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# GLOBALIZATION AND WATER RESOURCES MANAGEMENT: THE CHANGING VALUE OF WATER

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## LEARNING FROM FIFTY YEARS OF UNITED STATES WATER POLLUTION LEGISLATION

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**ABSTRACT:** Since 1948, the federal government has assumed an increasingly dominant role in efforts to control pollution of surface waters in the United States. Over that half century, the federal role has evolved from research support and financial grants to states to federal effluent standards and a national permit requirement and, more recently, to enforcement of a mandate to achieve water quality standards. This paper describes the evolution of federal water pollution control legislation in the United States. It focuses particularly on the 1972 statute prescribing feasibility-based controls for point sources and its 1977 modification, the increasing concern with toxic pollution in the 1980s, and recent litigation requiring total maximum daily loads for waters that fail to meet water quality standards. The paper uses this description to evaluate the accomplishments and failures of each step in the legislative evolution and to generate practical lessons for successful water pollution control legislation.

**KEY TERMS:** water pollution, regulation, legislation, litigation

### INTRODUCTION

In the United States, federal water pollution control legislation has evolved significantly over the last 50 years. Reviewing the statutory developments provides valuable lessons for understanding and improving the regulatory process.

### FEDERAL WATER POLLUTION CONTROL LEGISLATION IN THE UNITED STATES

#### Federal Water Regulations Prior to 1972

The United States Supreme Court has long recognized broad federal authority over waters used for interstate commerce. In the nineteenth century, Congress normally exercised its authority by regulating the navigable waters of the United States, *i.e.*, those waters capable of being used for interstate commerce in their natural states or with reasonable improvement. Although Congress delayed significant federal pollution control legislation until the middle of the twentieth century, one nineteenth century statute B the Rivers and Harbors Appropriation Act of 1899, 30 Stat. 1151 B was important in shaping modern legislation. Section 13 of the Act, commonly known as the Refuse Act, prohibited discharging any Arefuse matter@ other than liquid sewerage into the navigable waters of the United States or placing any material on the bank of a navigable water when the material was liable to be washed into the water and to obstruct navigation. A proviso allowed the Army Corps of Engineers to permit Athe deposit of any material above mentioned@ in the navigable waters.

Federal water pollution control legislation began after World War II. The Federal Water Pollution Control Act of 1948 authorized federal support for research on water pollution problems and financial assistance to state water pollution control programs; in words that remain part of federal law, the 1948 Act declared that water pollution control was primarily the responsibility of state and local governments. In 1956, Congress expanded the 1948 statute to authorize direct funding for municipal sewerage treatment plants and to allow the federal government to act against interstate pollution through an awkward abatement conference procedure.

When Congress amended the Federal Water Pollution Control Act in 1965, it directed states to establish water quality standards for all navigable waters and to prepare implementation plans imposing pollution controls that would achieve the water quality standards. Although the amendments required the states to submit their standards to the Federal Water Pollution Control

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Administration for approval, the new federal statute did not mandate enforceable regulations on individual sources on pollution. Moreover, the administrator lacked the power to enforce a federal implementation plan when a state failed to act.

Two United States Supreme Court decisions interpreting the Refuse Act were instrumental in creating the political compromise that resulted in new federal legislation. In 1960, the Court ruled that the ban on placing refuse in the navigable waters applied regardless of whether the refuse obstructed navigation. *United States v. Republic Steel Corp.*, 362 U.S. 482 (1960). Six years later, *United States v. Standard Oil Co.*, 384 U.S. 224 (1966), held that the term "refuse" included commercially valuable oil that was spilled into a navigable water. Because the Corps of Engineers lacked a program for permitting discharges that did not impede navigation, the effect of these decisions was to render unlawful virtually all industrial discharges into the navigable waters of the United States and their tributaries. (Rodgers, 1994, pp. 253-54.)

### Federal Water Pollution Control Act Amendments of 1972

The Refuse Act decisions made possible the compromise that led to the Federal Water Pollution Control Act Amendments of 1972. Industrial dischargers wanted a permit system to avoid possible criminal liability under the absolute prohibition of the Refuse Act. Environmental groups also favored a new statute; they wanted controls to reach beyond the navigable waters of the United States, the Environmental Protection Agency (EPA) - rather than the Corps of Engineers - to regulate the discharge of pollutants, and the elimination of the municipal sewerage exclusion in the Refuse Act. Congress gained the support of local governments for the new legislation by promising to increase funding for publicly owned treatment facilities (POTWs). Finally, farming interests agreed to support the new statute when Congress drastically limited its impact on farming operations.

The 1972 Amendments reflected these political compromises. They continued the declaration that water pollution control was primarily the responsibility of state and local governments. The absolute ban of the Refuse Act also remained in Section 101 of the 1972 legislation as a "no discharge goal" and in Section 306 as a direction for EPA to impose no-discharge standards for new sources "where practicable." However, the actual prohibition of Section 301(a) allowed discharges from point sources if the discharger complied with the requirements of the Act. In addition to establishing substantive standards, the new statute created a new discharge permit system administered by EPA. The regulatory system applied to all discharges from point sources into navigable waters, but Section 502 defined that term to include all waters of the United States. The regulatory requirements of the 1972 Amendments applied to discharges from POTWs, but Congress authorized a new construction grant program in which the federal share of the cost of building new treatment facilities was 75 percent. The point source limitation to the new regulatory regime exempted runoff from farming operations; in addition, Section 502 specifically excluded drainage ditches and return flows from irrigated agriculture from the definition of point sources.

The amendments shifted the substantive approach of federal water pollution legislation. Nationally applicable, feasibility-based standards that were uniform among categories of point sources replaced the water quality standards of the 1965 legislation. Publicly owned treatment works were to provide secondary treatment (ST) for their wastes by 1977 and the best treatment control technology over the life of the works by 1983. Other point sources (principally industrial discharges) were to employ best practicable control technology (BPT) by 1977 and the best available control technology economically achievable (BAT) by 1983; new sources other than POTWs were to use the best available demonstrated control technology (BADT).

In the 1972 Amendments, the federal government assumed a dominant role in water pollution control without totally displacing state authority. A state that obtained EPA approval could assume responsibility for the administering the discharge permit program. In addition, states retained authority to impose standards that are stricter than the feasibility-based requirements of the federal statute; but states have rarely exercised this authority.

The 1972 Amendments contained three sections that focused on water quality, but achievement of standards based on water quality was a distinctly subordinate concern of the new legislation. Section 302 provided a mechanism for enforcing the "national goal" that all navigable waters support fish, wildlife, and recreational uses; however, its usefulness was drastically reduced because the EPA Administrator could modify the new controls whenever the cost of attaining the water quality standard was unreasonable. Section 307 provided for additional controls on toxic pollutants; it obligated the Administrator to identify toxic pollutants for which additional effluent limits were appropriate and to prepare standards for those pollutants. Section 303 obligated states to set and to implement water quality standards. Although the Section 303 provisions remained unused for more than two decades, they have recently formed the basis for a new attempt to improve water quality.

Section 303 continued and expanded the 1965 provisions for state water quality standards. It extended the obligation for state water quality standards to encompass intrastate waters and to require triennial revision of the standards, and it gave the EPA Administrator authority to establish standards when a state failed to comply with the statutory mandate. The statute also required states to identify waters that fail to meet water quality standards and to develop total maximum daily loads (TMDLs) for those waters for any pollutant that the Administrator determined was suitable for calculation of such a load. The states had to submit the identifications and loads to EPA for approval. If EPA disapproved, the agency had to prepare the identifications or loads itself; but the statute did not expressly provide what action EPA should take if a state made no submission.

For nonpoint sources of pollution, the 1972 Act substituted planning for regulation. As a prerequisite to obtaining construction grants for POTWs, Section 208 obligated states to initiate an area-wide planning process for controlling pollution for

both point sources and nonpoint sources. Although Congress authorized funding for the planning process, it did not require that the states impose regulatory limits nor did it offer to pay the cost of reducing pollution from nonpoint sources.

The 1972 Act continued the traditional authority of the Corps of Engineers to protect navigation. Section 402 allowed the corps to veto any permit that would impair navigation. More importantly, Section 404 substituted for the prohibition of the Rivers and Harbors Act a provision that allowed the corps to issue permits for the deposit of dredge and fill material into the navigable waters at specified disposal sites. In deciding whether to grant a permit, the corps was to consider water quality criteria that EPA established for ocean dumping plus the economic impact of the proposed disposal site on anchorage and navigation. Moreover, EPA retained the right to veto any particular disposal site that would have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas . . . , wildlife, or recreational areas.®

Congress also established new enforcement provisions in 1972. The federal statute now authorized the federal government to file civil actions to collect penalties from violators, and it now included criminal provisions for intentional violations. An even greater innovation allowed citizens to file civil actions against violators and against the EPA Administrator when the Administrator failed to perform a nondiscretionary duty.

The 1972 Amendments were overly ambitious in the tasks they assigned to EPA. Congress never gave the agency resources commensurate with the new responsibilities. Frequent legal challenges also delayed implementation. Moreover, the standard-setting process established that achieving the BAT standards, the second stage of feasibility-based controls for industrial sources, was going to be very costly and to produce more modest reductions in pollution than the BPT standards.

Progress was even slower with respect to standards based on water quality. EPA never used its Section 302 authority. The agency also found it impossible to comply with the obligation to issue toxic pollutant standards until a 1976 consent decree allowed it to issue feasibility-based standards rather than standards designed to protect the aquatic environment. The story was similar with respect to the Section 303 standards. By 1977, EPA had not even completed the prerequisite for state preparation of TMDLs, the identification of pollutants for which the calculation of TMDLs was appropriate.

Implementation of Section 404 was particularly controversial. Despite the new definition of navigable waters , the Corps of Engineers applied the traditional definition in deciding when permits were required and so declined to require permits for deposits of dredge and fill material into wetlands. The District Court for the District of Columbia overturned this interpretation, *NRDC, Inc. v. Calloway*, 392 F. Supp. 685 (D.D.C. 1975), and revised regulations extended the permit requirement to most wetlands. The Supreme Court upheld the new requirement insofar as it applied to wetlands adjacent to surface waters, *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985), but a recent decision held isolated wetlands® are not part of the navigable waters under the federal statute. *Solid Waste Agency v. Corps of Engineers*, 531 U.S. 159 (2001).

#### Revisions to the 1972 Legislation

Congress has amended the Federal Water Pollution Control Act three times since 1972. These amendments have made important, incremental modifications to the Act, and they have relaxed some of the feasibility-based standards of the 1972 statute. Despite these changes, the amendments have retained feasibility-based standards as the basic regulatory approach of the statute, and they have continued the declaration that states and local governments are primarily responsible for controlling water pollution. More recently, however, judicial decisions have revived water quality standards as a supplement to the feasibility-based standards that have characterized the United States water pollution control legislation for the last thirty years.

Congress adopted the most significant revisions in 1977. The 1977 Amendments continued but relaxed the feasibility-based standards of the 1972 legislation. They extended the deadline for POTWs to achieve the secondary-treatment standards, and they modified the standards and extended the deadline for other point sources. For conventional pollutants (those similar to the pollutants treated in POTWs, the 1977 Amendments prescribed an intermediate standard between BPT and BAT - the best conventional pollutant control technology (BCT). For toxic pollutants, the new BAT deadline was 1984; for pollutants that were not classified as either toxic or conventional, the new BAT deadline was 1987. The amendments accepted the feasibility-based approach to toxic pollutants, but EPA retained discretionary authority to impose stricter standards when necessary to protect the aquatic environment. To keep polluters from avoiding the BAT standard for toxic pollutants by sending their effluent to a POTW, the 1977 statute required pretreatment of such effluent to eliminate any pollutants that would not be adequately treated by the secondary treatment required in POTWs as well as those that would interfere with the operation of the POTW. With respect to Section 404, the changes were more modest. Congress embraced the regulation of wetlands, but authorized the issuance of general permits for deposits of dredge and fill materials that have only minimal environmental impacts. More significantly, Congress allowed states to assume responsibility for administration of the 404 permit program in those areas that did not fall within the traditional definition of navigable waters. Congress also attempted to revive the planning process for nonpoint sources by offering to share the cost with farmers who implemented best management practices (BMPs). Finally, Congress expanded the enforcement provisions of the Act. It allowed administrative imposition of civil penalties and provided harsher criminal penalties for willful violations that knowingly place another in danger of death or serious bodily injury.

The 1981 Amendments further diluted the feasibility-based standards of the 1972 and 1977 legislation. They eliminated entirely the second stage for POTWs, and they extended the BAT and BCT deadlines for other point sources. At the same time, they strengthened requirements that states revise their water quality standards every three years.

In 1987, Congress again revised the Act to address problems of storm water discharges, toxic pollutants, and pollution from nonpoint sources. The amendments required industrial polluters and large POTWs to treat storm water runoff. They also required states to establish numerical limits for water quality standards applicable to toxic pollutants, to identify waters that failed to achieve toxic water pollutant standards because of discharges from point sources, and to establish individual control strategies (ICSSs) for those sources to insure that the water quality standards are achieved. The 1987 Amendments made control of pollution from nonpoint sources a goal of the statute and added Section 319, which directs states to address problems from nonpoint sources. Although Section 319 requires states to identify waters impaired because of pollution from nonpoint sources and to prepare plans to achieve the water quality standards, it does not mandate state regulatory limits on nonpoint sources.

By the 1990s, many water quality problems remained despite implementation of the feasibility-based standards for point sources. Environmentalists urged EPA to require further reductions in pollution to achieve the water quality standards established under Section 303. When the agency was reluctant to use Section 303, environmental groups filed suits seeking to force EPA to act. Decisions of lower federal courts have held that EPA must identify waters that fail to meet water quality standards and prepare TMDLs for those waters when states fail to perform their responsibilities under Section 303.

In response to these decisions, EPA has taken steps to implement Section 303. The agency is now requiring states to prepare TMDLs within 12 to 15 years for all waters that fail to meet water quality standards. This return to water quality standards as the basis for establishing the additional controls represents a significant shift in regulatory approach. (Houck, 2001). However, the ultimate outcome of this shift remains in doubt for several reasons. First, the United States Supreme Court has not ruled on the obligations imposed by Section 303, and EPA is still appealing some of the lower court decisions. If EPA ultimately prevails in the litigation, it may retreat from the more aggressive approach represented by the new regulations. Second, EPA's authority to use Section 303 as a mechanism to impose enforceable controls on nonpoint sources of pollution remains unclear, and in many areas substantial reductions in pollution from nonpoint sources are essential if water quality standards are to be achieved. Third, the political balance of power with respect to TMDLs has not been clearly established.

## FEDERAL WATER POLLUTION CONTROL LEGISLATION: A BRIEF ASSESSMENT

Most assessments give the Clean Water Act mixed reviews. Feasibility-based controls on point sources have reduced the pollutants in the effluent those sources discharge, but the Act has not achieved its goals. Although one might dismiss the no-discharge goal as symbolic, the widespread inability to achieve the water-quality goal is a significant failure. In many respects, the problems that remain are the predictable consequences of any system that relies on feasibility-based standards imposed on only a portion of pollution sources. Because feasibility-based standards are unrelated to the quality of the receiving water, the failure to achieve water quality standards in heavily polluted waters was hardly surprising - especially since the statute imposes no enforceable controls on nonpoint sources of pollution and Congress has frequently delayed and relaxed the feasibility-based standards. At the same time, point sources frequently complain that they have been required to install expensive pollution control equipment that is not needed to achieve the desired water quality in less polluted areas.

## LESSONS FOR FUTURE REGULATION

If water pollution control legislation in the United States presents a mixed picture of success and failure, one can derive a variety of lesson from the successes and failures of the last 50 years.

### Lessons of Regulatory Philosophy

1. Elimination of public acceptance of water bodies as a commons is essential to achieving regulatory goals (Hardin, 1968). When regulated entities assume they are entitled to use water bodies as a disposal source, they naturally demand that the burden of limiting that use fall on the government. By contrast, the burden of justifying activity that degrades that resource falls on the person causing the degradation when water bodies are seen as a separate thing owned collectively by others. In the United States, pollution from nonpoint sources presents the most obvious example of this resistance to effective pollution control. In part, the exclusion of nonpoint sources arises from the difficulty of controlling pollution that enters water bodies from diffuse rather than discrete sources, but the philosophical basis runs much deeper. United States environmental law has always backed away from direct control of land use. Nowhere is this aversion to federal land use regulation more ingrained than with respect to agricultural pollution. Agricultural runoff escapes regulation as pollution from a nonpoint source, but even obvious point sources such as irrigation return flows are excluded from the federal regulatory system. United States water pollution law apparently accepts that farmers are free to use their land as they see fit even if those uses adversely affect water quality.

2. Cost-benefit analysis is a barrier to effective regulation. Regulated entities routinely appeal to cost-benefit analysis to defeat or to delay regulation, arguing that it is a prerequisite to rational pollution control. However, Professor Rodgers (1980) demonstrated more than 20 years ago that costs may rationally be considered in a variety of ways without engaging in formal cost-benefit analysis. Perhaps the most important objection to the demand for cost-benefit analysis stems from recognition that the process of calculating costs and benefits is highly manipulable. Given the concentrated costs and diffuse benefits of any particular environmental regulation, dispassionate consideration of costs and benefits seems unlikely. Thus, United States water pollution

law has wisely accepted the precautionary principle (Cameron and Abouchar, 1991), a preference for avoiding environmental degradation when avoidance is possible without serious damage to the macro economic system.

3. Politics drives regulatory legislation. Certainly, the growth of an environmental movement was important, but the specific direction of federal water pollution control legislation has been profoundly shaped for three decades by the specific political compromise that produced the 1972 legislation. Similarly, the political imperative to minimize displacement of state and local law has been a significant barrier to the achievement of water quality standards.

4. Research is important. Lack of scientific information has frustrated the achievement of the goals of the Act in many ways. In establishing feasibility-based standards, EPA generally had to rely on information supplied by the regulated industries; they had obvious incentives to exaggerate the costs and to question the effectiveness of alternatives to current industry practices. Now that attention is shifting to water quality standards, a principal obstacle to achieving clean water is the lack of scientific information. EPA and the states lack reliable information about the actual state of water quality as well as about the complicated processes of achieving the desired water quality. Governmental funding of research should be seen not as a subsidy to regulated industries, but as a check on their claims that effective controls are impossible or infeasible.

### Lessons of Regulatory Strategy

1. A regulatory floor is essential to achieving water quality goals. Nonpoint sources are a great example here. In 1972, Congress substituted area-wide planning for regulation for nonpoint sources; the 1981 Amendments offered to pay some of the costs that farmers would incur by instituting BMPs; the 1987 Amendments required new state plans for controlling nonpoint sources without mandating the use of regulatory controls. None has produced a reduction in pollution from nonpoint sources comparable to the reductions achieved by point sources. Unless EPA is granted authority to impose enforceable regulations on nonpoint sources, the TMDLs now being prepared are also likely to fail to achieve water quality standards in many areas.

2. Exceptions to the regulated universe are likely to frustrate achieving the desired ambient environment. Again, nonpoint sources are the most obvious example. The 1972 decision to exempt nonpoint sources from regulatory controls was rooted in political compromise, but justified on policy grounds: the inability to treat pollution from nonpoint sources and the difficulty of enforcing controls on nonpoint sources. Although each policy justification contained a kernel of truth, neither rendered it impossible to establish enforceable controls on pollution from nonpoint sources. Together, however, they have justified the continued exclusion of pollution from nonpoint sources from the regulatory system even though that exclusion means that water quality goals cannot be achieved in many areas. Indeed, now that substantial controls have been placed on point sources, the exclusion of nonpoint sources has become the primary reason why so many waters still fail to achieve water quality standards.

3. Indirect regulations rarely produce optimal results. The Section 404 program is probably the best example of this phenomenon. The primary reason for the dredge and fill permit program was to allow the corps continued control over navigation. Once the program expanded to include wetlands, environmentalists began to use it to protect the other environmental values. Because the program is still tied to the deposit of dredge and fill materials, developers can often bypass the permit requirement by destroying the wetland character of an area before they begin developments.

4. Judicial innovation can stimulate legislative action. This pattern is one that has been frequently repeated in the United States. From the interpretation of the Refuse Act to the inclusion of wetlands within the 404 permit program to the revival of water quality standards, innovative judicial interpretations have prompted new reforms. The judicial opinions have not generally provided the final reform, but they have often stimulated further legislative revisions or new regulations.

5. Delays in achieving regulatory goals are inevitable. In water pollution legislation, Congress has regularly set ambitious goals that EPA has failed to meet on the schedule set by Congress. The reasons include scientific uncertainty, insufficient agency resources, and use of legal remedies by the regulated community to delay costs that cannot be avoided. Given the likelihood of delay, water pollution control legislation should follow the lead of the 1984 Amendments to the Resource Conservation and Recovery Act and establish requirements that will apply if the agency fails to act in a timely fashion.

6. Financial assistance from the national government is likely to be necessary to induce subordinate governments to install adequate pollution controls. POTWs now use secondary treatment because the federal government paid most of the cost of constructing the new treatment facilities. They have been much slower to treat storm water discharges because they have had to bear the cost. Local governments face great demands on their limited resources. When the bulk of a pollution problem can be imposed on those downstream, the benefits of environmental expenditures are likely to receive a lower priority than other expenditures whose benefits are concentrated more locally. Given the difficulties of forcing environmental compliance on governmental actors, cost-sharing seems a desirable way of obtaining compliance from local entities.

7. Unexpected consequences will require revision to the regulatory scheme. Beyond expecting that most regulated entities will seek to advance their own self interests, no legislator can accurately predict how individuals will respond to the mix of incentives and penalties a regulatory system entails. Consequently, the need for mid-term correction of regulatory programs is always foreseeable. The construction grant program for POTWs aptly illustrates this phenomenon. The program aimed to enable local governments to achieve secondary treatment of their existing discharges. Many local governments, however, used it to expand systems to support development in ways that actually increased pollution loadings.

## Lesson of Regulatory Implementation

1. Feasibility-based controls are the most effective way to achieve prompt reductions in pollution loadings. The imposition of BPT and ST controls produced dramatic reductions in pollution loadings under the Clean Water Act. Even today, the most obvious way to reduce pollution loadings in impaired waters substantially is to *require* nonpoint sources to comply with best management practices - the equivalent of BPT for point sources. The scientific, financial, and political obstacles to achieving water quality standards in the most polluted waters in the United States are significant; they would be substantially reduced if controls on nonpoint sources were similar to the ones that the 1972 legislation required point sources to implement by 1977.

2. For a variety of reasons, feasibility-based controls are unlikely to eliminate substantially all pollution. The dream of the Federal Water Pollution Control Act Amendments of 1972 was to eliminate discharges from point sources. None of the feasibility-based standards of the Clean Water Act was successful in imposing zero discharge limits for all pollutants. Moreover, the cost of moving from BPT (the average of existing plants) to BAT (the best of existing plants) often produced only modest reductions in pollution loads at very high costs. Given this reality, the compromise of the Clean Water Act - to avoid these costs for common pollutants except where necessary to achieve water quality standards - makes sense.

3. Individual polluters can achieve pollution reductions beyond those that are likely to be imposed on a category of sources. Because the implementation of individualized controls is scientifically complicated and time consuming, they are best delayed until after the imposition of a general level of feasibility-based controls. The best illustration of the potential for greater reductions from individual sources comes from the ICSs required by Section 304(l); individual sources often achieved dramatic reductions beyond BAT, when further reductions were necessary to obtain renewal of a source's discharge permit. This phenomenon produces some optimism that even serious water quality problems can be solved if the scope of the problem is first reduced by imposing feasibility-based controls on all pollution sources that contribute to water quality problems.

4. Controls at water basin levels are necessary to solve serious water quality problems. The Acooperative federalism@ of the federal law presents a serious obstacle to achieving water quality standards in major waterways. The Mississippi River presents the most dramatic example because it drains to the Gulf of Mexico from the Rocky Mountains on the west, Minnesota in the north, and the Appalachian Mountains on the east. Obviously no single state can address these problems, and the federal response is equally fragmented. Essentially, the federal government is limited to review of state plans and state permit programs; even that review is divided among several EPA regions. The likelihood of a coordinated response from such a fragmented regulatory system is minimal.

5. Effective enforcement is an essential element of a successful regulatory scheme. Without effective enforcement alternatives, environmental regulations perversely favor those who flout regulatory requirements. Congress has always been more willing to legislate hortatory language and even strict regulatory requirements than effective enforcement mechanisms, but the United States has made progress toward effective enforcement. The 1956 legislation established an awkward conferencing system for combating interstate pollution problems, and the 1965 Amendments provided for the establishment of water quality standards without a system for mandating enforceable controls on those whose pollution resulted in waters that failed to meet the standards. The 1972 Amendments authorized substantial civil penalties, although they required costly judicial actions to impose them; even more importantly, the 1972 statute authorized environmental groups to enforce the state when EPA failed to perform its responsibilities. The 1977 Amendments made administrative enforcement more meaningful by authorizing administrative imposition of civil penalties.

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## REFERENCES

- Cameron, James and Juli Abouchar, 1991. The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment, *Boston College International and Comparative Law Review*, 14:1-27.
- Hardin, Garrett, 1968. Tragedy of the Commons, *Science* 168:1243-48.
- Houk, Oliver A., 2000. The Clean Water Act TMDL Program: Law, Policy, and Implementation, Environmental Law Institute.
- Percival, Robert V., Alan S. Miller, Christopher H. Schroeder, and James P. Peape, 2000. *Environmental Regulation: Law, Science, and Policy*, 3d ed., Aspen Law and Business, 623-758.
- Rodgers, William H., Jr., 1980. Benefits, Costs, and Risks: Oversight of Health & Environmental Decisionmaking, *Harvard Environmental Law Review* 4:191-226.
- Rodgers, William H., Jr., 1994. *Environmental Law*, 2d ed., West Publishing Co. pp. 246-392.
- Zener, Robert, 1974. *The Law of Water Pollution Control in Federal Environmental Law*, Erica L. Dolgin and Thomas G. P. Gilbert, eds., West Publishing Co., pp. 682-791.