

**ENVIRONMENTAL FEDERALISM: ALLOCATING
RESPONSIBILITIES FOR ENVIRONMENTAL PROTECTION**

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PREFACE

This Congressional Budget Office staff working paper examines the division of responsibilities among federal, state, and local governments in the field of environmental protection. The study is an interim report on work in progress in response to a request from the Senate Committee on Governmental Affairs. It examines trends in the allocation of environmental program responsibilities, and explores how economic criteria might be used to facilitate the assignment of public-sector responsibilities to different levels of government. Future work will seek to investigate the advantages and limitations of these criteria in practical applications. In keeping with the mandate of the Congressional Budget Office to provide objective analysis, the paper makes no recommendations.

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SUMMARY

Federal, state, and local governments play diverse roles in designing, managing, and funding environmental programs. This division of responsibility may be critical in determining the level of environmental protection that occurs and the type of program that develops. Some of the mature environmental programs, as in air and water quality and hazardous waste management, are designed with a built-in expanding role for state governments; under these programs, a growing portion of both program and funding responsibility is being delegated to states by the federal government. In areas of emerging importance such as toxic air pollution, indoor air pollution, and groundwater contamination, states are taking the initiative to plan and implement programs concurrently with federal efforts.

As the role of the states expands, federal funding for many environmental programs is either being reduced or is not growing as quickly as total program costs, so that states are funding a growing percentage of the costs. States and municipalities complain that they are overburdened by their new responsibilities and are or will be unable to raise the necessary revenues to continue to manage and enforce existing programs and develop new programs.

This paper consists of two parts. The first part examines the existing allocation of program and funding responsibilities among levels of government for current environmental programs. The second part suggests ways in which economic criteria can contribute to understanding whether or not the allocation of responsibility is appropriate.

THE CURRENT DIVISION OF RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION

Environmental protection programs are initiated, designed, implemented, and funded at all levels of government. The division of responsibilities among federal, state, and local levels of government ranges from complete federal control of some programs to a federal-state partnership in others and to independent state actions in some newer programs.

The current allocation of program and funding responsibilities is primarily the result of federal legislative changes over the last 20 years. Until the late 1960s and early 1970s, federal involvement in environmental protection was minimal. As interest in environmental issues grew, participation in environmental protection at all levels of government also grew. This was reflected in part by the passage of several major federal statutes in the 1970s that established expanded roles for the federal government and laid out increased responsibilities for the states. Several of these statutes, notably the Toxic Substances Control

Act and the Marine Protection, Research and Sanctuaries Act, assign the federal government primary regulation responsibility.

In contrast, the major air and water quality and hazardous waste management programs provide for the delegation of all or part of the responsibility for daily implementation to the states. As these programs have evolved, the federal government has maintained a strong role in enforcement, overseeing and approving state plans and providing technical guidance and funds for research, while states have been delegated more and more funding and program responsibilities.

For example, under the Clean Air Act, the Environmental Protection Agency (EPA) sets national standards for air quality while states, through their State Implementation Plans, have primary responsibility for meeting these criteria. Under the Clean Water Act, states may be delegated responsibility for issuing permits and for portions of the municipal wastewater treatment program. The Resource Conservation and Recovery Act gives states authority to administer all or part of EPA's hazardous waste management program. Currently, every state has been approved to administer all or part of at least one of these programs. In addition, states are providing the impetus for developing protection plans in many areas where no comprehensive federal approach exists, such as indoor air pollution and groundwater management.

As the Table S-1 indicated, EPA's operating budget and federal grants to states have both declined or grown in real terms only slightly as federal and state responsibilities have grown. Grants to states for air, water, and hazardous waste have fallen by almost half since the peak of \$477 million (in 1987 constant dollars) in 1979, and total EPA expenditures on air, water, and hazardous waste have fallen by nearly one-quarter during the same time period; the percentage of the EPA budget for air, water, and hazardous waste that is devoted to state grants has declined also. Estimates by the Congressional Budget Office suggest that states have been funding a growing percentage of these programs. In 1982, EPA grants to states constituted approximately half of total state expenditures on air and water quality and three-quarters of state hazardous and solid waste management costs (see Table S-2).¹ In 1986, the federal portion had dropped slightly for air quality and had declined to one-third for water quality and to 40 percent for waste management.

ALLOCATING PROGRAM AND FUNDING RESPONSIBILITY

The roles to be played by federal, state, and local governments in emerging environmental issues have not yet been fully defined. In addition, governmental participation in the more mature air and water programs, and in funding and decision making, continues to change. In order to evaluate the division of responsibility, it is helpful to have guidelines for determining which levels of government are best suited to different activities. From an economic

1. Of course, other criteria also are used to evaluate environmental programs, such as their impacts on human health and on the ecology.

TABLE S-1. EPA OPERATING BUDGET AND GRANTS TO STATES FOR AIR, WATER, AND HAZARDOUS WASTE PROGRAMS

	EPA Operating Budget (In millions of 1987 dollars) <u>a</u> /	Grants to States (In millions of 1987 dollars) <u>a</u> /	Grants as a Percentage of EPA Budget
1978	937	384	41
1979	1,113	477	43
1980	1,031	353	34
1981	1,016	324	32
1982	754	267	35
1983	697	251	36
1984	707	251	36
1985	809	267	33
1986	834	276	33
1987	872	289	33
1988	845	264	31
1989	825	256	31

SOURCES: Congressional Budget Office, from data reported in Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; and Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988).

NOTE: 1978 through 1987 data are actual budget authority; 1988 data are estimated budget authority; 1989 data are President's requested budget authority.

- a. Includes air quality and water quality control, drinking water programs, and solid and hazardous waste management programs.

TABLE S-2. STATE BUDGETS AND EPA GRANTS TO STATES FOR AIR, WATER, AND HAZARDOUS WASTE PROGRAMS

	Total State Budgets (In millions of 1987 dollars)			EPA Grants as a Percentage of State Budgets		
	Air	Water <u>a</u> / Hazardous Waste <u>b</u> /		Air	Water <u>a</u> / Hazardous Waste <u>b</u> /	
1982	210	236	64	49	49	76
1983	213	274	76	45	38	66
1984	206	296	110	46	35	47
1985	202	326	146	48	34	41
1986	213	336	169	46	33	40

SOURCES: Congressional Budget Office, from Congressional Budget Office survey of state water and hazardous waste budgets; from federal grant data reported in Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988); from state air budget data reported in State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials, *Air Permit and Emissions Fees: Results of a Survey*, prepared by Mary M. Sullivan (Washington, D.C., April 1987); and from unpublished additional state air budget survey data provided by the State and Territorial Air Pollution Program Administrators.

- a. Includes water quality programs; some drinking water programs may not be included.
- b. Includes both hazardous and solid waste programs.

perspective, the division should promote levels of protection and types of programs that are efficient and equitable. The standard of economic efficiency implies that a program should balance benefits and costs, that benefits should be achieved at the lowest cost possible, and that benefits should accrue to the people and groups who place the most value on them. The standard of equity applies to the distribution of benefits and costs; for example, equity may imply that the costs of environmental programs should be borne by those responsible for the pollution to the extent that they are able to bear the burden, or that the benefits should be evenly distributed.^{2/}

Environmental programs involve five broad categories of responsibility, each of which may be carried out by federal, state, or local levels of government:

- o Setting goals and standards--defining program goals and setting standards for quality or emissions;
- o Designing and implementing programs--designing, managing, and revising plans for achieving standards and goals;
- o Enforcement--ensuring that program goals and requirements are met by the regulated community;
- o Research and development--developing and providing technical guidance for standard setting, program design, and enforcement; and
- o Funding--providing funds necessary to meet administrative and research costs.

In general, the unit of government best suited to undertake each of these responsibilities is the level best able to assess costs and benefits accurately and to act on that assessment to produce environmental programs that are efficient and equitable. Levels of government typically vary in their abilities to do this, depending on the activity involved. The appropriate level of government to deal with an environmental problem also depends on the type of environmental problem, the available control options, and the characteristics of the governmental jurisdiction.

Smaller units of government tend to be closer to the environmental problem and to the persons and firms affected. They may have better information on local circumstances and thus be able to assess costs and benefits more accurately. If so, they may be able to provide programs that address specific local problems and circumstances. Smaller units of government may also have an advantage in terms of flexibility and the ability to provide more innovative solutions to environmental problems. These same characteristics may also enable lower levels of government to be more responsive to equity concerns.

Larger units of government may be able to provide more efficient and

2. State budget estimates were obtained, in part, from an informal Congressional Budget Office survey. The limitations of these data are discussed in Chapter II.

equitable environmental protection under certain circumstances. If a substantial number of people and firms receiving benefits or incurring costs under a program are located outside the boundary of a jurisdiction (externalities), then it is less likely that local government will take into account the preferences of these groups and accurately assess the level and distribution of the costs and benefits. In addition, some activities (such as setting health or technology-based standards) require substantial amounts of technical information. Small government units may not be willing to incur the costs of developing or acquiring this information. Finally, a program may have economies of scale in administration or construction, as in issuing permits or building wastewater treatment plants. If so, then larger government units may be better able to capture these economies and provide lower-cost services.

The degree to which these general characteristics will give preference to one level of government over another depends on the specific program activity. Different program activities also generate different levels of tension between the economic goals of efficiency and equity. Consider, for example, the level of government with control over standard setting. Variations in local standards provide an opportunity for flexibility in responding to unique regional circumstances, and allow the adoption of environmental quality levels that reflect local benefits and costs. On the other hand, uniform national standards provide a minimum standard of health for everyone, and thus may be justifiable on other than efficiency grounds.

As another example, the responsibility for funding a public program typically parallels program responsibility. The implicit assumption is that the governmental unit responsible for daily implementation of a program is in the best position to develop the most appropriate methods for raising program revenues. This may not always be equitable and efficient. The costs of program management and compliance imposed by federal regulations may be substantial at the state and local levels. The burden of complying with these regulations may also be unevenly or unfairly distributed among jurisdictions; if so, then additional federal support may be justified on the basis of equity and as a mechanism for persuading state and local governments to comply with national regulations.

CHAPTER I

INTRODUCTION

The relationship between federal, state and local governments in the design and implementation of environmental protection programs has gone through a number of significant changes over the last 30 years. From being primarily a state concern in the 1950s and 1960s, environmental protection became increasingly a federal concern during the 1970s. Since then a partnership of sorts has evolved, with different levels of government taking on different responsibilities.

In the coming decade, the nature and effectiveness of this partnership will be increasingly tested. Budget constraints are forcing all levels of government to reexamine their obligations under existing environmental programs. New or unaddressed environmental concerns have arisen that place additional constraints on governmental ability to cope effectively with any one problem. The Congress will be dealing with these constraints as it debates reauthorization of maturing environmental programs, as it moves to confront new problems, and as it determines budgetary priorities for the environment. The resulting allocation of roles and responsibilities for environmental protection among the different levels of government will determine, in large part, the types of programs that are developed, the effectiveness of these programs, and ultimately the level of environmental quality that is achieved.

Federal, state, and local governments are not equally capable of handling all the different activities that are associated with environmental protection programs. One key to effective environmental management will be the Congress's ability to assign (directly or indirectly) roles and responsibilities to those levels of government best suited to specific tasks. The purpose of this staff working paper is to report on work in progress to assist the Congress in making these decisions. Specifically, this report presents the first two of three parts of a larger study on environmental federalism.

The first part of the study, presented in Chapter II, describes the governmental partnership that appears to be evolving for many current environmental programs. By design or default, current programs embody various forms of environmental federalism. The division of technical, administrative, and financial functions that has developed can provide some insight into the ability of governments to undertake various parts of environmental management, and the types of problems that are likely to arise. Within this context, the emerging relationship between levels of government in dealing with new problems can also be informative.

The second part of the study, presented in Chapter III, aims to provide an analytical structure for allocating environmental responsibilities among different levels of government. The paper adopts an economic viewpoint that provides one

set of broad criteria for assigning responsibilities and indicating the efficiency and equity implications of alternative assignments. Used in conjunction with the information on current trends in environmental federalism, this approach can provide a set of guidelines for evaluating current programs and designing effective new programs.

The third part of the analysis, to be reported in a later study, will investigate the potential for applying the general guidelines set forth here to specific problems of allocating governmental responsibility.

CHAPTER II

TRENDS IN ENVIRONMENTAL FEDERALISM

The responsibility for environmental protection programs is shared in varying degree among federal, state, and local governments. Some processes are completely under federal control, such as the regulation of new and existing chemicals under the Toxic Substances Control Act (TSCA). Other environmental programs are primarily under the jurisdiction of state and local governments--for example, the regulation of indoor air pollution and groundwater management. Still others, notably air and water quality control programs, are the responsibility of both federal and state governments.

Environmental protection programs have increased markedly in the last two decades, both in number of statutes and in breadth of coverage. Until the 1970s pollution was considered a state and local concern, and programs and funding originated at the state and local levels. Federal activity concentrated on research and development, and on providing limited technical and financial assistance to state and local governments as in the construction grants program. Increased awareness of environmental problems in the 1960s and concern about inconsistencies among state statutes, together with a need to assure continued state involvement, culminated in the formation of the Environmental Protection Agency (EPA) in 1970.^{1/} The passage of the Clean Air Act (CAA) amendments in 1970 and the subsequent enactment of major statutes governing water quality (1972) and the disposal of hazardous wastes (1976) assured a strong federal presence in overall program direction and development, as well as a federal financial commitment both to federal programs and to support for state and local programs. The federal government has also assumed primary responsibility for the administration of several new statutes, including TSCA and the Marine Protection, Research and Sanctuaries Act (MPRSA), and has been assigned expanded duties under amendments to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

While some programs remain primarily in the federal domain, the major air, water, and hazardous waste programs have gradually evolved into federal-state partnerships. As these programs have matured, the federal role in program

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1. For a comprehensive look at the legislative development and changing federal-states roles in environmental protection in the decades preceding 1982, see Claudia Copeland, *Federal-State Relations in Transition: Implications for Environmental Policy*, a report prepared by the Congressional Research Service for the Senate Committee on Environment and Public Works and issued as a Committee print, Serial No. 97-7, February 1982.

management and in funding of state activities has changed. States currently administer many portions of the major programs, while the federal government sets standards, oversees and approves state programs, and steps in to administer programs as needed.

Newer programs are emerging in a number of areas, such as groundwater protection and air toxics. In these areas, the debate concerning the appropriate roles for federal and state governments has been vigorous. Currently, the federal government provides funds for research and program development, and assists states with technical guidance and financial support; many states have already undertaken the task of designing and implementing programs to address these problems.

Federal funding of environmental protection activities has declined in real terms over the last 10 years, although slight increases have occurred in the second half of this decade. In the air and water programs and overall, EPA's budget has declined, as have grants to state and local governments. The percentage of EPA's total operating budget apportioned to state grants was also declined, for each program individually and for all programs combined. In part, these trends reflect federal budget pressures. They also suggest that financial responsibility is being shifted to the states along with program responsibility. As a result, states appear to be funding a growing percentage of the costs of running their programs.

THE ALLOCATION OF PROGRAM RESPONSIBILITY

Nearly all the major air, water and hazardous waste programs operate under some form of federal-state partnership in which states implement federally approved plans while EPA retains authority for setting the standards and overseeing the plans (see Box 1).^{2/} States are also developing programs to deal with environmental problems that may not be adequately addressed by existing federal requirements. In order to highlight the types of responsibilities for which states are currently responsible, this section discusses the existing and emerging environmental programs for which states have been delegated or assumed substantial control. The federal government also has numerous responsibilities under statutes not discussed here, including the Toxic Substances Control Act, the Federal Insecticide, Fungicide and Rodenticide Act, and the Marine Protection, Research and Sanctuaries Act.

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2. For reviews of the major federal programs for air, water, and hazardous waste, see Congressional Research Service, *Summaries of Federal Environmental Laws Administered by the Environmental Protection Agency*, Report No. 87-226 ENR (April 15, 1987); and Sheldon M. Novick and others, eds., *Law of Environmental Protection*, vols. 1 and 2 (New York: Clark Boardman Company, Ltd., 1987).

BOX 1
The Distribution of Responsibilities

Every environmental program involves a wide range of actions, from defining policy goals to designing permit systems and enforcing regulations; these activities fall into five broad categories. The distribution of responsibilities among levels of government varies by statute and type of activity.

Setting goals and standards--defining the goals of the program and setting standards for water or air quality, as applicable, and for allowable emissions. Authority for setting standards is reserved to the federal government under most major environmental statutes, although the Clean Water Act requires each state to set standards for bodies of water within its jurisdiction.

Designing and implementing programs--determining what techniques will be employed to meet goals and standards and designing, revising, and administering programs. Responsibility for design and implementation is shared by federal and state governments to varying degrees. At one extreme, the Superfund legislation and the Toxic Substances Control Act reserve virtually all program management for the federal government. The Federal Insecticide, Fungicide and Rodenticide Act grants primary enforcement and certification authorities to states, but reserves most registration and other program functions for EPA. At the other extreme, the major acts--the Clean Air, Clean Water, and Safe Drinking Water Acts and the Resource Conservation and Recovery Act (RCRA)--delegate a significant portion of program responsibility to the states.

Enforcement--monitoring environmental quality and emissions, inspecting facilities, levying and collecting fines, issuing notices of violation, invoking civil and criminal penalties, recalling products, and revoking permits. Most statutes give the states the principal role in enforcement, although EPA retains residual or concurrent enforcement authority. Statutes also provide for enforcement by citizen suits in the absence of corrective government actions.

Research and development--developing and providing technical guidance for standard setting, program design, and enforcement. Many of the statutes authorize EPA to conduct or fund research, to prepare technical guidance, or to report to the Congress on the progress of environmental protection. For example, the 1977 amendments to the Clean Air Act authorize research on emissions that could affect stratospheric ozone, and the 1986 Superfund Amendments and Reauthorization Act (SARA) requires a team of federal agencies to prepare an Emergency Planning Guide to be used by state and local officials in complying with SARA's emergency planning requirements.

Funding--providing funds necessary to meet administrative costs. Most state activities required by federal statutes are funded, at least in part, by federal grants.

Air Quality Control Programs

The Clean Air Act of 1955, together with subsequent amendments, is the principal federal statute governing air pollution. Under this act, the federal government has responsibility for setting air quality standards; the responsibility for attaining these standards rests with the states. Toxic air pollution, while addressed in the CAA, has received little federal regulatory attention, but is addressed by state air programs in 20 states. In addition, both the federal government and the states conduct research on the issues of acid rain and indoor air pollution; a number of states have already initiated regulatory programs in these areas.

The Clean Air Act. The CAA and its amendments represents a unique federal-state partnership. Under this act, EPA is responsible for setting national ambient air quality standards (NAAQS) for criteria pollutants, based on health effects. NAAQS are currently in effect for six pollutants: total suspended particulates, sulfur dioxide, ozone, nitrogen oxides, carbon monoxide, and lead. EPA is also responsible for setting new source performance standards (NSPS) for stationary sources of criteria pollutants, and uniform national emissions standards for new mobile sources of criteria pollutants, and for setting national emission standards for "hazardous air pollutants" (NESHAPs).

States, through their state implementation plans (SIPs), have primary responsibility for establishing procedures by which national standards will be met for Air Quality Control Regions within each state. Each state develops a SIP that must be submitted to EPA for approval; if no approved plan exists, EPA must develop a plan. At a minimum, a SIP must include emissions standards for pre-1970 stationary sources and new cars and trucks, and must incorporate new source standards and new source review procedures. All states currently have accepted delegation of the air quality protection program. As of December 1985, 33 states had deficient plans for controlling sources and pollutant levels in one or more counties, and EPA had imposed sanctions on 21 states as a result of these deficiencies; sanctions imposed included construction bans and funding restrictions.^{3/} SIP enforcement is shared among EPA, states, and private citizens.

Indoor Air Pollution. Programs dealing with indoor pollution have begun to emerge in this decade in response to increasing evidence of the presence of toxic chemicals in indoor air and water supplies resulting, in part, from energy conservation measures that reduce ventilation. The pollutants currently being addressed at the state or federal levels include asbestos, radon, lead, biological contaminants, volatile organic compounds such as formaldehyde, and combustion by-products such as carbon monoxide.

Federal activity in this area has been limited primarily to monitoring and

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3. U.S. Environmental Protection Agency, *Actions on Deficient SIPs and Other Nonattainment SIPs*, in-house database printout, Office of Air and Radiation (1986), referenced in Fund for Renewable Energy and the Environment, *The State of the States: 1987* (Washington, D.C., February 1987), p. 33, Air Matrix, n.1.

research. Some federal statutes and regulations exist: federal rules restrict smoking in federal buildings and on short airplane flights; the Asbestos Hazard Emergency Response Act requires states to submit asbestos management plans covering public and private schools, and provides funds for this purpose; and the Department of Housing and Urban Development (HUD) restricts the use of formaldehyde-emitting wood products in mobile homes. In addition, EPA has established a remedial action level for radon in the home.

A recent study reports that these federal statutes, together with independent state statutes, have resulted in significant efforts to curb indoor pollution at the state and local levels. Forty-two states and more than 200 cities and counties have passed legislation that limits or prohibits smoking in public places. Eleven states offer free or subsidized testing of homes for radon, and 22 states offer educational materials; some states offer low-interest loans for home repair. States are moving to pass asbestos-related legislation: 39 states require some form of accreditation of asbestos removal contractors, and several offer educational materials.^{4/} One state has expanded the restrictions on formaldehyde products beyond those specified by HUD.

Toxic Air Pollution. The Clean Air Act amendments of 1970 require EPA, under the provisions governing National Emission Standards for Hazardous Air Pollutants, to set standards for pollutants that present a threat to public health. As of October 1986, EPA had regulated only seven pollutants, and expected to promulgate final standards for an additional eight pollutants in 1988. States have begun stepping into the gap left by federal regulations. As of May 1986, 17 states had air toxics regulatory programs in place, and 29 states were in the process of developing programs.^{5/}

Water Quality Control Programs

The two primary statutes directed at improving the quality of surface and drinking waters are the Clean Water Act of 1972 (CWA), and the Safe Drinking Water Act of 1974 (SDWA), together with subsequent amendments to these acts. Both statutes provide the federal government with substantial responsibility for setting standards; they permit delegation of program management to states, subject to EPA approval. Neither these acts nor other federal statutes contain a comprehensive program for groundwater protection, but a number of statutes contain provisions that address groundwater contamination problems; in addition, many states have assumed responsibility for designing and implementing policies to deal with this pollution problem.

The Clean Water Act. The CWA has two major parts: the provisions authorizing federal support of municipal sewage treatment, and the regulatory

4. For discussions of state activities in indoor pollution, see Fund for Renewable Energy and the Environment, *The State of the States: 1988* (Washington, D.C., February 1988).
5. General Accounting Office, *Air Pollution: States Assigned a Major Role in EPA's Air Toxics Strategy* (March 1987), pp.4, 8.

requirements designed to control industrial and municipal discharges. As in the Clean Air Act, the regulatory requirements of the CWA establish a federal-state partnership, although the CWA assigns a larger role for states in setting standards. The CWA requires EPA to issue regulations containing technology-based effluent standards applicable to categories of industrial sources. To supplement federal standards, if needed, states may set water quality standards consisting of maximum allowable concentrations of pollutants based on designated use classifications, such as recreation, water supply, or agriculture, for each body of water within the state. The principal mechanism for enforcing the water quality and effluent standards is the National Pollutants Discharge Elimination System (NPDES) permitting process. More than two-thirds of the states have been delegated the NPDES permit program.^{6/} In addition to the NPDES program, states may be delegated responsibility for the issuance of permits for disposing of dredge or fill material in bodies of water.

The second major portion of the CWA is the authorization of grants for construction of municipal sewage facilities. As of January 1987, 45 states had obtained authority to administer portions of the municipal wastewater treatment construction program.^{7/} In addition, under the 1987 amendments to the CWA, states are directed to develop and implement nonpoint pollution management programs and to undertake groundwater protection activities as part of their overall nonpoint pollution control effort. As under the CAA, enforcement responsibilities and powers are given to EPA, the states, and to private citizens.

The Safe Drinking Water Act. The SDWA has three major sets of provisions. First, the act requires EPA to issue national drinking water regulations that are based on both health effects and available technology. States are responsible for developing, implementing, and enforcing regulations at least as stringent as those set by the federal government. Most of the states have been delegated authority for this program.^{8/} Second, EPA is required to issue regulations governing state programs to protect underground sources of drinking water by controlling underground injection of wastes. States must submit plans to implement an underground injection control program to EPA for approval; if no approved state plan exists, EPA must implement the program. Finally, under the 1986 amendments to the act, EPA may award grants to states for developing and implementing groundwater protection programs; if states choose not to establish such programs, EPA has no authority to establish a program. The 1986 amendments also require states to ban lead in certain uses of plumbing; in response, 26 states have already banned the use of lead in drinking water systems.

Groundwater Protection. There is no single federal regulatory program to

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6. Fund for Renewable Energy and the Environment, *State of the States: 1988*, p. 47; and Congressional Research Service, *Summaries of Federal Environmental Laws*, p. 17.
 7. Congressional Research Service, *Summaries of Federal Environmental Laws*, p. 17.
 8. Ibid, p. 28.

protect groundwater, although EPA has established an Office of Groundwater Protection to coordinate its activities, and numerous federal programs including the Clean Water Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act, address some aspect of the groundwater problem and require or fund state activities to protect groundwater. A majority of the states have developed or are developing groundwater protection plans and have implemented programs to assist in groundwater protection. State activities range from the development of groundwater standards and protection strategies to underground storage tank programs, agricultural contamination programs, and waste disposal programs.^{9/}

Hazardous and Solid Waste Management

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), known as Superfund, and the Resource Conservation and Recovery Act of 1976 (RCRA), together with subsequent amendments, provide the authority for regulations governing the disposal and cleanup of hazardous waste. RCRA, which governs disposal, permits delegation of substantial portions of the hazardous waste management program to the states; however, CERCLA retains federal control over cleanup operations.

The Resource Conservation and Recovery Act. RCRA and its amendments govern the management and disposal of solid and hazardous wastes. Subtitle C of this act creates a "cradle to grave" hazardous waste management program. The federal government is responsible for key components of this program, including identifying criteria determining whether or not wastes are hazardous and developing standards and regulations for generators and transporters of waste and for facilities that treat, store, and dispose of waste. The two major compliance mechanisms under Subtitle C are a manifest system that tracks waste from point of generation to final treatment, storage, or disposal, and requirements that permits be issued for all treatment, storage, or disposal facilities. RCRA is designed to encourage states to take over EPA's hazardous waste management program. As of June 1988, 42 states were administering all or part of the RCRA program.^{10/} Both EPA and states have enforcement authority under RCRA. Subtitle D of RCRA provides financial and technical assistance to states for solid waste management, resource conservation, and resource recovery; however, appropriations for assistance under this subtitle ceased in fiscal year 1981.

The Comprehensive Environmental Response, Compensation, and Liability Act. CERCLA authorizes the federal government to respond to spills and other releases of hazardous substances and to leaking hazardous waste dumps. The act establishes the Superfund, which is to be used for cleanups and is financed mostly by taxes (on crude oil, for example), general revenues, and recoveries

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9. General Accounting Office, *Groundwater Quality: State Activities to Guard Against Contaminants* (February 1988).
 10. General Accounting Office, *Hazardous Waste: New Approach Needed to Manage the Resource Conservation and Recovery Act* (July 1988), p. 14.

from responsible parties. The 1984 amendments to RCRA establish a new program regulating underground storage tanks, and the 1986 amendments to CERCLA establish a Leaking Underground Storage Tank (LUST) trust fund for many cleanups not covered under Superfund.

As directed by CERCLA, EPA has assembled a National Priorities List of sites targeted for remedial action under Superfund. CERCLA does not provide for delegation of the cleanup program to states; however, states can exercise considerable control over the process by requiring cleanups to meet more stringent state standards (and providing additional funds for this purpose) or by refusing to provide state contributions to the initial cleanup and ongoing maintenance costs, which contributions are required by statute before EPA can proceed. EPA may either take the lead in cleaning up a site, or it may set up a cooperative arrangement with the state involved. Under these agreements, Superfund and the state both contribute to financing the cleanup, which is supervised by the state, although EPA retains oversight authority and responsibility. In response to delays in federal cleanup, states have begun to implement their own Superfund laws and financing mechanisms. More than half the states possess, and are actively exercising, authority to initiate remedial action.^{11/}

Title III of the 1986 Superfund Amendments and Reauthorization Act (SARA) provides new responsibilities in the area of emergency planning for EPA and state and local governments. Title III has three major sections: emergency planning, community right-to-know reporting, and toxic chemical release reporting. Under the emergency planning provisions, state and local governments are responsible for designing and implementing emergency plans for responding to chemical accidents. EPA's role is to provide guidance and technical assistance. The community right-to-know provisions require state and local governments to maintain and make available to the general public inventory reports on quantities and types of chemicals stored at facilities in their jurisdictions. Finally, the emissions inventory provisions require EPA to establish an inventory of toxic chemical emissions from specific categories of facilities nationwide.

RECENT TRENDS IN FUNDING RESPONSIBILITY

As shown in the previous section, both the federal government and the states have been assigned new responsibilities for environmental protection over the last two decades. In particular, states have in recent years been delegated a growing portion of program responsibility under the major air, water, and hazardous waste programs. States are also devoting resources to developing programs to address emerging problems, at the same time that the federal government is undertaking technical research and developing coordinated approaches to address these issues. These trends in program responsibility are, in part, reflected in funding trends.

11. Fund for Renewable Energy and the Environment, *State of the States: 1987*, p. 20.

EPA expenditures on environmental protection, and the percentage of these funds going to aid state programs, have both declined over the last 12 years in real terms. EPA program expenditures and grants to states peaked in 1979, dropped sharply in 1981 and 1982, and began rising gradually in 1983. EPA's estimated total budget and contributions to states in 1989 are both significantly below their 1979 values. During the same period, grants to state programs, excluding construction grants, fell from \$497 million to \$270 million (in 1987 constant dollars), which is slightly more than half the 1979 value.¹² Construction grants have been steadily declining since 1979; the Water Quality Act of 1987 calls for a phase-out of federal construction grants by 1994, substituting an \$8.4 billion state program of grants for revolving loan funds for localities.

Federal expenditures and state grants for waste programs have both risen in the last 10 years, as have federal contributions to the Superfund, reflecting growing program responsibilities for hazardous and solid waste management. Despite reduced air and water grants, state expenditures on air, water, and hazardous waste all have risen; between 1982 and 1986, water program expenditures rose by over 40 percent and hazardous and solid waste budgets more than doubled in real terms. Although EPA grants are still an important component in state expenditures, states are funding a growing percentage of their expenditures on these programs. In particular, estimates presented in this paper suggest that states in 1986 were responsible for 67 percent of water program costs and 60 percent of waste program costs, in comparison with 51 percent and 24 percent in 1982. The percentage of state expenditures financed by state revenues in the air program rose slightly, from 51 percent to 54 percent during this same period.

Federal Funds

As Table 1 indicates, EPA's operating budget has declined in real terms over the last 12 years from a peak of \$1.8 billion (1987 constant dollars), to \$1.5 billion estimated for 1989, or by 16 percent. This decline is the result of an increase in real terms of approximately 20 percent between 1982 and 1989, after a sharp decline of almost 25 percent between 1981 and 1982. Total EPA expenditures, including construction grants and payments to Superfund and the Leaking Underground Storage Tank trust fund, are roughly the same in 1989 as they were in 1982, reflecting declines in construction grants.

The distribution of the budget by function, displayed in Table 2, has remained roughly constant over the past 12 years. Research and development outlays have been between 11 percent and 15 percent of the total budget since

12. Throughout this section current dollars have been converted to 1987 constant dollars using the implicit price deflator for gross national product. For 1978 through 1987, the deflator is taken from *Economic Report of the President* (February 1988), Table B-3. For 1988 and 1989, CBO forecasts of the GNP deflator are used, as reported in Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1989-1993, Part I* (February 1988), Table I-7.

TABLE 1. EPA BUDGET FOR ENVIRONMENTAL PROGRAMS
(In millions of 1987 dollars)

Year	Operating Budget	Superfund	Construction Grants	LUST ^a /	Total
1978	1,626	0	7,329	0	8,955
1979	1,798	0	6,278	0	8,076
1980	1,738	0	4,664	0	6,402
1981	1,690	94	2,000	0	3,784
1982	1,276	223	2,820	0	4,320
1983	1,187	238	2,749	0	4,173
1984	1,215	447	2,650	0	4,312
1985	1,425	655	2,537	0	4,617
1986	1,468	269	1,827	0	3,564
1987	1,542	1,411	2,361	50	5,363
1988	1,529	1,091	2,228	14	4,862
1989	1,514	1,487	1,394	46	4,441

SOURCES: Congressional Budget Office, from data reported in Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; and Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988).

NOTE: Totals may not equal sum of components because of rounding. Data for 1978 through 1987 are actual budget authority; 1988 data are estimated budget authority; 1989 data are President's requested budget authority.

a. Leaking Underground Storage Tank trust fund.

TABLE 2. EPA OPERATING BUDGET BY FUNCTION
(In millions of 1987 dollars)

Year	Salaries and Expenses	Research and Development	Abatement, Control, and Compliance	Buildings and Facilities	Total
1980	720	320	695	3	1,738
1981	703	314	669	5	1,690
1982	652	181	438	4	1,276
1983	628	137	417	3	1,187
1984	630	152	430	3	1,215
1985	704	200	507	13	1,425
1986	678	217	569	5	1,468
1987	727	198	610	8	1,542
1988	740	180	586	23	1,529
1989	743	183	580	7	1,514

SOURCES: Congressional Budget Office, from data reported in U.S. Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; and Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988).

NOTE: Totals may not equal sum of components because of rounding. Data for 1980 through 1987 are actual budget authority; 1988 data are estimated budget authority; 1989 data are President's requested budget authority.

1982, and were about 18 percent of the total budget in 1980 and 1981. Abatement, control, and compliance expenditures (as a percentage of the total budget) fell to 34 percent in 1982, grew gradually to 40 percent in 1987, and leveled off at 38 percent in 1988 and 1989.

The operating budgets for air, water, and hazardous waste together constituted approximately 55 percent to 60 percent of the EPA annual operating budget between 1978 and 1989. As illustrated in Table 3, the programs for air, water, and hazardous and solid waste were all sharply cut back in real terms in 1982; the air budget fell the least (16 percent), water fell by 28 percent, and hazardous waste showed the sharpest decline (34 percent). In 1983, air and water programs were almost 40 percent and 48 percent, respectively, below their 1979 peaks. The air program budget fell from \$401 million in 1979 to \$243 million in 1983, while water funding dropped from a peak of \$602 million to \$318 million in 1983. Although air and water program funding tended to grow between 1983 and 1987, the 1989 estimated budgets for these programs are still well below the 1979 peaks, by 40 percent for the air program and 43 percent for the water program. Hazardous and solid waste spending rose sharply in 1981, following the passage of the Comprehensive Environmental Response, Compensation, and Liability Act in 1980, and has more than doubled since 1982, following amendments to CERCLA and the Resource Conservation and Recovery Act.

Table 3 also displays the portion of EPA's operating budget that is devoted to grants to state governments. Grants to states for air, water, and hazardous waste account for over 94 percent of all state environmental grants. Overall, grants for the three major programs combined fell in real terms from \$477 million to \$251 million between 1979 and 1983--a decline of 47 percent. Between 1983 and 1987, major media grants rose by about 15 percent, to \$289 million. On balance, the state grant budget for these three program areas combined has fallen from its peak in 1979 by almost 50 percent, to \$256 million. Hazardous waste state program funding is approximately the same in 1989 as it was in 1979--\$70 million. The decline in state grant funding is, thus, due primarily to declines in the air and water programs. Air and water grants in 1989 are \$88 million and \$98 million, respectively--less than half of their 1979 peaks, and approximately 15 percent lower than their levels in 1982. Hazardous waste grants are about 40 percent higher than in the first three years of this decade.

As a percentage of EPA's operating budget, state grants are below their 1979 peaks, and have steadily declined since 1982, as shown in Table 4. The largest decline has occurred in the hazardous waste program, which accounts for only 29 percent of EPA's budget in 1989, compared with 39 percent in 1982. The proportion of federal funds going to states for water and air programs also declined slightly between 1982 and 1989, from 31 percent to 28 percent for water and from 40 percent to 37 percent for air.

State Expenditures

While federal grants to states declined between 1982 and 1986 for the three major program areas (with the exception of waste), total state environmental

TABLE 3. EPA OPERATING BUDGET FOR ENVIRONMENTAL PROGRAMS (In millions of 1987 dollars)

Year	Operating Budget					Grants to States				
	Air	Water <u>a/</u>	Hazardous Waste <u>b/</u>	Subtotal <u>c/</u>	All Programs	Air	Water <u>a/</u>	Hazardous Waste <u>b/</u>	Subtotal <u>c/</u>	All Programs <u>d/</u>
1978	280	599	58	937	1,626	108	253	23	384	396
1979	401	602	110	1,113	1,798	194	216	67	477	497
1980	340	561	131	1,031	1,738	114	187	53	353	370
1981	306	521	189	1,016	1,690	110	167	48	324	339
1982	256	373	125	754	1,276	103	115	49	267	281
1983	243	318	136	697	1,187	96	105	50	251	264
1984	245	322	140	707	1,215	96	104	51	251	264
1985	248	357	203	809	1,425	96	111	60	267	282
1986	253	340	241	834	1,468	99	109	68	276	290
1987	247	370	255	872	1,542	95	122	72	289	302
1988	238	357	251	845	1,529	90	105	69	264	279
1989	239	343	343	825	1,514	88	98	70	256	270

SOURCES: Congressional Budget Office, from data reported in U.S. Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; and Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988).

NOTE: Totals may not equal sum of components because of rounding. Data for 1978 through 1987 are actual budget authority; 1988 data are estimated budget authority; 1989 data are President's requested budget authority.

- a. Includes both water quality and drinking water programs.
- b. Includes both hazardous and solid waste programs.
- c. Subtotal for air, water, and hazardous waste.
- d. Includes grants for pesticides and toxic substances; does not include construction grants.

TABLE 4. GRANTS TO STATES AS PERCENTAGES OF EPA OPERATING BUDGET, BY PROGRAM

Year	Air	Water <u>a</u> /	Hazardous Waste <u>b</u> /	Other	Total
1978	38	42	40	2	24
1979	48	36	61	3	28
1980	33	33	40	2	21
1981	36	32	26	2	20
1982	40	31	39	3	22
1983	40	33	37	3	22
1984	39	33	37	2	22
1985	39	31	30	2	20
1986	39	32	28	2	20
1987	38	33	28	2	20
1988	38	30	27	2	18
1989	37	28	29	2	18

SOURCES: Congressional Budget Office, from data reported in Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; and Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988).

- a. Includes both water quality and drinking water programs.
- b. Includes both hazardous and solid waste programs.

budgets in these areas rose, with states contributing a growing portion of total expenditures in all three programs. Estimated total state budgets for air programs remained roughly constant in real terms between 1982 and 1986 at \$200 million; however, state water program expenditures rose by over 40 percent to \$336 million, and waste budgets, totalling \$169 million in 1986, were more than double 1982 levels (see Table 5).^{13/}

A clear pattern in state funding of environmental programs emerges in Table 6. Although federal grants to all three state programs either did not fall dramatically or else rose between 1982 and 1986, the percentages of state program budgets supported by federal grants have declined over time. The trend is most noticeable in hazardous waste management, although small declines are also evident in the air and water programs. In particular, between 1982 and 1986, federal support for state air programs fell from 49 percent to 46 percent. Federal grants in 1982 constituted nearly half of state water program budgets; in 1986 only one-third of those budgets came from EPA grants. For waste programs, the change has been dramatic: despite the growth in EPA grants for waste programs, the percentage of state waste program budgets funded by federal grants fell from 76 percent in 1982 to only 40 percent in 1986.

A survey of state officials conducted jointly by several national associations presents another picture of federal funding support, which tends to support the results in Table 6.^{14/} According to this report, federal grants for fiscal year 1982 funded 45 percent of state air program budgets, about 46 percent of state water quality program budgets, about 69 percent of state hazardous waste program budgets, and about 48 percent of state drinking water supply program budgets.

13. The total state water and waste budgets for states presented in Table 5, and used to compute Table 6, were obtained from an informal telephone survey of state environmental officials performed by the Congressional Budget Office between March 1987 and July 1988, and thus should be treated as estimates. The total state air budget figures, as noted on Table 5, were obtained from a survey of state agencies by the State and Territorial Air Pollution Program Administrators (STAPPA). In the context of this paper, several features of both the CBO data and the STAPPA survey deserve note. In particular, the state budget estimates may include grants from federal agencies other than EPA; they may not include budgets for all programs (since related programs may be implemented by multiple agencies within a state); and they may not include grant money passed through to local governments. In addition, several states did not report to CBO for all years, and some states may have reported data by calendar year, although fiscal year was requested.

14. Thomas W. Curtis and Peter Creedon, National Governors' Association Committee on Energy and Environment, *The State of the States: Management of Environmental Programs in the 1980s* (Washington, D.C., June 1982).

TABLE 5. TOTAL STATE BUDGETS FOR AIR, WATER, AND
HAZARDOUS WASTE PROGRAMS (In millions of 1987 dollars)

Year	Air	Water <u>a</u> /	Hazardous Waste <u>b</u> /	Total
1982	210	236	64	510
1983	213	274	76	563
1984	206	296	110	613
1985	202	326	146	675
1986	213	336	169	717

SOURCES: Congressional Budget Office, from Congressional Budget Office survey of state water and hazardous waste budgets; from state air budget data reported in State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials, *Air Permit and Emissions Fees: Results of a Survey*, prepared by Mary M. Sullivan (Washington, D.C., April 1987); and from unpublished additional state air budget survey data provided by the State and Territorial Air Pollution Program Administrators.

NOTE: Details may not sum to totals because of rounding.

- a. Includes water quality programs; some drinking water programs may not be included.
- b. Includes both hazardous and solid waste programs.

TABLE 6. GRANTS TO STATES AS A PERCENTAGE OF TOTAL STATE BUDGETS, BY PROGRAM

Year	Air	Water <u>a</u> /	Hazardous Waste <u>b</u> /
1982	49	49	76
1983	45	38	66
1984	46	35	47
1985	48	34	41
1986	46	33	40

SOURCES: Congressional Budget Office, from Congressional Budget Office survey of state water and hazardous waste budgets; from federal grant data reported in Environmental Protection Agency, *Justification of Appropriation Estimates for Committee on Appropriations*, for fiscal years 1980, 1981, 1982, 1984, and 1989; Environment and Energy Study Conference, *Senate Floor Brief* (Washington, D.C., June 18, 1984) and *Special Report* (Washington, D.C., February 24, 1988); from state air budget data reported in State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials, *Air Permit and Emissions Fees: Results of a Survey*, prepared by Mary M. Sullivan (Washington, D.C., April 1987); and from unpublished additional state air budget survey data provided by the State and Territorial Air Pollution Program Administrators.

- a. Includes water quality programs; some drinking water programs may not be included.
- b. Includes both hazardous and solid waste programs.

AN EVOLVING PARTNERSHIP

As discussed in preceding sections, the partnerships under which federal, state and local governments participate in the management of air and water quality and hazardous waste have altered during recent decades. Both federal and state governments have new responsibilities, and a growing portion of responsibility for existing pollution control programs has devolved to the states; states are the principal agents responsible for certification and issuing permits, and often have primary responsibility for devising and enforcing control programs designed to meet statutory goals and federal standards. The federal government maintains a strong role in overseeing, enforcing, and providing technical guidance to assist state implementation of these programs, and continues to provide financial support for research and development. States are also taking the initiative in developing protection programs side by side with federal efforts to cope with emerging environmental concerns, such as groundwater contamination and toxic air pollution.

In part, the trends in fiscal responsibility during the last six to ten years reflect and in part contrast with, this movement in program responsibility. EPA's operating budget is lower in real terms than last 10 years ago, although it has been increasing in recent years. The overall declines have occurred primarily in the mature air and water quality control programs; in contrast, the hazardous waste budget has risen steadily, reflecting expanding federal requirements for waste management. Fiscal responsibility has been shifting to the states; EPA grants to state and local governments have declined over the past 10 years in real terms, both for air and water quality control programs and overall; in all programs, grants are a declining or constant percentage of EPA's budget. Despite declines in grants, state budgets appear to be rising, and states are funding a growing percentage of their program expenditures.

CHAPTER III

ALLOCATING GOVERNMENTAL RESPONSIBILITY

FOR ENVIRONMENTAL PROTECTION

A number of factors may determine what level of government ought to be responsible for a specific environmental program. These include, among others, the geographic dispersion of pollutants, the type and amount of information needed to design and run a program, and the cost structure of alternative control strategies. At the same time, the particular level of government chosen may affect the kind of control program selected, the level of environmental protection that ultimately occurs, and who gains or loses from the program. All of these considerations may enter into choosing a division of responsibility that will best promote desirable environmental policies. This section approaches the problem from an economist's point of view--that is, it evaluates governmental intervention in environmental policy in terms of its impacts on economic efficiency and equity.^{1/}

THE NOTIONS OF ECONOMIC EFFICIENCY AND ECONOMIC EQUITY

Efficiency and equity provide two quite different perspectives on public policies: economic efficiency speaks to the magnitude and relationship of benefits and costs, while equity is concerned with the distribution of costs and benefits. Together, they can be used to create a broad economic framework for assigning responsibilities among various levels of government.

Economic Efficiency

From an efficiency perspective, a desirable allocation of responsibilities is one that promotes:^{2/}

- o Environmental programs that result in a balance between marginal
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1. An economic perspective is adopted here because of concerns over budget impacts and the allocation of resources. Other criteria may also be used to evaluate environmental programs and governmental roles, such as health and ecological standards, constitutionality, and personal and states' rights.
 2. In the absence of government intervention, society will not provide an efficient level of environmental protection. See, for example, William J. Baumol and Wallace E. Oates, *The Theory of Environmental Policy*, Second Edition (Cambridge: Cambridge University Press, 1988).

costs and marginal benefits;^{3/}

- o Environmental programs that result in the lowest level of costs for a given level of benefits; and
- o Environmental programs that ensure the greatest benefits for a given level of costs, that is, with the resulting benefits going to those who value them the most.

From the standpoint of economic efficiency, governmental responsibilities should be allocated to allow environmental policies that provide the maximum level of benefits for a given level of expenditure; no other allocation provides more benefits at the same or lower level of costs to society.

Economic Equity

The concept of equity relates not so much to the level of benefits and costs as to how they are distributed among individuals and over time. The equity criteria stresses the notion of fairness as an important value to be used in conjunction with the more formal calculation of efficiency. This is not to suggest that efficiency goals are value free, but rather that economic efficiency does not concern itself with judgments concerning who bears the costs of programs and who benefits.^{4/}

In the context of the allocation of environmental program responsibilities, a scheme may be judged inequitable or unfair if, for example:

- o The costs of a control program are not borne by those responsible for the pollution;
- o The costs of a control program are imposed on a particular group disproportionately to its ability to meet the burden; or
- o The benefits of the program are unevenly distributed.

Equity is not concerned simply with the distribution of costs and benefits at one point in time, but also with their distribution over time. Thus, an allocation that does not adequately reflect the interests of future generations for a cleaner environment may be held inequitable.

When economic efficiency and equity are used as guides in deciding how to

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3. Economic theory suggests that an efficient control program reduces pollution to the point at which the cost of further reductions equals the benefit of the reduction.
 4. The measure of efficiency, for example, assumes a given distribution of wealth and income in the population. Redistributing income would revise the efficiency properties of alternative environmental programs by changing the costs and benefits associated with each level of pollution control.

allocate governmental responsibilities for environmental protection, they can lead to very different solutions depending on which weighs more heavily. A solution that makes sense in terms of balancing costs and benefits may violate a particular notion of fairness. While economic analysis does not offer much assistance in weighing efficiency and equity concerns, it provides a framework for identifying decisions in which tension is most likely to occur (see Box 2).

RESOURCE ALLOCATION AND GOVERNMENTAL RESPONSIBILITY

From an economic efficiency perspective, the appropriate level of government to deal with an environmental problem is the level that is best able to assess costs and benefits accurately. Levels of government vary in their abilities to do this, depending on the activities involved. Smaller units of government tend to be closer to the environmental problem and the persons and firms affected. They may have better information on local circumstances, and thus be able to assess costs and benefits more accurately and provide programs that address specific local problems and circumstances. Smaller units of government may also have an advantage in terms of flexibility and the ability to provide more innovative solutions to environmental problems.

On the other hand, small governmental units can be at a disadvantage when there are substantial externalities, information requirements, or economies of scale. For example, if a large number of the persons and firms receiving benefits or incurring costs under a program are located outside the boundary of the jurisdiction, then it is less likely that local government will take into account the preferences of these groups and accurately assess the real costs and benefits. In addition, some program activities--such as setting health or technology-based standards--require substantial amounts of technical information. Small governmental units may not be willing or able to incur the costs of developing or acquiring this information. Also, economies of scale may exist, as in issuing permits or building wastewater treatment plants. If so, then larger governmental units may be better able to achieve these economies and provide lower-cost services. Allocating responsibility to a more centralized level of government may also be preferred if uniform treatment of individuals, polluters, or municipalities is desirable from an efficiency or equity viewpoint.

An equity perspective offers fewer analytical (or measurable) guidelines for selecting the appropriate level of government than does the efficiency perspective. From an equity standpoint, the key question is what level of government is best able to assess various social preferences for fairness. On the one hand, it might seem a reasonable presumption that lower levels of government are likely to be more responsive to the impacts of environmental programs on the distribution of costs and benefits within their own jurisdictions. As the impacts of programs expand, higher governmental entities may become more appropriate, because they include more of the affected population. On the other hand, it might be argued that lower levels of government are more susceptible to pressures from those seeking economic growth or development without regard to fairness. Also, it is not clear which levels of government are more likely to represent the desires of future generations, particularly in a

BOX 2**Evaluating Trade-offs: The Regulatory Flexibility Act**

Federal environmental statutes allocate broad responsibility for environmental protection activities across levels of government. Within this framework, federal agencies have leeway in the magnitude and nature of the requirements imposed on lower levels of government. The concepts of efficiency and equity can guide both statutory assignments of responsibility and the design of regulations; both statute and regulations should attempt to provide environmental protection programs that not only achieve benefits at the lowest cost to society but also embody notions of equity.

In large part, these principles are reflected in the contents of the Regulatory Flexibility Act of 1980 (RFA), which requires that regulatory agencies consider ways to reduce the regulatory burden on entities such as small businesses, small organizations, and small cities and towns. The RFA requires that, in promulgating regulations, an agency must demonstrate that it has considered alternatives that reduce the impact on small governments and businesses by employing features such as exemptions, different or simpler compliance and reporting requirements, and performance rather than design standards.

The discussion in the act in support of the requirement to reduce the burden on small entities is consistent with the principles outlined in Chapter III of this paper. The basic economic criterion for allocating responsibility is that costs imposed by regulation should reflect benefits to society. Uniform requirements do not necessarily mean that burdens imposed are uniform. In particular, since small entities may have fewer and less versatile resources than large entities and may not be able to take advantage of economies of scale, burdens may fall more heavily on smaller entities. To the extent that options are available to reduce the economic impact on small entities without a significant loss of regulatory benefits, agencies should exercise these options.

The rationale underlying the act is also supported by notions of equity. If burdens are imposed that fall unequally on businesses or jurisdictions, or that exceed ability to pay, equity considerations may suggest providing additional funding. Thus, efficiency considerations suggest matching the benefits and costs, while equity suggests matching the burden to the capacity to pay; together they suggest that regulatory requirements be matched to the scale of the regulated entity.

Although the act stresses the importance of efficiency and equity, it does not provide guidelines for agencies to use in choosing between them. Both efficiency and different notions of equity may argue for national standards that are implemented by state and local governments. Complying with national requirements may result in significant costs. How crucial is it in developing national policies to consider the burden these costs impose? On the one hand, the responsibility and burden of environmental improvement should be allocated to achieve appropriate levels of environmental protection. On the other hand, the burden may be substantial. While the act provides an impetus for regulatory agencies to adopt innovative procedures to prevent small entities from being unnecessarily affected by regulations, it does not suggest how these concerns should be weighed against the stated goals of the statute.

mobile society.^{5/}

Efficiency and equity taken together might suggest that the appropriate level of government is one that can acquire information cheaply on who the gainers and losers from environmental policy are, and how great their gains and losses are. It would be crucial, however, that the information be reflected in political decisions; that is, the government must be capable of acting to promote efficient and equitable policies and programs. This would depend on how political decisions are made in the jurisdiction, on the characteristics of the jurisdiction and its population, and on the environmental problem involved. Smaller governmental units may act more effectively if all benefits and costs are encompassed by the jurisdiction, if the population is relatively homogeneous in tastes, and if the environmental problem is pervasive enough to be of major concern to the community. Alternatively, small governmental units may be less able to resist group pressures to attract or keep industry by reducing environmental standards.

SOME ECONOMIC CRITERIA

The following paragraphs expand on several of the criteria that may help to guide environmental federalism decisions from the standpoint of efficiency. Specific equity issues are discussed more extensively farther on as they relate to nationally uniform standards and to the level of government that should be responsible for funding programs.

Flexibility in Environmental Protection

Because local preferences and local circumstances vary, a single standard of environmental quality may not be appropriate for all jurisdictions. The same is true for program administration. Smaller units of government may have an advantage over larger ones in designing environmental protection programs to deal with local problems.

Standards and programs promoted by larger units of government tend to be uniform, rather than tailored to conditions in local units. Although the federal government can set standards that vary among and within states, such a policy is likely to be technically (and perhaps politically) infeasible except for narrowly defined areas that require special treatment, such as pristine areas or nonattainment areas. The efficiency losses from uniform national standards depend on how costs and benefits differ among localities. An efficient level of protection will not be the same everywhere, to the extent that localities vary in the amounts and types of pollution, in the damages done by the pollution, in the number of inhabitants and their preferences for pollution abatement, and in

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5. Wallace E. Oates and Robert M. Schwab, "Economic Competition Among Jurisdictions: Efficiency Enhancing or Distortion Inducing?" *Journal of Public Economics*, forthcoming.

geographical and meteorological characteristics.^{6/}

For example, if a community has a strong preference for environmental improvement, the local government can enforce stringent environmental standards. In another community, where environmental cleanup may be relatively expensive because pollution is high, factories are old, or geographical and climatic conditions impose difficulties, the government may choose to enact a different standard of environmental quality, or a different type of standard, in order to retain jobs and prevent industry from leaving. To impose a compromise uniform standard on both jurisdictions might force the second jurisdiction to clean up too much, or spend more than necessary. The more widely benefits or abatement costs vary among jurisdictions, the more inefficient national standards will be.

A local jurisdiction may have easier access to information on environmental tastes, protection costs, and other local circumstances than higher levels of government. Even if a larger unit of government was willing to enact standards or design programs that varied across local government units, there would be no assurance that these standards and programs would adequately suit the needs of local areas. Local governments are closer to local problems and, therefore, can more easily develop cost-effective options for dealing with local circumstances. A good example of this problem is the current effort to bring various areas of the country into compliance with the national ambient air-quality standard for ozone. Because regions vary widely in terms of their ozone problem, its development, and their prospects for controlling it, no single set of control measures is likely to be best for every area. In addition, competition between governments may also make them more innovative in policy and responsive to local needs; to the extent that it does, decentralization may enable governments to achieve a given level of environmental protection at lower cost.

As a final point, smaller units of government, as compared with the national government, may have fewer administrative and legal constraints. Thus they may be able to implement regulations more quickly, or to take advantage more easily of innovative tools and policies. For example, more than 40 states have some sort of environmental fee or charge associated with their state environmental programs. The federal government, on the other hand, still relies mainly on general revenues to fund its programs.

While flexibility and variation in standards, tools, and programs may be desirable from an efficiency perspective, equity concerns may argue against decentralization. In particular, uniform national standards do provide a minimum standard of health for everyone--not only people living in an area, but those passing through it as well. Equity concerns may dictate that, even in those situations in which efficiency would suggest variations in environmental quality, individuals have a right not to be exposed to more than a minimum level of risk.

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6. D. Ewringmann and K.H. Hansmeyer, "The Institutional Setting of Regional Environmental Policy," and Rene L. Frey, "Interregional Welfare Comparisons and Environmental Policy", both in Horst Siebert and others, eds., *Regional Environmental Policy: the Economic Issues* (New York: New York University Press, 1979).

This particular issue is discussed more fully later in this chapter.

Spillover Benefits and Costs

While some environmental issues, such as sewage treatment, are fairly local in impact, many pollution abatement issues involve substantial externalities (spillovers) either of benefits or of costs. Pollution travels downstream, or is airborne, or otherwise affects individuals and firms located outside the immediate jurisdiction where the polluters are situated. Similarly, cost spillovers occur if the polluter provides jobs, services, or goods for persons and firms located outside the jurisdiction.

Decentralized responsibility for environmental protection is more likely to be efficient if it is possible to encompass external costs and benefits using existing political boundaries. If a governmental unit does not represent all those experiencing benefits or incurring costs, it is not likely to have complete information on costs and benefits or to have an incentive to take all costs and benefits into account in evaluating alternative environmental protection programs. Externalities that are left outstanding are difficult to capture by interjurisdictional bargaining or compacts.

One example is a situation in which pollutants are discharged into a waterway and adversely affect downstream users. In choosing to regulate, the governmental unit with jurisdiction over the polluters would take into account primarily the damages done to members of the community. Health and other costs of environmental degradation would be underestimated and environmental standards would be too low. Another example is a community that receives all the benefits of the pollution policy but does not include all the employees of the polluting firm. In its concern for the environment, the community may not take into account the true costs of pollution abatement and may regulate the polluter at the expense of the employees.

In principle, all externalities could be captured if each environmental situation was handled by a jurisdiction in which everyone who received the benefits of an improvement also incurred the costs of achieving it. Such a situation has been termed a "perfect correspondence."^{7/} How large a jurisdiction would need to be to achieve a perfect correspondence depends on the situation. In some instances, the appropriate unit of government may be very small. An example is a factory that provides jobs for a local community and emits air pollutants that remain in a confined area around the factory. Reducing emissions will affect people living and traveling in the area around the factory, so that benefits will accrue primarily to the community. The costs of reducing emissions consist of governmental administrative costs together with increased costs to the factory, which will be reflected largely in reduced wages or employment and in higher prices. Costs and benefits for people outside the

7. For discussions of the efficiency properties of a perfect correspondence, see Wallace E. Oates, *Fiscal Federalism* (New York: Harcourt Brace Jovanovich, Inc., 1972) and Richard W. Tresch, *Public Finance: a Normative Theory* (Plano, Texas: Business Publications, Inc., 1981).

community will be small. In this situation, the local community can choose a level of pollution that balances the costs and benefits of improvement, since almost all costs and benefits accrue to people in the community.

Few pollution problems are confined to local political boundaries. Although some hazardous waste management may be an exception, most air and water pollution concerns go beyond one city's or municipality's lines. For these cases, a state, national, or international jurisdiction may be necessary to internalize all the costs and benefits of an environmental pollution problem. Acid rain is a case that transcends not only local and state, but regional and national boundaries as well. Much of the costs of a program to reduce sulfur dioxide emissions that contribute to acid rain problems would be borne by the high-sulfur coal-producing states in the Midwest.^{8/} In this case, allowing state governments, or even regional compacts of states, to regulate environmental quality would provide too little environmental protection. On the other hand, standards set at the national level to control acid rain could be regarded as inequitable, because of the diverse distributions of benefits and costs under the program. If so, for reasons of equity and in order to make controls politically more feasible, environmental regulation could be combined with a program that compensates Midwestern states for the costs of pollution control.

Information Provision

Externalities also arise in the provision of information. The research and development necessary to set standards and design systems have benefits that extend beyond the environmental situation being analyzed or the system being designed. Information on risk assessment or on containment of hazardous spills, for example, potentially benefits all jurisdictions involved in developing emergency response programs. Local jurisdictions do not have an incentive to do all the research necessary to design such systems, since they do not reap all the benefits. Thus, some centralization of information collection may be necessary to ensure that appropriate systems are designed and implemented.

An efficient solution is more likely on a local level if information requirements are not great. The more uncertainties exist in estimating the magnitude of health or output effects, or the impact on the ecology, or the persistence of environmental effects into the future, the less likely are local or state jurisdictions to have the technical expertise necessary to make informed decisions. The role of the national government may change over time, however, as more expertise becomes available to state and local governments and they develop the technical capacity to implement and manage environmental programs.

Economies of Scale

The provision of environmental protection often involves economies (or diseconomies) of scale. If there are economies of scale, a higher level of government can achieve cost savings by combining administrative or other

8. Congressional Budget Office, *Curbing Acid Rain: Cost, Budget, and Coal-Market Effects* (June 1986).

functions across local jurisdictions. If centralization extends to the setting of standards as well as to administrative functions, a more uniform level of environmental quality can be achieved among jurisdictions. Alternatively, there may be diseconomies of scale. For example, the costs of decision making increase with the size of an organization, although there will be fewer organizations making decisions.

Economies of scale may also arise in connection with the costs to industry and government of complying with regulations. Decentralization leads to many diverse plans. Requiring a firm that operates in several jurisdictions to become acquainted with several sets of regulations, forms, and standards leads to higher costs of compliance. National programs create stability, and may reduce the costs of compliance by providing more uniformity and certainty in pollution control and by permitting industry to centralize compliance activities. Technical economies of scale also arise in abatement practices, such as waste treatment, recycling, and hazardous waste disposal. To the extent that larger jurisdictions permit more centralized treatment and control, a more cost-effective solution may result.

Government Decision Making and Environmental Protection

The discussion thus far has concentrated on the level of government that is best suited to developing an environmental program that balances costs and benefits, based on the magnitude of externalities, economies of scale, and other circumstances. Levels of government also differ in the extent to which they actually incorporate costs and benefits into policy development.

Small and large jurisdictions face different problems in defining solutions to environmental problems. Small jurisdictions are unlikely to implement appropriate programs when the political process does not include those affected by externalities. Very large jurisdictions may not decide on correct environmental programs if only a small subset of a population is affected by a problem. Very large jurisdictions may also be less likely to face pressures to compete with other jurisdictions in attracting industry.

Some problems are common to small and large governments. For both, political decisions are influenced by voter preferences and by the preferences of decisionmakers, which are not always identical. In addition, the political process in large and small jurisdictions tends to favor the preferences of the representative voter, which do not necessarily coincide with the level of protection that would balance benefits and costs.

Dealing with Externalities and Internalities. If the level of government with jurisdiction over an environmental problem is too small to capture substantially all of the externalities, then the level of environmental protection will likely be inefficient. Alternatively, if the government jurisdiction includes more than those experiencing benefits and costs--sometimes called an "internality"--the

environmental policy chosen is not likely to be correct.^{9/} For example, if the number of voters benefiting from the program exceeds the number indifferent to the program, but all or most of the voters pay the costs, a majority vote is likely to favor a program in which the costs exceed the benefits--unless complex forms of bargaining occur. Likewise, when voters are grouped into political jurisdictions whose boundaries do not match those of the environmental issues, bargaining is essential to an efficient solution.^{10/} If the problem is relegated to a higher level of government that captures the externality, then solutions may fail because the problems are too small relative to the scope of the higher government to get the attention they deserve.

Competition for Industry. It has been argued that state or local government officials, in a quest to attract or retain industry and jobs, will permit excessive environmental degradation; hence, the appropriate level of government may be national.^{11/} Competition may bias the outcome in two ways. First, in a community where workers and industry are not completely mobile, industry may be able to wield excessive power. Workers cannot cheaply or easily relocate to find other jobs and the community cannot quickly attract alternative industry and jobs. Officials may prefer to retain industry by forgoing a standard of environmental protection that would be optimal in the long run but lead, in the short run, to lost jobs, or a threat of lost jobs.

Second, a jurisdiction may overestimate the costs of pollution abatement if costs are viewed as including not only lost jobs and salaries, but also tax revenues forgone.^{12/} Here again, overestimating costs will lead to too little environmental protection. Interjurisdictional competition for industry is more likely if the concentration of industry and income varies widely among jurisdictions.

Conflict of Preferences. The political process is such that there may be a discrepancy between the level of pollution acceptable to voters and the level chosen by the government of a jurisdiction. Decisions made by government officials may reflect not only a desire to be reelected, but other goals such as

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9. Mancur Olson, "Strategic Theory and its Applications," *American Economic Review*, vol. 59 (1969), pp. 479-487.
 10. Dennis C. Mueller, "Public Choice and Environmental Protection," Working Paper, Department of Economics, University of Maryland (1988).
 11. See, for example, John H. Cumberland, "Efficiency and Equity in Interregional Environmental Management," *The Review of Regional Studies*, vol. 10 (1980), pp. 1-9, David C. Nice, *Federalism: the Politics of Intergovernmental Relations* (New York: St. Martin's Press, Inc., 1987), and Robert E. Manley, "Federalism and Management of the Environment," *The Urban Lawyer*, vol. 19 (1987), pp. 661-681.
 12. Oates and Schwab, "Economic Competition."

the enhancement of salaries, status, and other perquisites of public office.^{13/} If so, the level of protection may not reflect the preferences of the representative voter, even when the latter coincide with the efficient solution.^{14/} Similarly, government is increasingly dominated by professionals, which may have resulted in a shift of influence from the private sector to government officials themselves. This suggests that the preferences of officials may in some instances dominate those of voters and special interest groups.^{15/}

Demographic Factors. Finally, the more homogeneous the population of the jurisdiction is in its desire for environmental improvement, the more likely it is that government decision making will appropriately balance costs and benefits in reaching a decision. The political process (in particular, majority rule) tends to reflect the preferences of the representative voter. If the population is relatively uniform in income and in other demographic variables affecting tastes for a cleaner environment, and if the population is exposed uniformly to the environmental problem, then the preferences of the representative voter may reasonably be expected to reflect the benefits of environmental improvement. Conversely, if the population is heterogeneous, then majority rule decisionmaking may not appropriately reflect benefits and costs. The one-man one-vote process fails to distinguish between those who value pollution abatement highly, those who are indifferent to it, those who bear the greatest burden of abatement costs, and those who pay slightly or not at all. Thus, majority rule cannot reflect accurately the magnitude as well as the direction of voters' preferences. In that case, majority rule may not lead to the appropriate level of pollution.^{16/}

The foregoing arguments suggest that, even if governmental responsibility is allocated in such a way as to take into account the presence of externalities and economies of scale, constraints in the political process may not result in environmental protection programs that appropriately balance all costs and benefits. Thus, the potential gains in flexibility and responsiveness implied by decentralization may not be realized. When the population is fairly homogeneous, or when the opportunities for interjurisdictional competition are minimal, an efficient outcome is more likely. But the political process may impose obstacles even if responsibility is delegated to more centralized government units, although a centralized government may have more technical expertise or bring a broader perspective to bear.

13. H. Van Den Doel, *Democracy and Welfare Economics* (Boston: Cambridge University Press, 1979) and William A. Niskanen, *Bureaucracy and Representative Government* (Chicago: Aldine, 1977).

14. Oates and Schwab, "Economic Competition."

15. Samuel H. Beer, "A Political Scientist's View of Fiscal Federalism," in Wallace E. Oates, ed., *The Political Economy of Fiscal Federalism* (Lexington, MA: Lexington Books, 1977).

16. Oates and Schwab, "Economic Competition."

RESPONSIBILITIES FOR SPECIFIC PROGRAM ACTIVITIES

Environmental programs comprise, as discussed earlier, a number of distinct activities that range from setting standards to enforcement. In addition, each program function requires multiple actions--for example, standard setting in water quality control may require setting concentration levels for bodies of water and also setting effluent limitations for individual polluters. It is not surprising, therefore, that the appropriate level of government to undertake each different action may vary, depending on the function involved and the nature of the environmental problem at hand. The purpose of this section is to relate some of the key considerations outlined above to determining which level of government is best for a specific activity. Part three of this study will examine these issues in more detail.

Setting Goals and Standards

One of the major controversies in environmental protection concerns whether to set national uniform standards or to permit local variation in standards.^{17/} Essentially, this is a question of how decentralized the standard setting should be, and involves both efficiency and equity considerations.^{18/} On the one hand, there are efficiency arguments in favor of decentralizing the setting of standards: since the benefits and costs of reducing pollution vary among jurisdictions, local governments may be in a better position to recognize and act on such differences in setting standards. On the other hand, information about the health effects associated with specific exposure levels, about the technological feasibility of various emission standards, or on the relationship between ambient and emissions standards, is both expensive to obtain and subject to externalities; this argues for national standard setting. Notions of equity and altruism in environmental protection also argue for national standards, since individuals may have a right not to be exposed to more than a minimum level of risk.

The argument in favor of decentralization relies on the principle that the efficient level of protection is the level that balances costs and benefits (at the margin) for a given jurisdiction. Assuming that administrative economies of scale are not large, the argument in favor of decentralized standard setting will be

17. For discussions of national versus local standard setting, see Wallace E. Oates, "The Environment and the Economy: Environmental Policy at the Crossroads," in John M. Quigley and Daniel L. Rubinfeld, eds., *American Domestic Priorities* (Berkeley: University of California Press, 1985); John H. Cumberland, "Interregional Pollution Spillovers and Consistency of Environmental Policy," in Siebert, *Regional Environmental Policy*; and Robert M. Schwab, "Environmental Federalism," *Resources*, Summer 1988, no. 92, pp 6-9.

18. This section of the paper assumes that national standards will tend to be uniform across jurisdictions.

stronger from an efficiency standpoint if three criteria are met: first, costs and benefits (and, thus, the efficient level of protection) must be shown to vary substantively among jurisdictions; second, political jurisdictions must capture essentially all externalities; and, third, decisions made by local jurisdictions must reflect these variations in costs and benefits.

Both the costs and the benefits associated with attaining a given level of environmental quality may vary significantly among jurisdictions for some pollutants, depending on the amounts and type of pollutants, the damages done by the pollutants, the concentration and age of industry, and geographic and climatic characteristics. For example, one study estimates that the level of total suspended particulates, a criteria air pollutant under the CAA, that balances costs and benefits in Baltimore is half that of the comparable level in St. Louis.^{19/} Allowing variation in local standards permits state and local governments to reflect these variations in local levels of environmental quality.

The efficiency and equity advantages of decentralized standards also depend on the extent to which the pollution problem follows political boundaries. If standard setting is decentralized to a level at which political jurisdictions with decisionmaking authority do not encompass most of the people receiving the benefits and costs of pollution control, then the wrong level of environmental quality may result. Some pollution problems are fairly local in impact, such as the containment of a hazardous waste site with confined contamination problems; however, many problems are multistate or regional in scope. In the latter category are the CAA's criteria air pollutants, along with water quality control problems for the Chesapeake Bay area and interstate water systems. The impacts of some pollution problems, such as acid rain and global warming, cross international boundaries.

Finally, the case in support of decentralized standards depends on the extent to which local or state jurisdictions will have good information about the costs and benefits associated with pollution control, and will set standards that reflect these costs and benefits. For several reasons, decentralized standards may result in too little or too much pollution control. First, state or local governments may engage in harmful interjurisdictional competition--reducing environmental standards in order to attract industry and jobs or in anticipation of reductions in standards in competing jurisdictions. Second, national government may be more sensitive to the benefits and costs received and borne by future generations or by lower-income individuals. Third, access to information is not costless; national governments may have more complete information, as well as the technical expertise needed to assess and understand the trade-offs involved. Unfortunately, while these arguments have intuitive appeal, there is not enough evidence to assess their validity and their implications for national versus local standard setting.

When the regulated industries engage in large amounts of interstate commerce, national standards and regulations may be preferred to decentralized control for both efficiency and equity reasons. Uniform programs reduce duplicative efforts and ease compliance for industry, and thus permit social goals

19. Schwab, "Environmental Federalism."

to be achieved at lower cost. To the extent that it is more equitable for firms in similar situations (for example, having similar abatement costs) to face similar requirements, national standards provide this uniformity of treatment. For example, the Toxic Substances Control Act and the Federal Insecticide, Fungicide and Rodenticide Act regulate chemical production, distribution, and use for categories of chemicals and manufacturers; both these acts, which have implications for large industries operating across state boundaries, are administered at the federal level.

As discussed above, the case for regional or national standards is strengthened when pollution problems extend beyond state or local political boundaries. When substantial pollution externalities do not exist, however, an argument may be made for national standards based on the notion that every person has a right to a minimum standard of protection.^{20/} Uniform ambient standards limit potential exposure to health risks both for those living in an area and those passing through. A case for national standards can also be made based on interpersonal externalities, or altruism: a reduction in the pollution to which a person is exposed creates not only benefits for that person, but benefits on a national level, because other members of society value the benefits received by that person.

Designing and Implementing Programs

In general, decentralization tends to promote efficiency in program design and development, to the extent that smaller units of government may be able to respond more rapidly and flexibly both to local circumstances and to changing problems and changing public preferences. They may also be more able to develop experimental and innovative policies and tools that result in lower-cost management of environmental problems.

For example, indoor air pollution is a problem nationwide, but is not a national problem in the sense of crossing local or state boundaries. Under constitutional and common law, state and local governments generally have purview over the types of statutes useful in combating this problem--for example, new building codes and land use restrictions. Thus, they may be better able than the national government to find practical and flexible solutions to particular local problems and pollutants.

20. It should be noted that environmental protection in general, and uniform standards in particular, may promote the interests of the rich rather than the poor. To the extent that they do, they may not conform to notions of equity. For example, many of the benefits of water pollution control arise in the form of recreational rather than health benefits; recreational areas tend to be used more by the rich than the poor. Similarly, environmental protection leads to some plant closures or other transition costs; lower-income groups have less occupational and geographical mobility and thus may bear more of the burden. For a discussion of the distribution of benefits and costs in environmental protection, see Baumol and Oates, *The Theory of Environmental Policy*.

On the other hand, designing and managing environmental programs requires not only information on polluters and local pollution problems that is specific to the jurisdiction, but also general expertise on methods of managing environmental programs. Such knowledge includes general familiarity with available tools and their efficacy, as well as understanding of the technical relationships, such as the effectiveness of technological controls and the relationship between emissions and ambient concentrations, or between ambient levels and health effects and other damages. The greater the uncertainties as to the magnitude of health or output effects of pollutants, or their impact on the ecology, or the persistence of their effects into the future, the more difficult it will be for all jurisdictions to make informed decisions and design effective environmental management plans without federal assistance.

Enforcement

Enforcement actions are designed to insure that overall program goals and standards are met. Enforcement occurs in two stages.^{21/} The first stage is monitoring and inspection, which may include determining whether the appropriate technology has been installed and is functioning, whether the quantity or concentration of emissions or discharges is within specified limits, and whether ambient concentrations are acceptable. If monitoring indicates that a violation may have occurred, then the second stage of enforcement can include requiring additional tests, meeting with the responsible parties, issuing notices of violations, and, finally, pursuing administrative, civil, or criminal penalties and proceedings.

The appropriate level of government to undertake these activities is that best able to develop and pursue effective policies. In turn, this depends on the tools that can be employed, the available knowledge concerning polluters and their potential responses to enforcement activities, the resources devoted to monitoring and subsequent proceedings, and the incentives for each level of government to carry out vigorous enforcement.

Under most statutes, enforcement authority has been delegated to the states along with program administration responsibilities. At the same time, the federal government remains responsible for overseeing state enforcement actions and retains authority to pursue direct enforcement activity against polluters. This allocation is not inconsistent with the efficiency and equity framework developed above. In general, the level of government with primary responsibility for daily program implementation is likely to have the best information on who the polluters are, what their responsibilities are under the program, and what sanctions they will be most responsive to. This level of government is thus ideally placed to undertake many enforcement activities. To the extent that smaller units of government have fewer legal constraints and levels of bureaucracy, they may be able to act more quickly or respond more flexibly to enforcement situations.

21. Enforcement activities are described in Clifford S. Russell, and others, *Enforcing Pollution Control Laws* (Washington, D.C.: Resources for the Future, 1986) and Environmental Law Institute, *Law of Environmental Protection*.

Depending on the environmental problem, not all program responsibilities need be allocated to the same level of government. For example, responsibility for setting standards may be allocated to the national government, but most implementation responsibility may be given to the states, although that enforcement actions may be necessary at all levels of government. There may be several reasons for higher levels of government--in particular, national government--to become involved in enforcement. First, to the extent that national goals are more stringent than state goals, states may have an incentive to enforce less vigorously. Federal enforcement can be directed both at polluters in states and at the states themselves, as has occurred in the case of deficient State Implementation Plans under the Clean Air program. Second, states may be subject to pressures to attract and retain industry, and thus may treat violations more leniently than strict enforcement of standards would suggest. Finally, the national government may have more resources, more technical expertise, and more statutory clout in dealing with polluters.

Research and Development

Virtually every current federal environmental program assigns primary R&D responsibility to the federal government. Explicitly or otherwise, this recognizes that many environmental programs at different levels of government rely on similar types of information and that this information can often be provided more cost-effectively at a centralized level. Individual risk assessments on chemicals for use in setting drinking water standards, industrial-level technological control options under the Clean Water Act, and new technologies for hazardous waste disposal are all examples of federal R&D efforts the results of which may be used by federal, state, and local governments.

Some states, particularly those with high pollution levels and a high population concentration, have taken the initiative to construct data sets or technical information in support of new program development. For example, New Jersey and California have been at the forefront of state activity, and their programs have provided the models for subsequent federal legislation--such as the Community Right-to-Know provisions of the Superfund Amendments and Reauthorization Act, in the case of New Jersey. Thus, states do conduct R&D on their own, but the extent of these efforts is not clear. Most of the state-level efforts are probably related to the design, implementation, and monitoring of their own programs, rather than to basic science or technology that may have broader applications. For example, states have sometimes complained that they could do more to control their own sources of chemicals that lead to the formation of ozone (mostly volatile organic chemicals) if the federal government would complete more technical assessments of control options (called Control Technology Guidance documents) for specific sources. These documents do not apply to states or regions specifically but to classes of technologies.

As states take the lead in certain environmental problems, they may be forced to undertake more basic R&D programs to support their initiatives. For example, over one-third of all states have regulatory programs to control emissions of toxic chemicals into the air. Underlying these programs are at least four different principles for setting standards, each requiring different

types of scientific and technical information. While some of the required information may be provided by the federal government, it is likely that states, or compacts of states, will have to look to their own research to meet their individual needs.

Funding

In practice, the level of government responsible for decision making or program management is often responsible for funding that activity. This correspondence of program and funding responsibility is both intuitively appealing on equity grounds and consistent with the efficiency and equity guidelines described earlier. The level of government with program responsibility may be in the best position to determine funding needs and choose among alternative funding schemes. Aligning funding with program responsibility has the additional advantage of introducing accountability; responsibility for providing or collected funds generates an incentive for conservation and careful management of resources.

On the other hand, funding is unique among program activities because the allocation of responsibility for funding directly influences the distribution of the costs of a program.^{22/} Thus, there may be circumstances in which allocating funding responsibility on the basis of program responsibility may not always be equitable because the burden imposed on a particular group appears large in comparison to the ability of the group to meet the burden, or in comparison with the burden imposed on other groups in similar circumstances.

There are three situations in which additional outside funding, usually federal, may be justified: if costs of improvement or revenue-raising capacities vary among or within states; if uniform national requirements impose burdens on lower levels of government; or if burdens are distributed unevenly over time.

Adjusting for Local Differences. Abilities to raise revenues (fiscal capacities), and the costs of environmental improvement, vary among jurisdictions. Local circumstances, such as types and amounts of pollutants, meteorological conditions, and the age of the capital stock, differ among jurisdictions, so that the cost to industry and the local government of achieving a given level of quality (or a given reduction in pollution), or of providing a service such as wastewater treatment, varies. Similarly, differences in local economies, for example in the size of the tax base, mean that costs to consumers of obtaining a given service may vary among jurisdictions.

22. Funding mechanisms, such as fees and charges, may also be used as regulatory devices. If the funding mechanism chosen depends on the level of government, its effect on efficiency and equity may depend on whether costs are met, for example, through general tax revenues or by charges on polluters, or through a combination of mechanisms. This paper is concerned only with the question of who should bear the administrative costs of running the program--not the question of which regulatory device should be used.

These differences form the basis for the argument made earlier that local governments are best able to adjust standards and programs to reflect local circumstances and to pursue efficient and equitable solutions for local problems. But there is another side to the picture: cost differences among localities may be viewed as inequitable, because people located in different jurisdictions will be required to pay different prices for a given level of environmental quality or a given improvement in the level of environmental quality. The inequities may extend to industry if similar industries located in different jurisdictions face different costs, either because they must meet different standards or because they must achieve different reductions in emissions to meet the same standard. If local cost differences represent inequities, then an argument can be made for using federal funds to equalize the "environmental purchasing power" of governments and industry through grants and subsidies.

While efficiency concerns may dictate that governmental units weigh local costs and benefits in choosing local levels of protection, equity considerations may suggest that access to some minimum level of protection should be available to all jurisdictions, regardless of ability to pay. This consideration is reflected in the principle of "equal treatment of equals", which underlies many conditional and matching grant programs such as vocational education grants.^{23/} Formulas for allocating grant money among jurisdictions reflect both the potential ability of a governmental unit to raise revenues internally and the cost of providing specified programs or services. Measurement of fiscal capacity has concentrated on designing indicators of relative ability among jurisdictions. Per capita income frequently is a key component of these indicators, which also may include adjustments for indirect business taxes, profits of state-local enterprises, and other indicators of resources that affect the ability of a governmental unit to raise revenue.^{24/}

Lightening Heavy Burdens. Environmental protection may represent not only a relative but also an absolute burden on municipalities and industry, particularly if national standards or other national policies require lower levels of government to perform activities such as issuing permits or inspecting facilities. The amount of supplemental federal funding appropriate for these programs depends on several considerations.

The first consideration is the magnitude of the burden imposed on localities. The previous chapter of this paper presented evidence that state environmental budgets have been growing, which suggests that states in the aggregate have been able to replace declining federal aid with state or local funds. Whether or not states and municipalities can afford to pay for environmental programs is an empirical issue beyond the scope of this discussion; but the amount local

23. Oates, *Fiscal Federalism*, p. 87.

24. For discussions of measures of fiscal capacity, see Department of the Treasury, Office of State and Local Finance, *Federal-State-Local Fiscal Relations: Report to the President and the Congress* (September 1985), and Advisory Commission on Intergovernmental Relations, *Measuring State Fiscal Capacity: Alternative Methods and Their Uses* (Washington, D.C., September 1986).

governments can raise to finance such projects may be limited by their taxing ability. As state and local governments develop the authority to charge fees and make use of other innovative means of raising revenue, replacement of federal grants may become more feasible.

Whether or not federal grants are warranted depends also on the justification for national control of state and local environmental activities. Many activities required of state or local governments by higher levels of government can be justified on the basis of externalities--that is, when the benefits of environmental improvement extend beyond a given jurisdiction, as is the case in most water or air pollution issues. Funding provides a mechanism for the federal government to persuade, control, or bargain with state and local governments when national policies differ from those that a state or locality would choose.

Compensating the Losers. Federal funding may also be justified when the burden of complying with federal regulations is unevenly distributed over time or regions. Many pollution problems are the result of long-entrenched geographic concentrations of industry. In the case of acid rain, a substantial portion of the benefits of sulfur dioxide controls are received by the Northeast region, while much of the costs are borne by coal-producing states, in terms of lost jobs and higher energy costs. Requiring industry and state and local governments in the Midwest to bear the burden of emission controls or energy taxes may be equitable in the long run under the damages principle, but may be unfair in the short run because of high transition costs. One way of avoiding serious dislocation costs would be to have the federal government, or the states receiving benefits, compensate the losers in the Midwest. Otherwise, states in the Northeast will receive windfall benefits at the same time that Midwest states are penalized for location and polluting decisions that were made long before the pollution control laws came into existence. A similar effort has already been made to ease the cost of transition under the wastewater treatment program by providing federal construction grants.