45,117	27,251	2,906
1955	54,400	61,800	28,000	2,500
1956	61,570	75,000	28,000	4,000
1957	52,500	71,005	20,500	1,800
1958	78,834	66,700	21,300	3,800
1959	73,331	78,682	34,102	5,508
1960	75,766	70,146	31,131	5,859
1961	78,260	64,068	31,067	5,444
1962	82,125	67,235	35,903	8,102
1963	79,275	61,135	33,199	7,179
1964	83,161	50,542	43,986	8,912
1965	80,568	52,986	50,535	7,244
1966	86,646	45,603	63,903	17,080
1967	86,289	40,257	66,955	15,381
1968	38,710	32,753	68,407	15,604
1969	89,721	30,256	49,576	13,218

[1] Production less exports +- net change in stocks at producer level only. Includes aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene.

Source: U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service.

The percentage increase of 1969 over 1968 was based on a recomputation of the 1968 figures using the new method.

table 2: annual average levels of selected air pollutants in selected cities—The values in Table 2 are from the Continuous Air Monitoring Program (CAMP) network operated by EPA. The network consists of one site located in the downtown area of each of six major cities. Measurements for each of six major pollutants (SO_2, NO, NO_2, CO, total hydrocarbons, and total oxidants) are taken every 5 minutes The values given in the table are the annual averages based on these figures.

table 3: estimated prevalence of water pollution, by region, 1970—Table 3 is based on the the same FWQA survey discussed above under Figure 3. Column 1 gives the region. Column 2 gives the total percentage of stream miles polluted within the region. Columns 3 to 6 classify the drainage basins within the region according to the percentage of basins suffering from given degrees of pollution. For example, the first value under column 3 shows that 14.8 percent of the basins within the Pacific Coast region have 50 percent or more of their stream miles polluted.

table 4: estimated U.S. consumption of selected metals, 1948 and 1968—This table also appeared on page 2 of the 1971 CEQ report, Toxic Substances.

table 5: use of and estimated demand for bureau of land management lands, 1968–70 and 1980—The nonconsumptive use projections are estimates based on the combined hunting and fishing increase projections. The low 1980 estimates for hunting and fishing are based on a projection of the existing ratio of public domain use to license sales, which for hunting was 2.3 visitor days per license and for fishing was 0.9 visitor days per license. The medium estimates are based on a projection of the 1968–70 increase in visitor days, and the high estimates on the 1964–70 increase. A visitor day for hunting, for example, is the equivalent of 1 person hunting for 12 hours or 12 persons hunting for 1 hour.

table 6: sportsman use of national forests—The term visitor day is used in the same way as in Table 5. The 1967 decrease in fishing is the result of a new inventorying system and thus reflects improved data rather than a decrease in use.

table 7: inventory of wetlands, by type and by region, 1955—The areas included in the regions in Table 7 are shown on the map below.

table 8: loss of coastal wetlands, 1954–64—The definition of coastal wetlands used in the report on which this table was based is approximately equivalent to the coastal saline and fresh saline categories in Table 7. The States included in Table 8 are covered in the Atlantic North region of Table 7, but Atlantic North also includes Maryland and all of New York.

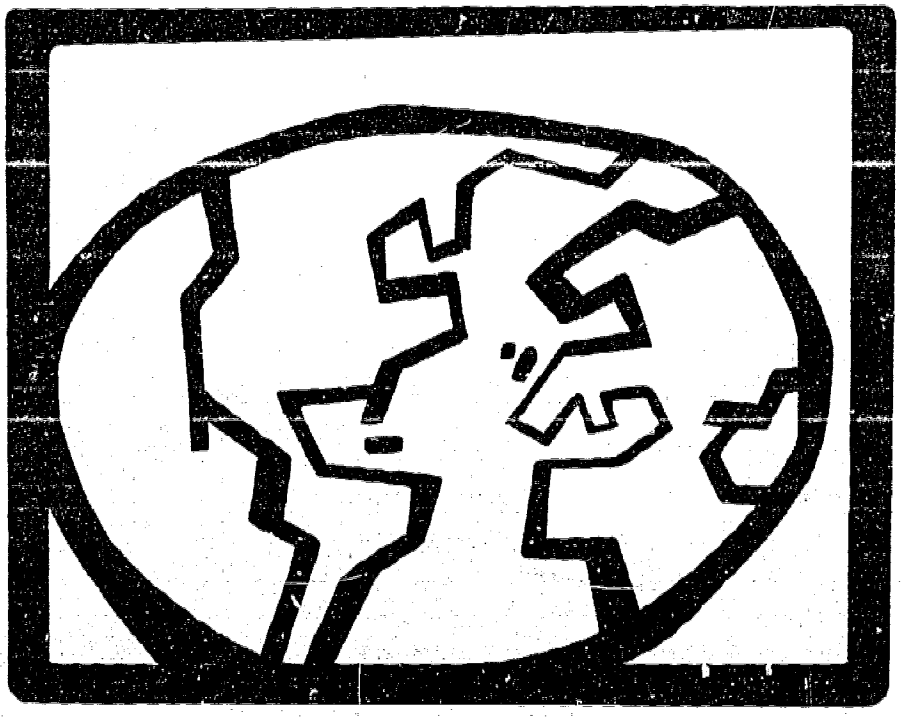
table 9: federal land acquisition for outdoor recreation financed by land and water conservation fund, 1966–69—The 1968 acreage figures and the 1969 cost figures under National Park Service include acquisition of land by the Bureau of Outdoor Recreation for Redwoods National Park. It should be noted that acquisitions under the Land and Water Conservation Fund are only a portion of total Federal acquisitions for recreation purposes. However, data are not available on total acquisitions.

table 10: public recreation areas, by location and by level of government, 1965—The figures in Table 10 are based on unpublished 1965 inventory conducted by the Bureau of Outdoor Recreation.

table 11: park acreage in selected cities, 1968—With respect to the last column in the table, it may be noted that the National Recreation and Parks Association recommends a standard of 10 acres of subregional (easily accessible) park acreage per 1,000 residents.

Figure A-1
Wetlands Regions

8



the environment, 1971—a perspective

Environment as an issue is in the process of maturing. The scattered concerns of a few years ago over air and water pollution, pesticides, and highways, and localized problems such as the Florida Jetport and the Santa Barbara oil spill are now coalescing into a broader understanding of the relationship of the environment to man's total well-being and to the quality of life. With this growing understanding has also emerged a greater appreciation of just how complex and multifaceted the problems are. Those who thought that the task of achieving environmental quality could be accomplished overnight either have learned better or lost interest. But the challenge of achieving a higher quality of life has become part of the American vision. And the goal of achieving environmental quality is becoming an integral part of our institutions and our values.

The changes being shaped by the drive to achieve environmental quality are visible in a wide variety of areas. Governmental institutions, the law, and the economy have all begun to adjust to a new set of goals. The "rules of the game" by which society makes decisions are shifting to take environmental factors into account. The methods by which environmental goals are to be achieved have also shifted as we learn more about regulations and incentives and about the uses and abuses of technology.

changes in government institutions

Institutional changes are one sign of an issue's growth in importance and public recognition. As an issue is perceived in its entirety, rather than by its components, a need exists to reflect this change in organization. In the past, when new problems were perceived as discrete policy issues rather than as subparts of other goals, new departments and agencies were created. This process is evident in the reorganization proposals recently submitted to the Congress by the President.

The same process has also been true of environmental quality. Air and water pollution control programs were once the stepchild of health agencies. Solid waste management had no larger image than the local garbage collector and the city dump. Pesticides were considered part of agricultural activity, while radiation was dealt with in the overall context of atomic energy. Increasing noise and the spread of toxic substances through the environment were generally ignored since no agency was responsible. The nature of many of the problems of improper land use, especially in critical areas, was largely unrecognized.

As the public and responsible officials began to perceive the totality of the environment and the interrelationships of pollutants in all media—air, water, and land—they also saw the need for organizational change. Major changes occurred in 1970 with the creation, early in the year, of the Council on Environmental Quality and, at the end of the year, of the Environmental Protection Agency.

The Environmental Protection Agency has a larger budget than some of the existing Cabinet departments. The Council on Environmental Quality is located within the Executive Office of the President which gives it vital leverage in the policymaking process. The National Oceanic and Atmospheric Administration (NOAA) consolidates oceanographic and atmospheric monitoring and forecasting programs conducted previously in a number of agencies. Early in 1971, the President proposed creation of a Department of Natural Resources to complete reorganization of environmental and natural resource activities, and to unify Federal energy and land management programs. The new department would include NOAA.

Similar organizational changes have taken place at the State level. New York's Department of Environmental Conservation, Washington's Department of Ecology, the institutions established by the Illinois Environmental Protection Act of 1970, as well as developments in several other States represent innovative approaches to unifying environmental programs.

The new unification of environmental programs should lead to more than mere administrative tidiness. Form and substance are intertwined. Bringing together programs previously

viewed as discrete entities enables administrators to consider the interrelationships and priorities within environmental activities and to act accordingly. By looking at the total burden of pollutants on the environment, and not only in media packages of air, water and land pollutants, unification provides a basis for different strategies aimed at controlling pollution throughout their distribution in the environment—from extraction, through production, distribution, use, and final disposal.

Unification also permits an intensity of concentration on a problem not otherwise possible. When air or water pollution programs were merely part of health or conservation departments, the department head could focus on them only momentarily among many other matters. In a unified agency, the full time of management can be concentrated on environmental protection. Institutionalizing responsibility for environmental quality through creation of unified organization provides the vehicle for a sustained and vigorous commitment to improvement in the quality of life.

Just as the United States has moved to organize its institutions for more effective environmental management, other nations such as Canada, France, Germany, Great Britain, and Japan have taken steps to establish central authority for environmental matters. This development has had international significance in facilitating more effective cooperation among nations.

Governmental changes have not been limited to unifying programs. The geographic scope of environmental efforts has expanded to include other nations. And at the State level there have been a number of organizational innovations aside from unification.

Action has begun on the international level to deal with problems, such as marine pollution, which require joint efforts with other countries. The United States and Canada are developing a bold program for dealing with the pollution of the Great Lakes. A number of efforts have been initiated to meet environmental problems through the NATO Committee on the Challenges of Modern Society and through the Organization for Economic Cooperation and Development. Active preparation is underway for the U.N. Conference on the Human Environment to be held in Stockholm in 1972.

One of the unsolved problems in environmental organization is how to reconcile the regional scope of many environmental problems with existing political boundaries. Action at the State level is coming to grips with this difficulty. Maryland has established a public corporation, the Maryland Environmental Service (MES), which is empowered to contract with municipalities or industries to build and operate solid and liquid waste treatment and disposal services and to install or operate abatement facilities when a municipality, firm, or individual fails to comply with

a pollution control enforcement order. Along with somewhat similar arrangements in New York and Ohio, MES provides a sound mechanism for regional solutions to pollution problems. Vermont has instituted statewide controls over land use, and a number of other States have begun to exercise control over particular types of land use such as use of wetlands and siting of powerplants, public facilities, and housing developments. And throughout the Nation there have been developed new organizational and legal methods to give private citizens the right to participate directly in improving environmental quality.

changes in the law

Another basic American institution—the law—is also changing to provide greater protection of the environment. This development has been most vividly demonstrated by enactment of the National Environmental Policy Act (NEPA), in which Congress declared "that it is the continuing policy of the Federal Government . . . to create and maintain conditions under which man and nature can exist in productive harmony" (sec. 101(a)). New Federal and State environmental regulatory laws and court interpretations of other statutes have recognized the private citizen's interest in his environmental condition by empowering the individual citizen to sue to prevent environmental damage and to force government to act in accordance with the new environmental policies.

The new environmental rights have also placed new obligations on citizens. If these rights are not to atrophy they must be responsibly exercised. The success of certain new governmental procedures, such as the environmental impact statement process of NEPA, depends heavily on citizen participation. If NEPA is to have maximum effect, an alert citizenry must be prepared to invest the time and effort in helping to make it work.

Chapter 3 describes a wide variety of successful environmental activities carried out by private citizens, ranging from the purchase of environmentally valuable land to the prosecution of lawsuits and from rewriting a State's air pollution control laws to promoting antilitter campaigns.

The vital role played by citizens must be joined with effective governmental efforts if we are to achieve effective control of pollution and other environmental threats. The pervasiveness of sources of environmental degradation, the wide scope of government activities that impact on the environment, the inherent limitations of the courts, which can only deal piecemeal with highly complex environmental issues—all require that government develop systematic approaches to achieving compliance, particularly approaches which rely on the use of market incen-

tives. These factors also require government to build environmental quality considerations into the major actions it takes. Only government possesses the resources and legal power to insure uniform and systematic compliance with environmental standards. Actions by government to build environmental considerations into its basic decisionmaking mechanisms are being stimulated by outside groups. The new legal authorities and court interpretations which provide authority for citizens to act as their own "environmental ombudsman" are a powerful impetus to the improvement of government's performance.

changes in the economy

A basic factor in the achievement of our environmental goals is economics. Much is said about the cost of environmental improvement; weight also must be given to the cost of continued environmental degradation. The annual cost of air pollution alone is roughly estimated at about $16 billion.

The industrial community has already made a sizable investment in pollution control equipment, and the amount of such investments is increasing. The cooperation of private industry will continue to be a necessary part of any solution to environmental problems. However, such cooperation must be backed up by governmental regulation, especially by charges and taxes, because in a competitive economy, compliance by an individual firm always presents the possible danger of putting that firm at a disadvantage with firms which have not made the necessary environmental control investments.

The costs of meeting air and water quality standards and providing solid waste disposal over the 1970 to 1975 period have been estimated at about $105 billion. The costs of meeting air and water quality standards—the areas in which the largest increases will occur—is estimated at $62 billion. Of that amount, 42 percent is public costs—paid by taxes and service charges—and 58 percent will be costs to industry. But in either case, the costs will ultimately be shared by all the American people—either as taxpayers or as consumers. These cost estimates are not comprehensive and are clearly tentative. They are presented in this report to stimulate further discussion and analysis on the costs of achieving environmental quality. They are most likely understated—probably significantly so. Ongoing governmental and private studies will provide the basis for improved estimates of total costs.

The costs of pollution control seem large in the aggregate but not nearly as significant when compared to such measures of economic activity as the gross national product, value of shipments by industries, or even total capital spending. However,

costs will be large for a few industries and for some individual firms.

Pollution control can be seen as an opportunity as well as a problem. It will provide new markets here and abroad for U.S. control equipment and engineering competence as other nations begin to upgrade their environmental standards.

Transitional problems will occur. Some industries, although probably very few, will have greater difficulties with competition in international markets. Some industries and firms will suffer domestic competitive disadvantages. Some marginal plants will be abandoned for newer, more efficient and less polluting technology. And individual workers at such plants may suffer from the transition. Although in most cases these adjustments are not expected to be great and are not dissimilar to other adjustments constantly being made by U.S. industry, it is important to evaluate what measures might be necessary to ease the transition.

In considering strategies to deal with possible transitional problems, it is important to keep in mind the general principle that the cost of preventing environmental damage from the manufacture or use of a product should be reflected in the price of the product. This principle is important if we are both to accomplish improvements efficiently and to place the costs equitably on the producers and users of polluting products.

It is also of vital importance that the costs of environmental improvements be considered in the context of the benefits to be gained and that the most cost-effective solutions to environmental problems are utilized. The costs of pollution control rise steeply as higher levels of abatement are attained, and thus the benefits to be achieved must be carefully weighed. Also, there may be great differences in costs depending upon the type of control strategy adopted. The use of economic incentives provides a promising method for achieving environmental goals in the most efficient manner.

regulations and incentives

There has been much discussion about the use of economic incentives as an alternative or a supplement to current regulatory authorities. Some have proposed tax writeoffs or other assistance to industry as a spur to pollution control. But unless the level of assistance is extremely high, it will offer no incentive for industry to invest in "nonproductive" pollution control facilities. Nor will it lead to investment by marginal firms which often cannot afford the additional costs of control facilities.

Others have proposed a pollution charge on the amount of effluents or emissions damaging the environment. Such a charge would provide a positive incentive to industry to reduce its pollution. It would lessen the burden on government by allow-

ing industries to adjust to pollution controls in the most efficient manner, and it would reduce the delays inherent in regulatory procedures.

The differences and shortcomings of both the regulatory process and economic incentives can be overcome by using them to supplement each other rather than as alternatives. The basic aspects of regulatory authority—standard-setting and backup enforcement—can be preserved while the automatic enforcing aspects of the pollution charge can provide a strong economic incentive to achieve the standards. In those areas where higher levels of purity are required than the charge can stimulate, backup enforcement authority would provide the necessary muscle to achieve compliance.

The Administration has adopted this strategy in proposals under development for a tax on lead in gasoline and a sulfur oxides emissions charge. These proposals, which supplement existing regulatory authority, demonstrate how both regulatory authority and economic incentives can be used together to achieve environmental objectives.

Such economic incentives are consistent with the principle that the polluter should pay the cost of operating in a way that avoids or minimizes environmental damage. This principle is akin to the legal principle, embodied in the common law of nuisance: that no person has a right to use his property in a manner that unreasonably interferes with another's right to use and enjoy his own property, or that interferes with general public rights involving such resources as air or water.

Except in cases in which process changes and other actions to control pollution are accompanied by greater production efficiencies, the inclusion of the costs of preventing environmental damage in the costs of manufacturing goods will result in some higher costs to the consumer. There is no way, short of unwarranted price controls, that the government can force the manufacturer to absorb these costs entirely. The government does not control the price of goods, and therefore manufacturers will pass on to consumers the costs of producing the goods, including the costs of environmental protection. Thus, in most cases, the citizen will pay the costs of such improvement, either as a consumer or as a taxpayer. But when he pays a higher price for goods because the price reflects the cost of pollution control, it can be said that he is really paying the fair price, because a product is underpriced if it does not include the costs of environmental control.

the development and assessment of technology

A development similar to including environmental costs in the price of goods has been the move to shift the burden of

proof of showing lack of adverse environmental impact with respect to new products or new sources of pollution from the public to the private sector. In the past, the prevailing assumption has been that air, water, or land resources could be used as a dumping ground for wastes until the government proved that a given discharge or disposal was harmful. Increasingly this assumption is being reversed—it is up to the manufacturer to show that the wastes or his product will not be harmful before society will allow him to introduce it into the environment. Two of the President's new environmental legislative proposals—The Toxic Substances Control Act and the Marine Protection Act—are based on this principle. The concept must be implemented carefully so as not to thwart technological innovation, and we must also keep in mind the impossibility of conclusively proving that a product is safe. However, the change in the burden of proof reflects the increased recognition of the public's environmental rights and also the need for an increased emphasis on adequate assessment of changing technology.

As the pace of technological innovation has steadily accelerated, so has the need to assess its full impact. New technology changes many aspects of society in significant but often unrecognized ways. If we are not to become victims of our own inventions, we must not only assess the impact of technologies but also exert sufficient control to minimize or avoid their adverse impacts.

Technology assessment is not a new practice. It has been applied for years in our food, drug, and pesticide control laws. Existing air and water pollution control laws are based in part on a recognition of the adverse side-effects of technology. However, we have come to recognize the need for two important elements in technology assessment.

First, such assessment must take place *before* a new technology is widely dispersed. The air and water pollution laws represent after-the-fact recognition of adverse effects, and this makes it much more difficult for them to curb such effects. This has been recognized by recently enacted and proposed amendments to these laws which authorize standards applicable to new plants at the time of construction.

Second, technology assessment must include consideration of secondary and tertiary effects of an innovation. The automobile not only brought about air pollution and congestion but it also changed land use patterns, the nature of urban life, and the structure of the family. The introduction of the one-way container added a new dimension to solid waste and litter problems. In many cases the secondary and tertiary effects of changing technologies may be more significant than the direct effects.

Clearly there must be linkages between technology assessment and mechanisms to control the impact of technologies. If we

develop tools to predict more accurately the consequences of technological developments, we must also develop policy mechanisms to act upon these findings.

The environmental impact statement process of NEPA provides one such link. Many large-scale technology developments are partially or entirely supported by the Federal Government. Mass transit development and nuclear and other energy sources, for example, are supported by government subsidies. Cloud seeding, saline water conversion, and new peaceful uses of atomic energy are direct government projects. The National Environmental Policy Act, through the environmental impact statement process, provides a framework for technology assessment of these governmentally financed activities, as will proposed new legislation, such as the Toxic Substances Control Act.

Undue emphasis should not be placed on the adverse consequences of new technology. Technological innovation has been and will continue to be necessary if we are to achieve environmental and other goals. It is clear, for example, that new sources of energy will be necessary to meet air quality standards over the long run. Ultimately, our transportation systems will have to change, placing greater emphasis on mass transit and possible new sources of power. The development of the breeder reactor, fusion power, coal gasification, and unconventionally powered vehicles all require technological breakthroughs enabling us to meet longer term environmental quality goals.

The challenge ahead is to assess the potentially detrimental effects from the introduction of new technology and at the same time to encourage the development of needed new technology. We can neither place blind reliance on technology to solve all of our problems nor can we ignore the need for technological improvements to meet the goals of our society, including environmental goals. A balanced approach to the two-edged sword of technological innovation is critical.

efforts and accomplishments

It is not fashionable to view environmental problems with anything less than alarm. Indeed, many have told us that we are facing an ecological doomsday unless we take radical steps. However, the chapter on Status and Trends provides some grounds for optimism, although the data base is too imprecise for any firm conclusions. Measurements of air quality in urban areas indicate some general improvement although the total amounts of air pollutants actually emitted nationwide have increased slightly. Control efforts, plus industry dispersion, are largely responsible for this pattern. Construction of municipal waste treatment plants has prevented further serious deterioration in water

quality in the face of signficant increases in population and industrial production. The use of persistent pesticides has been declining for several years. These patterns indicate that with concerted effort, we can make progress in dealing with environmental problems.

However, some problems are emerging with portentous implications. The accumulation of mercury in our waters is a serious problem that may become even worse as organisms continue to concentrate mercury through the food chain. The increases in complex toxic materials—both heavy metals and organic chemicals—may be serious long-term threats to human health and the life cycle upon which all men depend. Eutrophication is a problem that will require significant efforts to control and reduce nutrient inputs into many lakes and rivers, and special actions may be necessary to restore water bodies in many parts of the country. Many aspects of land use, such as wetlands development and urban sprawl, pose serious problems.

The blight that characterizes so much of our urban environment has been with us at least since the beginning of the industrial revolution. It has only been comparatively recently that environmentalists have devoted attention to urban problems, especially those in the inner city, the decaying, older areas where so many of the urban poor live in inferior conditions. However, most Americans work and play in urban areas; it is the setting which is most immediate and familiar to us. Indeed, ecology is defined as the interrelationship between an organism and its environment and the environment for most human organisms in industrial society is the large metropolitan area. Further, many of the traditional environmental problems, such as air pollution and basic sanitation, are most acute in the central city. If we are to make our environment livable, we must make our cities livable. If we are to achieve a desirable level of environmental quality, we must make our cities desirable places in which to work and live.

It would be helpful to be able to show a direct cause-and-effect relationship between the developments described in the first three chapters and accomplishments as described in the Status and Trends chapter. But the relationship between efforts and accomplishments is often unclear. Many factors aside from governmental efforts exert a strong influence on environmental trends—the state of the economy, the development of new technology, the preferences of consumers. Time is another complicating factor: It may take several years between the initiation of a governmental effort, such as giving a grant for a waste treatment plant, and any actual effect on environmental quality. Most importantly, the data now collected on environmental status and trends is not adequate to provide reliable evidence for the evaluation of governmental programs.

The established base which our new institutions have given us should improve evaluation of programs and increase "feedback" on the success or failure of our efforts. The critical challenge to the government in the coming years, particularly in pollution control where the legislative mandate is well established, will be to improve the effectiveness of the implementation of the legislation. The best laws can be subverted by poor implementation, and there is much room for improvement in the manner in which Federal programs are executed. Better information is critical to this improvement, because only through accurate data on environmental conditions can we tell whether Federal programs are accomplishing their intended purpose.

Our view of environmental conditions is a product of three factors: the actual conditions which exist, the methods we use to determine these actual conditions, and the values which we place on the results.

It is difficult to tell how much the data in the Status and Trends chapter really tell us about actual conditions, because all of them are filtered through a complex and very imperfect set of processes whose purpose is to describe the real world. The tables and graphs are not the real world. They are but the final outcome of selecting a few dimensions from an almost unlimited number of environmental variables, selecting a few sampling sites from an almost unlimited number, collecting and analyzing the data on the basis of often very inaccurate techniques, and then aggregating and statistically analyzing the collected data on the basis of a number of crude assumptions. How close the results of this process come to reflecting actual conditions is uncertain.

We are also handicapped by our lack of knowledge about fundamental scientific questions. Much needs to be done to improve our knowledge about the effects of various environmental insults. There is also a great deal we do not understand about the basic ecological processes which determine the fate and importance of pollutants. For example, the cycles governing the balance of the basic components of the atmosphere and the mechanisms through which these components are absorbed or changed by earth and ocean are, for the most part, unknown.

Aside from the processes of collection and analysis, our view of actual conditions also is filtered through the values which we hold. Whether the data from the monitoring effort is viewed with alarm or with complacency depends on the standard of judgment applied—in other words on the values we hold concerning what actual conditions *should* be. Thirty years ago the data on status and trends would have been of little or no interest to most people, because our knowledge and our values had not yet come to include the importance of environmental factors.

environmental quality and the quality of life

Our knowledge and our values have changed significantly and are continuing to change. What is developing in this country is a greater awareness both of man's dependence and of his independence.

We are realizing our dependence on the intricate web of nature of which we are part. We have discovered that man's continued existence depends on the functions of microscopic bacteria and fungi and on the grand natural cycles which govern the flow of the major elements through the environment.

Man is also coming to understand his relationship with the urban environment he has created—from the parks and open space to the quality of its buildings and the character of its neighborhoods. The harshness of much of the inner city environment and the cruel effects of improper sanitation, air pollutants, and household hazards such as lead in paint have been recognized. If we are to be concerned about the quality of life, it will not be possible to escape the city and cloak ourselves in pastoral romanticism. For as we concern ourselves with the quality of our natural environment, we must give equal attention to the quality of our manmade environment.

We also have begun to realize that we have an opportunity and a challenge to determine the shape and future course of our development. The application of scientific knowledge and the continuing alteration of our physical surroundings are not predetermined. They are ours to mold and to decide. This freedom will be no easier to protect and exercise than our other freedoms. But the decisions as to what kind of world we want to live in are ours to make, providing that they are made with the knowledge and awareness of the constraints which nature has set.

Much of the current concern over environmental problems has sprung from a negative reaction to the degradation we have inflicted upon our surroundings. Much of it has sprung from a fear that we will destroy ourselves if environmental insults go unchecked. These reactions and fears are legitimate—environmental degradation degrades us, and the possibility of an ecological "doomsday," although often exaggerated, does exist.

But it is important to consider the positive side of the struggle for environmental quality. Our environment is literally what surrounds us—what we see and feel and smell every minute of every day. If life is to be worth living, the environment must do more than sustain life. It must provide the esthetic satisfaction and the sense of human dignity which give meaning and purpose to existence.

Many governmental programs are devoted to providing the necessities for sustaining life. Many are devoted to helping particular segments of the population. But the environmental prob-

lem is everybody's problem—we are all affected by bad air, polluted water, or despoiled land. And the environmental opportunity—the possibility of protecting and shaping our surroundings so that they accord with our vision of the good life—is ours to take if we have the will and persistence.

There are those who doubt that we will have the will and persistence, and who believe that concern with the environment is simply a passing fad. But the evidence is to the contrary. The problems are real. All of us are paying the costs of a degraded environment daily, through being surrounded by dirt and ugliness. Our values and perceptions have come to demand better. We have realized that our resources are limited, and that our natural surroundings cannot tolerate the unlimited burdens placed on them by an industrialized society. As leisure time and educational levels have increased we have placed a higher value on recreation, esthetics, and the things which make for a better life.

The environmental ethic is becoming a permanent part of our governmental institutions. It has found a permanent place in our legal principles, and it is beginning to become an accepted part of our economic calculations. The environmental issue is still in the process of maturing, and like all vital and lasting issues it will undergo many transformations in its definition and in the way its problems are approached. But maturation should not be mistaken for transience. The pursuit of environmental quality has become a firm national commitment. Through fundamental changes in institutions, laws, and values we have embarked on a new course which will affect both national policy and personal values.

appendix a

the national environmental policy act of 1969, public law 91-190, january 1, 1970

AN ACT To establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969".

purpose

SEC. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

title i

declaration of national environmental policy

SEC. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may—

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;

(B) identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the for-

eign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

SEC. 103. All agencies of the Federal Government shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SEC. 104. Nothing in section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SEC. 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

title ii

council on environmental quality

SEC. 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, manmade, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the

Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

SEC. 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds; to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, economic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

SEC. 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

SEC. 204. It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

SEC. 205. In exercising its powers, functions, and duties under this Act, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

(2) utilize, to the fullest extent possible, the services, facilities and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

SEC. 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV of the Executive Schedule Pay Rates (5 U.S.C. 5315).

SEC. 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed $300,000 for fiscal year 1970, $700,000 for fiscal year 1971, and $1,000,000 for each fiscal year thereafter.

Approved January 1, 1970.

appendix b

the environmental quality improvement act of 1970, public law 91-224, april 3, 1970

title ii—environmental quality (of the water quality improvement act of 1970)

short title

SEC. 201. This title may be cited as the "Environmental Quality Improvement Act of 1970."

findings, declarations, and purposes

SEC. 202. (a) The Congress finds—

(1) that man has caused changes in the environment;

(2) that many of these changes may affect the relationship between man and his environment; and

(3) that population increases and urban concentration contribute directly to pollution and the degradation of our environment.

(b)(1) The Congress declares that there is a national policy for the environment which provides for the enhancement of environmental quality. This policy is evidenced by statutes heretofore enacted relating to the prevention, abatement, and control of environmental pollution, water and land resources, transportation, and economic and regional development.

(2) The primary responsibility for implementing this policy rests with State and local governments.

(3) The Federal Government encourages and supports implementation of this policy through appropriate regional organizations established under existing law.

(c) The purposes of this title are—

(1) to assure that each Federal department and agency conducting or supporting public works activities which affect the environment shall implement the policies established under existing law; and

(2) to authorize an Office of Environmental Quality, which, notwithstanding any other provision of law, shall provide the professional and administrative staff for the Council on Environmental Quality established by Public Law 91–190.

office of environmental quality

SEC. 203. (a) There is established in the Executive Office of the President an office to be known as the Office of Environmental Quality (hereafter in this title referred to as the "Office"). The Chairman of the Council on Environmental Quality established by Public Law 91–190 shall be the Director of the Office. There shall be in the Office a Deputy Director who shall be appointed by the President, by and with the advice and consent of the Senate.

(b) The compensation of the Deputy Director shall be fixed by the President at a rate not in excess of the annual rate of compensation payable to the Deputy Director of the Bureau of the Budget.

(c) The Director is authorized to employ such officers and employees (including experts and consultants) as may be necessary to enable the Office to carry out its functions under this title and Public Law 91–190, except that he may employ no more than ten specialists and other experts without regard to the provisions of title 5, United States Code, governing appointments in the competitive service, and pay such specialists and experts without regard to the provisions of chapter 51 and subchapter 111 of chapter 53 of such title relating to classification and General Schedule pay rates, but no such specialist or expert shall be paid at a rate in excess of the maximum rate for GS–18 of the General Schedule under section 5330 of title 5.

(d) In carrying out his functions the Director shall assist and advise the President on policies and programs of the Federal Government affecting environmental quality by—

(1) providing the professional and administrative staff and support for the Council on Environmental Quality established by Public Law 91–190;

(2) assisting the Federal agencies and departments in appraising the effectiveness of existing and proposed facilities, programs, policies, and activities of the Federal Government, and those specific major projects designated by the President which do not require individual project authorization by Congress, which affect environmental quality;

(3) reviewing the adequacy of existing systems for monitoring and predicting environmental changes in order to achieve effective coverage and efficient use of research facilities and other resources;

(4) promoting the advancement of scientific knowledge of the effects of actions and technology on the environment and encourage the development of the means to prevent or reduce adverse effects that endanger the health and well-being of man;

(5) assisting in coordinating among the Federal departments and agencies those programs and activities which affect, protect, and improve environmental quality;

(6) assisting the Federal departments and agencies in the development and interrelationship of environmental quality criteria and standards established through the Federal Government;

(7) collecting, collating, analyzing, and interpreting data and information on environmental quality, ecological research, and evaluation.

(e) The Director is authorized to contract with public or private agencies, institutions, and organizations and with individuals without regard to sections 3618 and 3709 of the Revised Statutes (31 U.S.C. 529; 41 U.S.C. 5) in carrying out his functions.

report

SEC. 204. Each Environmental Quality Report required by Public Law 91–190 shall, upon transmittal to Congress, be referred to each standing committee having jurisdiction over any part of the subject matter of the Report.

authorization

SEC. 205. There are hereby authorized to be appropriated not to exceed $500,000 for the fiscal year ending June 30, 1970, not to exceed $750,000 for the fiscal year ending June 30, 1971, not to exceed $1,250,000 for the fiscal year ending June 30, 1972, and not to exceed $1,500,000 for the fiscal year ending June 30, 1973. These authorizations are in addition to those contained in Public Law 91–190.

Approved April 3, 1970.

appendix c

executive order 11514, protection and enhancement of environmental quality, march 5, 1970

By virtue of the authority vested in me as President of the United States and in furtherance of the purpose and policy of the National Environmental Policy Act of 1969 (Public Law No. 91–190, approved January 1, 1970), it is ordered as follows:

SECTION 1. *Policy.* The Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal agencies shall initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals. The Council on Environmental Quality, through the Chairman, shall advise and assist the President in leading this national effort.

SEC. 2. *Responsibilities of Federal agencies.* Consonant with Title I of the National Environmental Policy Act of 1969, hereinafter referred to as the "Act", the heads of Federal agencies shall:

(a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and enhance the quality of the environment. Such activities shall include those directed to controlling pollution and enhancing the environment and those designed to accomplish other program objectives which may affect the quality of the environment. Agencies shall develop

programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities. Heads of agencies shall consult with appropriate Federal, State and local agencies in carrying out their activities as they affect the quality of the environment.

(b) Develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Federal agencies shall also encourage State and local agencies to adopt similar procedures for informing the public concerning their activities affecting the quality of the environment.

(c) Insure that information regarding existing or potential environment problems and control methods developed as part of research, development, demonstration, test, or evaluation activities is made available to Federal agencies, States, counties, municipalities, institutions, and other entities, as appropriate.

(d) Review their agencies' statutory authority, administrative regulations, policies, and procedures, including those relating to loans, grants, contracts, leases, licenses, or permits, in order to identify any deficiencies or inconsistencies therein which prohibit or limit full compliance with the purposes and provisions of the Act. A report on this review and the corrective actions taken or planned, including such measures to be proposed to the President as may be necessary to bring their authority and policies into conformance with the intent, purposes, and procedures of the Act, shall be provided to the Council on Environmental Quality not later than September 1, 1970.

(e) Engage in exchange of data and research results, and cooperate with agencies of other governments to foster the purposes of the Act.

(f) Proceed, in coordination with other agencies, with actions required by section 102 of the Act.

SEC. 3. *Responsibilities of Council on Environmental Quality.* The Council on Environmental Quality shall:

(a) Evaluate existing and proposed policies and activities of the Federal Government directed to the control of pollution and the enhancement of the environment and to the accomplishment of other objectives which affect the quality of the environment. This shall include continuing review of procedures employed in the development and enforcement of Federal standards affecting environmental quality. Based upon such evaluations the Council shall, where appropriate, recommend to the President policies of environmental quality and shall, where appropriate, seek resolution of significant environmental issues.

(b) Recommend to the President and to the agencies priorities among programs designed for the control of pollution and for enhancement of the environment.

(c) Determine the need for new policies and programs for dealing with environmental problems not being adequately addressed.

(d) Conduct, as it determines to be appropriate, public hearings or conferences on issues of environmental significance.

(e) Promote the development and use of indices and monitoring systems (1) to assess environmental conditions and trends, (2) to predict the environmental impact of proposed public and private actions, and (3) to determine the effectiveness of programs of protecting and enhancing environmental quality.

(f) Coordinate Federal programs related to environmental quality.

(g) Advise and assist the President and the agencies in achieving international cooperation for dealing with environmental problems, under the foreign policy guidance of the Secretary of State.

(h) Issue guidelines to Federal agencies for the preparation of detailed statements on proposals for legislation and other Federal actions affecting the environment, as required by section 102(2)(C) of the Act.

(i) Issue such other instructions to agencies, and request such reports and other information from them, as may be required to carry out the Council's responsibilities under the Act.

(j) Assist the President in preparing the annual Environmental Quality Report provided for in section 201 of the Act.

(k) Foster investigations, studies, surveys, research, and analyses relating to (i) ecological systems and environmental quality, (ii) the impact of new and changing technologies thereon, and (iii) means of preventing or reducing adverse effects from such technologies.

SEC. 4. *Amendments of E. O. 11472.* Executive Order No. 11472 of May 29, 1969, including the heading thereof, is hereby amended:

(1) By substituting for the term "the Environmental Quality Council", wherever it occurs, the following: "the Cabinet Committee on the Environment".

(2) By substituting for the term "the Council", wherever it occurs, the following: "the Cabinet Committee".

(3) By inserting in subsection (f) of section 101, after "Budget,", the following: "the Director of the Office of Science and Technology,".

(4) By substituting for subsection (g) of section 101 the following:

"(g) The Chairman of the Council on Environmental Quality (established by Public Law 91–190) shall assist the President in directing the affairs of the Cabinet Committee."

(5) By deleting subsection (c) of section 102.

(6) By substituting for "the Office of Science and Technology", in section 104, the following: "the Council on Environmental Quality (established by Public Law 91–190)".

(7) By substituting for "(hereinafter referred to as the 'Committee')", in section 201, the following: "hereinafter referred to as the 'Citizens' Committee')".

(8) By substituting for the term "the Committee", wherever it occurs, the following: "the Citizens' Committee".

RICHARD NIXON.

THE WHITE HOUSE.

appendix d

executive order 11574, administration of refuse act permit program, december 23, 1970

By virtue of the authority vested in me as President of the United States, and in furtherance of the purposes and policies of section 13 of the Act of March 3, 1899, c. 425, 30 Stat. 1152 (33 U.S.C. 407), the Federal Water Pollution Control Act, as amended (33 U.S.C. 1151 et. seq.), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661–666c), and the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4347), it is hereby ordered as follows:

SECTION 1. *Refuse Act permit program.* The executive branch of the Federal Government shall implement a permit program under the aforesaid section 13 of the Act of March 3, 1899 (hereinafter referred to as "the Act") to regulate the discharge of pollutants and other refuse matter into the navigable waters of the United States or their tributaries and the placing of such matter upon their banks.

SEC. 2. *Responsibilities of Federal agencies.* (a)(1) The Secretary shall, after consultation with the Administrator respecting water quality matters, issue and amend, as appropriate, regulations, procedures, and instructions for receiving, processing, and evaluating applications for permits pursuant to the authority of the Act.

(2) The Secretary shall be responsible for granting, denying, conditioning, revoking, or suspending Refuse Act permits. In so doing:

(A) He shall accept findings, determinations, and interpretations which the Administrator shall make respecting applicable water quality standards and compliance with those standards in particular circumstances, including findings, determinations, and interpretations arising from the Administrator's review of State or interstate agency water quality certifications under section 21(b) of the Federal Water Pollution Control Act (84 Stat. 108). A permit shall be denied where the certification prescribed by section 21(b) of the Federal Water Pollution Control Act has been denied, or where issuance would be inconsistent with any finding, determination, or interpretation of the Administrator pertaining to applicable water quality standards and considerations.

(B) In addition, he shall consider factors, other than water quality, which are prescribed by or may be lawfully considered under the Act or other pertinent laws.

(3) The Secretary shall consult with the Secretary of the Interior, with the Secretary of Commerce, with the Administrator, and with the head of the agency exercising administration over the wildlife resources of any affected State, regarding effects on fish and wildlife which are not reflected in water quality considerations, where the discharge for which a permit is sought impounds, diverts, deepens the channel, or otherwise controls or similarly modifies the stream or body of water into which the discharge is made.

(4) Where appropriate for a particular permit application, the Secretary shall perform such consultations respecting environmental amenities and values, other than those specifically referred to in paragraphs (2) and (3) above, as may be required by the National Environmental Policy Act of 1969.

(b) The Attorney General shall conduct the legal proceedings necessary to enforce the Act and permits issued pursuant to it.

SEC. 3. *Coordination by Council on Environmental Quality.* (a) The Council on Environmental Quality shall coordinate the regulations, policies, and procedures of Federal agencies with respect to the Refuse Act permit program.

(b) The Council on Environmental Quality, after consultation with the Secretary, the Administrator, the Secretary of the Interior, the Secretary of Commerce, the Secretary of Agriculture, and the Attorney General, shall from time to time or as directed by the President advise the President respecting the implementation of the Refuse Act permit program, including recommendations regarding any measures which should be taken to improve its administration.

SEC. 4. *Definitions.* As used in this order, the word "Secretary" means the Secretary of the Army, and the word "Administrator" means the Administrator of the Environmental Protection Agency.

RICHARD NIXON.

THE WHITE HOUSE.

appendix e

excerpt from the state of the union address, january 22, 1971

The third great goal is to continue the effort so dramatically begun last year: to restore and enhance our natural environment.

Building on the foundation laid in the 37-point program I submitted to Congress last year, I will propose a strong new set of initiatives to clean up our air and water, to combat noise, and to preserve and restore our surroundings.

I will propose programs to make better use of our land, and to encourage a balanced national growth—growth that will revitalize our rural heartland and enhance the quality of life throughout America.

And not only to meet today's needs but to anticipate those of tomorrow, I will put forward the most extensive program ever proposed by a President of the United States to expand the nation's parks, recreation areas and open spaces in a way that truly brings parks to the people, where the people are. For only if we leave a legacy of parks will the next generation have parks to enjoy.

appendix f

the president's message on the environment, february 8, 1971

To the Congress of the United States:

Last August I sent to the Congress the first annual report on the state of the nation's environment. In my message of transmittal, I declared that the report "describes the principal problems we face now and can expect to face in the future, and it provides us with perceptive guidelines for meeting them. . . . They point the directions in which we must move as rapidly as circumstances permit."

The comprehensive and wide-ranging action program I propose today builds upon the 37-point program I submitted to the Congress a year ago. It builds upon the progress made in the past year, and draws upon the experience gained in the past year. It gives us the means to ensure that, as a nation, we maintain the initiative so vigorously begun in our shared campaign to save and enhance our surroundings. This program includes:

Measures to strengthen pollution control programs

—Charges on sulfur oxides and a tax on lead in gasoline to supplement regulatory controls on air pollution

—More effective control of water pollution through a $12 billion national program and strengthened standard-setting and enforcement authorities

—Comprehensive improvement in pesticide control authority

—A Federal procurement program to encourage recycling of paper

Measures to control emerging problems
—Regulation of toxic substances
—Regulation of noise pollution
—Controls on ocean dumping
Measures to promote environmental quality in land use decisions
—A national land use policy
—A new and greatly expanded open space and recreation program, bringing parks to the people in urban areas
—Preservation of historic buildings through tax policy and other incentives
—Substantial expansion of the wilderness areas preservation system
—Advance public agency approval of power plant sites and transmission line routes
—Regulation of environmental effects of surface and underground mining
Further institutional improvement
—Establishment of an Environmental Institute to conduct studies and recommend policy alternatives
Toward a better world environment
—Expanded international cooperation
—A World Heritage Trust to preserve parks and areas of unique cultural value throughout the world

1970—a year of progress

The course of events in 1970 has intensified awareness of and concern about environmental problems. The news of more widespread mercury pollution, late summer smog alerts over much of the East Coast, repeated episodes of ocean dumping and oil spills and unresolved controversy about important land use questions have dramatized with disturbing regularity the reality and extent of these problems. No part of the United States has been free from them, and all levels of government—Federal, State and local—have joined in the search for solutions. Indeed, there is a growing trend in other countries to view the severity and complexity of environmental problems much as we do.

There can be no doubt about our growing national commitment to find solutions. Last November voters approved several billion dollars in State and local bond issues for environmental purposes, and Federal funds for these purposes are at an all time high.

The program I am proposing today will require some adjustments by governments at all levels, by our industrial and business community, and by the public in order to meet this national commitment. But as we strive to expand our national effort, we must also keep in mind the greater cost of *not* pressing

ahead. The battle for a better environment can be won, and we are winning it. With the program I am outlining in this message we can obtain new victories and prevent problems from reaching the crisis stage.

During 1970, two new organizations were established to provide Federal leadership for the Nation's campaign to improve the environment. The Council on Environmental Quality in the Executive Office of the President has provided essential policy analysis and advice on a broad range of environmental problems, developing many of our environmental initiatives and furnishing guidance in carrying out the National Environmental Policy Act, which requires all Federal agencies to devote specific attention to the environmental impact of their actions and proposals. Federal pollution control programs have been consolidated in the new Environmental Protection Agency. This new agency is already taking strong action to combat pollution in air and water and on land.

—I have requested in my 1972 budget $2.45 billion for the programs of the Environmental Protection Agency—nearly double the funds appropriated for these programs in 1971. These funds will provide for the expansion of air and water pollution, solid waste, radiation and pesticide control programs and for carrying out new programs.

In my special message on the Environment last February, I set forth a comprehensive program to improve existing laws on air and water pollution, to encourage recycling of materials and to provide greater recreational opportunities for our people. We have been able to institute some of these measures by executive branch action. While unfortunately there was no action on my water quality proposals, we moved ahead to make effective use of existing authorities through the Refuse Act water quality permit program announced in December. New air pollution control legislation, which I signed on the last day of 1970, embodies all of my recommendations and reflects strong bipartisan teamwork between the administration and the Congress—teamwork which will be needed again this year to permit action on the urgent environmental problems discussed in this message.

We must have action to meet the needs of today if we would have the kind of environment the nation demands for tomorrow.

i. strengthening pollution control programs

The Clean Air Amendments of 1970 have greatly strengthened the Federal-State air quality program. We shall vigorously administer the new program, but propose to supplement it with measures designed to provide a strong economic stimulus to achieve the pollution reduction sought by the program.

sulfur oxides emissions charge—Sulfur oxides are among the most damaging air pollutants. High levels of sulfur oxides have been linked to increased incidence of diseases such as bronchitis and lung cancer. In terms of damage to human health, vegetation and property, sulfur oxide emissions cost society billions of dollars annually.

Last year in my State of the Union message I urged that the price of goods "should be made to include the cost of producing and disposing of them without damage to the environment." A charge on sulfur emitted into the atmosphere would be a major step in applying the principle that the costs of pollution should be included in the price of the product. A staff study underway indicates the feasibility of such a charge system.

—Accordingly, I have asked the Chairman of the Council on Environmental Quality and the Secretary of the Treasury to develop a Clean Air Emissions Charge on emissions of sulfur oxides. Legislation will be submitted to the Congress upon completion of the studies currently underway.

The funds generated by this charge would enable the Federal Government to expand programs to improve the quality of the environment. Special emphasis would be given to developing and demonstrating technology to reduce sulfur oxides emissions and programs to develop adequate clean energy supplies. My 1972 budget provides increased funds for these activities. They will continue to be emphasized in subsequent years.

These two measures—the sulfur oxides emissions charge and expanded environmental programs—provide both the incentive for improving the quality of our environment and the means of doing so.

leaded gasoline—Leaded gasolines interfere with effective emission control. Moreover, the lead particles are, themselves, a source of potentially harmful lead concentrations in the environment. The new air quality legislation provides authority, which I requested, to regulate fuel additives, and I have recently initiated a policy of using unleaded or low-lead gasoline in Federal vehicles whenever possible. But further incentives are needed. In 1970, I recommended a tax on lead used in gasoline to bring about a gradual transition to the use of unleaded gasoline. This transition is essential if the automobile emission control standards scheduled to come into effect for the 1975 model automobiles are to be met at reasonable cost.

—*I shall again propose a special tax to make the price of unleaded gasoline lower than the price of leaded gasoline. Legislation will be submitted to the Congress upon completion of studies currently underway.*

water quality

We have the technology now to deal with most forms of water pollution. We must make sure that it is used.

In my February 1970 special message to the Congress on the Environment, I discussed our most important needs in the effort to control water pollution: adequate funds to ensure construction of municipal waste treatment facilities needed to meet water quality standards; more explicit standards, applicable to all navigable waters; more effective Federal enforcement authority to back up State efforts; and funds to help States build the necessary capability to participate in this joint endeavor.

municipal wastes—Adequate treatment of the large volume of commercial, industrial and domestic wastes that are discharged through municipal systems requires a great expenditure of funds for construction of necessary facilities. A thorough study by the Environmental Protection Agency completed in December 1970 revealed that $12 billion will be required by 1974 to correct the national waste treatment backlog. The urgency of this need, and the severe financial problems that face many communities, require that construction of waste treatment facilities be jointly funded by Federal, State, and local governments. We must also assure that adequate Federal funds are available to reimburse States that advance the Federal share of project costs.

—*I propose that $6 billion in Federal funds be authorized and appropriated over the next three years to provide the full Federal share of a $12 billion program of waste treatment facilities.*

Some municipalities need help in overcoming the difficulties they face in selling bonds on reasonable terms to finance their share of construction costs. The availability of funds to finance a community's pollution control facilities should depend not on its credit rating or the vagaries of the municipal bond market, but on its waste disposal needs.

—*I again propose the creation of an Environmental Financing Authority so that every municipality has an opportunity to sell its waste treatment plant construction bonds.*

A number of administrative reforms which I announced last year to ensure that Federal construction grant funds are well invested have been initiated. To further this objective:

—*I again propose that the present, rigid allocation formula be revised, so that special emphasis can be given to those areas where facilities are most needed and where the greatest improvements in water quality would result.*

—*I propose that provisions be added to the present law to induce communities to provide for expansion and replacement of treatment facilities on a reasonably self-sufficient basis.*

—*I propose that municipalities receiving Federal assistance in constructing treatment facilities be required to recover from industrial users the portion of project costs allocable to treatment of their wastes.*

standards and enforcement—While no action was taken in the 91st Congress on my proposals to strengthen water pollution standard setting and enforcement, I initiated a program under the Refuse Act of 1899 to require permits for all industrial discharges into navigable waters, making maximum use of present authorities to secure compliance with water quality standards. However, the reforms I proposed in our water quality laws last year are still urgently needed.

Water quality standards now are often imprecise and unrelated to specific water quality needs. Even more important, they provide a poor basis for enforcement: without a precise effluent standard, it is often difficult to prove violations in court. Also, Federal-State water quality standards presently do not apply to many important waters.

—*I again propose that the Federal-State water quality program be extended to cover all navigable waters and their tributaries, ground waters and waters of the contiguous zone.*

—*I again propose that Federal-State water quality standards be revised to impose precise effluent limitations on both industrial and municipal sources,*

—*I also propose Federal standards to regulate the discharge of hazardous substances similar to those which I proposed and the Congress adopted in the Clean Air Amendments of 1970.*

—*I propose that standards require that the best practicable technology be used in new industrial facilities to ensure that water quality is preserved or enhanced.*

—*I propose that the Administrator of the Environmental Protection Agency be empowered to require prompt revision of standards when necessary.*

We should strengthen and streamline Federal enforcement authority, to permit swift action against municipal as well as industrial and other violators of water quality standards. Existing authority under the Refuse Act generally does not apply to municipalities.

—*I propose that the Administrator of EPA be authorized to issue abatement orders swiftly and to impose administrative fines of up to $25,000 per day for violation of water quality standards.*

—*I propose that violations of standards and abatement orders be made subject to court-imposed fines of up to $25,000 per day and up to $50,000 per day for repeated violations.*

—*I again propose that the Administrator be authorized to seek immediate injunctive relief in emergency situations in*

which severe water pollution constitutes an imminent danger to health, or threatens irreversible damage to water quality.

—I propose that the cumbersome and time-consuming enforcement conference and hearing mechanism in the current law be replaced by a provision for swift public hearings as a prelude to issuance of abatement orders or requiring a revision of standards.

—I propose an authorization for legal actions against violations of standards by private citizens, as in the new air quality legislation, in order to bolster State and Federal enforcement efforts.

—I propose that the Administrator be empowered to require reports by any person responsible for discharging effluents covered by water quality standards.

—I again propose that Federal grants to State pollution control enforcement agencies be tripled over the next four years—from $10 million to $30 million—to assist these agencies in meeting their expanded pollution control responsibilities.

control of oil spills—Last May I outlined to the Congress a number of measures that should be taken to reduce the risks of pollution from oil spills. Recent events have underlined the urgency of action on these proposals. At the outset of this present Congress I resubmitted the Ports and Waterways Safety Act and the legislation requiring the use of bridge-to-bridge radiotelephones for safety of navigation. Such legislation would have decreased the chances of the oil spill which occurred as a result of a tanker collision in San Francisco Bay.

—I have provided $25 million in next year's budget for developement of better techniques to prevent and clean up oil spills and to provide more effective surveillance. I am asking the Council on Environmental Quality in conjunction with the Department of Transportation and the Environmental Protection Agency to review what further measures can be developed to deal with the problem.

—I also am renewing my request that the Senate give its advice and consent on the two new international conventions on oil spills and the pending amendments to the 1954 Oil Spills Convention for the Prevention of Pollution of the Sea by Oil.

The Intergovernmental Maritime Consultative Organization (IMCO) is presently preparing a convention to establish an International Compensation Fund to supplement the 1969 Civil Liability Convention. Our ratification of the 1969 convention will be withheld until this supplementary convention can also be brought into force because both conventions are part of a comprehensive plan to provide compensation for damages caused by

oil spills. In addition, we have taken the initiative in NATO's Committee on the Challenges of Modern Society and achieved wide international support for terminating all intentional discharges of oil and oily wastes from ships into the oceans by 1975, if possible, and no later than the end of this decade. We will continue to work on this matter to establish through IMCO an international convention on this subject.

pesticides

Pesticides have provided important benefits by protecting man from disease and increasing his ability to produce food and fiber. However, the use and misuse of pesticides has become one of the major concerns of all who are interested in a better environment. The decline in numbers of several of our bird species is a signal of the potential hazards of pesticides to the environment. We are continuing a major research effort to develop nonchemical methods of pest control, but we must continue to rely on pesticides for the foreseeable future. The challenge is to institute the necessary mechanisms to prevent pesticides from harming human health and the environment.

Currently, Federal controls over pesticides consist of the registration and labeling requirements in the Federal Insecticide, Fungicide, and Rodenticide Act. The administrative processes contained in the law are inordinately cumbersome and time-consuming, and there is no authority to deal with the actual *use* of pesticides. The labels approved under the Act specify the uses to which a pesticide may be put, but there is no way to insure that the label will be read or obeyed. A comprehensive strengthening of our pesticide control laws is needed.

—*I propose that the use of pesticides be subject to control in appropriate circumstances, through a registration procedure which provides for designation of a pesticide for "general use," "restricted use," or "use by permit only." Pesticides designated for restricted use would be applied only by an approved pest control applicator. Pesticides designated for "use by permit only" would be made available only with the approval of an approved pest control consultant. This will help to ensure that pesticides which are safe when properly used will not be misused or applied in excessive quantities.*

—*I propose that the Administrator of the Environmental Protection Agency be authorized to permit the experimental use of pesticides under strict controls, when he needs additional information concerning a pesticide before deciding whether it should be registered.*

—*I propose that the procedures for cancellation of a registration be streamlined to permit more expeditious action.*

—*I propose that the Administrator be authorized to stop the sale or use of, and to seize, pesticides being distributed or held in violation of Federal law.*

recycling of wastes

The Nation's solid waste problem is both costly and damaging to the environment. Paper, which accounts for about one-half of all municipal solid waste, can be reprocessed to produce a high quality product. Yet the percentage the Nation recycles has been declining steadily.

To reverse this trend, the General Services Administration, working with the Council on Environmental Quality, has reviewed the Federal Government's purchasing policies. It found a substantial number of prohibitions against using paper with recycled content. Such prohibitions are no longer reasonable in light of the need to encourage recycling.

As a result of this review, the GSA has already changed its specifications to require a minimum of 3 to 50 percent recycled content, dependent on the product, in over $35 million per year of paper purchases. GSA is currently revising other specifications to require recycled content in an additional $25 million of annual paper purchases. In total, this will amount to more than one-half of GSA's total paper products purchases. All remaining specifications will be reviewed to require recycled content in as many other paper products as possible. The regulations will be reviewed continually to increase the percentage of recycled paper required in each.

I have directed that the Chairman of the Council on Environmental Quality suggest to the Governors that they review State purchasing policies and where possible revise them to require recycled paper. To assist them, I have directed the Administrator of GSA to set up a technical liaison to provide States with the federally revised specifications as well as other important information on this new Federal program, which represents a significant first step toward a much broader use of Federal procurement policies to encourage recycling.

ii. controlling emerging problems

Environmental control efforts too often have been limited to cleaning up problems that have accumulated in the past. We must concentrate more on preventing the creation of new environmental problems and on dealing with emerging problems. We must, for example, prevent the harmful dumping of wastes into the ocean and the buildup of toxic materials throughout our environment. We must roll back increasingly annoying and

hazardous levels of noise in our environment, particularly in the urban environment. Our goal in dealing with emerging environmental problems must be to ward them off before they become acute, not merely to undo the damage after it is done.

toxic substances

As we have become increasingly dependent on many chemicals and metals, we have become acutely aware of the potential toxicity of the materials entering our environment. Each year hundreds of new chemicals are commercially marketed and some of these chemicals may pose serious potential threats. Many existing chemicals and metals, such as PCB's (polychlorinated biphenyls) and mercury, also represent a hazard.

It is essential that we take steps to prevent chemical substances from becoming environmental hazards. Unless we develop better methods to assure adequate testing of chemicals, we will be inviting the environmental crises of the future.

—*I propose that the Administrator of EPA be empowered to restrict the use or distribution of any substance which he finds is a hazard to human health or the environment.*

—*I propose that the Administrator be authorized to stop the sale or use of any substance that violates the provisions of the legislation and to seek immediate injunctive relief when use or distribution of a substance presents an imminent hazard to health or the environment.*

—*I propose that the Administrator be authorized to prescribe minimum standard tests to be performed on substances.*

This legislation, coupled with the proposal on pesticides and other existing laws, will provide greater protection to humans and wildlife from introduction of toxic substances into the environment. What I propose is not to ban beneficial uses of chemicals, but rather to control the use of those that may be harmful.

ocean dumping

Last year, at my direction, the Council on Environmental Quality extensively examined the problem of ocean dumping. Its study indicated that ocean dumping is not a critical problem now, but it predicted that as municipalities and industries increasingly turned to the oceans as a convenient dumping ground, a vast new influx of wastes would occur. Once this happened, it would be difficult and costly to shift to land-based disposal.

Wastes dumped in the oceans have a number of harmful effects. Many are toxic to marine life, reduce populations of fish and other economic resources, jeopardize marine ecosystems, and impair esthetic values. In most cases, feasible, economic, and

more beneficial methods of disposal are available. Our national policy should be to ban unregulated ocean dumping of all wastes and to place strict limits on ocean disposal of harmful materials. Legislation is needed to assure that our oceans do not suffer the fate of so many of our inland waters, and to provide the authority needed to protect our coastal waters, beaches, and estuaries.

—*I recommend a national policy banning unregulated ocean dumping of all materials and placing strict limits on ocean disposal of any materials harmful to the environment.*

—*I recommend legislation that will require a permit from the Administrator of the Environmental Protection Agency for any materials to be dumped into the oceans, estuaries, or Great Lakes and that will authorize the Administrator to ban dumping of wastes which are dangerous to the marine ecosystem.*

The legislation would permit the Administrator to begin phasing out ocean dumping of harmful materials. It would provide the controls necessary to prevent further degradation of the oceans.

This would go far toward remedying this problem off our own shores. However, protection of the total marine environment from such pollution can only be assured if other nations adopt similar measures and enforce them.

—*I am instructing the Secretary of State, in coordination with the Council on Environmental Quality, to develop and pursue international initiatives directed toward this objective.*

noise

The American people have rightly become increasingly annoyed by the growing level of noise that assails them. Airplanes, trucks, construction equipment, and many other sources of noise interrupt sleep, disturb communicataion, create stress, and can produce deafness and other adverse health effects. The urban environment in particular is being degraded by steadily rising noise levels. The Federal Government has set and enforces standards for noise from aircraft, but it is now time that our efforts to deal with many other sources of noise be strengthened and expanded.

The primary responsibility for dealing with levels of noise in the general environment rests upon local governments. However, the products which produce the noise are usually marketed nationally, and it is by regulating the noise-generating characteristics of such products that the Federal Government can best assist the State and local governments in achieving a quieter environment.

—*I propose comprehensive noise pollution control legislation that will authorize the Administrator of EPA to set noise standards on transportation, construction and other equipment and require labeling of noise characteristics of certain products.*

Before establishing standards, the Administrator would be required to publish a report on the effects of noise on man, the major sources, and the control techniques available. The legislation would provide a method for measurably reducing major noise sources, while preserving to State and local governments the authority to deal with their particular noise problems.

iii. promoting environmental quality in our land use decisions

The use of our land not only affects the natural environment but shapes the pattern of our daily lives. Unfortunately, the sensible use of our land is often thwarted by the inability of the many competing and overlapping local units of government to control land use decisions which have regional significance.

While most land use decisions will continue to be made at the local level, we must draw upon the basic authority of State government to deal with land use issues which spill over local jurisdictional boundaries. The States are uniquely qualified to effect the institutional reform that is so badly needed, for they are closer to the local problems than is the Federal Government and yet removed enough from local tax and other pressures to represent the broader regional interests of the public. Federal programs which influence major land use decisions can thereby fit into a coherent pattern. In addition, we must begin to restructure economic incentives bearing upon land use to encourage wise and orderly decisions for preservation and development of the land.

I am calling upon the Congress to adopt a national land use policy. In addition, I am proposing other major initiatives on land use to bring "parks to the people," to expand our wilderness system, to restore and preserve historic and older buildings, to provide an orderly system for power plant siting, and to prevent environmental degradation from mining.

a national land use policy

We must reform the institutional framework in which land use decisions are made.

—*I propose legislation to establish a National Land Use Policy which will encourage the States, in cooperation with local government, to plan for and regulate major developments affecting growth and the use of critical land areas. This*

should be done by establishing methods for protecting lands of critical environmental concerns, methods for controlling large-scale development, and improving use of land around key facilities and new communities.

One hundred million dollars in new funds would be authorized to assist the States in this effort—$20 million in each of the next five years—with priority given to the States of the coastal zone. Accordingly, this proposal will replace and expand my proposal submitted to the last Congress for coastal zone management, while still giving priority attention to this area of the country which is especially sensitive to development pressures. Steps will be taken to assure that federally-assisted programs are consistent with the approved State land use programs.

public lands management—The Federal public lands comprise approximately one-third of the Nation's land area. This vast domain contains land with spectacular scenery, mineral and timber resources, major wildlife habitat, ecological significance, and tremendous recreational importance. In a sense, it is the "breathing space" of the Nation.

The public lands belong to all Americans. They are part of the heritage and the birthright of every citizen. It is important, therefore, that these lands be managed wisely, that their environmental values be carefully safeguarded, and that we deal with these lands as trustees for the future. They have an important place in national land use considerations.

The Public Land Law Review Commission recently completed a study and report on Federal public land policy. This Administration will work closely with the Congress in evaluating the Commission's recommendations and in developing legislative and administrative programs to improve public land management.

The largest single block of Federal public land lies in the State of Alaska. Recent major oil discoveries suggest that the State is on the threshold of a major economic development. Such development can bring great benefits both to the State and to the Nation. It could also—if unplanned and unguided—despoil the last and greatest American wilderness.

We should act now, in close cooperation with the State of Alaska, to develop a comprehensive land use plan for the Federal lands in Alaska, giving priority to those north of the Yukon River. Such a plan should take account of the needs and aspirations of the native peoples, the importance of balanced economic development, and the special need for maintaining and protecting the unique natural heritage of Alaska. This can be accomplished through a system of parks, wilderness, recreation, and wildlife areas and through wise management of the Federal lands generally. I am asking the Secretary of the Interior to take the lead in this task, calling upon other Federal agencies as appropriate.

preserving our natural environment—The demand for urban open space, recreation, wilderness and other natural areas continues to accelerate. In the face of rapid urban development, the acquisition and development of open space, recreation lands and natural areas accessible to urban centers is often thwarted by escalating land values and development pressures. I am submitting to the Congress several bills that will be part of a comprehensive effort to preserve our natural environment and to provide more open spaces and parks in urban areas where today they are often so scarce. In addition, I will be taking steps within the executive branch to assure that all agencies are using fully their existing legislative authority to these ends.

"legacy of parks"—Merely acquiring land for open space and recreation is not enough. We must bring parks to where the people are so that everyone has access to nearby recreational areas. In my budget for 1972, I have proposed a new "Legacy of Parks" program which will help States and local governments provide parks and recreation areas, not just for today's Americans but for tomorrow's as well. Only if we set aside and develop such recreation areas now can we ensure that they will be available for future generations.

As part of this legacy, I have requested a $200 million appropriation to begin a new program for the acquisition and development of additional park lands in urban areas. To be administered by the Department of Housing and Urban Development, this would include provision for facilities such as swimming pools to add to the use and enjoyment of these parks.

Also, I have recommended in my 1972 budget that the appropriation for the Land and Water Conservation Fund be increased to $380 million, permitting the continued acquisition of Federal parks and recreation areas as well as an expanded State grant program. However, because of the way in which these State grant funds were allocated over the past five years, a relatively small percentage has been used for the purchase and development of recreational facilities in and near urban areas. The allocation formula should be changed to ensure that more parks will be developed in and near our urban areas.

—*I am submitting legislation to reform the State grant program so that Federal grants for the purchase and development of recreation lands bear a closer relationship to the population distribution.*

—*I am also proposing amendments to the Internal Revenue Code which should greatly expand the use of charitable land transfers for conservation purposes and thereby enlarge the role of private citizens in preserving the best of America's landscape.*

Additional public parks will be created as a result of my program for examining the need for retention of real property

owned by the Government. The Property Review Board, which I established last year, is continuing its review of individual properties as well as its evaluation of the Government's overall Federal real property program. Properties identified as suitable for park use and determined to be surplus can be conveyed to States and political subdivisions for parl. purposes without cost. The State or other political subdivision must prepare an acceptable park use plan and must agree to use the property as a park in perpetuity. More than 40 properties with high potential for park use have already been identified.

Five such properties are now available for conversion to public park use. One, Border Field, California, will be developed as a recreation area with the assistance of the Department of the Interior. The other four will be conveyed to States or local units of government as soon as adequate guarantees can be obtained for their proper maintenance and operation. These four are: (1) part of the former Naval Training Devices Center on Long Island Sound, New York; (2) land at a Clinical Research Center in Fort Worth, Texas; (3) about ten miles of sand dunes and beach along the Atlantic Coast and Sandy Hook Bay, a part of Fort Hancock, New Jersey; and (4) a portion of Fort Lawton, Washington, a wooded, hilly area near the heart of Seattle. In addition, efforts are underway to open a significant stretch of Pacific Ocean Beach Front and Coastal Bluffs at Camp Pendleton, California.

Many parcels of Federal real property are currently underutilized because of the budgetary and procedural difficulties that are involved in transferring a Federal operation from the current site to a more suitable location.

—*I am again proposing legislation to simplify relocation of federal installations that occupy properties that could better be used for other purposes.*

This will allow conversion of many additional Federal real properties to a more beneficial public use. Lands now used for Federal operations but more suited to park and recreational uses will be given priority consideration for relocation procedures. The program will be self-financing and will provide new opportunities for improving the utilization of Federal lands.

wilderness areas—While there is clearly a need for greater efforts to provide neighborhood parks and other public recreation areas, there must still be places where nature thrives and man enters only as a visitor. These wilderness areas are an important part of a comprehensive open space system. We must continue to expand our wilderness preservation system, in order to save for all time those magnificent areas of America where nature still predominates. Accordingly, in August last year I expressed my intention to improve our performance in the study and presentation of recommendations for new wilderness areas.

—*I will soon be recommending to the Congress a number of specific proposals for a major enlargement of our wilderness preservation system by the addition of a wide spectrum of natural areas spread across the entire continent.*

national parks

While placing much greater emphasis on parks in urban areas and the designation of new wilderness areas, we must continue to expand our National Park System. We are currently obligating substantial sums to acquire the privately owned lands in units of the National Park System which have already been authorized by the Congress.

Last year, joint efforts of the administration and the Congress resulted in authorization of ten areas in the National Park System, including such outstanding sites as Voyageurs National Park in Minnesota, Apostle Islands National Lakeshore in Wisconsin, Sleeping Bear Dunes National Lakeshore in Michigan, Gulf Islands National Seashore in Mississippi and Florida, and the Chesapeake and Ohio Canal National Historical Park in the District of Columbia, Maryland and West Virginia.

However, the job of filling out the National Park System is not complete. Other unique areas must still be preserved. Despite all our wealth and scientific knowledge, we cannot recreate these unspoiled areas once they are lost to the onrush of development. I am directing the Secretary of the Interior to review the outstanding opportunities for setting aside nationally significant natural and historic areas, and to develop priorities for their possible addition to the National Park System.

powerplant siting—The power shortage last summer and continuing disputes across the country over the siting of power plants and the routing of transmission lines highlight the need for longer-range planning by the producers of electric power to project their future needs and identify environmental concerns well in advance of construction deadlines. The growing number of confrontations also suggest the need for the establishment of public agencies to assure public discussion of plans, proper resolution of environmental issues, and timely construction of facilities. Last fall, the Office of Science and Technology sponsored a study entitled "Electric Power and the Environment," which identified many of these issues. Only through involving the environmental protection agencies early in the planning of future power facilities can we avoid disputes which delay construction timetables. I believe that these two goals of adequacy of power supply and environmental protection are compatible if the proper framework is available.

—*I propose a powerplant siting law to provide for establishment within each State or region of a single agency with*

responsibility for assuring that environmental concerns are properly considered in the certification of specific power plant sites and transmission line routes.

Under this law, utilities would be required to identify needed power supply facilities ten years prior to construction of the required facilities. They would be required to identify the power plant sites and general transmission routes under consideration five years before construction and apply for certification for specific sites, facilities, and routes two years in advance of construction. Public hearings at which all interested parties could be heard without delaying construction timetables would be required.

mined area protection—Surface and underground mining have scarred millions of acres of land and have caused environmental damages such as air and water pollution. Burning coal fires, subsidence, acid mine drainage which pollutes our streams and rivers and the the destruction of aesthetic and recreational values frequently but unnecessarily accompany mining activities. These problems will worsen as the demand for fossil fuels and other raw materials continues to grow, unless such mining is subject to regulation requiring both preventive and restorative measures.

—*I propose a Mined Area Protection Act to establish Federal requirements and guidelines for State programs to regulate the environmental consequences of surface and underground mining. In any State which does not enact the necessary regulations or enforce them properly, the Federal Government would be authorized to do so.*

preserving our architectural and historic heritage

Too often we think of environment only as our natural surroundings. But for most of us, the urban environment is the one in which we spend our daily lives. America's cities, from Boston and Washington to Charleston, New Orleans, San Antonio, Denver, and San Francisco, reflect in the architecture of their buildings a uniqueness and character that is too rapidly disappearing under the bulldozer. Unfortunately, present Federal income tax policies provide much stronger incentives for demolition of older buildings than for their rehabilitation.

Particularly acute is the continued loss of many buildings of historic value. Since 1933 an estimated one-quarter of the buildings recorded by the Historic American Building Survey have been destroyed. Most lending institutions are unwilling to loan funds for the restoration and rehabilitation of historic buildings because of the age and often the location of such buildings. Finally, there are many historic buildings under Federal ownership for which inadequate provision has been made for restoration and preservation.

—I shall propose tax measures designed to overcome these present distortions and particularly to encourage the restoration of historic buildings.

—I shall propose new legislation to permit Federal insurance of home improvement loans for historic residential properties to a maximum of $15,000 per dwelling unit.

—I am recommending legislation to permit State and local governments more easily to maintain transferred Federal historic sites by allowing their use for revenue purposes and I am taking action to insure that no federally-owned property is demolished until its historic significance has first been reviewed.

iv. toward a better world environment

Environmental problems have a unique global dimension, for they afflict every nation, irrespective of its political institutions, economic system, or state of development. The United States stands ready to work and cooperate with all nations, individually or through international institutions, in the great task of building a better environment for man. A number of the proposals which I am submitting to Congress today have important international aspects, as in the case of ocean dumping. I hope that other nations will see the merit of the environmental goals which we have set for ourselves and will choose to share them with us.

At the same time, we need to develop more effective environmental efforts through appropriate regional and global organizations. The United States is participating closely in the initiatives of the Organization for Economic Cooperation and Development (OECD), with its emphasis on the complex economic aspects of environmental controls, and of the Economic Commission for Europe (ECE), a U.N. regional organization which is the major forum for East-West cooperation on environmental problems.

Following a United States initiative in 1969, the North Atlantic Treaty Organization has added a new dimension to its cooperative activities through its Committee on the Challenges of Modern Society. CCMS has served to stimulate national and international action on many problems common to a modern technological society. For example, an important agreement was reached in Brussels recently to eliminate intentional discharges of oil and oily wastes by ships into the oceans by 1975 if possible or, at the latest, by the end of the decade. CCMS is functioning as an effective forum for reaching agreements on the development of pollution-free and safe automobiles. Work on mitigating the effects of floods and earthquakes is in progress. These innovative and specific actions are good examples of how efforts of

many nations can be focused and coordinated in addressing serious environmental problems facing all nations.

The United Nations, whose specialized agencies have long done valuable work on many aspects of the environment, is sponsoring a landmark Conference on the Human Environment to be held in Stockholm in June 1972. This will, for the first time, bring together all member nations of the world community to discuss those environmental issues of most pressing common concern and to agree on a world-wide strategy and the basis for a cooperative program to reverse the fearful trend toward environmental degradation. I have pledged full support for this Conference, and the United States is actively participating in the preparatory work.

Direct bilateral consultations in this field are also most useful in jointly meeting the challenges of environmental problems. Thus, the United States and Canada have been working closely together preparing plans for action directed to the urgent task of cleaning up the Great Lakes, that priceless resource our two nations share. Over the past few months, ministerial level discussions with Japan have laid the basis for an expanded program of cooperation and technological exchange from which both nations will benefit.

It is my intention that we will develop a firm and effective fabric of cooperation among the nations of the world on these environmental issues.

world heritage trust

As the United States approaches the centennial celebration in 1972 of the establishment of Yellowstone National Park, it would be appropriate to mark this historic event by a new international initiative in the general field of parks. Yellowstone is the first national park to have been created in the modern world, and the national park concept has represented a major contribution to world culture. Similar systems have now been established throughout the world. The United Nations lists over 1,200 parks in 93 nations.

The national park concept is based upon the recognition that certain areas of natural, historical, or cultural significance have such unique and outstanding characteristics that they must be treated as belonging to the nation as a whole, as part of the nation's heritage.

It would be fitting by 1972 for the nations of the world to agree to the principle that there are certain areas of such unique worldwide value that they should be treated as part of the heritage of all mankind and accorded special recognition as a part of a World Heritage Trust. Such an arrangement would impose no limitations on the sovereignty of those nations which choose to

participate, but would extend special international recognition to the areas which qualify and would make available technical and other assistance where appropriate to assist in their protection and management. I believe that such an initiative can add a new dimension to international cooperation.

—*I am directing the Secretary of the Interior, in coordination with the Council on Environmental Quality, and under the foreign policy guidance of the Secretary of State, to develop initiatives for presentation in appropriate international forums to further the objective of a World Heritage Trust.*

Confronted with the pressures of population and development, and with the world's tremendously increased capacity for environmental modification, we must act together now to save for future generations the most outstanding natural areas as well as places of unique historical, archeological, architectural, and cultural value to mankind.

v. further institutional improvement

The solutions to environmental and ecological problems are often complex and costly. If we are to develop sound policies and programs in the future and receive early warning on problems, we need to refine our analytical techniques and use the best intellectual talent that is available.

After thorough discussions with a number of private foundations, the Federal Government through the National Science Foundation and the Council on Environmental Quality will support the establishment of an Environmental Institute. I hope that this nonprofit institute will be supported not only by the Federal Government but also by private foundations. The Institute would conduct policy studies and analyses drawing upon the capabilities of our universities and experts in other sectors. It would provide new and alternative strategies for dealing with the whole spectrum of environmental problems.

vi. toward a better life

Adoption of the proposals in this message will help us to clean up the problems of the past, to reduce the amount of waste which is disposed, and to deal creatively with problems of the future before they become critical. But action by government alone can never achieve the high quality environment we are seeking.

We must better understand how economic forces induce some forms of environmental degradation, and how we can create and change economic incentives to improve rather than degrade en-

vironmental quality. Economic incentives, such as the sulfur oxides charge and the lead tax, can create a strong impetus to reduce pollution levels. We must experiment with other economic incentives as a supplement to our regulatory efforts. Our goal must be to harness the powerful mechanisms of the marketplace, with its automatic incentives and restraints, to encourage improvement in the quality of life.

We must also recognize that the technological, regulatory, and economic measures we adopt to solve our environmental problems cannot succeed unless we enlist the active participation of the American people. Far beyond any legislative or administrative programs that may be suggested, the direct involvement of our citizens will be the critical test of whether we can indeed have the kind of environment we want for ourselves and for our children.

All across the country, our people are concerned about the environment—the quality of the air, of the water, of the open spaces that their children need. The question I hear is "What can *I* do?"

Fortunately, there is a great deal that each of us can do. The businessman in his every day decisions can take into account the effects on the environment of his alternatives and act in an environmentally responsible way. The housewife can make choices in the marketplace that will help discourage pollution. Young people can undertake projects in their schools and through other organizations to help build a better environment for their communities. Parents can work with the schools to help develop sound environmental teaching throughout our education system. Every community in the nation can encourage and promote concerned and responsible citizen involvement in environmental issues, an involvement which should be broadly representative of the life-styles and leadership of the community. Each of us can resolve to help keep his own neighborhood clean and attractive and to avoid careless, needless littering and polluting of his surroundings. These are examples of effective citizen participation; there are many others.

The building of a better environment will require in the long term a citizenry that is both deeply concerned and fully informed. Thus, I believe that our educational system, at all levels, has a critical role to play.

As our nation comes to grips with our environmental problems, we will find that difficult choices have to be made, that substantial costs have to be met, and that sacrifices have to be made. Environmental quality cannot be achieved cheaply or easily. But, I believe the American people are ready to do what is necessary.

This nation has met great challenges before. I believe we shall meet this challenge. I call upon all Americans to dedicate them-

selves during the decade of the seventies to the goal of restoring the environment and reclaiming the earth for ourselves and our posterity. And I invite all peoples everywhere to join us in this great endeavor. Together, we hold this good earth in trust. We must—and together we can—prove ourselves worthy of that trust.

RICHARD NIXON.

THE WHITE HOUSE.

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notes on the president's 1971 environmental program

pollution control

air pollution—1. A Clean Air Emission Charge on sulfur oxides emissions to be developed to stimulate the reductions in these harmful emissions called for by regulatory requirements and goals. The funds generated by this charge would enable the Federal government to expand programs to improve the quality of the environment.

2. A tax on the lead additives used in gasoline to act as an economic incentive to increase the production and use of unleaded or low-leaded gasolines.

water pollution—1. Authorization of $6 billion for construction of municipal waste treatment plants, to be allocated at $2 billion per year over the next three years, as part of a total $12 billion program.

2. Creation of an Environmental Financing Authority to ensure that municipalities can finance their share of waste treatment plant construction costs.

3. Revision of statutory formula allocating Federal funds for treatment plant construction, to permit construction of plants where need is greatest.

4. Requirement that municipalities provide for meeting future waste treatment needs on a reasonably self-sufficient basis, including recovery from industrial users of the portion of construction costs allocable to treatment of their wastes.

5. Extension of Federal-State water quality standards to all navigable waters, ground waters, and waters of the contiguous zone, with a requirement that the standards include specific effluent limitations for individual sources of pollution.

6. Federal effluent standards for hazardous substances.

7. Requirement that new industrial facilities use best practicable technology to enhance and preserve water quality.

8. Authority for Administrator of the Environmental Protection Agency to enforce water quality standards, with administrative fines of up to $25,000 per day and court-imposed fines of up to $50,000 per day for repeated violations.

9. Elimination of the cumbersome enforcement conference and hearing mechanism in current law.

10. Authorization for legal action by private citizens against violators of standards.

11. Authority for Administrator to require that persons responsible for discharging effluent into waterways report on the nature and amount of such effluent.

12. Tripling of Federal operating grants to State pollution control agencies—from $10 million to $30 million—over four years.

13. Legislation, international measures, and $25 million in 1972 funds to control oil spills.

pesticides—1. Registration of pesticides in one of three categories—general use, use only by a trained applicator, or use only with a permit for each application—to ensure protection of human health and the environment.

2. Streamlining of procedure for appeal from a cancellation by the Administrator of the Environmental Protection Agency of a pesticide registration.

3. Authority for Administrator to stop the sale of any pesticide that is in violation of Federal law.

recycling of wastes—1. A new Federal program to purchase paper with recycled content which will soon apply to almost one-half of all the General Services Administration's paper procurement.

2. Expansion of the Federal program to other products with recycled content and technical assistance to States in developing similar programs.

toxic substances—1. Authority for Administrator of the Environmental Protection Agency to restrict the use or distribution of any substance which he finds is hazardous to human health or to the environment.

2. Authority for Administrator to stop the sale or use of any substance that violates the provisions of the legislation and to seek immediate injunctive relief when use presents an imminent hazard to health or to the environment.

3. Authority for Administrator to prescribe minimum standard tests to be prescribed on substances.

ocean dumping—1. Requirement that a permit be obtained from the Administrator of the Environmental Protection Agency for

any dumping of materials into the oceans, estuaries or Great Lakes.

2. Authority for the Administrator to place strict limits on ocean disposal in areas of critical ecological significance and to ban dumping of wastes that are dangerous to the marine ecosystem.

noise—1. Authority for Administrator of the Environmental Protection Agency to set noise emission standards for construction and transportation equipment and to require labelling of the noise characteristics of other products.

2. Noise control considerations incorporated in other Federal programs.

land use

national land use policy—1. Authorization of $100 million—$20 million in each of the next five years—in Federal matching assistance to States for State Land Use Programs.

2. States to be encouraged to assume control over land use planning and regulation in areas of critical environmental concern, e.g., the coastal zone and scenic and historic areas.

3. States to regulate land use around major growth-inducing facilities, e.g., major airports and highway interchanges, major recreational areas, and new communities.

4. States not implementing programs by 1974 to be ineligible for further grant assistance. In such States, Federal agencies to hold public hearings before proceeding with proposed Federally-assisted projects, with findings reviewed by Secretary of Interior.

legacy of parks—1. Major expansion of open space programs, focused on urban area parks to bring parks to the people.

2. HUD program of grants to States and localities to acquire and develop open space to be reoriented to help provide urban area parks, with budget authority increased from $75 million to $200 million.

3. Full finding of the Land and Water Conservation Fund at $380 million, of which $280 million would be used by States and localities to provide local park and recreational areas, particularly in or near major cities. Appropriation of $100 million from the Fund for Federal acquisition of nationally significant natural and historic areas.

4. Changes in the International Revenue Code to encourage charitable land transfers for conservation purposes.

5. Conversion of surplus Federal properties to public park use.

wilderness areas—1. Major expansion of the wilderness areas system to include many new areas throughout the nation.

power plant siting—1. Electric utilities to be required to submit to State or regional agencies established to balance power and

environmental needs plans providing 10-year projections of power and facilities requirements.

2. The State or regional agency to provide preliminary clearance of proposed power plant sites and transmission line routes five years prior to commencement of construction, and certification of specific sites, facilities and routes two years in advance, with public hearings at both stages.

mined area protection—Federal requirements and guidelines for State programs to regulate the environmental consequences of surface and underground mining, with Federal authority to act if the States fail to do so.

preserving our architectural and historic heritage—1. Amendment of the Internal Revenue Code to redress the current imbalance which favors demolition of buildings over their rehabilitation and preservation. Specific provisions to encourage the preservation of historic structures and to discourage their demolition.

2. State and local governments to be authorized to use for revenue-producing purposes historic properties transferred to them at no cost by the Federal government—to encourage preservation of such properties.

3. Federal insurance of bank loans to restore historic homes—up to $15,000 and 15 years.

world environment

Secretary of Interior, with Council on Environmental Quality and Secretary of State, to develop initiatives for presentation in international forums for establishment of a World Heritage Trust to provide protection for and international recognition of places of unique natural, historical, and cultural value to mankind.

environmental institute

Establishment of an Environmental Institute, jointly funded by the Federal Government and a number of private foundations, to conduct environmental policy studies.

appendix g

statements on proposed federal actions affecting the environment: guidelines*

1. *Purpose.* This memorandum provides guidelines to Federal departments, agencies, and establishments for preparing detailed environmental statements on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment as required by section 102(2)(C) of the National Environmental Policy Act (Public Law 91–190) (hereafter "the Act"). Underlying the preparation of such environmental statements is the mandate of both the Act and Executive Order 11514 (35 F.R. 4247) of March 4, 1970, that all Federal agencies, to the fullest extent possible, direct their policies, plans and programs so as to meet national environmental goals. The objective of section 102(2)(C) of the Act and of these guidelines is to build into the agency decision making process an appropriate and careful consideration of the environmental aspects of proposed action and to assist agencies in implementing not only the letter, but the spirit, of the Act. This memorandum also provides guidance on implementation of section 309 of the Clean Air Act, as amended (42 U.S.C. 1857 et seq.).

2. *Policy.* As early as possible and in all cases prior to agency decision concerning major action or recommendation or a favorable report on legislation that significantly affects the environment, Federal agencies will, in consultation with other appropri-

* 36 Fed. Register, 7724–7729, Apr. 23, 1971.

ate Federal, State, and local agencies, assess in detail the potential environmental impact in order that adverse effects are avoided, and environmental quality is restored or enhanced, to the fullest extent practicable. In particular, alternative actions that will minimize adverse impact should be explored and both the long- and short-range implications to man, his physical and social surroundings, and to nature, should be evaluated in order to avoid to the fullest extent practicable undesirable consequences for the environment.

3. *Agency and OMB procedures.* (a) Pursuant to section 2(f) of Executive Order 11514, the heads of Federal agencies have been directed to proceed with measures required by section 102(2)(C) of the Act. Consequently, each agency will establish, in consultation with the Council on Environmental Quality, not later than June 1, 1970 (and, by July 1, 1971, with respect to requirements imposed by revisions in these guidelines, which will apply to draft environmental statements circulated after June 30, 1971), its own formal procedures for (1) identifying those agency actions requiring environmental statements, the appropriate time prior to decision for the consultations required by section 102(2)(C), and the agency review process for which environmental statements are to be available, (2) obtaining information required in their preparation, (3) designating the officials who are to be responsible for the statements, (4) consulting with and taking account of the comments of appropriate Federal, State, and local agencies, including obtaining the comment of the Administrator of the Environmental Protection Agency, whether or not an environmental statement is prepared, when required under section 309 of the Clean Air Act, as amended, and section 8 of these guidelines, and (5) meeting the requirements of section 2(b) of Executive Order 11514 for providing timely public information on Federal plans and programs with environmental impact including procedures responsive to section 10 of these guidelines. These procedures should be consonant with the guidelines contained herein. Each agency should file seven (7) copies of all such procedures with the Council on Environmental Quality, which will provide advice to agencies in the preparation of their procedures and guidance on the application and interpretation of the Council's guidelines. The Environmental Protection Agency will assist in resolving any question relating to section 309 of the Clean Air Act, as amended.

(b) Each Federal agency should consult, with the assistance of the Council on Environmental Quality and the Office of Management and Budget if desired, with other appropriate Federal agencies in the development of the above procedures so as to achieve consistency in dealing with similar activities and to assure effective coordination among agencies in their review of proposed activities.

(c) State and local review of agency procedures, regulations, and policies for the administration of Federal programs of assistance to State and local governments will be conducted pursuant to procedures established by the Office of Management and Budget Circular No. A–85. For agency procedures subject to OMB Circular No. A–85 a 30-day extension in the July 1, 1971, deadline set in section 3(a) is granted.

(d) It is imperative that existing mechanisms for obtaining the views of Federal, State, and local agencies on proposed Federal actions be utilized to the extent practicable in dealing with environmental matters. The Office of Management and Budget will issue instructions, as necessary, to take full advantage of existing mechanisms (relating to procedures for handling legislation, preparation of budgetary materials, new procedures, water resource and other projects, etc.).

4. *Federal agencies included.* Section 102(2)(C) applies to all agencies of the Federal Government with respect to recommendations or favorable reports on proposals for (i) legislation and (ii) other major Federal actions significantly affecting the quality of the human environment. The phrase "to the fullest extent possible" in section 102(2)(C) is meant to make clear that each agency of the Federal Government shall comply with the requirement unless existing law applicable to the agency's operations expressly prohibits or make compliance impossible. (Section 105 of the Act provides that "The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.")

5. *Actions included.* The following criteria will be employed by agencies in deciding whether a proposed action requires the preparation of an environmental statement:

(a) "Actions" include but are not limited to:

(i) Recommendations or favorable reports relating to legislation including that for appropriations. The requirement for following the section 102(2)(C) procedure as elaborated in these guidelines applies to both (i) agency recommendations on their own proposals for legislation and (ii) agency reports on legislation initiated elsewhere. (In the latter case only the agency which has primary responsibility for the subject matter involved will prepare an environmental statement.) The Office of Management and Budget will supplement these general guidelines with specific instructions relating to the way in which the section 102(2)(C) procedure fits into its legislative clearance process;

(ii) Projects and continuing activities: directly undertaken by Federal agencies; supported in whole or in part through Federal contracts, grants, subsidies, loans, or other forms of funding assistance; involving a Federal lease, permit, license, certificate or other entitlement for use;

(iii) Policy, regulations, and procedure-making.

(b) The statutory clause "major Federal actions significantly affecting the quality of the human environment" is to be construed by agencies with a view to the overall, cumulative impact of the action proposed (and of further actions contemplated). Such actions may be localized in their impact, but if there is potential that the environment may be significantly affected, the statement is to be prepared. Proposed actions, the environmental impact of which is likely to be highly controversial, should be covered in all cases. In considering what constitutes major action significantly affecting the environment, agencies should bear in mind that the effect of many Federal decisions about a project or complex of projects can be individually limited but cumulatively considerable. This can occur when one or more agencies over a period of years puts into a project individually minor but collectively major resources, when one decision involving a limited amount of money is a precedent for action in much larger cases or represents a decision in principle about a future major course of action, or when several Government agencies individually make decisions about partial aspects of a major action. The lead agency should prepare an environmental statement if it is reasonable to anticipate a cumulatively significant impact on the environment from Federal action. "Lead agency" refers to the Federal agency which has primary authority for committing the Federal Government to a course of action with significant environmental impact. As necessary, the Council on Environmental Quality will assist in resolving questions of lead agency determination.

(c) Section 101(b) of the Act indicates the broad range of aspects of the environment to be surveyed in any assessment of significant effect. The Act also indicates that adverse significant effects include those that degrade the quality of the environment, curtail the range of beneficial uses of the environment, and serve short-term, to the disadvantage of long-term, environmental goals. Significant effects can also include actions which may have both beneficial and detrimental effects, even if, on balance, the agency believes that the effect will be beneficial. Significant adverse effects on the quality of the human environment include both those that directly affect human beings and those that indirectly affect human beings through adverse effects on the environment.

(d) Because of the Act's legislative history, environmental protective regulatory activities concurred in or taken by the Environmental Protection Agency are not deemed actions which require the preparation of environmental statements under section 102(2)(C) of the Act.

6. *Content of environmental statement.* (a) The following points are to be covered:

(i) A description of the proposed action including information and technical data adequate to permit a careful assessment of environmental impact by commenting agencies. Where relevant, maps should be provided.

(ii) The probable impact of the proposed action on the environment, including impact on ecological systems such as wildlife, fish, and marine life. Both primary and secondary significant consequences for the environment should be included in the analysis. For example, the implications, if any, of the action for population distribution or concentration should be estimated and an assessment made of the effect of any possible change in population patterns upon the resource base, including land use, water, and public services, of the area in question.

(iii) Any probable adverse environmental effects which cannot be avoided (such as water or air pollution, undesirable land use patterns, damage to life systems, urban congestion, threats to health or other consequences adverse to the environmental goals set out in section 101(b) or the Act).

(iv) Alternatives to the proposed action (section 102(2)(D) of the Act requires the responsible agency to "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources"). A rigorous exploration and objective evaluation of alternative actions that might avoid some or all of the adverse environmental effects is essential. Sufficient analysis of such alternatives and their costs and impact on the environment should accompany the proposed action through the agency review process in order not to foreclose prematurely options which might have less detrimental effects.

(v) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. This in essence requires the agency to assess the action for cumulative and long-term effects from the perspective that each generation is trustee of the environment for succeeding generations.

(vi) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. This requires the agency to identify the extent to which the action curtails the range of beneficial uses of the environment.

(vii) Where appropriate, a discussion of problems and objections raised by other Federal, State, and local agencies and by private organizations and individuals in the review process and the disposition of the issues involved. (This section may be added at the end of the review process in the final text of the environmental statement.)

(b) With respect to water quality aspects of the proposed action which have been previously certified by the appropriate State or interstate organization as being in substantial compliance with applicable water quality standards, the comment of the Environmental Protection Agency should also be requested.

(c) Each environmental statement should be prepared in accordance with the precept in section 102(2)(A) of the Act that all agencies of the Federal Government "utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and decisionmaking which may have an impact on man's environment."

(d) Where an agency follows a practice of declining to favor an alternative until public hearings have been held on a proposed action, a draft environmental statement may be prepared and circulated indicating that two or more alternatives are under consideration.

(e) Appendix 1 prescribes the form of the summary sheet which should accompany each draft and final environmental statement.

7. *Federal agencies to be consulted in connection with preparation of environmental statement.* A Federal agency considering an action requiring an environmental statement, on the basis of (i) a draft environmental statement for which it takes responsibility or (ii) comparable information followed by a hearing subject to the provisions of the Administrative Procedure Act, should consult with, and obtain the comment on the environmental impact of the action of, Federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved. These Federal agencies include components of (depending on the aspect or aspects of the environment):

Advisory Council on Historic Preservation.
Department of Agriculture.
Department of Commerce.
Department of Defense.
Department of Health, Education, and Welfare.
Department of Housing and Urban Development.
Department of the Interior.
Department of State.
Department of Transportation.
Atomic Energy Commission.
Federal Power Commission
Environmental Protection Agency.
Office of Economic Opportunity.

For actions specifically affecting the environment of their geographic jurisdictions, the following Federal and Federal-State agencies are also to be consulted:

Tennessee Valley Authority.
Appalachian Regional Commission.
National Capital Planning Commission.

Delaware River Basin Commission.
Susquehanna River Basin Commission.

Agencies seeking comment should determine which one or more of the above listed agencies are appropriate to consult on the basis of the areas of expertise identified in Appendix 2 to these guidelines. It is recommended (i) that the above listed departments and agencies establish contact points, which often are most appropriately regional offices, for providing comments on the environmental statements and (ii) that departments from which comment is solicited coordinate and consolidate the comments of their component entities. The requirement in section 102(2)(C) to obtain comment from Federal agencies having jurisdiction or special expertise is in addition to any specific statutory obligation of any Federal agency to coordinate or consult with any other Federal or State agency. Agencies seeking comment may establish time limits of not less than thirty (30) days for reply, after which it may be presumed, unless the agency consulted requests a specified extension of time, that the agency consulted has no comment to make. Agencies seeking comment should endeavor to comply with requests for extensions of time of up to fifteen (15) days.

8. *Interim EPA procedures for implementation of section 309 of the Clean Air Act, as amended.* (a) Section 309 of the Clean Air Act, as amended, provides:

SEC. 309. (a) The Administrator shall review and comment in writing on the environmental impact of any matter relating to duties and responsibilities granted pursuant to this Act or other provisions of the authority of the Administrator, contained in any (1) legislation proposed by any Federal department or agency, (2) newly authorized Federal projects for construction and any major Federal agency action (other than a project for construction) to which section 102(2)(C) of Public Law 91–190 applies, and (3) proposed regulations published by any department or agency of the Federal Government. Such written comment shall be made public at the conclusion of any such review.

(b) In the event the Administrator determines that any such legislation, action, or regulation is unsatisfactory from the standpoint of public health or welfare or environmental quality, he shall publish his determination and the matter shall be referred to the Council on Environmental Quality.

(b) Accordingly, wherever an agency action related to air or water quality, noise abatement and control, pesticide regulation, solid waste disposal, radiation criteria and standards, or other provisions of the authority of the Administrator if the Environmental Protection Agency is involved, including his enforcement authority, Federal agencies are required to submit for review and comment by the Administrator in writing: (i) proposals for new Federal construction projects and other major Federal agency actions to which section 102(2)(C) of the National Environmental Policy Act applies and (ii) proposed legislation and regulations, whether or not section 102(2)(C) of the National Environmental Policy Act applies. (Actions requiring review by

the Administrator do not include litigation or enforcement proceedings.) The Administrator's comments shall constitute his comments for the purposes of both section 309 of the Clean Air Act and section 102(2)(C) of the National Environmental Policy Act. A period of 45 days shall be allowed for such review. The Administrator's written comment shall be furnished to the responsible Federal department or agency, to the Council on Environmental Quality and summarized in a notice published in the FEDERAL REGISTER. The public may obtain copies of such comment on request from the Environmental Protection Agency.

9. *State and local review.* Where no public hearing has been held on the proposed action at which the appropriate State and local review has been invited, and where review of the environmental impact of the proposed action by State and local agencies authorized to develop and enforce environmental standards is relevant, such State and local review shall be provided as follows:

(a) For direct Federal development projects and projects assisted under programs listed in Attachment D of the Office of Management and Budget Circular No. A-95, review of draft environmental statements by State and local governments will be through procedures set forth under Part I of Circular No. A-95.

(b) Where these procedures are not appropriate and where a proposed action affects matters within their jurisdiction, review of the draft environmental statement on a proposed action by State and local agencies authorized to develop and enforce environmental standards and their comments on the environmental impact of the proposed action may be obtained directly or by distributing the draft environmental statement to the appropriate State, regional and metropolitan clearinghouses unless the Governor of the State involved has designated some other point for obtaining this review.

10. *Use of statements in agency review processes; distribution to Council on Environmental Quality; availability to public.* (a) Agencies will need to identify at what stage or stages of a series of actions relating to a particular matter the environmental statement procedures of this directive will be applied. It will often be necessary to use the procedures both in the development of a national program and in the review of proposed projects within the national program. However, where a grant-in-aid program does not entail prior approval by Federal agencies of specific projects the view of Federal, State, and local agencies in the legislative process may have to suffice. The principle to be applied is to obtain views of other agencies at the earliest feasible time in the development of program and project proposals. Care should be exercised so as to not to duplicate the clearance process, but when actions being considered differ significantly from those that have already been reviewed pursuant to section 102(2)(C) of the Act an environmental statement should be provided.

(b) Ten (10) copies of draft environmental statements (when prepared), ten (10) copies of all comments made thereon (to be forwarded to the Council by the entity making comment at the time comment is forwarded to the responsible agency), and ten (10) copies of the final text of environmental statements (together with all comments received thereon by the responsible agency from Federal, State, and local agencies and from private organizations and individuals) shall be supplied to the Council on Environmental Quality in the Executive Office of the President (this will serve as making environmental statements available to the President). It is important that draft environmental statements be prepared and circulated for comment and furnished to the Council early enough in the agency review process before an action is taken in order to permit meaningful consideration of the environmental issues involved. To the maximum extent practicable no administrative action (i.e., any proposed action to be taken by the agency other than agency proposals for legislation to Congress or agency reports on legislation) subject to section 102(2)(C) is to be taken sooner than ninety (90) days after a draft environmental statement has been circulated for comment, furnished to the Council and, except where advance public disclosure will result in significantly increased costs of procurement to the Government, made available to the public pursuant to these guidelines; neither should such administrative action be taken sooner than thirty (30) days after the final text of an environmental statement (together with comments) has been made available to the Council and the public. If the final text of an environmental statement is filed within ninety (90) days after a draft statement has been circulated for comment, furnished to the Council and made public pursuant to this section of these guidelines, the thirty (30) day period and ninety (90) day period may run concurrently to the extent that they overlap.

(c) With respect to recommendations or reports on proposals for legislation to which section 102(2)(C) applies, the final text of the environmental statement and comments thereon should be available to the Congress and to the public in support of the proposed legislation or report. In cases where the scheduling of congressional hearings on recommendations or reports on proposals for legislation which the Federal agency has forwarded to the Congress does not allow adequate time for the completion of a final text of an environmental statement (together with comments), a draft environmental statement may be furnished to the Congress and made available to the public pending transmittal of the comments as received and the final text.

(d) Where emergency circumstances make it necessary to take an action with significant environmental impact without observing the provisions of these guidelines concerning minimum periods for agency review and advance availability of environmental

statements, the Federal agency proposing to take the action should consult with the Council on Environmental Quality about alternative arrangements. Similarly, where there are overriding considerations of expense to the Government or impaired program effectiveness, the responsible agency should consult the Council concerning appropriate modifications of the minimum periods.

(e) In accord with the policy of the National Environmental Policy Act and Executive Order 11514 agencies have a responsibility to develop procedures to insure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact in order to obtain the views of interested parties. These procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action. Agencies which hold hearings on proposed administrative actions or legislation should make the draft environmental statement available to the public at least fifteen (15) days prior to the time of the relevant hearings except where the agency prepares the draft statement on the basis of a hearing subject to the Administrative Procedure Act and preceded by adequate public notice and information to identify the issues and obtain the comments provided for in sections 6–9 of these guidelines.

(f) The agency which prepared the environmental statement is responsible for making the statement and the comments received available to the public pursuant to the provisions of the Freedom of Information Act (5 U.S.C., sec. 552), without regard to the exclusion of interagency memoranda when such memoranda transmit comments of Federal agencies listed in section 7 of these guidelines upon the environmental impact of proposed actions subject to section 102(2)(C).

(g) Agency procedures prepared pursuant to section 3 of these guidelines shall implement these public information requirements and shall include arrangements for availability of environmental statements and comments at the head and appropriate regional offices of the responsible agency and at appropriate State, regional, and metropolitan clearinghouses unless the Governor of the State involved designates some other point for receipt of this information.

11. *Application of section 102(2)(C) procedure to existing projects and programs.* To the maximum extent practicable the section 102(2)(C) procedure should be applied to further major Federal actions having a significant effect on the environment even though they arise from projects or programs initiated prior to enactment of the Act on January 1, 1970. Where it is not practicable to reassess the basic course of action, it is still important that further incremental major actions be shaped so as to

minimize adverse environmental consequences. It is also important in further action that account be taken of environmental consequences not fully evaluated at the outset of the project or program.

12. *Supplemetary guidelines, evaluation of procedures.* (a) The Council on Environmental Quality after examining environmental statements and agency procedures with respect to such statements will issue such supplements to these guidelines as are necessary.

(b) Agencies will continue to assess their experience in the implementation of the section 102(2)(C) provisions of the Act and in conforming with these guidelines and report thereon to the Council on Environmental Quality by December 1, 1971. Such reports should include an identification of the problem areas and suggestions for revision or clarification of these guidelines to achieve effective coordination of views on environmental aspects (and alternatives, where appropriate) of proposed actions without imposing unproductive administrative procedures.

RUSSELL E. TRAIN,
Chairman.

appendix i

A summary sheet should accompany each environmental statement submitted, consisting of no more than one page, and covering the following items:

(Check one) ( ) Draft. ( ) Final Environmental Statement.

Name of Responsible Federal Agency (with name of operating division where appropriate).

1. Name of Action. (Check one) ( ) Administrative Action. ( ) Legislative Action.

2. Brief description of action indicating what States (and counties) particularly affected.

3. Summary of environmental impact and adverse environmental effects.

4. List alternatives considered.

5. a. (For draft statements) List all Federal, State, and local agencies from which comments have been requested.

b. (For final statements) List all Federal, State, and local agencies and other sources from which written comments have been received.

6. Dates draft statement and final statement made available to Council on Environmental Quality and public.

appendix ii—federal agencies with jurisdiction by law or special expertise to comment on various types of environmental impacts

air

air quality and air pollution control—Department of Agriculture: Forest Service (effects on vegetation).

Department of Health, Education, and Welfare (health aspects).

Environmental Protection Agency: Air Pollution Control Office.

Department of the Interior:
Bureau of Mines (fossil and gaseous fuel combustion).
Bureau of Sport Fisheries and Wildlife (wildlife).
Department of Transportation:
Assistant Secretary for Systems Development and Technology (auto
sions).
Coast Guard (vessel emissions).
Federal Aviation Administration (aircraft emissions).

weather modification—Department of Commerce: National Oceani
Atmospheric Administration.
Department of Defense: Department of the Air Force.
Department of the Interior: Bureau of Reclamation.

energy

environmental aspects of electric energy generation and transmiss
Atomic Energy Commission (nuclear power).
Environmental Protection Agency:
Water Quality Office.
Air Pollution Control Office.
Department of Agriculture: Rural Electrification Administration
areas).
Department of Defense: Army Corps of Engineers (hydro-facilities).
Federal Power Commission (hydro-facilities and transmission lines).
Department of Housing and Urban Development (urban areas).
Department of the Interior—(facilities on Government lands).

natural gas energy development, transmission and generation—Fe
Power Commission (natural gas production, transmission and supp
Department of the Interior:
Geological Survey.
Bureau of Mines.

hazardous substances

toxic materials—Department of Commerce: National Oceanic and A
pheric Administration.
Department of Health, Education and Welfare (health aspects).
Environmental Protection Agency.
Department of Agriculture:
Agricultural Research Service.
Consumer and Marketing Service.
Department of Defense.
Department of the Interior: Bureau of Sport Fisheries and Wildlife

pesticides—Department of Agriculture:
Agricultural Research Service (biological controls, food and fiber pro
tion).
Consumer and Marketing Service.
Forest Service.
Department of Commerce:
National Marine Fisheries Service.
National Oceanic and Atmospheric Administration.
Environmental Protection Agency: Office of Pesticides.
Department of the Interior:
Bureau of Sport Fisheries and Wildlife (effects on fish and wildlife).
Bureau of Land Management.
Department of Health, Education, and Welfare (health aspects).

herbicides—Department of Agriculture:
Agricultural Research Service.
Forest Service.

Environmental Protection Agency: Office of Pesticides.
Department of Health, Education, and Welfare (Health aspects).
Department of the Interior:
Bureau of Sport Fisheries and Wildlife.
Bureau of Land Management.
Bureau of Reclamation.

transportation and handling of hazardous materials—Department of Commerce:
Maritime Administration.
National Marine Fisheries Service.
National Oceanic and Atmospheric Administration (impact on marine life).
Department of Defense:
Armed Services Explosive Safety Board.
Army Corps of Engineers (navigable waterways).
Department of Health, Education, and Welfare: Office of the Surgeon General (health aspects).
Department of Transportation:
Federal Highway Administration Bureau of Motor Carrier Safety.
Coast Guard.
Federation Railroad Administration.
Federal Aviation Administration.
Assistant Secretary for Systems Development and Technology.
Office of Hazardous Materials.
Office of Pipeline Safety.
Environmental Protection Agency (hazardous substances).
Atomic Energy Commission (radioactive substances).

land use and management

coastal areas: wetlands, estuaries, waterfowl refuges, and beaches—Department of Agriculture: Forest Service.
Department of Commerce:
National Marine Fisheries Service (impact on marine life).
National Oceanic and Atmospheric Administration (impact on marine life).
Department of Transportation: Coast Guard (bridges, navigation).
Department of Defense: Army Corps of Engineers (beaches, dredge and fill permits, Refuse Act permits).
Department of the Interior:
Bureau of Sport Fisheries and Wildlife.
National Park Service.
U.S. Geological Survey (coastal geology).
Bureau of Outdoor Recreation (beaches).
Department of Agriculture: Soil Conservation Service (soil stability, hydrology).
Environmental Protection Agency: Water Quality Office.

historic and archeological sites—Department of the Interior: National Park Service.
Advisory Council on Historic Preservation.
Department of Housing and Urban Development (urban areas).

flood plains and watersheds—Department of Agriculture:
Agricultural Stabilization and Research Service.
Soil Conservation Service.
Forest Service.
Department of the Interior:
Bureau of Outdoor Recreation.
Bureau of Reclamation.

Bureau of Sport Fisheries and Wildlife.
Bureau of Land Measurement.
U.S. Geological Survey.
Department of Housing and Urban Development (urban areas).
Department of Defense: Army Corps of Engineers.

mineral land reclamation—Appalachian Regional Commission.
Department of Agriculture: Forest Service.
Department of the Interior:
Bureau of Mines.
Bureau of Outdoor Recreation.
Bureau of Sport Fisheries and Wildlife.
Bureau of Land Management.
U.S. Geological Survey.
Tennessee Valley Authority.

parks, forests, and outdoor recreation—Department of Agriculture:
Forest Service.
Soil Conservation Service.
Department of the Interior:
Bureau of Land Management.
National Park Service.
Bureau of Outdoor Recreation.
Bureau of Sport Fisheries and Wildlife.
Department of Defense: Army Corps of Engineers.
Department of Housing and Urban Development (urban areas).

soil and plant life, sedimentation, erosion and hydrologic conditions—Department of Agriculture:
Soil Conservation Service.
Agricultural Research Service.
Forest Service.
Department of Defense: Army Corps of Engineers (dredging, aquatic plants).
Department of Commerce: National Oceanic and Atmospheric Administration.
Department of the Interior:
Bureau of Land Management.
Bureau of Sport Fisheries and Wildlife.
Geological Survey.
Bureau of Reclamation.

noise

noise control and abatement—Department of Health, Education, and Welfare (health aspects).
Department of Commerce: National Bureau of Standards.
Department of Transportation:
Assistant Secretary for Systems Development and Technology.
Federal AviationAdministration (Office of Noise Abatement).
Environmental Protection Agency (Office of Noise).
Department of Housing and Urban Development (urban land use aspects, building materials standards).

physiological health and human well being

chemical contamination of food products—Department of Agriculture: Consumer and Marketing Service.
Department of Health, Education, and Welfare (health aspects).
Environmental Protection Agency: Office of Pesticides (economic poisons).

food additives and food sanitation—Department of Health, Education, and Welfare (health aspects).

Environmental Protection Agency: Office of Pesticides (economic poisons, e.g., pesticide residues).
Department of Agriculture: Consumer Marketing Service (meat and poultry products).

microbiological contamination—Department of Health, Education, and Welfare (health aspects).

radiation and radiological health—Department of Commerce: National Bureau of Standards.
Atomic Energy Commission.
Environmental Protection Agency: Office of Radiation.
Department of the Interior: Bureau of Mines (uranium mines).

sanitation and waste systems—Department of Health, Education, and Welfare (health aspects).
Department of Defense: Army Corps of Engineers.
Environmental Protection Agency:
Solid Waste Office.
Water Quality Office.
Department of Transportation: U.S. Coast Guard (ship sanitation).
Department of the Interior:
Bureau of Mines (mineral waste and recycling, mine acid wastes, urban solid wastes).
Bureau of Land Management (solid wastes on public lands).
Office of Saline Water (demineralization of liquid wastes).

shellfish sanitation—Department of Commerce:
National Marine Fisheries Service.
National Oceanic and Atmospheric Administration
Department of Health, Education, and Welfare (health aspects).
Environmental Protection Agency: Office of Water Quality.

transportation

air quality—Environmental Protection Agency: Air Pollution Control Office.
Department of Transportation: Federal Aviation Administration.
Department of the Interior:
Bureau of Outdoor Recreation.
Bureau of Sport Fisheries and Wildlife.
Department of Commerce: National Oceanic and Atmospheric Administration (meteorological conditions).

water quality—Environmental Protection Agency: Office of Water Quality.
Department of the Interior: Bureau of Sport Fisheries and Wildlife.
Department of Commerce: National Oceanic and Atmospheric Administration (impact on marine life and ocean monitoring).
Department of Defense: Army Corps of Engineers.
Department of Transportation: Coast Guard.

urban

congestion in urban areas, housing and building displacement—Department of Transportation: Federal Highway Administration.
Office of Economic Opportunity.
Department of Housing and Urban Development.
Department of the Interior: Bureau of Outdoor Recreation.

environmental effects with special impact in low-income neighborhoods—Department of the Interior: National Park Service.
Office of Economic Opportunity.
Department of Housing and Urban Development (urban areas).
Department of Commerce (economic development areas).
Economic Development Administration.

Department of Transportation: Urban Mass Transportation Administration.

rodent control—Department of Health, Education, and Welfare (health aspects).
Department of Housing and Urban Development (urban areas).

urban planning—Department of Transportation: Federal Highway Administration.
Department of Housing and Urban Development.
Environmental Protection Agency.
Department of the Interior:
Geological Survey.
Bureau of Outdoor Recreation.
Department of Commerce: Economic Development Administration.

water

water quality and water pollution control—Department of Agriculture:
Soil Conservation Service.
Forest Service.
Department of the Interior:
Bureau of Reclamation.
Bureau of Land Management.
Bureau of Sports Fisheries and Wildlife.
Bureau of Outdoor Recreation.
Geological Survey.
Office of Saline Water.
Environmental Protection Agency: Water Quality Office.
Department of Health, Education, and Welfare (health aspects).
Department of Defense:
Army Corps of Engineers.
Department of the Navy (ship pollution control).
Department of Transportation: Coast Guard (oil spills, ship sanitation).
Department of Commerce: National Oceanic and Atmospheric Administration.

marine pollution—Department of Commerce: National Oceanic and Atmospheric Administration.
Department of Transportation: Coast Guard.
Department of Defense:
Army Corps of Engineers.
Office of Oceanographer of the Navy.

river and canal regulation and stream channelization—Department of Agriculture: Soil Conservation Service.
Department of Defense: Army Corps of Engineers.
Department of the Interior:
Bureau of Reclamation.
Geological Survey.
Bureau of Sport Fisheries and Wildlife.
Department of Transportation: Coast Guard.

wildlife

Environmental Protection Agency.
Department of Agriculture:
Forest Service.
Soil Conservation Service.
Department of the Interior:
Bureau of Sport Fisheries and Wildlife.
Bureau of Land Management.
Bureau of Outdoor Recreation.

federal agency offices for receiving and coordinating comments upon environmental impact statements

advisory council on historic preservation

Robert Garvey, Executive Director, Suite 618, 801 19th Street NW., Washington, DC 20006, 343–8607.

department of agriculture

Dr. T. C. Byerly, Office of the Secretary, Washington, D.C., 20250, 388–7803.

appalachian regional commission

Orville H. Lerch, Alternate Federal Co-Chairman, 1666 Connecticut Avenue NW., Washington, DC 20235, 967–4103.

department of the army (corps of engineers)

Col. J. B. Newman, Executive Director of Civil Works, Office of the Chief of Engineers, Washington, D.C. 20314, 693–7168.

atomic energy commission

For nonregulatory matters: Joseph J. DiNunno, Director, Office of Environmental Affairs, Washington, D.C. 20545, 973–5391.

For regulatory matters: Christopher L. Henderson, Assistant Director for Regulation, Washington, D.C. 20545, 973–7531.

department of commerce

Dr. Sydney R. Galler, Deputy Assistant Secretary for Environmental Affairs, Washington, D.C. 20230, 967–4335.

department of defense

Dr. Louis M. Rousselot, Assistant Secretary for Defense (Health and Environment), Room 3E172, The Pentagon, Washington, DC 20301, 697–2111.

delaware river basin commission

W. Brinton Whitall, Secretary, Post Office Box 360, Trenton, NJ 08603, 609–883–9500.

environmental protection agency

Charles Fabrikant, Director of Impact Statements Office, 1626 K Street NW., Washington, DC 20460, 632–7719.

federal power commission

Frederick H. Warren, Commission's Advisor on Environmental Quality, 441 G Street NW., Washington, DC 20426, 386–6084.

general services administration

Rod Kreger, Deputy Administrator, General Services Administration–AD, Washington, D.C. 20405, 343–6077.

Alternate contact: Aaron Woloshin, Director, Office of Environmental Affairs, General Services Administration–ADF, 343–4161.

department of health, education, and welfare

Roger O. Egeberg, Assistant Secretary for Health and Science Affairs, HEW North Building, Washington, D.C. 20202, 963–4254.

department of housing and urban development [1]

Charles Orlebeke, Deputy Under Secretary, 451 Seventh Street SW., Washington, DC 20410, 755–6960.

Alternate contact: George Wright, Office of the Deputy Under Secretary, 755–8192.

department of the interior

Jack O. Horton, Deputy Assistant Secretary for Programs, Washington, D.C. 20240, 343–6181.

national capital planning commission

Charles H. Conrad, Executive Director, Washington, D.C. 20576, 382–1163.

office of economic opportunity

Frank Carlucci, Director, 1200 19th Street, NW., Washington, DC 20506, 254–6000.

susquehanna river basin commission

Alan J. Summerville, Water Resources Coordinator, Department of Environmental Resources, 105 South Office Building, Harrisburg, PA. 17120, 717–787–2315.

tennessee valley authority

Dr. Francis Gartrell, Director of Environmental Research and Development, 720 Edney Building, Chattanooga, TN 37401, 615–755–2002.

department of transportation

Herbert F. DeSimone, Assistant Secretary for Environment and Urban Systems, Washington, D.C. 20590. 426–4563.

department of treasury

Richard E. Slitor, Assistant Director, Office of Tax Analysis, Washington, D.C. 20220, 964–2797.

department of state

Christian Herter, Jr., Special Assistant to the Secretary for Environmental Affairs, Washington, D.C. 20520, 632–7964.

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[1] Contact the Deputy Under Secretary with regard to environmental impacts of legislation, policy statements, program regulations and procedures, and precedent-making project decisions. For all other HUD consultation, contact the HUD Regional Administrator in whose jurisdiction the project lies, as follows:

James J. Barry, Regional Administrator I, Attention: Environmental Clearance Officer, Room 405, John F. Kennedy Federal Building, Boston, MA 02203, 617–223–4066.

S. William Green, Regional Administrator II, Attention: Environmental Clearance Officer, 26 Federal Plaza, New York, NY 10007, 212–264–8068.

Warren P. Phelan, Regional Administrator III, Attention: Environmental Clearance Officer, Curtis Building, Sixth and Walnut Street, Philadelphia, PA 19106, 215–597–2560.

Edward H. Baxter, Regional Administrator IV, Attention: Environmental Clearance Officer, Peachtree-Seventh Building, Atlanta, GA 30323, 404–526–5585.

George Vavoulis, Regional Administrator V, Attention: Environmental Clearance Officer, 360 North Michigan Avenue, Chicago, IL 60601, 312–353–5680.

Richard L. Morgan, Regional Administrator VI, Attention: Environmental Clearance Officer, Federal Office Building, 819 Taylor Street, Fort Worth, TX 76102, 817–334–2867.

Harry T. Morley, Jr., Regional Administrator VII, Attention: Environmental Clearance Officer, 911 Walnut Street, Kansas City, MO 64106, 816–374–2661.

Robert C. Rosenheim, Regional Administrator VIII, Attention: Environmental Clearance Officer, Samsonite Building, 1051 South Broadway, Denver, CO 80209, 303–837–4061.

Robert H. Baida, Regional Administrator IX, Attention: Environmental Clearance Officer, 450 Golden Gate Avenue, Post Office Box 36003, San Francisco, CA 94102, 415–556–4752.

Oscar P. Pederson, Regional Administrator X, Attention: Environmental Clearance Officer, Room 226, Arcade Plaza Building, Seattle, WA 98101, 206–583–5415.

appendix h

executive order 11593, protection and enhancement of the cultural environment, may 13, 1971

By virtue of the authority vested in me as President of the United States and in furtherance of the purposes and policies of the National Environmental Policy Act of 1969 (83 Stat. 852, 42 U.S.C. 4321 et seq.), the National Historic Preservation Act of 1966 (80 Stat. 915, 16 U.S.C. 470 et seq.), the Historic Sites Act of 1935 (49 Stat. 666, 16 U.S.C. 461 et seq.), and the Antiquities Act of 1906 (34 Stat. 225, 16 U.S.C. 431 et seq.), it is ordered as follows:

SECTION 1. *Policy*. The Federal Government shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. Agencies of the executive branch of the Government (hereinafter referred to as "Federal agencies") shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally

owned sites, structures and objects of historical, architectural or archaeological significance.

SEC. 2. *Responsibilities of Federal agencies.* Consonant with the provisions of the acts cited in the first paragraph of this order, the heads of Federal agencies shall:

(a) no later than July 1, 1973, with the advice of the Secretary of the Interior, and in cooperation with the liaison officer for historic preservation for the State or territory involved, locate, inventory, and nominate to the Secretary of the Interior all sites, buildings, districts, and objects under their jurisdiction or control that appear to qualify for listing on the National Register of Historic Places.

(b) exercise caution during the interim period until inventories and evaluations required by subsection (a) are completed to assure that any federally owned property that might qualify for nomination is not inadvertently transferred, sold, demolished or substantially altered. The agency head shall refer any questionable actions to the Secretary of the Interior for an opinion respecting the property's eligibility for inclusion on the National Register of Historic Places. The Secretary shall consult with the liaison officer for historic preservation for the State or territory involved in arriving at his opinion. Where, after a reasonable period in which to review and evaluate the property, the Secretary determines that the property is likely to meet the criteria prescribed for listing on the National Register of Historic Places, the Federal agency head shall reconsider the proposal in light of national environmental and preservation policy. Where, after such reconsideration, the Federal agency head proposes to transfer, sell, demolish or substantially alter the property he shall not act with respect to the property until the Advisory Council on Historic Preservation shall have been provided an opportunity to comment on the proposal.

(c) initiate measures to assure that where as a result of Federal action or assistance a property listed on the National Register of Historic Places is to be substantially altered or demolished, timely steps be taken to make or have made records, including measured drawings, photographs and maps, of the property, and that copy of such records then be deposited in the Library of Congress as part of the Historic American Buildings Survey or Historic American Engineering Record for future use and reference. Agencies may call on the Department of the Interior for advice and technical assistance in the completion of the above records.

(d) initiate measures and procedures to provide for the maintenance, through preservation, rehabilitation, or restoration, of federally owned and registered sites at professional standards prescribed by the Secretary of the Interior.

(e) submit procedures required pursuant to subsection (d), to

the Secretary of the Interior and to the Advisory Council on Historic Preservation no later than January 1, 1972, and annually thereafter, for review and comment.

(f) cooperate with purchasers and transferees of a property listed on the National Register of Historic Places in the development of viable plans to use such property in a manner compatible with preservation objectives and which does not result in an unreasonable economic burden to public or private interests.

SEC. 3. *Responsibilities of the Secretary of the Interior.*

The Secretary of the Interior shall:

(a) encourage State and local historic preservation officials to evaluate and survey federally owned historic properties and, where appropriate, to nominate such properties for listing on the National Register of Historic Places.

(b) develop criteria and procedures to be applied by Federal agencies in the reviews and nominations required by section 2(a). Such criteria and procedures shall be developed in consultation with the affected agencies.

(c) expedite action upon nominations to the National Register of Historic Places concerning federally owned properties proposed for sale, transfer, demolition or substantial alteration.

(d) encourage State and Territorial liaison officers for historic preservation to furnish information upon request to Federal agencies regarding their properties which have been evaluated with respect to historic, architectural or archaeological significance and which as a result of such evaluations have not been found suitable for listing on the National Register of Historic Places.

(e) develop and make available to Federal agencies and State and local governments information concerning professional methods and techniques for preserving, improving, restoring and maintaining historic properties.

(f) advise Federal agencies in the evaluation, identification, preservation, improvement, restoration and maintenance of historic properties.

(g) review and evaluate the plans of transferees of surplus Federal properties transferred for historic monument purposes to assure that the historic character of such properties is preserved in rehabilitation, restoration, improvement, maintenance and repair of such properties.

(h) review and comment upon Federal agency procedures submitted pursuant to section 2(e) of this order.

RICHARD NIXON.

THE WHITE HOUSE.

appendix i

executive order 11602, providing for administration of the clean air act with respect to federal contracts, grants, or loans, june 30, 1971

By virtue of the authority vested in me by the provisions of the Clean Air Act, as amended (42 U.S.C. 1857 et seq.), and particularly section 306 of that Act as added by the Clean Air Amendments of 1970 (Public Law 91–604, approved December 31, 1970), it is hereby ordered as follows:

SECTION 1. *Policy*. It is the policy of the Federal Government to improve and enhance environmental quality. In furtherance of that policy, the program prescribed in this Order is instituted to assure that each Federal agency empowered to enter into contracts for the procurement of goods, materials, or services and each Federal agency empowered to extend Federal assistance by way of grant, loan, or contract shall undertake such procurement and assistance activities in a manner that will result in effective enforcement of the Clean Air Act (hereinafter referred to as "the Act").

SEC. 2. *Designation of Facilities*. (a) The Administrator of the Environmental Protection Agency (hereinafter referred to as "the Administrator") shall be responsible for the attainment of the purposes and objectives of this Order.

(b) In carrying out his responsibilities under this Order, the

Administrator shall, in conformity with all applicable requirements of law, designate facilities which have given rise to a conviction for an offense under section 113(c)(1) of the Act. The Administrator shall, from time to time, publish and circulate to all Federal agencies lists of those facilities, together with the names and addresses of the persons who have been convicted of such offenses. Whenever the Administrator determines that the condition which gave rise to a conviction has been corrected, he shall promptly remove the facility and the name and address of the person concerned from the list.

SEC. 3. *Contracts, Grants, or Loans.* (a) Except as provided in section 8 of this Order, no Federal agency shall enter into any contract for the procurement of goods, materials, or services which is to be performed in whole or in part in a facility then designated by the Administrator pursuant to section 2.

(b) Except as provided in section 8 of this Order, no Federal agency authorized to extend Federal assistance by way of grant, loan, or contract shall extend such assistance in any case in which it is to be used to support any activity or program involving the use of a facility then designated by the Administrator pursuant to section 2.

SEC. 4. *Procurement, Grant, and Loan Regulations.* The Federal Procurement Regulations, the Armed Services Procurement Regulations, and, to the extent necessary, any supplemental or comparable regulations issued by any agency of the Executive Branch shall, following consultation with the Administrator, be amended to require, as a condition of entering into, renewing, or extending any contract for the procurement of goods, materials, or services or extending any assistance by way of grant, loan, or contract, inclusion of a provision requiring compliance with the Act and standards issued pursuant thereto in the facilities in which the contract is to be performed, or which are involved in the activity or program to receive assistance.

SEC. 5. *Rules and Regulations.* The Administrator shall issue such rules, regulations, standards, and guidelines as he may deem necessary or appropriate to carry out the purpose of this Order.

SEC. 6. *Cooperation and Assistance.* The head of each Federal agency shall take such steps as may be necessary to insure that all officers and employees of his agency whose duties entail compliance or comparable functions with respect to contracts, grants, and loans are familiar with the provisions of this Order. In addition to any other appropriate action, such officers and employees shall report promptly any condition in a facility which may involve noncompliance with the Act or any rules, regulations, standards, or guidelines issued pursuant to this Order to the head of the agency, who shall transmit such report to the Administrator.

SEC. 7. *Enforcement.* The Administrator may recommend to the Department of Justice or other appropriate agency that legal proceedings be brought or other appropriate action be taken whenever he becomes aware of a breach of any provision required, under the amendments issued pursuant to section 4 of this Order, to be included in a contract or other agreement.

SEC. 8. *Exemptions—Reports to Congress.* (a) Upon a determination that the paramount interest of the United States so requires—

(1) The head of a Federal agency may exempt any contract, grant, or loan, and, following consultation with the Administrator, any class of contracts, grants or loans from the provisions of this Order. In any such case, the head of the Federal agency granting such exemption shall (A) promptly notify the Administrator of such exemption and the justification therefor; (B) review the necessity for each such exemption annually; and (C) report to the Administrator annually all such exemptions in effect. Exemptions granted pursuant to this section shall be for a period not to exceed one year. Additional exemptions may be granted for periods not to exceed one year upon the making of a new determination by the head of the Federal agency concerned.

(2) The Administrator may, by rule or regulation, exempt any or all Federal agencies from any or all of the provisions of this Order with respect to any class or classes of contracts, grants, or loans which (A) involve less than specified dollar amounts, or (B) have a minimal potential impact upon the environment, or (C) involve persons who are not prime contractors or direct recipients of Federal assistance by way of contracts, grants, or loans.

(b) Federal agencies shall reconsider any exemption granted under subsection (a) whenever requested to do so by the Administrator.

(c) The Administrator shall annually notify the President and the Congress of all exemptions granted, or in effect, under this Order during the preceding year.

SEC. 9. *Related Actions.* The imposition of any sanction or penalty under or pursuant to this Order shall not relieve any person of any legal duty to comply with any provision of the Act.

SEC. 10. *Applicability.* This Order shall not apply to contracts, grants, or loans involving the use of facilities located outside the United States.

RICHARD NIXON.

THE WHITE HOUSE.

appendix j

excerpts from the president's report to the congress on united states foreign policy for the 1970's

It was a poet who expressed the profound political truth that the world has become a frail spaceship and that the people of the earth are its passengers. The technology which inspired that concept has also brought with it a degree of global interdependence which differs from the past, not only in degree but in kind.

For our progress mocks us. The more we have succeeded in controlling our environment, the more our environment needs to be controlled. The more means we have devised to improve the quality of human life, the more that quality of life needs protection from the means we have devised.

Along with its vast contribution to our well-being, technology has given us the common capability to pollute the earth's oceans and air. It has increased the incentives for nations to assert, and attempt to enforce, territorial claims to the oceans so immoderate as to endanger the ancient right of freedom of the seas. It has brought the ability to tap—or to ravage—the resources of the sea and the ocean floor, to the vast benefit—or to the huge harm—of mankind.

These are examples of problems in which every country has a deep national interest, but which, as a practical matter, are simply not subject to satisfactory resolution by national means. They are matters on which the nations of the world must subsume their narrower interests in a broad and generous concept

of the world interest. For without such an approach, we will not find the solutions which both the world interest and the national interests require. Without such an approach, we cannot fully harness the capacity of technology to meet these global challenges.

Thus there has come into being a new dimension in the foreign policy of the United States, not as a matter of choice and deliberate action on our part but as a reflection of the demanding realities of the world in which we live. Foreign policy has, of course, always aimed at serving the nation's security and well-being. What is new is the fact that we now face an increasing range of problems which are central to our national well-being, but which are, by definition, global problems, or problems which can only be dealt with effectively on a global scale.

In addressing these problems a narrow calculation of national interests is inadequate. For viewed from that perspective, the nations of the world do sometimes have conflicting interests of a real and substantial nature. Of greater import, however, is our shared and transcendent interest in the livability of our common home, the earth. To these problems, and the opportunities they present, that interest must be our guide and the guide of others. The nurturing of that interest has now become a prime task of American leadership.

During the past year, this new dimension of our international activity has been evident at the United Nations, in a number of its associated organizations, in various regional activities, and through frequent bilateral contacts with many nations around the world. It is encouraging that the international community is showing an increasing willingness to grapple with these problems. But the fact remains that the time available for finding a solution to many of them is perilously short. I want to review our attitude toward some of the more salient issues, and the steps that are being taken by the international community to meet those issues. . . .

No nation can keep its pollution to itself. Wastes discharged into the air and water in fact befoul a common resource. Restraint on the part of individual states, however laudable and necessary, is inadequate to the problem, for, in the absence of international action competitive economic pressures will severely limit national abilities to require the costly measures needed to protect the environment. A broad international approach is therefore necessary.

In the United Nations, this country has joined with most other nations of the world in preparing for the 1972 Stockholm Conference on the Human Environment, which will consider the whole range of environmental problems. We are also participating in discussions on the environment with such diverse groups as the United Nations Economic Commission for Europe (the nations of both Eastern and Western Europe), the Organization for Economic Cooperation and Development (the developed

nations of the Free World), NATO's new Committee on the Challenges of Modern Society (our Atlantic allies), and the Inter-Governmental Maritime Consultative Organization (the major shipping nations).

These activities are developing a consensus, reflected last year in the call by the NATO/CCMS Conference on Oil Spills for an end to intentional discharges of oil and oily wastes into the oceans by the middle of this decade. The Prague Conference, called by the Economic Commission for Europe, will play an important role in promoting East-West cooperation on environmental problems. The growing international concern is also reflected in our bilateral discussions with countries such as Canada, Japan, France, Germany, Spain, and Sweden with whom we have a variety of arrangements on environment matters.

The vigor of these efforts must increase, however, for we consider it essential that the international community take at least the following measures within the near future:

—Identification of pollutants and other ecological hazards which are dangerous on a global scale.
—Establishment of an effective world monitoring network to keep track of these environmental dangers.
—Initiation of a global information system to facilitate exchange of experience and knowledge about environment problems.
—Establishment of internationally accepted air and water quality criteria and standards.
—Development of international guidelines for the protection of the environment.
—Achievement of comprehensive international action programs to prevent further environmental deterioration and to repair the damage already done.
—Development and improvement of training and education programs to provide the skilled capability to meet the environmental challenge. . . .

It is hardly tolerable that mankind should permit, much less cause, the extinction of fish and wildlife species. Yet, for a number of species, that is the stark prospect. For two reasons, international cooperation is required to prevent it. First, these creatures move without respect to national boundaries and cannot, therefore, be completely protected through national action. Second, the economic demand in other countries for wildlife species, both living animals and their products, has often nullified the protective efforts of individual nations of origin.

Our Endangered Species Conservation Act of 1969 was a singular step forward in this field. To be fully effective, however, there must be similar controls in other countries. In the next year, therefore, the United States will propose and seek broad adherence to an international convention on conservation of endangered species. . . .

appendix k

federal environmental program budgets*

This analysis identifies Federal funding for selected environmental activities. It covers:

- Pollution control and abatement activities;
- Sewer and water programs;
- Selected activities to protect and enhance the environment; and
- Activities to understand, describe, and predict environmental conditions.

pollution control and abatement

Federal funding for pollution control and abatement activities in 1972 will increase significantly over 1970 and 1971:

(Dollars in millions)

	1970 actual	1971 estimate	1972 estimate	Percent increase over 1971
Budget authority	$1,432	$1,828	$3,127	71
Obligations	1,071	2,036	3,088	52
Outlays	751	1,176	2,014	71

The largest share of the increase is for grants to State and local governments for construction of municipal waste treatment facili-

* Office of Management and Budget. 1971. Special Analyses: Budget of the United States Government, Fiscal Year 1972. Special Analyses O.

ties. Grants were made for 1,050 treatment facility projects in 1970; 1,650 grants are expected in 1971, and 2,000 in 1972. Grants also provide support for pollution control agency operations and for planning. Budget authority for grants will increase by 89% over 1971, from $1,108 million to $2,089 million. Outlays will increase by 112%, from $533 million to $1,131 million.

Table O–1

Pollution Control and Abatement Activities

(In millions of dollars)

Type activity	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Financial aid to State and local governments	874	1,108	2,089	288	533	1,131
Research, development, and demonstration	344	390	426	296	378	398
Federal abatement and control operations	80	123	122	72	98	117
Manpower development	16	19	20	12	15	19
Reduce pollution from Federal facilities	72	113	250	32	88	185
Program direction and other	48	62	135	52	61	110
Separate transmittal [1]	.....	13	85	.....	4	56
Total	**1,432**	**1,828**	**3,127**	**751**	**1,176**	**2,014**

[1] Not reflected in preceding activity lines are proposals that will be transmitted subsequently for $13 million in budget authority for 1971, and $85 million for 1972 for EPA for implementing air quality and solid waste legislation and other activities.

Funding will also increase for:

- Research, development, and demonstration activities which include efforts to determine and describe pollution sources and effects and to develop and demonstrate technology for monitoring and controlling pollution (work is performed in Federal laboratories and under contracts and grants with educational institutions, industry, and others);
- Direct Federal pollution control operations including planning, monitoring, and surveillance; standard setting and enforcement; and technical assistance; and
- Manpower development, ranging from training of treatment plant operators to researchers at the graduate level.

Budget authority will increase by 121% from $113 million to $250 million, primarily in the Department of Defense, for remedial projects to reduce pollution from Federal facilities—as required by Executive Order 11507, February 4, 1970. This is a major step toward the goal of having all essential Federal projects underway by December 31, 1972.

agencies involved—Major Federal activities to control and abate pollution were consolidated in the Environmental Protection Agency (EPA) on December 2, 1970, by Reorganization Plan No. 3. However, several other agencies carry on important pollution control activities, as indicated in table O–2.

Table O–2

Pollution Control and Abatement Activities—By Agency

(In millions of dollars)

Agency	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Environmental Protection Agency [1]	1,046	1,297	2,440	388	695	1,359
Defense—Military	89	126	193	39	83	147
Atomic Energy Commission	120	125	127	116	126	125
Agriculture	60	96	77	91	93	107
Defense—Civil	3	11	56	3	11	56
Interior	36	47	68	37	48	65
Transportation	17	49	60	11	27	54
Commerce	19	28	29	22	28	34
General Services Administration	1	1	19	----	1	1
National Aeronautics and Space Administration	21	17	16	15	17	13
National Science Foundation	7	13	17	7	12	14
Other agencies	12	18	25	23	36	38
Total	**1,432**	**1,828**	**3,127**	**751**	**1,176**	**2,014**

[1] Funding shown above for EPA has been adjusted to include activities actually carried out by Departments of Health, Education, and Welfare; Agriculture; Interior; Atomic Energy Commission; and Federal Radiation Council prior to Dec. 2, 1970. The budget authority adjustment is $42 million in 1970 and $14 million in 1971, and the related outlay adjustment is $37 million in 1970 and $17 million in 1971.

Funding for EPA will increase sharply in 1972. Budget authority for activities now carried on by EPA will increase by 88% in 1972 from $1,297 million to $2,440 million. Outlays will increase by 96% from $695 million to $1,359 million. EPA's program of grants for waste treatment facilities will be doubled—from $1 billion to $2 billion annually with the goal of assisting States and localities in reducing the Nation's backlog of treatment facilities needs. Other major increases will provide for implementing the new air quality and solid waste legislation, for increasing grants for State and local pollution control agency operations, increasing planning activities, increasing research

on water supply purity, expanding cost-sharing arrangements with private industry to develop technology for controlling sulfur oxides, expanding the program for developing low-pollution motor vehicles, and increasing EPA's efforts directed toward identifying the magnitude of pollution problems and determining benefits and costs associated with alternative corrective actions.

Other agencies also carry out important pollution control and abatement activities. For example, the *Department of Defense* will expand its effort to reduce pollution from its industrial production facilities and military bases and step up research on abating pollution from naval vessels and jet engine run-up facilities.

The *Atomic Energy Commission* will continue its major program of research, development and monitoring relating to effects of ionizing radiation.

The *Department of Agriculture* makes grants and loans for waste treatment facilities in smaller localities and conducts research on agriculturally related pollution such as pesticides, animal and crop processing wastes, and fertilizer and plant nutrients. Increases in 1972 are largely for reducing pollution from facilities in national forests. Pesticide registration activities, formerly conducted in the Department, were transferred to EPA.

The *Department of the Interior* will continue research relating to pollution sources and effects, will expand activities to reduce pollution from facilities in the national parks, and will increase research in methods of converting coal to low pollution fuels. Water pollution control and certain pesticides activities were transferred to EPA.

The *Corps of Engineers* will construct dikes for the containment of polluted material dredged from Great Lakes harbors.

The *Department of Transportation* will increase funding significantly for work on reducing aircraft engine noise, studying environmental effects of supersonic aircraft and reducing pollution from Coast Guard installations.

The *Department of Commerce* provides grants for waste treatment facilities under economic development programs and the National Oceanic and Atmospheric Administration conducts research on sources and effects of pollution and engages in environmental monitoring.

The *General Services Administration* will have increased funding in 1972 for pollution reduction at Federal installations.

The *National Aeronautics and Space Administration* activities consist primarily of research and development on reduction of aircraft noise.

Most pollution abatement activities of the *Department of Health, Education, and Welfare* have been transferred to the Environmental Protection Agency, including air pollution, solid waste, pesticides standards, water hygiene, and certain radiation activities.

Media polluted and pollutants.—Pollution control and abatement activities are generally focused on reducing pollution in air or water or reducing adverse effects of particular pollutants such as pesticides or radiation. Table O–3 summarizes the total Federal effort in terms of media polluted and also identifies funding associated with selected pollutants. Among the media, *water* pollution currently receives the greatest share—80%—of total Federal pollution control obligations. This large share is a result of grants and loans for construction of municipal waste treatment facilities.

Air pollution control efforts account for 11% of the total. Principal Federal efforts in 1972 will be directed toward research, development, and demonstration; grants to State and local air pollution control agencies; and direct Federal operations such as monitoring, standard setting, and enforcement. Funds to implement new air quality legislation will be proposed in a subsequent request to the Congress. Activities relating to pollution of *land* are for research and other activities concerned with effects of acid mine drainage, nutrients, pesticides, and other substances.

Federal pollution control activities relating to radiation, pesticides, solid wastes, and noise are largely confined to research relating to effects, control technology, and standard setting and enforcement. Funds to implement new solid waste legislation will be contained in a subsequent request.

Excluded from the funding shown above for pollution control and abatement activities are:

- activities to reduce or avoid the use of pesticides. Funding for such activities is expected to be approximately $57 million in 1972 for both research and education programs, largely carried out by the Department of Agriculture; and
- activities that are carried on for some other primary purpose but which also contribute to the reduction of pollution. For example, extensive activities to hold soil in place to preserve soil productivity, such as those financed by the Department of Agriculture, and other erosion control activities by Corps of Engineers and Department of Transportation (highways), have been excluded from this analysis even though these activities also serve to reduce sediment pollution of water.

Table 0–3
Pollution Control and Abatement Activities—By Media or Pollutant

(In millions of dollars)

Media or pollutant	Obligations		
	1970 actual	1971 estimate	1972 estimate
Media polluted:			
Water:			
Construction grants and loans	491	1,256	1,974
Other	186	296	425
Air	189	234	341
Land	35	42	46
Other (e.g., living things, materials)	100	97	110
Multi-media (i.e., more than one of above)	69	98	107
Total [1]	1,071	2,023	3,003
Selected pollutants: [2]			
Solid wastes	20	39	50
Pesticides	30	42	54
Radiation	116	124	129
Noise	36	43	66

[1] Excludes $13 million in 1971 and $85 million in 1972 for EPA which will be proposed in a separate transmittal (see footnote for table 0–1).
[2] These funds are included in the "media" breakdown above.

sewer and water programs

Federal programs of grants and loans for the construction of sewer and water systems are directed toward a variety of objectives, including economic development, urban and rural development, and in some cases, pollution control.

(Dollars in millions)

	1970 actual	1971 estimate	1972 estimate	Percent increase over 1971
Budget authority	$252	$500	[1] $124	----------
Obligations	409	422	[1] 389	----------
Outlays	364	382	446	17

[1] Budget authority and obligations for water and sewer grants will decline in 1972 as grant programs administered by HUD and Agriculture are merged into Special revenue-sharing programs.

Grants and loans to finance water system and sewer line construction are made by five Federal agencies. The *Department of Housing and Urban Development*, as a part of its community development efforts, provides assistance for basic sewer and water facilities. $100 million in new grant reservations will be made by December 31, 1971. On January 1, 1972, the program will be folded into the Urban Community Development Special Reve-

nue-Sharing Program. Public facility loans, about 67% of which are used to finance sewer and water facilities, will be increased by 62% in 1972.

The *Department of Agriculture* provides grants and loans for basic sewer and water facilities in rural communities with population not in excess of 5,500 people. Approximately one-half of the $25 million budgeted for grants will be obligated prior to January 1, 1972, and the remainder will be folded into the Rural Community Development Special Revenue-Sharing Program. Agriculture's loans, about 78% of which are used for water and sewer facilities, will be increased by 18%.

The *Department of Commerce* provides assistance to municipalities as a part of its economic development efforts. Budget authority will not increase, but outlays for this program will increase by 27% from $62 million in 1971 to $79 million in 1972. Other agencies providing sewer and water system grants are the *Appalachian Regional Commission* and the *Department of the Interior* (for the Trust Territory).

Grants and loans made by Environmental Protection Agency, Agriculture, Commerce, and Housing and Urban Development for waste treatment plants and interceptor sewers are included in the section on pollution control and abatement.

Table O–4
Sewer and Water Programs [1]

(In millions of dollars)

	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Purpose:						
Sewer grants	102	205	44	72	88	116
Sewer loans	4	3	4	14	17	18
Water system grants	142	287	71	112	138	168
Water system loans	4	4	5	165	139	144
Total	252	500	124	364	382	446
Agencies:						
Housing and Urban Development	135	350	0	133	168	192
Agriculture	25	52	27	164	140	163
Commerce (economic development)	81	84	84	60	62	79
Other agencies	11	14	13	6	12	12
Total	252	500	124	364	382	446

[1] Funds provided by the above agencies which are for construction of waste treatment facilities or interceptor sewers, often counted as part of "sewer and water programs," are included in the section on pollution control and abatement for purposes of this analysis. Funds shown in above table are for water supply systems and collecting sewers. They are not included in tables O–1, 2, or 3.

selected environmental enhancement activities

Federal funding will increase for environmental protection and enhancement activities such as providing recreational areas and open space, fish and wildlife preservation, and beautification programs.

(Dollars in millions)

	1970 actual	1971 estimate	1972 estimate	Percent increase over 1971
Budget authority	$628	$875	$1,108	27
Obligations	586	748	1,018	36
Outlays	553	730	846	16

protection and enhancement activities—The Federal Government provides grants to State and local governments for acquiring land for recreational purposes, for preserving open space and historic properties, and for fish and wildlife refuges. Aid is also provided for research and planning; construction and maintenance of recreational facilities and wildlife refuges; and for promoting beautification such as highway landscaping. Similar activities are also carried on directly by several Federal agencies. Funding for many of these activities will increase sharply. For example, budget authority for grants to State and local governments to acquire recreational and open space lands will increase by 61%, from $140 million in 1971 to $226 million in 1972. Grants for development of recreational areas will increase by 127%, from $120 million in 1971 to $272 million in 1972.

agencies involved—The *Department of the Interior* accounts for approximately 61% of the environmental protection and enhancement activities described in this section. Interior's budget authority for these programs will increase by 13%, from $552 million in 1971 to $624 million in 1972. Most Interior activities are carried out by the Bureau of Outdoor Recreation, including the land and water conservation fund; the Bureau of Sport Fisheries and Wildlife; and the National Park Service. The 1972 budget for the land and water conservation fund provides a major increase for grants to State and local governments to help them meet the increasing demand for local recreation areas, especially those located in or near major cities. Federal land purchases financed from the fund are made by several Federal agencies to preserve nationally important natural and historic areas, including endangered species habitats. Newly authorized areas for which funds are provided to begin initial acquisition in 1972 are Apostle Islands National Lakeshore, Sleeping Bear Dunes Na-

Table O–5
Selected Environmental Protection and Enhancement Activities

(In millions of dollars)

Activity	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Financial aid to State and local governments:						
Purchase recreation and open space lands	80	140	226	51	75	107
Develop recreational areas, related activities	55	120	272	53	53	100
Historic properties	3	7	6	2	7	7
Preserve fish and wildlife	51	56	63	45	60	69
Beautification (e.g., highways)	62	116	112	62	79	87
Subtotal	252	440	679	214	275	371
Direct Federal activities:						
Purchase nationally important areas	85	138	98	68	158	151
Develop recreational facilities, related activities	158	181	197	163	177	193
Historic properties	1	2	2	1	2	2
Park roads and trails	56	37	48	34	36	44
Preserve fish and wildlife	66	66	73	63	71	73
Beautification	10	10	11	10	10	11
Subtotal	376	434	429	339	454	474
Total	628	875	1,108	553	730	846

tional Lakeshore, Voyageurs National Park, Gulf Islands National Seashore, Chesapeake and Ohio Canal Historic Park, and Andersonville National Historic Site. Emphasis will also be placed on acquisition of lands in older natural preservation areas and parks such as Everglades National Park. The Bureau of Sport Fisheries and Wildlife provides assistance to State and local governments for fish and wildlife restoration and establishes Federal refuges. The National Park Service emphasizes resource protection, construction and maintenance of visitor facilities at national park system areas and park roads, trails, and highways.

The Department of Housing and Urban Development provides grants to help States and localities acquire and develop open space lands. In 1972, the open space program will be reoriented to help meet the growing recreational needs in urban areas. New emphasis will be given to the development of small neighborhood parks in and around cities. To support this initiative.

budget authority will increase by 167%, from $75 million to $200 million.

The Department of Transportation provides assistance to State and local governments for highway beautification activities, including control of advertising and junkyards, landscaping, and scenic easements. Budget authority for such DOT activities will increase by 11%, from $97 million to $108 million.

The Department of Agriculture carries out a variety of environmental enhancement activities, particularly through the Forest Service. The 1972 budget authority will increase by 16%, from $83 million in 1971 to $96 million in 1972.

The Corps of Engineers provides facilities for water based recreation at reservoirs and other public works.

The Department of Commerce provides assistance to State and local governments through its economic development programs for the development of recreational areas.

Table O–6

Selected Environmental Enhancement Activities, By Agency

(In millions of dollars)

Agency	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Interior	366	552	634	307	452	517
Housing and Urban Development	75	75	200	43	72	100
Transportation	42	97	108	51	60	69
Agriculture	81	83	96	80	81	94
Defense—Civil	43	46	47	43	46	47
Commerce	12	13	14	20	9	8
Other agencies	8	10	10	9	10	10
Total	**628**	**875**	**1,108**	**553**	**730**	**846**

understanding, describing, and predicting the environment [1]

Federal agencies conduct a wide variety of activities to understand, describe, and predict environmental conditions. Objectives range from the provision of routine weather forecasts to the scientific understanding of complex ecological systems. Funding for these activities will increase in 1972.

activities—Over half of the funding for this category supports environmental observation and measurement to describe and pre-

[1] This section excludes activities reported under Pollution control and abatement.

(In millions of dollars)

	1970 estimate	1971 estimate	1972 estimate	Percent increase over 1971
Budget authority	719	867	950	10
Obligations	710	880	956	9
Outlays	702	810	917	13

dict weather and ocean conditions and disturbances such as earthquakes. Budget authority will increase by 9%, from $486 million in 1971 to $528 million in 1972 for research, development, and operational activities in this category. Funding will also be increased, but less sharply, for:

- Locating and describing natural resources;
- Survey activities to describe the physical environment for the purpose of preparing maps and charts; and
- Weather modification.

Additional emphasis will be placed upon research to develop a better understanding of the impact of the environment on man, for which budget authority will be increased by 42%, from $33

Table O–7

Understanding, Describing and Predicting the Environment, By Type Activity

(In millions of dollars)

Activity	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Observe and predict weather and ocean conditions, disturbances:						
Research and development	120	139	154	105	128	152
Operations	299	347	374	305	343	375
Locating and describing natural resources:						
Research and development	100	145	140	95	110	124
Operations	61	74	75	60	74	74
Physical environmental surveys:						
Research and development	4	4	4	4	4	4
Operations	54	60	66	54	57	65
Weather modification	12	16	17	12	16	17
Research on environmental impact on man	26	33	47	25	30	38
Ecological and other basic environmental research	44	50	75	41	48	68
Total	719	867	950	702	810	917

million in 1971 to $47 million in 1972; and on ecological and other basic environmental research, for which budget authority will be increased by 51% from $49 million in 1971 to $74 million in 1972.

agencies involved—In this overall category, the *Department of Commerce* accounts for about one-fourth of all Federal activities. The Department's activities are carried out by the National Oceanic and Atmospheric Administration which was created on October 3, 1970, by Reorganization Plan No. 4, and includes the former Environmental Science Services Administration and activities transferred from the Departments of the Interior, Defense, and Transportation and the National Science Foundation. NOAA carries on a wide range of environmental observation and prediction activities, including weather, river and marine forecasting; mapping and charting; development of instrumentation; data dissemination; and related research. Budget authority will increase by 4%, from $226 million in 1971 to $235 million in 1972, with increases providing for improved public weather services; hurricane and tornado warnings; weather modification experiments; earthquake and seismic research; satellite procurement; and development of ocean data buoys.

Within the *Department of Defense*, both the Navy and the Air Force carry out weather and ocean observation and prediction,

Table O–8

Understanding, Describing and Predicting the Environment, By Agency

(In millions of dollars)

Agency	Budget authority			Outlays		
	1970 actual	1971 estimate	1972 estimate	1970 actual	1971 estimate	1972 estimate
Commerce [1]	193	226	235	190	219	245
Defense—Military	178	194	185	178	194	185
National Science Foundation	60	92	161	61	88	136
National Aeronautics and Space Administration	87	129	117	75	88	106
Interior	103	117	131	102	116	129
Agriculture	51	53	52	51	54	52
Health, Education, and Welfare	17	21	25	17	20	23
Transportation	17	18	22	17	18	22
Smithsonian Institution	9	10	16	8	9	14
Other agencies	3	7	7	2	6	6
Total	**719**	**867**	**950**	**702**	**810**	**917**

[1] Funding shown above for Commerce has been adjusted to include activities actually carried out by the Departments of Defense, Interior, and Transportation and National Science Foundation prior to Oct. 3, 1970. The budget authority adjustment is $25 million in 1970 and $9 million in 1971, and the related outlay adjustment is $15 million in 1970, $14 million in 1971, and $7 million in 1972.

and mapping and charting activities important to military operations. Funding for these DOD activities will decline slightly in 1972.

The *National Science Foundation* supports research activities important to the understanding of environmental problems. Budget authority will increase by 75%, from $92 million in 1971 to $161 million in 1972, with the increases providing for greater emphasis in nearly all areas of environmental research through such programs as the International Biological Program, and the International Decade of Ocean Exploration.

The *National Aeronautics and Space Administration* conducts activities concerned with the application of satellite technology to atmospheric sciences and measurement of earth resources.

The *Department of the Interior* carries out such activities as geologic investigations, topographic mapping, weather modification, and water resources research. Increases in 1972 will provide principally for expansion of Interior's work on application of remote sensing data from aircraft and spacecraft to earth resource measurement.

The *Department of Agriculture* conducts such activities as soil and river basin surveys, research and surveys relating to forest and timber management, and basic ecological research.

The *Department of Health, Education, and Welfare* conducts a variety of activities relating to environmental impact on man, principally research at the Department's National Institute of Environmental Health Sciences.

The *Department of Transportation* conducts oceanographic and meteorological research and surveys, largely through the Coast Guard.

The *Smithsonian Institution* conducts a variety of programs dealing with environmental impact on man and is developing baseline ecological information. Increases in 1972 will provide for substantial expansion of ecological research.

other environmental activities

The meaning of the term "environment" is still subject to widely varying definitions. This first special analysis of Federal funding for environmental activities has been limited to selected areas. Among the areas of federally funded activity important to environmental understanding and environmental quality *not* included in this analysis are:

- Environmental education;
- Preventing or correcting environmental degradation resulting from public works or natural resources exploitation;
- Management of public lands;
- Population control and population distribution;

- Programs that are justified and conducted for some other primary purpose (e.g., R. & D. on improved methods for producing energy and undergrounding high-voltage electric transmission lines) but which may have significant environmental quality or natural resource conservation benefits; and
- Federal activities conducted outside the United States, including scientific activities overseas financed with special foreign currency.

appendix I

advisory committees of the council on environmental quality

In addition to the statutory consultations (see Sec. 205(1) of NEPA) with the Citizens' Advisory Committee on Environmental Quality, the Council has appointed three advisory committees: the Advisory Committee on Advanced Automotive Power Systems, the Legal Advisory Committee, and the Tax Policy Advisory Committee. As required by Executive Order 11007, the members, a brief description of their functions, and the dates of their meetings are listed below.

advisory committee on advanced automotive power systems

functions

The Committee advises the Council on research and development programs and other technical progress toward developing low-emission, surface-vehicle power systems as alternatives to the present internal combustion engine.

Chairman

Dr. David O. Ragone
Dean, Thayer School of Engineering
Dartmouth College
Hanover, New Hampshire

Members

Mr. James L. Dooley
Vice President, Engineering
McCulloch Corporation
Los Angeles, California

Dr. S. William Gouse, Jr.
Associate Dean
Carnegie Mellon University
Pittsburgh, Pennsylvania

Dr. George J. Huebner, Jr.
Director of Research, Product Planning and Development
Chrysler Corporation
Detroit, Michigan

Dr. Wolf H. Koch
Manager, Applied Electronics Department
Ford Motor Company
Dearborn, Michigan

Professor Robert F. Sawyer
Associate Professor
University of California
Department of Mechanical Engineering
Berkeley, California

Mr. Ernest Starkman
Vice President-Environmental Activities Staff
General Motors Corporation
Warren, Michigan

Dr. John H. Sununu
Associate Dean, College of Engineering
Tufts University
Medford, Massachusetts

Government Liaison Members

Mr. William B. Foote
Deputy Commissioner for Transportation
Transportation and Communications Service
General Services Administration
Washington, D. C.

Dr. James R. McNesby
Chief, Physical Chemistry Division
National Bureau of Standards
Washington, D. C.

Dr. Ernest N. Petrick
Chief Scientist
U.S. Army Tank-Automotive Command
Warren, Michigan

Mr. Valentine Russack
Director, Vehicles Branch, Maintenance Division
U.S. Postal Service
Washington, D. C.

Mr. Glenn Schleede
Assistant Chief, Natural Resources Programs Division
Office of Management and Budget
Washington, D. C.

Dr. Louis Schoen
Senior Staff Scientist
Air Pollution-Science and Technology
Environmental Protection Agency
Rockville, Maryland

Mr. Henry O. Slone
Assistant Division Chief, Space Power Systems Division
National Aeronautics and Space Administration
Cleveland, Ohio

Dr. Richard L. Strombotne
Physicist
Department of Transportation
Washington, D. C.

Previous Chairman

Mr. Ernest Starkman

Previous Members

Dr. David O. Harris
Assistant Professor of Chemistry
University of California
Santa Barbara, California

Mr. Frederick J. Hooven
Professor of Engineering
Dartmouth College
Hanover, New Hampshire

Dr. Craig Marks
Assistant Director, Advance Product Engineering
General Motors Corporation
Warren, Michigan

Dr. William Mirsky
Professor of Engineering
University of Michigan
Ann Arbor, Michigan

Previous Government Liaison Member

Dr. S. William Gouse, Jr.

meetings

July 9–10, 1970, Ann Arbor, Michigan
October 7–8, 1970, Washington, D. C.
December 16–17, 1970, Santa Barbara, California
March 23–24, 1971, Phoenix, Arizona
July 19–20, 1971, Hanover, New Hampshire

legal advisory committee

functions

The Committee advises the Council on legal issues involved in environmental legislation, regulation, and litigation. It has studied the problems of public and private litigation, Federal enforcement of antipollution laws, international environmental law, and law student involvement in environmental programs.

Chairman

Whitney North Seymour, Jr.
U. S. Attorney for the Southern District of New York
New York, New York

Members

Malcolm Baldwin
The Conservation Foundation
Washington, D. C.

William T. Coleman, Jr.
Dilworth, Paxson, Kalish, Levy and Coleman
Philadelphia, Pennsylvania

Christopher DeMuth
University of Chicago Law School
Chicago, Illinois

Professor Frank P. Grad
Director, Legislative Drafting Research Fund
Columbia Law School
New York, New York

Roger P. Hansen
Executive Director
Rocky Mountain Center on Environment
Denver, Colorado

Wesley A. Hodge
Hodge, Dahlgren & Hillis
Seattle, Washington

Professor Louis L. Jaffe
Harvard Law School
Cambridge, Massachusetts

William F. Kennedy
Corporate Counsel
General Electric Company
New York, New York

Professor Eugene Mooney
University of Kentucky Law School
Lexington, Kentucky

E. Lewis Reid
Steinhart, Goldberg, Feigenbaum & Ladar
San Francisco, California

Nicholas Robinson
Chambers of Judge Morris E. Lasker
New York, New York

Professor Ann L. Strong
Director, Institute for Environmental Studies
University of Pennsylvania
Philadelphia, Pennsylvania

Professor Joseph L. Sax
University of Michigan Law School
Ann Arbor, Michigan

David Sive
Winer, Neuburger & Sive
New York, New York

meetings

May 25, 1970, Washington, D.C.
September 14, 1970, Washington, D.C.
January 11, 1971, Washington, D.C.
April 19, 1971, Washington, D.C.

tax policy advisory committee

functions

The Committee advises the Council on the impact of the tax structure on the environment. In particular, it has examined the question of whether existing tax policies are encouraging environmentally undesirable results and possible modifications of the tax structure to induce individuals and corporations to meet environmental goals.

Chairman

Dan Throop Smith
Lecturer, Stanford Graduate School of Business
Stanford, California

Members

Charles A. Anderson, President
Stanford Research Institute
Menlo Park, California

Miss Eleanor Applewhaite
Senior Attorney, Law Department
Columbia Broadcasting Company
New York, New York

Joel Barlow
Covington & Burling
Washington, D.C.

Dr. Rita Ricardo Campbell
Senior Fellow
Hoover Institution
Stanford, California

Arnold Cantor
Economist, Research Department
AFL-CIO
Washington, D.C.

Charles F. Conlon
Executive Director
Federation of Tax Administrators
Chicago, Illinois

John Dane
Choate, Hall and Stewart
Boston, Massachusetts

Kenneth W. Gemmill
Dechert, Price & Rhoads
Philadelphia, Pennsylvania

Willis D. Gradison, Jr.
Partner
W. D. Gradison & Company
Cincinnati, Ohio

Professor C. Lowell Harriss
Department of Economics
Columbia University
New York, New York

David A. Lindsay
Davis, Polk, Wardwell, Sunderland and Kiendl
New York, New York

Dr. Joseph A. Pechman
Director of Economic Studies
Brookings Institution
Washington, D.C.

B. Kenneth Sanden
Price, Waterhouse & Co.
New York, New York

Leonard Silverstein
Silverstein & Mullens
Washington, D.C.

Dr. Jacob A. Stockfisch
Senior Research Associate
Institute for Defense Analysis
Arlington, Virginia

Dr. Mabel Walker
Executive Director
Tax Institute of America, Inc.
Princeton, New Jersey

Richard Slitor
Former Assistant Director, Office of Tax Analysis
Department of Treasury
Washington, D.C.

Laurence N. Woodworth
Chief of Staff
Joint Committee on Internal Revenue Taxation
House of Representatives
Washington, D.C.

meetings

May 5, 1970, Washington, D.C.
May 28, 1970, Washington, D.C.
July 9, 1970, Washington, D.C.
July 29, 1970, Washington, D.C.
September 25, 1970, Washington, D.C.
January 20, 1971, Washington, D.C.
February 22, 1971, Washington, D.C,

appendix m

organization and staff of the council on environmental quality

the council

On January 29, 1970, the President nominated Russell E. Train, Chairman, and Robert Cahn and Gordon J. F. MacDonald, members, of the Council on Environmental Quality, Executive Office of the President. They were confirmed by the Senate on February 6.

Mr. Train was formerly Under Secretary of the Interior. From 1965 to 1969 he was president of the Conservation Foundation and has been active in a number of other conservation organizations, both here and abroad. He served on the staffs of congressional committees and headed the Treasury Department's tax legislative staff before being appointed to the Tax Court of the United States, on which he served for eight years. Following the 1968 election, President-elect Nixon appointed him chairman of a special task force on environmental problems.

Mr. Cahn is on leave from the Washington Bureau of *The Christian Science Monitor*, for which he has been a correspondent since 1965. He was awarded the 1969 Pulitzer Prize for National Reporting for his series of articles on National Parks. He has been a reporter for the *Seattle Star*, the *Pasadena Star-News*, and *Life* magazine; an editor of *Collier's* and the *Saturday Evening Post*; and the White House correspondent for the U.S. Information Agency.

Dr. MacDonald is from the University of California at Santa Barbara, where he was vice chancellor for research and graduate affairs since September 1968. He was a member of the President's Science Advisory Committee, 1965–69. For the National Academy of Sciences, he served on the Committee on Atmospheric Sciences, 1961–70; The Space Science Board, 1962–70; and the Environmental Studies Board, 1968–70, part of which period he was the Board Chairman. He has also been chairman of the Executive Committee of the Earth Sciences Division, National Research Council.

program development and evaluation

The program development and Federal impact evaluation staffs are headed by Alvin L. Alm, Staff Director for Program Development. The program development staff is primarily responsible for developing policy proposals through legislation, special reports, task forces, and other means. It also assists in the coordination of Federal environmental policy. Staff members are: J. Clarence Davies III, Senior Staff Member; Joan C. Hock; Mary P. Loomis; Warren R. Muir; Sheila A. Mulvihill; Philip E. Schambra; W. Roger Strelow; Thomas C. Winter, Jr.; and Eric R. Zausner.

The Federal impact evaluation staff is responsible for evaluation of Federal, State, local, and private activities which have a potential effect on the environment. Members are: William J. Dircks, Steven D. Jellinek, William Matuszeski, Stephen F. Sloan, J. Robert Stottlemyer, and Peter C. Wolcott.

general counsel

The General Counsel's office is responsible for review of legislative and regulatory matters coming before the Council, specifically with regard to interpretation and implementation of the National Environmental Policy Act. Timothy Atkeson, General Counsel to the Council, is assisted by William T. Lake and Charles F. Lettow.

advisors

The technical advisors on the Council staff provide expertise in the areas of science, economics, and international affairs. They are: Lee M. Talbot, Senior Scientist; Jack L. Knetsch, on leave from The George Washington University, Economist; and William A. Hayne, International Officer, assisted by Henry H. Janin. In addition, Harry C. Blaney is on loan from the Department of

State as a special assistant for the Committee on the Challenges of Modern Society.

secretary to the council

The Secretary's office is responsible for policy development and coordination with the program development staff. It also oversees primary staff support activities including budget, personnel, and administration. Boyd H. Gibbons III is Secretary to the Council. Staff members are William K. Reilly; Jayne Brumley, Public Information Officer; Willis G. Savage, Administrative Officer, and Grace H. Reppert, Assistant Administrative Officer.

supportive staff

Marion L. O'Connell, Mary C. Curran, and Marjory D. Bianchi are Executive Assistants to the Chairman, Dr. MacDonald, and Mr. Cahn, respectively. Other staff members are: Elouise Agee, Julia Alessio, Terry S. Bernhardt, Bernice J. Carney, Olga S. Chemerys, Elizabeth A. Ference, Margaret E. Fenton, Dorothy A. Gooding, Barbara N. Gray, Margaret M. Gugino, Hope H. Hale, Joanne V. Kennedy, Margaret Kennedy, Anna M. Klocke, Michael L. Lagana, Barbara A. Luckett, Muriel L. Montgomery, N. Jayne Parker, Janet Peck, Barbara E. Sergeant, Katherine R. Soaper, Beverly D. Thomas, Thomas Walker, and Norma L. Williams.

summer interns

With the Council for the summer are: Gordon L. Binder, University of Michigan; Wendy L. Burnard, The College of Wooster; Bradford Butman, Massachusetts Institute of Technology; Joseph W. Creekmore III, College of William and Mary; Robert H. Daniels, Harvard University Law School; David J. Eaton, Oberlin College; Jan Ehrlichman, Principia College; Sally K. Makielski, Associate Professor, Loyola University; Joseph L. Meresman, University of California at Berkeley; Connie A. Musgrove, University of California; Eugene C. O'Leary, Duke University Law School; Noralyn Olom, Vassar College; Michael Rawson, George Washington University; Stuart L. Sessions, University of Michigan; and Joann S. Stern, University of North Carolina.