THE HISTORICAL DEVELOPMENT OF NATIONAL NONPOINT SOURCE
POLLUTION ABATEMENT EFFORTS AND THE ROLE OF FEDERALISM

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THE HISTORICAL DEVELOPMENT OF NATIONAL NONPOINT SOURCE POLLUTION ABATEMENT EFFORTS AND THE ROLE OF FEDERALISM

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CHAPTER I

NONPOINT SOURCE POLLUTION ABATEMENT STRATEGIES:

THE PROBLEM

This study was conducted to survey the historical development and ultimate effectiveness of national nonpoint water pollution abatement strategies. These policies seek to meet the Clean Water Act (CWA) goal of providing “fishable” and “swimmable” waters for our nation’s citizenry. Although the CWA has led to safer water systems across much of the United States as a result of point source pollution reductions, a significant number of these waters remain impaired as a direct result of nonpoint sources of pollution (NPS). A recent EPA evaluation suggests that 35 to 40 percent of our rivers and streams do not meet their designated uses (USEPA, 1996). Almost two thirds of the nation’s impaired water systems are linked directly to agricultural sources of NPS (USEPA, 2000). This suggests nonpoint source pollution constitutes the major problem confronting our nation’s modern water pollution abatement strategies.

Point and Nonpoint Sources of Pollution

Since the Clean Water Act was enacted, it has become apparent that certain types of pollution are easier to identify and address than others. Although the CWA reduced the levels of many discrete sources of pollution, contaminant levels remained surprisingly high in many of our nation’s water systems. This caused the national government more
fully examine the nature of environmental pollutants. Their efforts led to a distinction between what has become known as point source and nonpoint source pollution (Broderick et al, 2002, pp.1-2).

The distinctions drawn between point and nonpoint sources of pollution help demonstrate the reasons for which nonpoint source pollutants are more difficult to measure and therefore address. Nonpoint, or diffuse, pollution does not enter the environment from a single easily identifiable outlet or point. Instead, these pollutants are likely to enter our nation’s waters indirectly through runoff from a variety of [typically human] activities (Broderick et al, 2002, pp.1-2). This makes it much more difficult to address. On the other hand, point source pollutants are generally the result of some form of pollution from an easily discernible source, or direct point, of origin. Because it is far easier to identify, point source pollutants were the primary focus of many of the early pollution abatement efforts, including the CWA.

Nonpoint pollution differs from point source pollution in the manner in which it appears in the environment. The EPA describes nonpoint pollutants in the following way:

- discharges enter surface and/or ground waters in a diffuse manner at irregular intervals related mostly to weather;
- pollutants arise of an extensive land area and move overland before they reach surface waters or infiltrate into ground waters;
- the extent of nonpoint source pollution is related to uncontrollable climactic events and to geographic and geologic conditions, and varies greatly from place to place and year to year;
- nonpoint sources of pollution are often more difficult or expensive to monitor at their point(s) of origin than point sources;
- abatement of nonpoint sources is focused on land and runoff management practices rather than effluent treatment; and
- nonpoint source pollutants can be transported and deposited as airborne contaminants (USEPA, February 2001, p.1-4).
Nonpoint source pollution can originate from a variety of diverse sources. These pollutants carry a myriad of potentially detrimental consequences that effect both the environment and humans. Agricultural activities like crop production and animal husbandry create the greatest amounts of diffuse pollution, but increased urbanization, manufacturing, resource extraction, and various silviculture activities also disperse dangerous amounts of sediment, nutrients, toxic metals, and other pollutants into surface water and groundwater (Broderick et al., 2002, p. 2-3).

Although the CWA initially focused almost entirely on point source pollution, a series of amendments to the Act, which were passed in 1987, broadened the legislation’s scope. The new focus included greater emphasis on NPS abatement. These amendments acknowledged the crucial impact of nonpoint source pollution on the environment. More importantly, their inclusion points to a realization that point source pollution, while easier to enforce, was insufficient, and would leave the environment impaired. The 1987 amendments to the CWA spawned numerous national, state, and local programs that sought to address NPS.

Statement of the Problem

This thesis will survey the historical development of national nonpoint source pollution abatement strategies since the inception of the United States. It will explore and document specific facets of nonpoint source pollution discharge monitoring efforts. Finally, it will examine the role federalism and intergovernmental relations play in determining the effectiveness of current abatement measures.
Assumptions Underlying the Study

Several assumptions underlie this examination. First, point and nonpoint sources of pollution constitute the primary forms of water pollution that exist in, and impact, the United States today. Second, although there are differences between the various types of nonpoint source pollutants, as well as the policies enacted to deal with each, there are also substantial similarities that allow for each source to be discussed in relation to the others. Third, the national government relies on a federal system to develop, address, and enforce many of the primary nonpoint source pollution abatement strategies that exist today. Fourth, while there are several factors that might increase the overall effectiveness of nonpoint source pollution abatement efforts, a focus on the impact of federalism and intergovernmental relations provides one of the more practical assessments of the reasons for which our nation continues to have impaired water systems. Fifth, addressing the shortcomings that exist within the current federal structure, as it deals with nonpoint source pollution, will lead to a decrease in overall water pollution and impairment levels. Sixth, these decreases will impact water pollution levels such that an increased number of our nation’s water systems may become “fishable” and “swimmable” again.

General Research Hypotheses

This survey has two research hypotheses. First, current nonpoint source pollution efforts are largely ineffective at reducing nonpoint source pollutants. Second, the nation’s federal system hampers the effectiveness of current nonpoint source pollution abatement strategies.
Significance of the Study

Both the national and state governments recognize nonpoint source pollution constitutes one of the primary environmental water pollution concerns our nation faces today. The national government has taken the forefront in examining the role NPS plays in preventing the achievement of the goals established by the CWA. Much of the non-governmental research that currently exists is limited to agricultural, legal, or economic studies. With the exception of some internal reviews conducted by the United States General Accounting Office, there are few studies that examine the role our federal system plays in determining the effectiveness of nonpoint source abatement efforts over the past 40 years. As such, this study is worthy of consideration insofar as it offers an opportunity to present one of the first comprehensive examinations of federalism and the overall success of nonpoint source pollution abatement strategies.

Scope of the Study

Although environmental policies, including those addressing nonpoint source pollution, may be found in place at each level of government, this study will be limited in its scope primarily to those national policies that directly influence NPS efforts. Admittedly, state and local policies constitute an integral component in defining and measuring our efforts to combat nonpoint sources of pollution. Still, the overall success of these abatement efforts necessitates a focus on policy decisions made at the national level.
Definitions and Operational Terms

Throughout this examination two terms will be used repeatedly – nonpoint source pollution and federalism. Each warrants a specific operational definition. First, *nonpoint source pollution, NPS*, or any similar derivatives, will be used to refer to any form of agricultural, urban, industrial, or silvicultural (forest-related) pollution that meets the Environmental Protection Agency’s accepted definition of nonpoint source pollution, which was provided earlier (see the section on point and nonpoint sources of pollution). This description, while an industry standard, also provides a meaningful explanation of the nature of nonpoint sources of pollution.

Second, this thesis will examine NPS policies based on their role and impact within a federal structure. Because the terms *federal* and *federalism* often have multiple meanings, it is important to explicitly identify the manner in which each should be understood herein. Elazar (1984) defines federalism “as the mode of political organization that unites separate polities within an overarching political system by distributing power among general and constituent governments in a manner designed to protect the existence and authority of both” (p.2). He further suggests a federal structure has two important characteristics within the United States. These are that:

i. the states are, at one and the same time, well-integrated parts of the overall American civil society and also separate civil societies in their own right with their own political systems, and

ii. the states have preserved their integrity not through a sharp separation of their political systems from the national system but within an intricate framework of cooperative relationships that preserve their structural integrity while tying all planes of government together functionally in the common task of serving the American people (pp.1-2).
Based on this understanding, the terms *federal* and *federalism* will refer only to the system of intergovernmental relations that exists within the United States. Any reference to a particular level of government will be specifically identified (i.e. national, state, or local).

*Summary*

This study attempts to provide one of the first comprehensive surveys of the historical development and effectiveness of national nonpoint water pollution abatement strategies in the United States, which seek to meet the Clean Water Act (CWA) goals of providing “fishable” and “swimmable” waters for our nation’s citizenry. To achieve this objective, the study examines two specific research hypotheses. First, it assumes current nonpoint source pollution efforts are largely ineffective at reducing nonpoint source pollutants. Second, it questions whether the nation’s federal system hampers the effectiveness of these nonpoint source pollution abatement strategies.

Nonpoint pollutants have only recently been recognized as a significant environmental water pollution concern worthy of national attention. National and state governments have sought to actively examine the role NPS plays in preventing efforts to reach and maintain the goals of the Clean Water Act since 1972. Still, little non-governmental research exists that adequately examines the overall effectiveness of national NPS strategies, let alone the impact that our current federal structure plays in determining this effectiveness. This study presents one of the first comprehensive examinations of the role federalism plays in determining the overall success of nonpoint source pollution abatement strategies.
CHAPTER II

A REVIEW OF THE LITERATURE

Clean water sources have historically played a critical role in determining the long-term viability of societies across the globe. Modern industrialized nations such as the United States rely heavily on the enduring sustainability, and overall integrity, of their water systems for the continued success, and ultimate survival, of the nation. Citizens expect their nation’s leaders will ensure clean water sources exist. These water sources are intended to meet a myriad of collective social and individual wants and needs. For instance, Americans depend on clean water for economic purposes (i.e. agricultural and industrial). We also value clean water for its recreational and aesthetic uses. This has created a system in which our nation’s waters have “historically…been considered to be common resources” (Deason et al., 2001, p.177). Simply, our society views water as if it is a public good. Yet many of the same activities we rely on clean water for also contribute heavily to its degradation. Historically our nation’s leaders have pursued several efforts to “protect the commons” from these activities (p.185).

These efforts often provide mixed results simply due to the particularly complex nature of water pollution. As such, it is difficult to effectively present, let alone address, the nature and manner of any actions that should be undertaken by our nation’s policy makers to ensure the safety of our water resources. The issues surrounding water
pollution are heightened by the manner within which pollution abatement policies are viewed and managed under our federal system.

Currently policy makers are forced to view environmental issues in terms of their economic (cost-benefit) impacts – particularly as they relate to matters of security, efficiency, liberty, equity, ecology, health, and sustainability (Rushefsky, 2002, pp.251 – 259). Water pollution is perceived as an externality, or market failure, which can be controlled through market-based incentives or regulations (pp.251-259). Yet the effectiveness of these efforts is a matter of continued debate. It is apparent that water contamination constitutes an enormous problem for our nation, which may be buttressed by governmental policies that seek to strike a balance between the varied expectations of the nation’s citizenry, businesses, and other individual and collective interests (pp.251-259).

Ensuring our nation’s waters are clean is a task that is far from simple. Public policies have successfully abated many forms of water pollution over the past several decades. In spite of the success of these policies clean water remains elusive – largely as a result of nonpoint sources of pollution (NPS) and the strategies employed to reduce it. These strategies fail as a result of the national government’s stance within the federal system, which hampers the overall effectiveness of nonpoint pollution abatement strategies.

This chapter will examine the historical development of water pollution abatement policies in the United States over the past 250 years. It will also review the primary forms of nonpoint source pollution, and the national efforts undertaken to abate each. The chapter will evaluate the impact our federal stance has on current nonpoint
abatement efforts. Approaching nonpoint source pollution in this manner should provide one of the first comprehensive examinations of the function federalism plays in determining the overall success of modern nonpoint source pollution abatement strategies in lieu of the historical development of our nation’s broader water policies.

*Historical Development of Water Pollution Policies*

While most of our water pollution control efforts have been put in place over the past 40 years, there are historical instances in which the national government found it necessary to enact water pollution control policies for reasons of economic security. Over the course of their development, the emphasis of these policies have shifted between economic and public health concerns. Nevertheless, early efforts were tied inexorably to economic worries. These policies existed as far into our history as 1824 as a result of the Supreme Court’s decision to provide Congress with the authority to “control the use of waters in interstate commerce” (Murchinson, 2005, p.529). The first environmental law enacted in the United States is known as the Refuse, or Rivers and Harbors Appropriation, Act (Rosenbloom & O’Leary, 1997, p.88). It was passed in 1899 to keep navigable waters free of refuse that could block ships (p.88). Murchinson (2005) suggests the Refuse Act played an integral role in shaping later legislation (p.529). Still such legislation was almost non-existent during the first 120 years of our nation (Rosenbloom & O’Leary, 1997, p.87).

The Water Pollution Control Act of 1948 (WPCA) was the next major environmental policy (Rosenbloom & O’Leary, 1997, p.88). “The story of modern federal [water pollution] legislation begins with the Federal Water Pollution Control Act
of 1948” insofar as it “assigned the federal government to a very secondary position in relation to the states in water quality matters” (Murchison, 2005, p.530). The WPCA was the first act to mandate that water pollution control be the responsibility of state and local governments (p.531). State and local governments were encouraged “to enact uniform laws and interstate compacts,” while the national government was left with the ability “to file a public nuisance action for interstate pollution that endangered persons in a state other than the one in which the pollution originated [with the approval of state officials]” (pp.530-531). The WPCA was amended in 1956 to allow for “direct funding for municipal sewerage treatment plants” (Rosenbloom & O’Leary, 1997, p.88; Murchinson, 2005, p.531). Several additional minor amendments were passed to the act in 1961 and 1970 (p.531). The WPCA remains significant today not for the effect it had on reducing water pollution, but instead because it established the federal structure under which later national water pollution policies would be pursued.

Many of the efforts undertaken under the WPCA “achieved limited results in improving the quality of the nation’s waters” (Murchinson, 2005, p.534). As Peters (2004) notes, “only one injunction was issued during the fifteen years the 1956 law was in effect” (pp.278-279). However, a series of developments in the 1960’s began moving the national government towards more comprehensive water pollution abatement strategies.

During the 1960’s the United States began to experience a variety of environmental and health-related crises/concerns that were directly attributable to lax or non-existent environmental regulations. For instance, it was argued that individuals – particularly pregnant women and children - who were exposed to pesticides such as
dichloro-diphenyl-trichloroethane (DDT) began to develop severe health problems. DDT was also thought to be responsible for declines in local fish and bird populations.

Several environmental catastrophes also gained national interest. Locally, on June 22, 1969, the Cuyahoga River caught fire as a result of high pollution levels (http://www.epa.gov/glnpo/aoc/cuyahoga.html, June 4, 2006). This had occurred several times before beginning in 1936. However, Time Magazine ran a feature on the 1969 fire that garnered national attention (http://www.epa.gov/glnpo/aoc/cuyahoga.html, June 4, 2006).

The growing environmental concern prompted numerous individuals to lobby for stricter environmental regulations. Much of the movement towards stricter environmental legislation can be attributed to the efforts of Rachel Carson. Carson was a biologist who published a 1962 book entitled *Silent Spring* which provided a chilling look at the effects of pollution on the environment. Although her book remains scientifically controversial to this day, it inspired a variety of actors, including Congress under the leadership of Al Gore, to enact numerous environmental regulations.

In 1965 the national government enacted the Water Quality Act (WQA). This Act expanded federal regulatory authority (Murchinson, 2005, p.532). The WQA was the national government’s first effort to establish defined, measurable criteria for water quality (Peters, 2004, p.279). It required state governments to develop measurable “standards for water quality,” which were approved by the national government and then “translated into specific effluent standards” (p.279). These standards were to be enforced by the states. If a state failed to enforce its own standards, the national government had the authority to ensure they were met. The WQA “did not mandate enforceable
regulations on *individual* [emphasis added] sources of pollution” and, more importantly, it “did not grant the [federal] administrator authority to impose and enforce a federal implementation plan” (Murchinson, 2005, p.532).

The national government left much of the decision-making and enforcement process to the state governments. The states generally had little incentive to enforce the Act, and the national government lacked the impetus to demand compliance from the states. Peters (2004) suggests:

The state basis of the Water Quality Act proved to be its undoing. Because states were competing with one another to attract industries, those that adopted more stringent water-quality standards might be at a disadvantage. Thus, water-quality standards tended to converge on the lowest common denominator. Even then, the states rarely if ever enforced their standards. The federal government, in turn, did little to encourage more vigorous enforcement by the states, and nothing to enforce the standards themselves. It became clear that the states had little incentive to enforce pollution standards to clean up their own water and that therefore more effective national standards would be required (p.279)

The WQA was so ineffective that the Department of Justice relied on the Refuse Act as the primary “basis for legal actions against polluters” in two cases during the 1960’s (Murchinson, 2005, p.534). These cases, when viewed simultaneously with the ongoing environmental push, “contributed to the political momentum that ultimately produced the political compromise” reflected in the modern legislation and the Clean Water Act (p.534).

The Supreme Court also played a role in the development of modern water pollution legislation. Murchinson (2005) notes “in addition to construing the Refuse Act broadly, the Court allowed claims based on the federal common law of nuisance when water pollution problems were interstate in nature” (p.536). The Court’s decisions
allowed for Congress to pass the Federal Water Pollution Control Act Amendments of 1972\(^1\), which helped created the “modern structure of water pollution control legislation” (p.536).

The Clean Water Act was the result of a series of lobbying efforts by various advocates, who hoped that stronger national water policies would result in improved policy direction, enforcement, and outcomes. For instance, “industrial dischargers wanted a permit system to avoid possible criminal liability under the absolute prohibition of the Refuse Act,” while environmental groups sought “a new statute to address perceived deficiencies in the 1899 law” (Murchinson, 2005, pp.536-537). This spelled the beginning of a new era of water pollution law.

During this new era the regulatory approach of the national government has changed substantially. This is partially the result of the rapid growth in new environmental legislation. Rosenbloom and O’Leary (1997) indicate “eleven major federal environmental laws were enacted in the 1960s, while seventeen were enacted in the 1970s” (p.88). Congress established the U.S. Environmental Protection Agency in 1971 (p.88). Working in tandem with the Justice Department, the Environmental Protection Agency (EPA) filed its first lawsuit against a governmental entity during that same year (p.88). Noncriminal lawsuits against governments rose over 250% during the 1980’s and 1990’s (Rosenbloom and O’Leary, 1997, p.88: citing O’Leary, 1993). Criminal lawsuits against individuals, which were nonexistent prior to 1980, also grew

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\(^1\) Although the 1972 amendments were made to the Federal Water Pollution Control Act, these changes became known as the Clean Water Act of 1972. Officially, the Clean Water Act was passed in 1977. For the purposes of this thesis, the Federal Water Pollution Control Act Amendments of 1972 will be referred to as the Clean Water Act of 1972.
significantly during this period (Rosenbloom and O’Leary, 1997, p.88; citing BNA Environmental Reporter, 1994).

Many of these changes were the direct result of the 1972 Clean Water Act (CWA). The CWA was touted as the nation’s first comprehensive water quality act by our nation’s political leaders (Murchinson, 2005, pp.536-537). The primary goal of the Clean Water Act was to ensure the protection and restoration of the “physical, chemical and biological integrity of our nation's waters” (Clean Water Act, §101(a), U.S.C., Volume 33, 125 (a)). Amendments to the 1972 Act sought to further guarantee that:

- All private concerns were to adopt the “best practicable technology by 1977 and the “best available technology by 1983”,
- The deadline for all streams to be safe for fish and for human swimming was to be set at 1983, and
- The deadline when all harmful discharges into navigable streams must stop was to be set at 1985 (Peters, 2004, p. 279).

The last two of these amendments were abandoned due to several federal lawsuits (p.279). However, the Act has established several additional standards. It includes standards for public sewage (pp.279-280). The Act also created a “nationwide discharge permit system, enabling the Environmental Protection Agency to specify the amount of effluents that could be released and to monitor compliance with the technology requirements” (p.280). Several of these efforts will be discussed in the proceeding sections.

It appears as if the CWA is firmly embedded in our nation’s environmental policy. As Peters (2004) notes, “President Regan vetoed the reauthorization of the CWA in 1986…but Congress overrode the veto, with the perhaps unexpected support of many industrial organizations” (p.280). Amendments made by Presidents Clinton and Bush
have both strengthened and weakened aspects of the Act. Nevertheless, it maintains a prominent role among environmental legislation.

Today there are seven main EPA policies addressing water pollution. These include:

- The Clean Air Act (CAA),
- The Clean Water Act (CWA),
- The Toxic Substances Control Act (TSCA),
- The Resource Conservation and Recovery Act (RCRA),
- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund),
- The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), and

The Clean Water Act has consistently been viewed as the symbol of our nation’s water pollution abatement efforts (Murchinson, 2005, pp.536-537).

Environmental policy is not the province of a single agency. Environmental policies can be found in the Department of Agriculture, the Department of the Interior, and the Department of Transportation among others. Furthermore, the number of laws has risen significantly over the past two decades (Rosenbloom and O’Leary, 1997, p.88). Ribaudo (2001) suggests “water quality in the US is addressed by literally hundreds of national, state, and local laws and programmes using a large policy suite of instruments” (p.123).

The rapid expansion of environmental regulations has affected individuals, businesses, and national, state, and local governments in numerous ways. Rosenbloom and O’Leary (1997) suggest there are seven areas of particular importance when examining the influence of water pollution laws, including “the erosion of government immunity, hazardous waste liabilities, the criminal liability of lower- and middle-level
government employees, increased reporting requirements, liability for regulatory takings, the municipality as mini-water pollution control agency, and the striking down of flow control ordinances by the Supreme Court” (p.89). Many of these factors also affect nongovernmental entities and individuals. Given these developments, it is apparent that the CWA has led to positive changes in pollution abatement efforts over the past several decades, and has prompted efforts to reduce nonpoint sources of pollution.

*The Clean Water Act and Point Source Pollution*

The Clean Water Act fundamentally changed the nature of water pollution policy in the United States. It led to a substantial increase in the regulatory authority of the national government. Murchinson stated “the focus of the new statute shifted to nationally applicable, feasibility-based standards that were uniform among categories of point sources [of pollution]” (p.539). Point source pollution has been defined as any “pollution that comes from a specific, identifiable source, such as a pipe or channel” (http://www.epa.gov/trs/, June 9, 2006).

In order to reach the goal of achieving “fishable” and “swimmable” waters through the reduction of point sources of pollution, the national government created a two-pronged process.

By 1977, publicly owned treatment works had to provide secondary treatment before discharging their effluent into the navigable water; by 1983, publicly owned treatment works had to employ the best treatment control technology over the life of the works. Other point sources (principally industrial discharges) were to employ the best practicable control technology currently available (BPT) by 1977 and the best available control technology economically achievable (BAT) by 1983. The principle difference between the two standards involved the role of costs. In setting BPT standards, EPA was to consider ‘the total cost of the application of technology in relation to the effluent reduction benefits to
be achieved from such application’ (FWPAA, §304(b)(1)). For BAT standards, the ‘cost of achieving such effluent reduction’ was merely one item in a list of factors EPA was directed to consider’ (FWPAA, §304(b)(2)(B))...the 1972 statute continued to distinguish between publicly owned treatment works and other point sources. New sources other than publicly owned treatment works were to use the best available demonstrated control technology (BADT). For publicly owned treatment works, the new standard was indirect. Because Congress anticipated that new public treatment facilities would be funded through the federal grant program, the conditions for grant approval contained the substantive standard. EPA could fund a construction project only if the project provided for ‘the best practicable waste treatment technology over the life of the works’ (Murchinson, 2005, pp.539-541).

These requirements marked the first attempt to establish substantive standards that would guide pollution abatement efforts. The act also contained several additional standards. A summary of the efforts can be found in Table 2.1.

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* Adapted from Murchinson, 2005, pp.539-547.
The adoption of these standards was the first aggressive step taken towards reducing water pollution across the nation.


In general, the amendments since 1972 have refined the approach of the 1972 law. They have retained feasibility-based standards as the basic regulatory approach of the statute, although they have made important, incremental medications to the Act – including relaxation of most of the original feasibility-based standards. Over the years, Congress increasingly has focused on problems associated with toxic pollutants, and it has strengthened enforcement provisions. Congress also has continued, and even expanded slightly, the state role in administering the statute (Murchinson, 2005, p.557).

However, many of these standards were eventually “relaxed” because the original goals of the CWA came to be perceived as too lofty. Nevertheless, the CWA has led to an actual decrease in point sources of pollution and impaired water systems.

The overall impact of the Clean Water Act is a matter of some debate, but the thrust of the literature suggests it has been at least somewhat effective.

Since the passage of the Clean Water Act in 1972, water quality in the US has improved largely through reductions in toxic and organic chemical loadings from point sources. Discharges of toxic pollutants have been reduces by an estimated billion pounds per year. Rivers affected by sewage treatment plants show a consistent reduction in ammonia between 1970 and 1992. The proportion of US population served by wastewater treatment plants increased from 42% to 74% in 1998. A widely scattered surface-water monitoring network has shown reductions in fecal bacteria and phosphorus concentrations. Case studies, opinion surveys and anecdotal data suggest that these reductions in pollutants have improved the health of aquatic ecosystems in many basins, particularly near urban areas. However, challenges to water quality remain, including continuing discharges of pollutants from a growing population and economy and pollution from agriculture and non-point sources. A growing share of remaining water-quality problems are due to pollution from non-point sources (Ribaudo, 2001, pp.123-124).
Evidence suggests the CWA has managed to reduce point sources of pollution (pp.123-124). Many water systems remained impaired in spite of the efforts taken as a result of the Act. This has led to an increased focus on nonpoint source pollution abatement strategies (pp.123-124).

*The Clean Water Act and Nonpoint Source Pollution*

Nonpoint source pollution has regularly plagued the nation since we began seriously pursuing pollution abatement efforts. The Clean Water Act sought to confront the problems associated with nonpoint source pollution. These measures fell short of those utilized to address point sources of pollution.

The effluent standards and permit requirements of the 1972 amendments applied only to point sources. For nonpoint sources of pollution, the 1972 Act substituted planning for regulation. As a prerequisite to obtaining construction grants for publicly owned treatment works, section 208 obligated states to initiate “a continuing area-wide waste treatment management planning process” for areas with “substantial water quality control problem.” In the planning process, the states had to provide for the creation of a plan for controlling pollution from both point sources and nonpoint sources. Plans prepared pursuant to this process had to be submitted to EPA for approval, but the Act did not authorize EPA to prepare a federal plan even if the plan submitted by the state was inadequate. Although Congress authorized funding for the planning process, it did not require that the state plans impose regulatory limits nor did it offer to pay the cost of reducing pollution from nonpoint sources (Murchinson, 2005, p.547).

The emphasis on abatement strategies that addressed point sources of pollution initially showed substantial promise (Ribaudo, 2001, pp.123-124). However, §305(b) of the CWA required a regular review, known as the National Water Quality Inventory, of various watersheds across the US (USEPA, 2000). This report has regularly shown that our nation’s water systems have remained impaired despite the efforts taken. The 1996
Inventory found “continuing problems with water pollution resulted, for example, in over 2,000 fish consumption advisories and than 2,500 beach closings and advisories” (USEPA, 1999, p.2).

A 1998 survey found “that 35% of river miles, 45% of lake acres (excluding the Great Lakes) and 44% of estuary square miles did not fully support the uses for which they were designated by states under the Clean Water Act” (Ribaudo, 2001, p.124). The table below provides further insight into water quality over previous rounds of the National Water Quality Inventory.

Figure 2.2 Status of US Surface Water Quality, 1990 – 1996*

<table>
<thead>
<tr>
<th></th>
<th>Rivers (miles)</th>
<th>Lakes (acres)</th>
<th>Estuaries (square miles)</th>
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<tr>
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<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Meeting designated usesb</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Supporting</td>
<td>62</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Partially supporting</td>
<td>25</td>
<td>22</td>
<td>36c</td>
</tr>
<tr>
<td>Not supporting</td>
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<td>14</td>
<td></td>
</tr>
<tr>
<td>Clean Water Act goals: fishable</td>
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</tr>
<tr>
<td>Meeting</td>
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<tr>
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<tr>
<td>Not meeting</td>
<td>20</td>
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</tr>
<tr>
<td>Not attainable</td>
<td>9</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

*Excluding Great Lakes.

b Supporting: water quality meets designated use criteria; partially supporting: water quality fails to meet designated use criteria at times; not supporting: water quality frequently fails to meet designated use criteria.

c In 1996, the categories 'Partially supporting' and 'Not supporting' were combined.


Data collected in 2000 indicated “states and tribes assessed 23% of the total river and stream miles; 42% of the lake, reservoir, and pond acres; 90% of the Great lakes shoreline miles; 32% of the estuary square miles; and 5% of the ocean shoreline miles did not meet their proscribed uses (McCarthy, 2001, p. 4). Ribaudo (2001) further notes:

For the 1998 listing cycle, 21,845 waters with 41,318 associated impairments were listed, covering over 300,000 miles (483,000 km) of rivers and streams and more than 5 million acres (2 million ha) of lakes (USEPA, 2000b). Over 218 million people live within 10 miles of a
polluted waterbody. The top three categories of impairment identified in section 303(d) lists are sediments (6133 waters), pathogens (5281 waters) and nutrients (4773 waters). Pesticides ranked tenth, affecting 1432 waters. Reductions in non-point source pollution loads will be required for these waters to achieve water quality standards” (p.124).

The harsh reality of these numbers forced the EPA, as well as the national government, to take a fresh look at water pollution.

The Environmental Protection Agency quickly realized that efforts to reduce point sources of pollution had not led to the achievement of the Clean Water Act’s goals of ensuring “fishable” and “swimmable” waters. This prompted the agency to ask “why is there still water that’s too dirty for swimming, fishing or drinking? Why are native species of plants and animals disappearing from many rivers, lakes, and costal waters?” (USEPA, 1994a). The agency came to determine:

The United States has made tremendous advances in the past 25 years to clean up the aquatic environment by controlling pollution from industries and sewage treatment plants. Unfortunately, we did not do enough to control pollution from diffuse, or nonpoint, sources. Today nonpoint source pollution (NPS) remains the Nation’s largest source of water quality problems. It’s the main reason that approximately 40 percent of our surveyed rivers, lakes, and estuaries are not clean enough to meet basic uses such as fishing or swimming” (USEPA, 1994a).

Consequently, many of our nation’s water pollution abatement efforts over the past two decades have focused on measures to reduce nonpoint sources of pollution.

The distinctions drawn between point and nonpoint sources of pollution help demonstrate the reasons nonpoint source pollution is more difficult to measure and mitigate. Nonpoint source pollution (NPS), or diffuse pollution, does not enter the environment from a single, easily identifiable outlet or “point,” but instead enters water
systems indirectly, primarily through the water runoff from a variety of sources (Broderick et al, 2002, pp.1-2).

Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, costal waters, and even our underground sources of drinking water. These pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding streambanks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems; and
- Atmospheric deposition and hydromodification are also sources of nonpoint sources of pollution...

States report that nonpoint source pollution is the leading remaining cause of water quality problems. The effects of nonpoint source pollutants on specific waters vary and may not always be fully assessed. However, we do know that these pollutants have harmful effects on drinking water supplies, recreation, fisheries, and wildlife (USEPA, 1994b).

More specifically, nonpoint source pollution differs from point source pollution primarily on the basis through which it appears in the environment. The EPA describes the ways in which NPS enters water systems in following manner:

- discharges enter surface and/or ground waters in a diffuse manner at irregular intervals related mostly to weather;
- pollutants arise of an extensive land area and move overland before they reach surface waters or infiltrate into ground waters;
- the extent of nonpoint source pollution is related to uncontrollable climactic events and to geographic and geologic conditions, and varies greatly from place to place and year to year;
- nonpoint sources of pollution are often more difficult or expensive to monitor at their point(s) of origin than point sources;
• abatement of nonpoint sources is focused on land and runoff management practices rather than effluent treatment; and
• nonpoint source pollutants can be transported and deposited as airborne contaminants (USEPA 2001, p.1-4).

Because nonpoint source pollution can originate from a variety of diverse sources, it carries a myriad of potentially detrimental consequences that effect both the environment and humans. Table 2.3 presents a list of the three leading sources of water quality impairment in the US as of 1994.

![Table 2.3 Three Leading Sources of Water Quality Impairment](source: Water National Quality Inventory, 1994. * USEPA, 1994(a))

Typically specific [human] activities within each of these broader categories lead to sources of nonpoint pollutants. Agricultural activities like crop production and animal husbandry create the greatest amounts of diffuse pollution, but increased urbanization, manufacturing, resource extraction, and various silviculture activities also disperse dangerous amounts of sediment, nutrients, toxic metals, and other pollutants into surface water and groundwater (Broderick et al., 2002, pp.2-3). The Environmental Protection Agency “has estimated the annual costs of controlling three major sources of nonpoint source pollution to be $9.4 billion” (USEPA, 1999, p.4).

Although much of the information presented above has been taken from research conducted over the last decade, nonpoint source pollution has been recognized as a significant source of water pollution for far longer. The national government came to
realize the seriousness of nonpoint sources of pollution by 1987, during which time Congress “revised the Clean Water Act with the Water Quality Act of 1987\(^2\)” (Murchinson, 2005, p.566). Many of the changes put in place by the amendments have shaped the current methods employed to abate NPS.

The modifications inspired by the amendments changed the reporting requirements of state governments, and allowed for the national government to partially-preempt state efforts (pp.566-569). It also included certain measures to reduce nonpoint sources of pollution, which marked the nation’s first comprehensive attempt to address NPS. Murchinson (2005) remarks:

> The 1987 Amendments launched another attempt to control pollution from nonpoint sources. [However], Congress made ‘expeditious’ control of pollution from nonpoint sources a ‘national policy’ and directed states to make another effort to address problems stemming from nonpoint sources. The new section required states to identify waters that failed to meet water quality standards because of pollution from nonpoint sources and to prepare management plans to achieve those water quality standards. Congress did not, however, mandate that management programs include regulatory limits on nonpoint sources, and the new section gave EPA only limited authority to ensure compliance with the new directive. Each state had to submit to EPA for final approval a report identifying the waters that failed to meet water quality standards because of nonpoint source pollution. The report also had to identify the categories of nonpoint sources that contributed to the failure to meet the water quality standard and to set forth a management plan for achieving the standard. If a state failed to make a submission or if the submission was inadequate, EPA could identify the impaired waters, but the agency was not authorized to prepare a federal management plan. Instead, the EPA Administrator was to ‘report to Congress on his actions’ (p.569).

The 1987 amendments still failed to adequately achieve the goals of the Clean Water Act. Congress again left the states with a substantial amount of land use and local regulatory control in pursuing the amendments, while leaving the national government with limited

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\(^2\) These amendments are generally referred to as the Clean Water Act Amendments of 1987.
recourse in instances in which states did not fully cooperate with the spirit of the law. It is often argued that this is as it should be; typically meaning, state and local governments, being closer to the problems (and needs) associated with water pollution, should determine the nature, and strength, of any abatement efforts pursued. Unfortunately, as will be discussed shortly, this notion is flawed. Nevertheless, the 1987 amendments moved the nation, as a whole, towards a greater focus on nonpoint source pollution. It spawned a number of new national, state, and local programs that sought to reduce NPS.

The EPA has taken several steps towards addressing sources of nonpoint pollution. Two of these efforts are the direct result of the Clean Water Act and its amendments. These include the National Nonpoint Source Program and the Clean Water State Revolving Fund Program. Section 319 of the Clean Water Act established the National Nonpoint Source Program, which required state’s to assess the extent to which nonpoint sources of pollution were responsible for the continued impairment of local water systems. States were also required to develop management plans to address these nonpoint pollution sources (USGAO 1999, p.27). The National Nonpoint Source Program also authorized the EPA to provide certain grants to the states to aid in implementing new initiatives. These grants support a variety of activities, including technical assistance, financial assistance, training, technology transfer, demonstration projects, and increased monitoring for projects already in process (USGAO 1999, pp.27-28). In 1999, the General Accounting Office (GAO) reported:

EPA estimated that for fiscal years 1994 through 1998, the agency obligated about $544 million to address nonpoint source pollution, with obligations of $119 million in fiscal year 1998. According to EPA, all states have approved nonpoint source control program that are helping to reduce nonpoint source loadings, increase public awareness, and improve
water quality. While the program’s funding was relatively stable during the 5-year period, its annual funding is significantly higher than it was in prior years. In fiscal year 1999, for example, $38 million was appropriated for the program” (p.28).

This suggests the National Nonpoint Source Program has significant (albeit not necessarily substantial) national support.

The 1987 amendments also established the Clean Water State Revolving Fund (CWSRF) under title VI of the Act (USGAO 1999, p.28). The CWSRF was established to “create, maintain and coordinate financial programs and partnerships to meet priority community water resource infrastructure needs, primarily those associated with wastewater treatment plants” (USGAO 1999, pp.28). This program allowed states to identify specific water pollution abatement infrastructure investment priorities. States, who matched 20% of national any dollars provided, were given funding to address wastewater management issues before other pollution problems (USGAO 1999, pp.28). The CWSRF provides for a regular recurring source of funding for programs that seek to address nonpoint sources of pollution. As states effectively reduce the varied causes and impacts of point source pollutants, the EPA expects a higher percentage of funds will be used to tackle nonpoint source pollution (USGAO 1999, p.29). It appears as if this has been the case. National dollars have generally increased over the life of the program. Figure 2.4 provides an examination of the increase in CWSRF dollars spent on nonpoint sources of pollution between the years of 1994 and 1998.
The effectiveness of the CWSRF to address NPS is still a matter of debate. Nevertheless, it does appear as if state and local governments are increasingly relying on national dollars to manage sources of nonpoint pollution.

The Clean Water Act, and its amendments, also contains numerous additional legislative components that seek to address nonpoint source pollution. Typically, these components include §§ 104, 106, 117, 301, 303, 314, 320 and 404 of the Act. For instance, §117 of the Clean Water Act established the Chesapeake Bay Program. The program “is a unique regional partnership involving many different constituencies, including federal, state, and local agencies; environmental groups; a citizens advisory group; and academia” (USGAO 1999, p.32). The Environmental Protection Agency “estimates that about $52 million was obligated to address nonpoint source pollution out of $101.4 million total program appropriations for fiscal years 1994 though 1998” (p.32).

Section 301 of the Act established the functional requirements of what has become known as the National Pollutant Discharge Elimination System (NPDES). The
NPDES program issues permits to all municipalities, construction sites, and some industrial sites that discharge pollutants into receiving waters. States were required to develop individual management plans utilizing best management practices (BMPs) to address point and nonpoint sources of pollution. These BMPs can include a variety of measures, including, in some instances, the design and utilization of systems such as settling basins, recharge basins, or tunnel and reservoir plans – each of which is intended to hold sewer and stormwater runoff until it can be purified (Broderick et al., 2002, p.12).

The Act established a “Total Maximum Daily Loads” (TMDL) requirement in §303. TMDL regulation sets restrictions on the total daily quantity of a given pollutant allowed to be present in any water body. These legal limits apply to many different forms of pollution, including sedimentation and siltation (Broderick et al., 2002, p.13).

Section 404 of the Clean Water Act was intended to provide considerable support to land and water restoration efforts that were impaired from the effects of farming and forestry practices within wetland areas (Broderick et al., 2002, p.13). It was established to combat programs associated with “fills for development, water resources projects (such as dams and levees), infrastructure developments (such as highways and airports), and conversion of lands for farming and forestry” (USEPA 2001, Ch. 2, p.6).

The EPA often works with other federal agencies/departments on programs addressing nonpoint source pollution. The Coastal Zone Act Reauthorization Amendments of 1990 provide another set of comprehensive standards which seek to address nonpoint source pollution levels. These standards are commonly known as the Coastal Nonpoint Pollution Control Program. Section 6217 of the Act, jointly administered by the EPA and the National Oceanic and Atmospheric Administration,
enlists states to address significant sources of nonpoint pollution impacting coastal waters, including the Great Lakes region. This program is more stringent in its state requirements insofar as it compels states to include specific descriptions of enforceable policies and mechanisms to ensure implementation (USGAO 1999, p.38).

Another joint project partnered the EPA and the USDA in implementing the 1997 Clean Water Action Plan, which included a group of 111 goals and initiatives intended to further the accomplishments of the Clean Water Act (Ribaudo & Horan, 1998, p.24). Several of these provisions deal specifically with polluted runoff control mechanisms, promoting conservation buffers, insurance provisions covering the financial risks for farmers who are using new technologies to manage nutrients and pesticides, and development of guidelines for animal feeding operations (USEPA, February 1998).

There are at least four additional programs that the Environmental Protection Agency relies on to manage discrete pollution. As the GAO (1999) indicates:

These include the National Wetlands Program (section 104(b)(3)); the Water Pollution Control, State and Interstate Program Support Program (section 106); the Clean Lakes Program (section 314); and the National Estuary Program (section 320). These programs accounted for $3.9 million in nonpoint-related obligations for fiscal years 1994 through 1998 (p.32).

However, there are also programs that do not fit directly under the auspices of the Clean Water Act, but still seek, in some form, to abate nonpoint sources of pollution.

The EPA relies on the Drinking Water State Revolving Fund (DWSRF) program to combat sources of nonpoint pollution. The DWSRF was established in 1996 “to help public water systems make infrastructure improvements in order to comply with national primary drinking water standards and to protect public health” (USGAO 1999, p.30).
Ultimately, the fund contains four “set-aside categories for which a state can choose to reserve” national dollars (USGAO, 1999, p.31). The GAO (1999) notes:

The local assistance and other state set-asides contain several nonpoint source-related activities. For example, source water protection activities, such as purchasing land as easements to reduce the likelihood of groundwater contamination, can help reduce the generation of nonpoint source pollutants. In addition, in fiscal year 1997, states could use this set aside to identify the areas around groundwater drinking water sources that must be protected to avoid contamination and the possible sources of contamination. EPA reported that 100 percent of the funds obligated for these activities, $111.8 million, should be considered as addressing nonpoint source pollution. In addition to providing funding to delineate and assess source water protection areas, the set-asides made available by the DWSRF Program provide states with funds to implement protection measures. These protection measures can address all sources of contamination, which may include nonpoint sources. EPA reports that the state program management and local assistance and other state programs set-asides are the ones most likely to be used for nonpoint source-related activities and can fund activities such as education, loans to public water systems for the purchase of land easements, and community tree planting (pp.31-32).

The effectiveness of the abilities of the Drinking Water State Revolving Fund to abate nonpoint source pollution goes largely unexplored.

Other Federal Mechanisms Addressing Nonpoint Source Pollution

While the Clean Water Act is viewed as the primary mechanism for abating diffuse pollution, several national agencies and departments, other than the EPA, devote significant resources to nonpoint source pollution abatement. These efforts are often indirect. For instance, the GAO (1999) reports:

Other federal agencies, however, have also made considerable investments in addressing the problem. USDA (United States Department of Agriculture) funding in particular has eclipsed EPA’s financial commitment by a significant margin….The 35 federal programs identified
by the agencies represent a broad array of activities, reflecting diversity in both the nature of nonpoint source pollution and the remedies needed to address it. Some programs are intended to deal directly with the problem….Other programs are primarily focused on other objectives but indirectly serve to address specific nonpoint source pollution problems. For example, Interior’s Abandoned Mine Land Program is intended to reclaim abandoned mines for health and safety reasons (e.g., to address dangers such as open mine shafts), but in doing so significantly addresses potentially contaminated stormwater runoff from these facilities. A further distinction among these programs is that some provide financial and technical resources to nonfederal entities to address nonpoint source pollution such as providing resources to farmers to implement certain land management practices, while other programs are focused directly on addressing such pollution on federal land (pp.25-26)

A summary of NPS-related expenditures indicates the United States Department of Agriculture (USDA) is the single largest spender for national NPS programs. USDA’s expenditures accounted for 81.2% of all NPS-related obligations between 1994 and 1998. The Department of the Interior spent 10.1% on NPS abatement activities, while EPA programs accounted for 8.1% of the total. The Departments of Defense (0.4%) and Interior (0.3%) also contributed to nonpoint source pollution abatement efforts (USGAO 1999, p. 26). Some of the major NPS abatement efforts and programs are found in these other departments.

There are several programs funded through the USDA that are fundamental to NPS abatement efforts. The Department’s “largest source of funding for nonpoint source pollution activities is the Conservation Reserve Program (CRP), which accounted for about 65 percent of all the federal funds identified….for fiscal years 1994 through 1998” (USGAO 1999, p.33). The program has several objectives, which seek to “reduce water and wind erosion, protect the nation’s long-term capability to produce food and fiber, reduce sedimentation, improve water quality, create and enhance wildlife habitat, and
encourage more permanent conservation practices” (pp.33-34). These efforts require farmers to remove land from the production process. The Conservation Reserve Program does not contain any specific nonpoint source pollution abatement strategies, but has “multiple indistinguishable benefits for water quality, water habitat, air quality, and erosion control” which USDA officials believes “should be considered as addressing nonpoint source pollution because all activities carried out under the program involve land use practices that help reduce nonpoint pollution” (p.34).

The USDA also maintains the Environmental Quality Incentives Program (EQIP), which combined several different existing conservation measures (p.35). EQIP is fairly similar to the Conservation Reserve Program. It does not require farmers to remove land from production. Instead, farmers are to “implement practices that minimize water quality impacts that allow them to continue to use the land” (p.35). The USDA argues “EQIP is intended to solely address nonpoint source pollution from farms and ranches” (p.35).

The USDA has identified 12 additional agricultural programs that seek to abate NPS (p.35). Many of these programs are remarkably varied. The GAO (1999) indicates “the environmental objectives of the programs vary, ranging from improving scientific understanding of the nature of the problem to direct efforts to reduce nonpoint source pollution” (p.35).

The Department of the Interior also manages various programs that attempt to reduce the impact of nonpoint source pollution. There are several agencies within the Department that deal with NPS. These include “the Bureau of Land Management, the Bureau of Reclamation, the U.S. Geological Survey, the U.S. Fish and Wildlife Service,
and the Office of Surface Mining Reclamation and Enforcement” (p.36). These agencies are involved in NPS efforts as a direct result of their primarily responsibilities, which include ensuring adequate supplies of water for drinking and agricultural purposes, protecting endangered species and wildlife habitats, and reclaiming resources impaired by mining activities (USGAO 1999, p.36).

The Office of Surface Mining Reclamation and Enforcement’s Abandoned Mine Land Program (AML) accounts for nearly 45 percent of Interior’s obligations from 1994 through 1999 (USGAO 1999, p.36). Pollution from abandoned mines constitutes a serious form of nonpoint source pollution. AML seeks to restore and reclaim “coal mine sites that were abandoned or left inadequately reclaimed before August 3, 1977” (p.36).

The Department of the Interior also operates 13 other programs that address nonpoint sources of pollution (USGAO, 1999, p.37). Many of the environmental objectives within these programs vary substantially. Some seek to directly reduce water pollution, while others attempt to restore water habitats or control long-term atmospheric conditions (pp.37-38).

The national government has several other entities that support nonpoint source pollution. For instance, the Departments of Commerce, Defense, and Transportation each have programs that address NPS. The National Oceanic and Atmospheric Administration manages the Coastal Zone Management Program, which spent approximately $23.8 million to reduce NPS between 1994 and 1998. The Department of the Army obligated $50.4 million between 1994 and 1998 to address NPS through its Integrated Training Area Management Program (USGAO, 1999, pp.38-39).
The sheer number of programs and efforts currently in place to address NPS points to the impact it has on our water systems. It also suggests that nonpoint source pollution is a pervasive problem for which successful abatement efforts remain elusive. Unfortunately, many of these failures are the direct result of the complexities inherent in the nature of nonpoint source pollutants.

*Identifying Nonpoint Source Pollution*

Nonpoint source pollution, by its very nature, is a multifaceted problem. NPS enters water sources in a diffuse manner, it may do so from an equally diffuse number of sources that are characteristically the result of some type of human activity. Five particular categories/types of activities have been demonstrated to create nonpoint sources of pollution, thereby limiting our nation’s ability to obtain “fishable” and “swimmable” waters (Clean Water Act, §101(a), U.S.C., Volume 33, 125 1(a)). These include agricultural, urban, industrial, mining, and forestry (or silviculture) practices (http://www.epa.gov/owow/nps/categories.html, June 9, 2006). Each of these forms of nonpoint source pollution is remarkably different, which lends itself to the complex patchwork of policies and practices employed to pursue abatement strategies. The intricacies and differences associated with each source of nonpoint pollution have led to the unique patchwork of programs and efforts discussed in the preceding section. The following sections attempt to identify some of these intricacies.

*Nonpoint Source Pollutants and Agricultural Activities.*

Agricultural nonpoint pollutants are arguably the most harmful source of water pollution that impact our water systems (USGAO, 1999, p.4; Eschwege, 1979, p.2). This
form of NPS is particularly problematic because it is the result of a necessary and fundamental human activity – that of growing and supporting food supplies and livestock. Farms require the existence of large amounts of open land. Crop growth often involves the application of various chemicals, including fertilizers and pesticides. Farmers also typically rely heavily on the use of irrigation systems to ensure crop growth. Agricultural pollution may also be the result of animal wastes that have not been properly disposed of or managed. Each of these can contribute to the spread of nonpoint sources of pollution (USEPA, February 1998). Agricultural pollutants often include nutrients (such as nitrates, phosphorous, and potassium), pesticides, and sedimentation (USEPA, February 1998; Eschwege, 1979, p.2). Unfortunately, these pollutants, which are often an integral component in the fertilization of crops (or the maintenance of animal husbandry practices), are particularly problematic insofar as the presence of open land areas and irrigation systems allow for agricultural pollutants to be transported across vast geographic areas. Ribaudo (2001) says, “the characteristics of [agricultural] nonpoint source pollution vary over geographical space, due to the great variety of farming practices, land forms, climate and hydrological characteristics found across even relatively small geographical areas” (p.135).

Agricultural NPS can cause numerous environmental problems. Many of these problems stem from agricultural runoff, which often contains nitrates or other nutrients that contaminate surface and ground waters. Agricultural runoff containing these nutrients can lead to a process known as “cultural eutrophication” (Horne & Goldman, 1994; MADEP, 2001; USEPA, November 2001). When nutrient levels within a water body are increased as a result of nutrient loading, aquatic life begins to grow more
quickly. This may lead to greater competition for food. In the long run, the normal, but weaker aquatic life forms die, while others like algae and bacteria flourish. Algae and bacteria increasingly occupy the water body. This leads to changes in the water’s temperature, which has the effect of reducing fish populations. The disappearance of fish leads to an increase in insect and larvae populations. Changes caused by nutrient loading may have the effect of altering the integrity of local ecosystems, and can render a water body unsuitable for human uses (Horne & Goldman, 1994; MADEP, 2001; USEPA, November 2001).

The application of pesticides in agricultural processes also contaminates water resources. This process has increased greatly over the past sixty years. In the mid-1960s, approximately 182 million kilograms of pesticides were applied to US cropland, but by 1996, approximately 410 million kilograms were applied (Ritter, 2001, p.112). The degree of damaged caused by pesticide application depends on toxicity (the degree to which a substance may harm or kill wildlife) and persistence (the tendency of a substance to remain in the ecosystem) (p.112). A chemical that is not highly toxic but highly persistent may still have a profound impact on the environment as water concentrations escalate over time (Broderick et al., 2002, p.3).

Sedimentation from soil erosion also constitutes a major form of agricultural NPS. Some soil erosion occurs naturally. The process is usually slowed through the presence of ground vegetation. Ground vegetation helps guard against the erosive effects of rain and wind. Unfortunately, many heavy farm activities, such as plowing, stripping crops from large open areas during harvest, irrigation, and the trampling of ground by livestock may promote soil erosion. Eroded soil may be transported to local water bodies through
runoff or as a result of the wind, where it is deposited as sediment (USDA, April 1996; Broderick et al., 2002, p.4).

Sedimentation poses two distinct threats to water systems. First, sediment may become suspended in a water body. This suspended sediment, which is commonly called turbidity, can reduce water clarity, block sunlight to aquatic plants, and subsequently change water temperature. Turbidity may even have the effect of suffocating fish species. Heavier sediment can be deposited on the bottom of a water body. These deposits have the potential to dramatically alter the shape and flow of a particular water body, rendering it unsuitable for human navigation. It also increases the likelihood of flooding, and may shorten the useful life of manmade structures such as dams. A second threat related to sedimentation is linked to water runoff. Various substances may come into contact with, and cling to, transported sediment. These substances, which may include toxins, can be carried for miles in runoff. Any pollutants carried along with the sedimentation may wreak havoc on the normal flora within an ecosystem (Horne & Goldman, 1994; MADEP, 2001; Broderick et al., 2002, p.4).

*Nonpoint Source Pollutants and Urban Activities.*

Urban runoff constitutes the second largest source of NPS (USGAO, 1999, p.4; USEPA, 1994a; Eschwege, 1979, p.2). Its effects on our nation’s water systems are quite severe. Urban runoff is estimated to affect anywhere from five percent to fifteen percent of waters assessed in the Water Quality Inventory (USEPA, June 2000). Urban NPS is particularly problematic because pollutants may be transported directly into a receiving water body through man-made structures, such as sewer overflow pipes. These pipes
may not provide appropriate filtration. Without filtration urban pollutants, which are remarkably varied and can include sediments, pathogens, road salts, fertilizers/nutrients, hydrocarbons, and metals, may be dumped untreated into local water bodies (USEPA, November 2005, pp.28-34). These pollutants are harmful as a direct result of the unique nature of urban structures (Broderick et al., 2002, p.5).

Pavement and compacted areas, roofs, and reduced tree canopy and open space increase runoff volumes that rapidly flow into our waters. This increase in volume and velocity of runoff often causes stream bank erosion, channel incision and sediment deposition in stream channels. In addition, runoff from these developed areas can increase stream temperatures that along with the increase in flow rate and pollutant loads negatively affect water quality and aquatic life (http://www.epa.gov/owow/nps/urbanmm/index.html#08, June 9, 2006).

The likelihood that urban pollutants will be dumped into a local water body depends heavily on the type of storm water sewer system used within a particular area. There are two types of sewer systems in the United States. In cities that use Municipal Separate Storm Sewer systems, known as MS4 storm sewers, only storm runoff is carried through the system until it is eventually discharged into a body of water. Combined sewer operations, however, carry wastewater and storm water runoff to water treatment plants. This system allows the storm water runoff to be subjected to the same filtering and chemical treatments as the sewage waste water before they are introduced into receiving waters (USGAO, June 2001, p.6). If wastewater and storm water exceed the limitations of a particular combined sewer system, a problem identified as combined sewer overflow (CSO) occurs. Excess unfiltered water is diverted directly to the receiving water bodies (p.9). The resulting untreated storm water runoff and raw sewage can create a host of sanitation and health concerns (Broderick et al., 2002, pp.5-6).
Nonpoint Source Pollutants and Industrial/Mining Activities.

Most industrial nonpoint sources of pollution can be divided into two separate categories, which typically include manufacturing and resource extraction activities. These sources of nonpoint pollution occur when industrial and manufacturing facilities release toxic pollutants, such as nitrogen, into the atmosphere or as runoff into water bodies. Many of the point source pollution efforts of the CWA significantly reduced industrial sources of pollution dumped into water systems. Those industrial pollutants that are released into the atmosphere may still be picked up by wind currents and travel for long distances before they are washed out of the air by precipitation, deposited onto the soil, and carried through runoff into nearby water bodies and groundwater systems. This form of pollution typically falls under the auspices of the Clean Air Act. However, once these pollutants are deposited into water bodies, they are as treated as nonpoint sources of pollution (USGAO, July 2005, pp.12-14; Broderick et al., 2002, p.6).

Admittedly these forms of pollution have been greatly reduced through point source efforts and the Clean Air Act. Nonetheless, certain areas such as the Great Lakes region are prone to higher levels of contamination as a result of heavy local manufacturing industries (USGAO, July 2005, p.12). These include iron ore mining, pulp and paper mills, oil refineries, steelmaking facilities, and coal-fired power plants. Such industries release toxins, including mercury and dioxin, which constitute serious forms of nonpoint pollution. Mercury and dioxin are transmitted to humans primarily through fish consumption (p.12). A process known as bioaccumulation can leave fish with a mercury concentration over a million times higher than surrounding water. More
than 50,000 bodies of water across 40 states contain fish with mercury levels high enough that health agencies warn people ingesting them (http://www.nwf.org/lakesuperior/pollution.html, April 17, 2002).

Although manufacturing processes contribute significantly to industrial sources of NPS, resource extraction activities (i.e. various forms of mining) are far more harmful. Abandoned strip mines provide the greatest impact insofar as these mines leave large sections of land without soil or vegetation. Strip mines may also contain residual materials left behind from the mining operation. However, any mining operation creates an increased risk of pollution through sedimentation and acidic mine drainage. Acidic mine drainage (AMD) forms when runoff flows through a mine’s pit walls or spoil piles and comes into contact with sulfur-bearing materials. When exposed to oxygen, a chemical reaction occurs among these materials and sulfuric acid is produced. AMD may then seep into groundwater or leach into nearby water bodies. This can change the pH of the water, thereby drastically altering an ecosystem and killing any normal flora. Acidic mine drainage is typically similar in composition to acid rain, but, because of its concentrated nature, it can be far more hazardous (http://www.epa.gov/region3/acidification/what_is_amd.htm, June 9, 2006; http://www.onenet.net/~naamlp/, March 26, 2002; Broderick et al., 2002, pp.6-7).

*Nonpoint Source Pollutants and Silviculture Activities.*

While there are many forms of nonpoint source pollution, those associated directly with forestry practices are fairly limited and tend to overlap with agricultural, urban, and industrial sources of nonpoint pollution. Forestry-related nonpoint source
pollution can be brought about by any number of behaviors, including logging, which both compacts and loosens soil, burning (both prescribed and unintentional), road construction and use, site preparation and forest regeneration, and forest chemical applications. These processes can lead to an increase in erosion, changes in nutrient levels due mainly to burned or decaying organic material, water temperature increases, reliance on fertilizers and pesticides, evaporation of harmful chemicals, stream runoff and channeling, and droughts or floods (Wisconsin DNR, 2002; USEPA, February 2001).

The principle pollutants stemming from silviculture activities are similar to those released by agriculture activities, including sediment, nutrients, and pesticides. Concerns usually focus around variations in the hydrological cycle, which can have a number of impacts on the overall quality of water systems. The health of these waters can be further influenced by changes in shade along shorelines and banks, the invasion of carbon and nutrients in aquatic environments, organic debris inputs, and alterations in basic flow patterns. Such changes can lead to the degradation in the overall quality of water systems and ecosystem dynamics, which may result in substantial shifts in local plant and animal populations (USEPA, February 2001).

Nonpoint Source Pollution: Current Policies

The problem of diffuse pollution is neither clearly defined nor explicitly limited in its impacts. Nonpoint sources of pollution can substantially decrease water quality levels, the overall health of ecosystems, and the well-being of the people who use, or rely on, these impaired waters. The consequences of these impacts can be disastrous. Nevertheless, nonpoint source pollution is extremely difficult to trace and measure,
particularly insofar as NPS indiscriminately transcends jurisdictional boundaries. This makes it difficult to attach individual (be that personal, corporate, or governmental) responsibility to the activities that result in the creation of these pollutants. Several national public policies have emerged to address the various forms of NPS and these same issues. An examination of these efforts is imperative to successfully analyzing the federal system under which NPS efforts are pursued.

*Agricultural Nonpoint Source Pollution Policies.*

Many of the agricultural efforts pursued over the past forty years have focused on the impact of soil erosion on the environment. These efforts were not originally linked to nonpoint source pollution. Instead, they sought to conserve soil on vulnerable farmlands. The federal government enacted several programs designed to reduce the causes and impact of soil erosion on farmlands in the years following the Great Depression. At the same time farmers were increasingly using new intensive techniques on larger land areas. Unfortunately, many of these efforts proved inadequate. The Food Security Act of 1985 offered the first comprehensive effort to mitigate the effects of soil erosion and nonpoint source pollutants (USGAO, April 2003; Broderick et al., 2002, pp.19-20).

The Food Security Act was intended to provide a series of multifaceted programs that focused on soil erosion efforts. Prior to its enactment, a significant amount of debate centered on the creation of what has become known as a “sodbuster” provision in the bill (CQ Weekly, 1985). The purpose of this measure was to require that farmers take certain proscribed environmentally friendly steps to reduce agricultural pollution. Failure to take
these steps would result in the loss of government farm subsidies (Broderick et al., 2002, p.20).

The hearings also contained a significant amount of discussion concerning the creation of a new subsidy program, which eventually became known as the Conservation Reserve Program (CRP). CRP would create stronger incentives for farmers to engage in conservation practices. The Conservation Reserve Program (CRP) would pay farmers for removing highly erodible cropland out of production. The program would also pay farmers for planting cover crops on rented lands (CQ Weekly, 1985).

Both of these provisions, as well as the sodbuser measure, were ultimately included in the final draft of the Food Security Act. Shortly after its enactment, it became apparent that CRP was more effective than its predecessors. Still, there were lingering questions about its ultimate efficiency (Cloud, 1990). There was growing evidence that CRP was increasingly being used to subsidize land that did not meet the goals of the program. Few farms who could meet the requirements of the program. There were also several concerns about the sodbuser efforts. Many individuals argued that the national government failed to adequately enforce the policy (Broderick et al., 2002, p.20).

The USDA made substantial changes to the CRP during a series of revisions in 1990 and 1991. These new rules altered the language and, more importantly, intent of the CRP. The revisions moved towards the notion that croplands in an environmentally sensitive area could qualify for a CRP subsidy (Broderick et al., 2002, p.21). This movement, while far less stringent than the 1985 requirement, marked an increased focus on conservation strategies as an effort to abate environmental damage. Unfortunately, as time has passed, it appears as if the 1990 and 1991 amendments have led to redistributive
consequences that have focused much of the CRP subsidies in the Great Lakes region (Hosansky, 1995). Nevertheless, as the GAO (1999) notes, the CRP remains one of the most substantial nonpoint source programs in the nation (p.33).

The national government passed the Federal Agricultural Improvement and Reform Act in 1996. The provisions of this act effectively ended the sodbuster measures, furthered the focus on soil erosion, and increased state and local involvement in agricultural NPS policy (CQ Weekly 1996). It established the Environmental Quality Incentives Program (EQIP). This program provides incentive payments to farmers who institute agricultural best management practices (BMPs) that address environmental, including water, measures. EQIP further required states to draft water quality improvement plans that tackled environmental shortcomings in their current systems. It provided states with water quality improvement plans with technical and financial assistance in pursuing efforts to help meet their goals. The relative success of EQIP led to another series of changes to the Conservation Resource Program (Broderick et al., 2002, pp.21-22).

CRP was once again expanded in 1997. The new criteria created the Conservation Reserve Enhancement Program (CREP). This program was initially introduced as a pilot program with the State of Maryland (Smith, 2000, pp.16-20; USDA, 2000), and later as a national effort. This effort sought to join state initiatives with the Conservation Reserve Program measures. It allowed for “participants who enroll their land with a set level of cost sharing, the same signing incentive payment as for ‘continuous’ signup CRP enrollees, an annual land rental rate, and an annual land
maintenance payment” (Smith, 2000, p.16). Simply, the Conservation Reserve
Enhancement Program is “a distinct program that uses CRP authorities to operate” (p.16).

Many of the questions and debates that arose over the years in the development of current agricultural NPS policy are still being resolved. Many of these focus on the appropriate distribution of funding, particularly in terms of determining the level to which national dollars should be spent subsidizing soil erosion or water quality efforts. Because of the high costs associated with environmental subsidies, there have been numerous attempts in Congress to move funding for these programs from the realm of discretionary spending towards a formula-based system. Given the financial strain the national government is currently facing, there are regular debates proposing cuts in NPS-related agricultural programs (Broderick et al., p.22).

_Urban Nonpoint Source Pollution Policies._

National policies focusing on urban runoff have two distinct goals. The first goal seeks to prevent runoff by ensuring urban areas maintain spaces that promote ground infiltration. While this goal is not explicitly stated in most of the policies concerned with urban NPS, it is an implicit justification for park areas, and other “no build” easements or spaces (USEPA, November 2005, p.3-10). The second goal focuses on treating urban runoff so as to minimize its effects on receiving water bodies (USEPA, June 2001). These goals are the result of a series of historical movements which began with Clean Water Act and the National Pollutant Discharge Elimination System (NPDES).

The Clean Water Act of 1972 established the functional requirements for National Pollutant Discharge Elimination Systems (NPDES) programs. These early efforts
focused almost entirely on point sources of water pollution. The 1987 amendments to the
Clean Water Act furthered the development, and broadened the responsibilities, of the
NPDES programs to include a focus on nonpoint source water pollutant contributors
through the Storm Water Phase programs. These included the 1990 Storm Water Phase I
initiatives and the 1991 Storm Water Phase II efforts. Both are NPDES programs that
issue permits to all designated municipalities, construction sites, and industrial sites that
discharge pollutants into receiving waters, who have implemented best management
practices to reduce pollutant loadings in local water systems (USGAO, June 2001, Ch. 0,
pp.7-12; Broderick et al., 2002, p.23).

In order to qualify for a NPDES permit, a local entity or industry must
demonstrate that its best management practices are successful. A successful BMP should
cover six distinct topics, including (1) public education and outreach on storm water
impacts, (2) public involvement and participation, (3) illicit discharge detection and
elimination, (4) construction site storm water runoff control, (5) post-construction storm
water management in new development and redevelopment, and (6) pollution prevention
and good housekeeping for municipal operations
EPA has compiled a list of accepted best management practice that local governments
and other entities may use. These localities and industrial entities can also design their
own BMPs, so long as it is effective and meets the six criteria established (Broderick et

The Storm Water Phase amendments have added substantially to many of the
early NPDES efforts. Storm Water Phase I addresses the sewer systems of medium and
large urban areas, as well as any construction activities that affected at least five acres of land and ten distinct types of industrial activities. Storm Water Phase II applies to the sewer systems of small urban areas and construction activities affecting less than five acres of land. Any operations that had an NPDES permit prior to the Storm Water Phase programs could be eligible for a waiver from the new permits if those operations meet certain design criteria established by the EPA or if the operation can prove that all machinery, materials, and procedures are protected by a storm water resistant shelter that prevents runoff (USGAO, June 2001; Broderick et al., 2002, pp.24-25).

A cooperative effort allowing selected states to issue their own permits has eased the administrative workload of the EPA. It has also created more flexibility within the states to individualize their watershed protection efforts and BMPs. Failure to comply with NPDES and Storm Water Phase programs is punishable by fines and civil or criminal proceedings. Agencies and facilities holding NPDES permits are required to periodically test their water quality, and to report the results of those tests to the EPA or an identified state regulatory agency. Both state agencies and the EPA have the right to conduct random compliance inspections. Because the results of these compliance checks are public information, concerned citizens can monitor compliance as well. The Storm Water Phase programs further required all previously identified municipal operations, construction sites, and industrial activities must be in compliance with the Storm Water Phase I and II regulations and have a valid NPDES permit by March 3, 2003 (USGAO, June 2001). Several state and local governments failed to meet this deadline. As such, it was postponed until June 12, 2006 (http://www.epa.gov/fedrgstr/EPA-WATER/2005/March/Day-09/w4467.htm, June 9, 2006). Whether this delay has
allowed state and local governments to meet compliance standards is unknown at this
time (Broderick et al., 2002, pp.24-25).

Consequently, the BMPs utilized by permit holders are remarkably varied. Many
of these practices seek to alleviate urban NPS problems by creating standards for the
structural design of water basins, and other runoff systems, that allow for better pollution
management. Some of these BMPs also contain other structural modifications that may
allow for polluted waters to be diverted to treatment facilities before being released in
local water systems (USEPA, November 2005; Broderick et al., 2002, pp.23-24).

In spite of the efforts undertaken as a direct result of the NPDES, several local
governments still rely on the use of various types of water basins that fail to protect the
overall quality of their waters. These typically included either settling or recharge basins.
Settling basins, which are also known as retention or detention basins, are designed to
slow the current of potentially polluted water. This allows for pollutants and sediment to
“settle” on the bottom of the water basin. After a period of time, the bottoms of these
basins must be cleaned to provide space for pollutants and sediments to be deposited.
Settling basins are rarely effective. In comparison, the recharge basin, which may be
classified as either wet or dry depending on the location of ground water sources,
essentially holds water until it seeps into the ground. This process is intended to separate
water from pollutants and sediment. Recharge basins may result in the contamination of
ground water or drinking water sources (USGAO, June 2001; Broderick et al., 2002,
p.24).

There have been other efforts to develop improved urban water pollution control
systems. One of these is the TARP, or tunnel and reservoir plan, which is used by the
City of Chicago. TARP systems rely on an elaborate series of underground tunnels, treatment facilities, and holding basins which are designed to capture runoff and sewage overflow until it can be treated. These systems may also help alleviate some of the impacts generally associated with flooding. The TARP system is expensive to develop, putting it beyond the reach of many smaller local governments. Still, the benefits of the TARP system may balance out the costs. Unfortunately, many of the early NPDES efforts failed to explicitly address nonpoint source pollution (USEPA, 1999; Broderick et al., 2002, p.24).

The NPDES and Storm Water Phase programs are not the only efforts the EPA has taken towards addressing urban sources of nonpoint pollution. According to the GAO, the majority of urbanization has continued along coastal areas (USGAO, 1999, pp.38-39). Areas that meet the requirements of the Coastal Zone Act Reauthorization Amendments of 1990, which focus on the sources of nonpoint source pollution in coastal areas, are not required to also be in compliance with Section 402(p) of the Clean Water Act. The Coastal Zone Act Reauthorization Amendments are typically perceived as stricter on pollutant loading than the NPDES program (USGAO, 1999, pp.38-39; Broderick et al., 2002, p.25).

One of the primary problems associated with the NPDES program and the Coastal Zone Reauthorization Act is that redesigning sewer systems is often too costly for many local governments. State revolving funds are available in certain circumstances, but federal funding is limited at best. It is estimated that at least $150.9 billion is necessary to help localities upgrade or maintain their water systems (USGAO, November 2001, p.3; Broderick et al., 2002, pp.25-26).
Industrial and Mining Nonpoint Source Pollution Policies.

Industrial pollution typically falls under the control of point source efforts. These activities do lead to nonpoint sources of pollution – particularly in the Great Lakes region. As such, the national government has pursued a variety of efforts in this area to reduce pollution. These efforts are commonly known as the “Great Lakes Initiative” (USGAO, July 2005). The Great Lakes Initiative has created a partnership with the national government, particular US states, and Canada in a collaborative effort to abate pollution in across the Great Lakes region. Unfortunately, the Great Lakes Initiative “has limited potential to impact overall water quality” and is focused primarily “on point sources which are not the major source of many toxic pollutants” in the region (USGAO, July 2005, p.12). This is partially the result of the fact that “nonpoint sources of pollution are more difficult to regulate than point sources because it is more difficult to determine the specific sources of pollutants” (USGAO, July 2005, pp.112-113). This difficulty is heightened by the political tensions that exist among the collaborative partners. Because industrial nonpoint source pollution abatement strategies are largely subject to international efforts (or under the auspices of the Clean Air Act in the United States), further discussions will focus only on mining and resource extraction efforts.

While some provisions of the Clean Water Act attempted to develop practices that would reduce the impact of mining activities, the Surface Mining Control and Reclamation Act of 1977 (SMCRA) reflected a stronger governmental commitment towards the reduction and prevention of pollution from mining sources. SMCRA provisions regulated both active mines, which are typically considered point sources of pollution, and abandoned mine lands, which are a leading cause of nonpoint source
pollution. The Act sought to regulate current and abandoned coal mines by creating programmatic control and reclamation measures that would set environmental guidelines for coal operators, while also ensuring the existence of uniform guidelines for federally-aided state control and reclamation programs. Congress amended the SMCRA in 1990 setting aside 10% of Abandoned Mine Land Trust funds to use in efforts to abate nonpoint source pollution from acid mine drainage (OSM, January 2003; OSM, 2003; Broderick et al., 2002, p.26).

Coal mining industries are one of the nation’s oldest, most prominent, and outspoken industries. These industries are concentrated in regions of the country like the Rocky and Appalachian Mountains, which include states such as Pennsylvania, Kentucky, Tennessee, Alabama, West Virginia, Pennsylvania, Colorado, Montana, and Wyoming. Although many of these states enacted laws to address pollution resulting from coal production (the first being West Virginia in 1939), concerns specifically regarding nonpoint source pollution were not introduced into legislation until the 1980s. Many mining states had passed land and water reclamation acts through the state legislatures during the late 1960s and early 1970s. Regulations and standards differed widely from state-to-state. The discrepancies between state initiatives raised questions as to fair competition and the overall effectiveness of state efforts. For instance, Pennsylvania had strong, strictly enforced surface mining reclamation laws, while Kentucky’s laws were weak and poorly enforced. The differences in these standards allowed Kentucky coal minors to avoid reclamation costs, thereby making them more competitive and profitable in the coal market (OSM, 1999). Based on the economic consequences associated with enacting stronger environmental legislation, coal
companies were notorious for exerting pressure on state legislatures to ensure mining regulations remained weak and under-enforced. Adding to these factors, state budgetary and staffing resources were scarce, and, consequently, enforcement by inspectors was difficult to carry out and measure (OSM, 1999; Broderick et al., 2002, pp.26-27).

Eventually, increased criticism of these state-based industrial and environmental regulations led the national government to become involved in mining practices. Proposals for workable surface mining legislation began to emerge around 1971. Congress initially drafted several bills that mirrored the Pennsylvania Land and Water Reclamation Act of 1967. Serious debate ensued over issues concerning the proper role of state and federal regulatory efforts, implementation requirements and deadlines, unemployment concerns, and the overall practicality of the Act given the current energy crisis the nation faced. After seven years of legislative maneuvering, the Surface Mining Control and Reclamation Act became law in 1977 (OSM, 1999; Broderick et al., 2002, p.27).

Even after the bill was enacted the debate continued between the national and state governments. These debates delayed the start of the SMCRA, and eventually caused members of Congress to agree that the bill would be reviewed every 1-2 years (USHR, 1978; OSM, 1999). This has resulted in continued criticism and debate over the course of the initiative (Broderick et al., 2002, p.31). In fact, Robert Bamberger of the Congressional Research Service, notes that many of these political tensions have led to reauthorization issues concerning the balance of regulatory authority between the states and national government. These issues are currently up for debate in the Congress (CRS, March 2005).
While the EPA admits that forestry practices are not the most significant source of impairment to our nation’s water supply, they remain a substantial concern insofar as water quality and the resources associated with aquatic environments are integral to the welfare of the United States (USEPA, February 2001, p.0-1). Any discussion concentrating on the extent of forest-related concerns must begin by noting that these issues are often highly dependent on geographical differences across the nation. Certain locations contain larger forest populations than do others. Practices directly related to forestry activities in these areas maintain a greater environmental bearing. For example, the EPA notes, “nine states list silviculture as a leading source of impairment to rivers and streams” (USEPA, 2001, p.1-1). Therefore, although forestry practices may not be of much concern to a large part of the nation, certain areas are exceedingly dependent on environmental protections to ensure the quality of the water supply in these locations. The EPA has pursued a number of different practices intended to moderate the effects of nonpoint source pollution caused by silviculture activities on surface and ground water systems in these areas, as well as across the nation.

The main goal of national forestry-related nonpoint source pollution programs is to foster a sense of individual stewardship. These programs are intended to cause private citizens to choose to engage in practices that will protect the welfare of forest areas. By accomplishing this objective, the national government further hopes that a significant number of water bodies will be protected in forest areas. This stance is the result of the general ownership of our nation’s forests. Only 29% of our forests are publicly owned. Private individuals and businesses own the other 71% (Smith, 1997, p.2). As such, the
national government lacks a great deal of control over the land use practices in these privately owned areas. The government has pursued a number of legislative attempts to regulate practices within its jurisdiction.

Five separate legislative efforts have affected forest-related nonpoint sources of pollution. These include the Costal Nonpoint Source Pollution Program, §319 of the Clean Water Act, the National Estuary Program, §404 of the Clean Water Act, and §303 of the Clean Water Act. Each has substantially impacted the development of silviculture NPS practices (USEPA, February 2001).

Congress enacted the Costal Nonpoint Source Pollution Program in November of 1990. This program required states to develop NPS systems that met certain criteria established by the Environmental Protection Agency and the National Oceanic and Atmospheric Administration. The purpose of this act was to “strengthen the links between federal and state costal zone management and water quality programs and to enhance state and local efforts to manage land use activities that degrade costal waters and habitats” (USEPA February 2001, p.1-5). While the act failed to directly address any issues related to silviculture, the subsequent criteria established by the EPA led to the development of such practices. These standards must be viewed in relation to other efforts pursued as a result of the Clean Water Act Amendments of 1987.

The Clean Water Act of 1987 set forth a number of standards under which the national government sought to develop several nonpoint source pollution strategies. For example, §319 of the act sought to direct greater attention to NPS. It stated that it was “the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this
Act to be met through the control of both point and nonpoint source pollution” (USEPA, February 2001, p.1-6). The most important aspect of this section was that it enabled the EPA to administer grant monies to states and regions in an effort to meet these objectives.

Section 320 of the Act established another important program key to monitoring NPS, which, as has been mentioned, is known as the National Estuary Program. This program allowed the EPA to work within various geographical areas to develop prioritized management and conservationist practices. It was hoped that this program would allow the EPA to pursue practices in certain specific locations that would aid in remedying substantial water quality concerns (USEPA, February 2001).

Similarly, §404 of the Act was intended to provide direct and substantial impacts on certain farming and forestry activities in wetland areas that led to nonpoint sources of pollution. It was further meant to combat various problems associated with, among other practices, forestry activities (USEPA, February 2001, p.1-6). The program developed and translated criteria used to issue permits, determine geographic regions of jurisdiction, and to oversee state actions and decisions. It also allows for a number of exemptions involving ongoing forestry projects or developments. These exemptions have limited the overall effectiveness of any attempts to abate NPS in these areas.

Finally, Section 303 of the Clean Water Act set forth Total Maximum Daily Load (TMDL) allowances. Total Maximum Daily Loads refer to legal limits placed on the total daily quantity of a given pollutant allowed to be present in any water body. These allocations create a scope, accounting for both point and nonpoint sources of pollution, in which a body of water is maintained safely. Safety, in this sense, is determined by protecting the “beneficial uses” of the water body, which include fishing, drinking,
swimming, and ability to support life. The requirement establishes a basis for limiting sedimentation and siltation, which are the main causes of forest related NPS. Within the context of laws such as these, the federal government and the EPA have continually sought to establish fundamental protections for local water supplies that might otherwise have been damaged by forestry activities (USEPA, February 2001).

These legislative attempts have translated into a number of programmatic efforts, which seek, as was mentioned earlier, to foster a greater sense of stewardship within forest areas. Several programs have been instituted to help develop this sense of stewardship. The main programs established are known as the Logger Education to Advance Professionalism (LEAP), the Forest Legacy Program, the Forest Stewardship Program, and the Stewardship Incentives Program. LEAP attempts to teach loggers best management practices. The last three of these efforts are directed towards private land owners. Basically, the Forest Legacy Program seeks to protect the deforestation of private forests. The Forest Stewardship Program attempts to help private forest owners develop plans to promote the sustainability of these areas. Finally, the Stewardship Incentives Program creates a federal cost-sharing program that allows private forest owners to enact sustainability goals (USEPA, February 2001, p.2-19).

Each of these programs are the result of collaboration on the part of Congress, the Department of Agriculture, the Bureau of Land Management, the Forestry Service, the military, the Atomic Energy Commission, and a variety of legislative organizations, such as National Association of Manufacturers, who sought to ensure the protection of the Regulatory Flexibility Act (RFA) and the Small Business Regulatory Enforcement Fairness Act (SBREFA). These groups have managed to designate approximately $9.4
billion directly to the Forestry Service, along with the Department of Agriculture for NPS-related programs (USEPA, February 2001, p.2-19).

The current efforts put in place to abate nonpoint source silviculture pollution are remarkably different. Each includes some type of best management practice requirement (USEPA, February 2001, p.2-19). These practices often refer to a specific type of legislative or regulatory requirement established as a result of certain abatement efforts which have been found to be relatively effective at meeting their overall objectives. They create groups of management measures applied in a systematic manner to realize some greater goal or objective. Such measures are integral to forest-related NPS abatement efforts.

In spite of the differences between these programs, each has very straightforward management objectives. These measures are intended to control the entry of pollutants into water systems. The procedures enacted often establish technologically based requirements, while also setting forth the particular actions one must follow in order to meet these standards. These measures are often established based on a variety of different factors, including “the amount of pollution prevention or pollutant removal anticipated, the ease of implementing the practice, how much maintenance it will require, its longevity, the willingness of landowners to implement the practice (in a program of voluntary implementation, for instance), and its cost and cost-effectiveness” (USEPA 2001, p. 2-20). Each management measure also typically addresses only a single pollutant or activity. Unfortunately, such practices cannot effectively control pollution levels due to the incredible variety of activities that create silviculture pollutants. These measures are often most effective when combined across a series of similar BMPs that
address different sources of pollution. It also appears as if site-specific BMPs provide the greatest protection for any given area. Therefore, BMPs often vary from location-to-location.

Best management practices entail a significant amount of oversight in order to be effective. It has been found that considerable attention must be given to a variety of factors to ensure the quality of the system. Careful assessment of the criteria used to determine the standards for the system is necessary to make certain that the overall integrity of the management measure is guaranteed. An awareness of other BMPs will help ascertain the effectiveness of any single practice. These practices may also require an assessment of the efforts followed to establish and maintain the BMP, which has been linked to the ultimate successfulness of a practice. Finally, management measures must take into account the various geographic, financial, environmental, and political factors unique to each state, or area, in which such procedures are enacted. Therefore, states, as well as individual people and entities, often rely on an assortment of programs or practices to develop any forest-related NPS standards. Because these programs are primarily focused on establishing a sense of stewardship, rather than actually mandating BMPs for local areas, best management practices may not be enacted [appropriately] on many private lands. Because forest-related activities can create a substantial amount of pollution, and in particular nonpoint source pollution, these cooperative programs leave much to be desired.
General Evaluation of Nonpoint Source Pollution Policies

The sheer complexity of our nation’s nonpoint source pollution abatement efforts is indicative of many of the problems inherent within our national water pollution strategies. Many of the shortcomings found within these efforts are magnified by the uniqueness of each type of pollution. Individual abatement policies are often prone to the same types of shortcomings. An evaluation of these shortcomings provides insight into the overall systematic failures of our current national NPS efforts.

Evaluation of Agricultural NPS Policy Efforts.

Although the Conservation Reserve Program (CRP) and Conservation Reserve Enhancement Programs (CREP) appear to have positive effects on overall water quality, there are problems. In testimony before Congress in 1994 and 2000, program administrators and farming community representatives raised a number of concerns about the manner in which these agricultural programs are run. These concerns also addressed several of the unintended consequences these programs may have in local areas (USHR, 1994; USHR, 2000). Many of these concerns present the reasons for which many policy analysts today have become dissatisfied with the overall performance of CRP and CREP (Broderick, 2002, p.38).

Perhaps the most troubling of the reports involves the effect that CRP has on farming economies. As stated in chapter one, one of the conditions for obtaining a CRP contract is taking cropland out of production, often for as long as 15 years. This type of shutdown can have far reaching effect on those members of the community that depend on cropping for their livelihood. Temporary farm workers, equipment rental companies,
supply stores, and a several other interests all are adversely affected when their primary sources of business are lost as a result of the CRP. This problem is particularly acute in certain areas across the country (Broderick et al, 2002, p.39).

Another common criticism of the CRP and CREP was that they are too easy to manipulate. Standards for the types of land parcels that qualified for enrollment have been sufficiently vague enough that environmental interests might be displaced by other profit-making enterprises. For example, in some Southern states farmers were asked to plant filter strips containing trees on areas of their property as part of their CRP agreements. Some farmers harvested these trees for lumber and paper. Consequently, the national government subsidized farmers to turn parts of their property into tree farms, and lost the ultimate benefits of the CRP efforts. These ambiguous qualifications have significantly hindered the overall effectiveness of the CRP (Broderick et al, 2002, p. 39).

In addition, CRP, CREP, and the Environmental Quality Incentives Program (EQIP) are incredibly costly. Since 1987, CRP and CREP paid out a total $1.6 billion dollars in rent payments (USHR, April 2003). Funding for EQIP has averaged between $170 and $200 million per year, which is likely to increase (Zinn, January 2003). When coupled with the unintended consequences of these efforts, many critics feel the public should not be forced to pay for what has often been considered a fundamental and essential right of US citizens. Others feel the national government should not be paying farmers to do what is best for our lands, which in some instances includes removing lands from production. Many environmentalists believe these programs have not received enough money. These criticisms have made agricultural and environmental policies contentious (Broderick et. al, 2002, pp.39-40).
Evaluation of Urban NPS Policy Efforts.

In terms of urban NPS efforts, it has been incredibly difficult to incorporate the Storm Water Phase I and II efforts into the NPDES program. The literature suggests there was a great deal of confusion as to when urban runoff should be identified as a point source or nonpoint source problem. Limited technological advancements and scientific research led to ineffective attempts to solve the problems associated with adjusting the NPDES system to reflect the changes inherent in the Storm Water efforts. Consequently, the NPDES nonpoint source components of the Storm Water Phase I and II programs have failed to adequately abate urban sources of nonpoint pollution (USGAO, June 2001; Broderick et al., 2002, pp.40-41).

EPA-instituted deadlines for compliance with the NPDES and Storm Water Phase programs further hindered efforts to reduce urban source of nonpoint pollution. A lack of resources forced the EPA to authorize forty-four states to conduct their own permit application and issuance processes with minimal national oversight. This placed the responsibility for permit compliance on the states rather than the national government. State governments also lacked the resources to effectively manage the NPDES system. When combined with unclear national guidelines, states left a significant amount of discretion to issuing agencies who had limited means necessary to ensure compliance. Many local municipalities and organizations did not receive their permits within the established time frame. Several individuals and entities who had permits, and may have fallen under an exemption category, found that their NPDES permit expired before being reviewed to determine their status. Consequently, the EPA-established deadlines for the completion of the Storm Water Phase initiatives were eventually delayed. Phase II was
originally designed to be fully implemented by October 1993. The deadline was reset to March of 2003 (USGAO, June 2001; Broderick et al., 2002, p.41).

There is little research regarding the overall effectiveness of the NPDES program and its nonpoint source components. Traditional research has focused on the sites and activities that lack an NPDES permit, or are operating with an expired permit. Difficulties in data tracking and information technology have led to inadequate or faulty records for many of the efforts pursued to measure the actual tangible benefits of the NPDES program in those instances in which evaluation has been conducted (USGAO, June 2001; Broderick et al., 2002, p.42).

Still, several basic measures have been adapted to examine the effectiveness of the program. One such measure involves the existence backlogged permits. The number of backlogged permits, which is typically defined as a permit issued more than five years ago and/or in which the holder has requested an extension of the permit’s validity, have decreased in recent years as the EPA has devoted more manpower to the NPDES system. An EPA analysis found that, despite an increasing demand for NPDES permits, 68% of all previously issued NPDES permits were valid (http://www.epa.gov/305b/98report, April 6, 2002). A similar analysis conducted in November of 1998 showed that only 55% of all previously issued NPDES permits were valid and current. In an effort to more effectively reduce backlogged permit applications, the EPA established backlog reduction goals of 10% for facilities in all states by the end of 2001 (USGAO, February 1999; Broderick et al. 2002, p.42). These figures mirror more recent studies.

Nevertheless, evaluating the effectiveness of the NPDES programs is nearly impossible. Permit-holding entities are self-regulating and must routinely report the
results of their best management practices to oversight agencies. Many of these oversight agencies lack the resources necessary to adequately ensure sites are compliant with the requirements of their permit. With limited enforcement personnel, there is limited incentive for oversight entities to create, or fix, their enforcement systems (USGAO, February 1999; Broderick et al., 2002, p.43).

For state and local governments, one of the largest problems associated with the NPDES program and its nonpoint source components is that the cost of redesigning sewer systems or instituting best management practices to meet NPDES requirements is incredibly high. Localities are able to influence the construction process of these sewer systems, and can prioritize components within the broader NPDES system, to meet their needs. These localities are still burdened with the costs of implementation. The costs associated with implementation become quite daunting when one considers that there is little research describing the tangible financial benefits obtained as a result of complying with the NPDES system (USGAO, November 2001; Broderick et al., 2002, pp.43-44).

*Evaluation of Mining NPS Policy Efforts.*

In order to fulfill the goals and objectives of the mining legislation, the SMCRA established the Abandoned Mine Land Program. This program allows state regulatory agencies to develop abandoned mine reclamation plans. After the Office of Surface Mining Reclamation and Enforcement (OSMRE) approves a state-sponsored plan, it becomes the reclamation program for that particular state. The state assumes the exclusive responsibility and authority to reclaim abandoned mine lands within its borders. The OSMRE maintains certain limited oversight abilities intended to ensure that states
are managing their plans appropriately and spending funds within established bounds. However, it is generally accepted that state-based implementation is more effective than national efforts (Broderick et al., 2002, p.44).

As a result of these distinct roles and the overall complexity of the SMCRA, the successfulness of the Act is difficult to determine. The OSMRE makes a number of independent inspections of mining and reclamation activities within each of the 27 mining states as a means of exercising oversight and evaluating overall performance and congruency with national mining law (USGAO, 1986). It has developed a set of standards, based on the SMCRA goals and objectives, which are employed to evaluate state activities. The most significant of these 23 standards include requirements for states to:

- restore affected land to its approximate original contour and to a condition capable of supporting the uses it was capable of supporting prior to mining;
- stabilize and protect surface areas affected by mining and reclamation; operations to control erosion and air and water pollution;
- protect and replace topsoil;
- properly dispose of waste materials; and
- insure environmentally sound reclamation (USGAO, 1986, p.33).

If OSMRE inspectors detect any violations in state mining areas, they are authorized to contact state officials and demand correction of these violations. The sites are inspected following the reported corrections to make sure that problems were truly remedied (Broderick et al., 2002, pp.44-45).

The OSMRE developed a three-level priority rating system to identify the most problematic and hazardous mining and abandoned mine areas. This allows the OSMRE to determine which areas should be targeted as priorities. These reports rely on state-based information to identify the successes of mining efforts. The OSMRE may also
collect information from environmental, citizen, and other groups. However, because the state is primarily responsible for implementing the mining plan, OSMRE depends foremost on the accuracy and validity of their reports. Consequently, the effectiveness of the SMCRA has regularly been called into question (USGAO, 1986; Broderick et al., 2002, pp.45-46).

Additionally, efforts to analyze the SMCRA have further called into question the effectiveness, adequacy, and responsiveness of the program’s efforts. There appear to be several difficulties in measuring the success of the policy based on its requirements. A series of GAO reports between the years of 1986 and 1991 pinpoint specific state weaknesses (USGAO, December 1986; USGAO, February 1987; USGAO, June 1987; USGAO, April 1988; USGAO, March 1989; USGAO, June 1991; USGAO, July 1991). Research indicates that while state and national OSMRE officials believed AML pollution abatement efforts have been relatively successful, this cannot be confirmed by state data, which is often nonexistent. Without sufficient data reports of reclamation progress, OSMRE cannot evaluate the real success of the state-based projects. In spite of this finding, states continue to self-monitor and report their progress (Broderick et al., 2002, p.46).

States and coal miners have also continued to criticize the Act and its subsequent amendments. While the legislation sought to leave the states with a high degree of flexibility in determining local needs and beneficial plans, it had several unintended consequences. Even though the legislation sought only to establish minimum environmental standards, it proved difficult for small mining operations to carry out, which was further aggravated by the slow pace of the national government in providing
the promised technical and financial aid (USGAO, February 1999; Broderick et al., 2002, p.46).

Shortly after the implementation of the Act, there was a great deal of concern regarding impending deadlines, inadequate staffing levels, and limited technological assistance. States complained that they could not carry out the necessary authorization procedures, much less develop programs, without national funding and technical assistance. They also believed the national government had not properly accounted for the length of time necessary to secure state and local appropriations and bolster political support (Green & Spring 1977). Resource problems still exist today in the form of decreased bond availability, which increases the risk that some lands identified under state projects may not be properly reclaimed. This problem is magnified insofar as states still lack the resources to carry out full surface mine land restoration without the help of the national government (Green & Spring 1977; Broderick et al., 2002, p.47).

Several state-based problems have also been identified. These include a failure to recognize or cite potentially detrimental mining violations, as well as a failure to collect monetary penalties imposed on coal mining operations who have been cited. States appear to be lenient towards any violations of their standards. In fact, some states did not impose any mandatory penalties, or improperly reduced or eliminated penalties, which undermines many of the provisions established to set minimum standards and protect states from unfair competition (USGAO, February 1999). Failure to fully implement state reclamation projects, when combined with an insufficient flow of information to the national government, impedes the ability to fully measure the effectiveness of the Act and its amendments (USGAO, February 1999; Broderick et al., 2002, p.47).
Finally, the Department of the Interior has been criticized for providing inadequate attention to state programs and inefficiencies that result as a consequence of the national government’s funding mechanisms (USGAO, February 1999). The design of many state-based programs may not effectively meet the aims of land reclamation and pollution reduction efforts. While the fault lies partially with the states, the national government is ultimately responsible for approval of these programs. Concerns have also surfaced regarding the national government’s focus on coalmine reclamation in general. It has been suggested that the Department of the Interior may fail to properly confirm that states have completed coal reclamation projects before moving on to less pressing non-coal projects (USGAO, February 1999; Broderick et al., 2002, pp.47-48).

*Evaluation of Silviculture NPS Policy Efforts.*

An analysis of forestry practices demonstrates that the results of these NPS policies are varied at best. Little or no data exists to allow one to even begin evaluating silviculture policies, practices, and procedures. Of the information that has been assembled the results are mixed, with critics falling on either side of any given issue (Edgens, August 2000, p.1). Several claims have been made about the effects of road construction, reconstruction, and maintenance in forest areas. Some critics point to the fact that the National Forest System contains over 383,000 miles of roads (Edgens, August 2000, p.1). The creation and upkeep of these roads, they argue, has been a primary source of NPS contamination. They have also allowed for increased logging and recreational opportunities, which led to further growth in NPS. Others note that the establishment of these road systems has allowed the Forestry Service to control both
prescribed and unintentional burning of forest areas. It is their belief that roads have indeed lead to an increase in NPS contamination, but that it allows for more harmful pollutants to be controlled. Similar examples exist for almost every form of silvicultural pollution. As such, it is remarkably difficult to provide a significant and useful analysis of these problems (Edgens, August 2000; USEPA, February 2001).

The goals and objectives of current nonpoint source silviculture policies are measured in terms of best management practices. These measures, as described earlier, control the amounts of pollutants allowable in certain regions, as well as on the behaviors and practices that lead to their creation. Because countless behaviors can produce contamination, several forestry measures have been fashioned (USEPA, February 2001).

Silviculture measures address a variety of potential pollutant areas. The EPA has set forth nine basic categories of management measures. These include “pre-harvest planning, streamside management areas, road construction/reconstruction, road management, timber harvesting, site preparation and forest regeneration, fire management, re-vegetation of disturbed areas, forest chemical management, and wetland management” (USEPA 2001, Ch. 3, p. 1). Within each of these nine categories, several independent management practices may exist. Several of these efforts might need to be employed simultaneously in order to see an actual decline in contamination levels. The national government has typically left implementation of silviculture practices to the states. Consequently, the broad scope of forest-related NPS programs, and the focus on state-based implementation, has forced the national government to exclude certain practices that have become politically infeasible to establish. Furthermore, the unique
nature of these management measures, and of nonpoint source pollution, has translated into a number of difficulties.

Outside of the general problems associated with administering the development, implementation, and maintenance of best management practices, there are several other problems linked to current NPS policies, and the management measures coupled with those policies. Organizations and individuals who deal with the standards necessary for measuring the effects of nonpoint source pollution on forest areas find that two significant problems exist. These entities have been unable to develop the financial accounting or permit information systems that would allow for a useful measurement of the costs associated with forestry practices that result in the creation of nonpoint pollutants (USGAO 1996, p. 1). Several reports, letters, and congressional interviews exist in which members of the Forestry Service have explicitly stated that they cannot provide information for these reasons (USGAO, April 1989). Numerous attempts have been made to establish practical systems, such as the All-Resource Cost Reporting System. Due to the fact that there are no technological processes that can effectively measure the actual level of distress on the environment, the Forestry Service and the Department of Agriculture have been unable to ensure that NPS pollutants have been limited. There is also a certain amount of concern centered on whether independent organizations and businesses, who have been given the authority to collect, assemble, and submit contamination data, are complying with federal requirements. As such, the overall integrity and validity of any information collected on NPS forest reductions cannot be ensured (USGAO, 1996).
The validity of information collected, as well as the reliability of the management standards used to measure NPS, poses significant problems for determining the effectiveness of current programmatic objectives. A number of other issues also exist, including a general lack of training, a lack of incentives necessary to ensure compliance, and a focus on pollution prevention. The most significant of these additional difficulties appears to be linked to a general lack of coordination between those agencies and governments involved with pollution control. For example, the Safe Drinking Water Act of 1974 gave the EPA the ability to protect sole source aquifers – many of which exist within, or near to, forest-areas. A sole source aquifer is defined in terms of one of three basic requirements. First, at least 50% of the population of a given area is dependent on the aquifer for drinking water. Second, a significant public health hazard would exist if the aquifer was to become contaminated. And third, no reasonable water alternatives exist (USGAO October 1992, p. 3). Unfortunately, the GAO has recognized several instances in which areas that should have been protected by these standards have not been.

The EPA relies on two separate sources for information related to activities in which aquifers may become contaminated. The first of these sources are regional groundwater officials. Because these regional officials lack sufficient resources, any information gained is relatively limited. Instead, the EPA relies on Memorandums of Understanding (MOUs) to limit aquifer contamination. Various state, local, and national organizations, such as the Federal Highway Administration, sign MOUs in which those agencies promise to inform the EPA of areas, or activities, that might represent, or have experienced, aquifer or groundwater pollution. However, there seems to be significant
doubt as to whether or not MOUs sufficiently identify potential problem areas. The Federal Highway Administration admits that relatively straightforward road construction projects often fail to warrant environmental review. This is particularly problematic in forest-areas insofar as these road construction projects are one of the leading causes of silviculture sources of nonpoint pollution. The GAO suggests that a reliance on MOUs, and a failure to have set national regulations requiring agencies to submit projects for environmental review, constitutes a significant failure in attempts to protect groundwater sources. This issue also provides a substantial look at the manner in which forest-related NPS policies may fail due to a lack of coordination (USGAO, 1992).

Given these circumstances it is incredibly difficult, if not impossible, to develop any useful policy review. This problem is heightened by the fact that states fail to recognize the serious of forest-related NPS, and that national efforts are focused primarily on fostering a sense of stewardship rather than directly regulating land uses. With this being the case, silviculture programs seem to be relatively limited in terms of their abilities to create a substantial impact on NPS. It should be noted that the data collected tends to show that some progress is being made. For example, the state of Montana is said to have protected 99 percent of its watersheds from logging activities. As such, even limited silviculture programs appear to have a positive effect on ensuring water quality, and should therefore be pursued.

**Summary of Nonpoint Source Pollution Policies**

Having examined the various types of nonpoint source pollution policies in place today, as well as their overall impacts and ultimate effectiveness, it seems apparent that
these policies offer mixed results. Research seems to indicate that each policy has some effect on NPS abatement. The extent of these effects is difficult to determine insofar as we lack the technological and financial resources necessary to adequately – let alone effectively – measure the impact of these policies. The GAO (October 2001) reports:

As we reported in March 2000 on our survey of 50 states and the District of Columbia, only 3 states indicated that they had the majority of the data needed to identify and assess nonpoint sources of pollution. The states lack data partly because assessing nonpoint source pollution is difficult. Runoff from nonpoint sources is caused by many activities, including urban land use and development, that take place over dispersed areas of land. In addition, nonpoint source runoff is episodic, primarily occurring as a result of rainfall or snowmelt, and, as a result, is more difficult to identify, measure, and control than point sources of pollution (pp. 59-60).

It is equally as apparent that there are certain common failures across each type of pollution policy.

These failures regularly appear within the literature as implementation problems. In terms of mining policies, it seems as if many of the difficulties associated with abating acid mine drainage arise from the economic implications associated with enacting the SMCRA measures. These implications become substantially heightened when one considers that implementation is left largely in the hands of the same states that stand to experience the economic shortfalls inherent within an effort to substantially meet the requirements of the SMCRA and its amendments. Given this is the case, it is more likely that these implementation failures are the result of a much larger systemic problem. These failures appear to have much more to do with our nation’s federal system.
The term *federal* often has multiple meanings today. Although most often used to identify any activity undertaken by our national government, the most important meaning typically refers to our nation’s broader governmental structure, and its implications on our political systems. An understanding of this structure is necessary to fully comprehend the failures of the various nonpoint source pollution abatement strategies employed by our national, state, and local governments.

Federalism, as delineated by Elazar (1984), can be defined as “the mode of political organization that unites separate polities within an overarching political system by distributing power among general and constituent governments in a manner designed to protect the existence and authority of both” (p.2). He further suggests a federal structure has two important characteristics within the United States. These are that:

i. the states are, at one and the same time, well-integrated parts of the overall American civil society and also separate civil societies in their own right with their own political systems, and

ii. the states have preserved their integrity not through a sharp separation of their political systems from the national system but within an intricate framework of cooperative relationships that preserve their structural integrity while tying all planes of government together functionally in the common task of serving the American people (pp.1-2).

These notions have become a central characteristic of our nation’s broader political system. This system ultimately relies on “the federal union as a partnership” which is itself “a key aspect of federalism” (p.2). Elazar goes on to state:

Partnership implies the distribution of real power among several centers that must negotiate cooperative arrangements with one another in order to achieve common goals. This arrangement is often mislabeled *decentralization*, but should more appropriately be called *noncentralization*. The American federal union differs from a decentralized political system in that constitutional limits are imposed on
the extent to which the national government can concentrate as well as
devolve governmental power and functions…In a noncentralized political
system, power is so diffused that it cannot legitimately be centralized or
concentrated without breaking the structure and spirit of the constitution.
The United States has such a noncentralized system. It has a national – or
general – government that functions powerfully in many areas for many
purposes, but it is not a central government controlling all the lines of
political communication and decision making. The states are not creatures
of the federal government, but, like the latter, derive their authority
directly from the people. Structurally, they are substantially immune from
federal interference. Functionally, they share many activities with the
federal government, but without necessarily forfeiting their policy-making
roles and decision-making powers (p.2).

This focus on partnership as a central component of the American political system is the
result of certain historical developments.

Elazar (1984), along with many other political theorists, argued that our model of
federal democracy is uniquely American. In this manner, he suggests:

Federal democracy is the authentic American contribution to democratic
thought and republican government. Its conception represents a synthesis
of the Puritan idea of the covenant relationship as the foundation of all
proper human society and the constitutional ideas of the English natural
rights school of the seventeenth and early eighteenth centuries. The
covenant idea (foedus, the Latin root of the word “federal,” means
covenant or compact), which the Puritans took from the Bible, demands a
different kind of human relationship than that emphasized by the various
theories of mass democracy that have attracted many adherents since the
first was enunciated by the Jacobins in the French Revolution. It
emphasizes partnership between individuals, groups, and governments in
the pursuit of justice, cooperative relationships that make the partnership
real, and negotiation among the partners as the basis for sharing power.
The Lockean understanding of the social compact as the basis for civil
society represents a secularized version of the covenant principle. It is the
synthesis of the two forms that undergrids the original American political
vision…The American theory of federalism was developed by the
founding fathers in their search for republican remedies for republican
diseases (p.3).

These remedies focused on the importance of the partnership in the exercise of political
authority.
The idea of partnership is important because it serves several purposes in our current structure. However, this notion is bound by certain limits. As Elazar notes, “it is not the need for interaction, or common action, that is special here. It is that the form and character of the interaction – sharing through bargaining, or negotiated cooperation – is uniquely the property of [our federal] arrangement” (p.8). The character of this interaction over the course of our nation’s development has led to a system in which the various participants in our federal arrangement have “worked together to develop common policies and programs” (p.9). More importantly, this partnership has created a system in which certain common trends exist. These trends lead to a situation in which:

*Most* important actors are involved in *most* important details of *most* steps in problem definition, planning, programming, budgeting, implementation, and evaluation (such as it has been) of *most* policies of mutual interest to them through the political process. That is the very heart of the argument of the cooperative federalists...[Nevertheless] there must be *centers* of power if there is not to be a *single* center of power. The choice is not between one center or none, but between one or many, with different ones taking precedence in different situations (p.9).

They also provide an interesting look at the role of state and local governments within the federal system. Elazar goes on to argue:

Some say that when we talk about the states in the federal system we are talking about a “mere” *structural* question, but these issues reveal just how *political* this structural question is. Despite the spate of federal legislation and the constant interventions by the federal courts and the federal executive branch in the past three decades, the actual status of each of these groups remains greatly dependent on the willingness of the states and their localities to carry out or comply with national policy...Moreover, the differing responses of the states to these issues make it clear that the bundle of individual characteristics combined to make up the political entity we call a *state* adds up to something more than a territory marked off by lines on a map...If the term *people* is understood to mean the congregation of persons belonging to a particular place, especially insofar as they constitute its citizenry and collectively invest that place with character, then it becomes very likely, if not inevitable, that
each state will possess its own particular characteristics simply by virtue of its settled existence over generations. In turn, the bundle of individual characteristics is what transforms each state into a civil society, possessing a political system that is in some measure autonomous. And, despite the apparently great and continuous pressures for centralization, this autonomy is no mean thing (pp.10-11).

Admittedly, the national government retains an enormous amount of power, but it tends to use a fair amount of “self-restraint in the exercise of its authority” as a result of the importance of the state and local governments and their citizens (p.12).

Although often not an overt process, the national, state, and local governments engage in a constant dialogue surrounding the appropriateness of the balance struck between various “problem definition, planning, programming, budgeting, implementation, and evaluation” issues faced by our nation and its decision-makers. This dialogue is a direct result of federalism matters. Elazar believes:

In the United States, the very existence of federalism requires that virtually all political issues be considered with two questions in mind: What kinds of issues are raised in American politics because states (and their localities) exist as they do and how are issues developed and resolved in the American political system because of the existence of the states (and their localities) in their present form? (p.10)

Each of these questions is as important to other political decisions as they are to our nation’s current nonpoint source pollution abatement efforts. Because our nation’s water pollution policies are already in place, the latter is particularly worthy of examination. The remainder of this chapter will attempt to present the [federalism] issues at hand because, as Elazar (1984) stated, “of the existence of the states (and their localities) in their present form” (p.10).

Many of the efforts undertaken by the national government to address nonpoint source pollution are the direct result of the failures of state and local governments to take
proactive steps towards addressing water pollution themselves, which suggests a collapse in our nation’s ability to effectively partner around the issue of NPS. Writing in 1977, Richard Stewart, suggested:

Enlighten the policy in the United States has reached a difficult impasse. Over the past decade, responsibility for setting environmental policy has increasingly shifted from state and local authorities to the federal government. Reacting to the perceived inability of the states to check or reverse environmental degradation, Congress has enacted comprehensive statutes establishing environmental standards and control strategies (p.1196).

Although Stewart was not concerned with the impact of nonpoint source pollution, his writings demonstrate that the national government became involved in water pollution control efforts to fill a gap typically not managed by the states. As such, the national government exercised a greater amount of federal authority during the development and implementation of early water control policies.

Unfortunately, water pollution control policies and the impacts those policies have on state and local governments, individuals, and other entities, are remarkably complicated. Even though the national government exercised greater authority in the development of the Clean Water Act and its subsequent amendments, these policies remained firmly rooted in the federal-state system, leaving the states with “those rights and responsibilities that are neither granted to the federal government nor reserved to the citizenry” (Deason et al., 2001, p.185). The consequences of this reality are further heightened by the fact that “the term ‘water conservation’ means different things to different people, [states, and localities]” (p.182).
As a result of these factors, early national efforts to develop legislation focusing on the abatement of nonpoint source pollution faced incredible opposition from a series of organized interests, not the least of which were the states.

Debates over the appropriate scope and division of power, responsibilities, and authority among the federal and state governments are certainly not over, and especially not for environmental federalism. When Congress passed a series of environmental laws three decades ago, lawmakers envisioned federalism and intergovernmental relations in environmental governance changing in dramatic and permanent ways, but they had no idea at the outset how complicated and contentious intergovernmental relations would become (Scheberle, 2004, p.8).

This contention between the national and state governments was not necessarily harmful to the enactment of nonpoint source pollution abatement legislation – at least insofar as varied national interests are concerned. As Elazar (1984) suggests:

If the federal system were predicated on a clean separation of functions as well as structures (i.e. dual federalism), then centralization would probably have been inevitable when it became necessary for the federal government to intervene in problems that transcended state lines. In fact, federal intervention is supplementary and stimulatory rather than preemptive because of the possibilities for intergovernmental collaboration (p.54).

Elazar’s statement holds significant weight when viewed in terms of nonpoint source pollution because it is a problem that transcends state lines. These pollutants, by their very nature, can travel several miles before being deposited. This means nonpoint source pollution knows no bounds. When coupled with many states’ failures to effectively address NPS, the issue became ripe for national legislation, otherwise coined “intervention” by Elazar. As he further suggested might occur, the national government created a set of systems that focused significantly on intergovernmental relations in the implementation of nonpoint source pollution policies.
Although there are several different nonpoint source pollution efforts in place across the United States, water pollution control policies at the national level have focused on a particular framework for determining the role of collaboration among the national and state governments. Scheberle (2004) describes this as follows:

Most often, when state and federal officials become partners, they do it within the context of a legal relationship. Several types of federal-state legal relationships exist in environmental laws. The prevailing national pattern for environmental policy was to write strong statutory language that relied on command-and-control regulatory schemes and an initial preemption of state laws, then permit devolution of responsibility back to state and local governments. Under this partial-preemption legislative strategy, Congress requires the federal oversight agency (usually EPA) to set national environmental quality standards and then allows the agency to delegate day-to-day programmatic responsibilities to the states with approved programs. Each environmental law establishes activities the states must undertake to receive delegated authority. This always includes a determination by the federal oversight agency that state laws and regulations be at least as strict as federal requirements. The principle of primacy preserves a state’s right to pass requirements more stringent than those found under national law and regulations (p.8).

However, this approach is not as simple as it appears. The author goes on to state:

This partial-preemption regulatory approach represents a middle ground in the implementation of a national regulatory policy. Federalism scholar Joseph Zimmerman observed that partial-preemption statutes have not only increased the complexity of the federal system but have raised accountability issues as well (citing Zimmerman, 2001, pp.15-30). Unlike total preemption, complete with federal mandates requiring state performance according to federal prescription, partial preemption allows states certain flexibility in program design. States have leeway to implement their laws and design their enforcement strategies, provided these laws are at least as stringent as the applicable federal statute. Furthermore, states can opt not to go along. If state officials choose not to shoulder the implementation responsibility for the regulatory program, the federal government remains the regulatory agent. If approved state programs prove inadequate in enforcing national standards, the federal government reserves the right to “preempt” state authority and reassume primacy. Thus the states’ acceptance of primacy for a national regulatory program is not, in theory, an abdication of national control (pp.8-9).
State governments may also participate in water pollution control policies through direct statutory order or voluntary relationships (pp.9-10). The partial-preemption approach has remained the primary focus of many national efforts.

Nonpoint source pollution efforts may not have shared the same benefits from this partial-preemption status as did early point source pollutant abatement efforts. States have been much less likely to direct significant attention towards developing local NPS programs. William R. Lowry (1992) reports that:

In terms of methods, each source category of NPS pollution can be subjected to voluntary restraints, mandatory constraints, some combination of the two, or to no guidance whatsoever. In agricultural pollution programs, for instance, roughly half of the states utilize only voluntary programs while the other half use some combination of voluntary, regulatory, and cost-sharing methods. Similarly, goals for state water programs display wide range. Groundwater standards, for example, differ between numeric specification of maximum contamination concentrations in twenty-six states and narrative prohibitions about general discharge in fifteen states. Numeric standards reflect ambient quality targets that can account for nonpoint sources of pollution. However, in many cases, these states have simply substituted EPA drinking water standards for groundwater goals, a potentially unrealistic course since groundwater quality often exceeds current drinking water targets (pp.106-107).

Certain trends seem to suggest that state and local governments have increasingly begun to focus on nonpoint source pollution as a serious local issue. Nolan (2002) argues:

There has been a remarkable and unnoticed trend among local governments to adopt laws that protect natural resources. These local environmental laws take on a number of forms. They include local comprehensive plans expressing environmental values, zoning districts created to protect watershed areas, environmental standards contained in subdivision and site plan regulations, and stand-alone environmental laws adopted to protect particular natural resources such as ridgelines, wetlands, floodplains, stream banks, existing vegetative cover, and forests. The purposes of these laws are to preserve natural resources from the adverse impacts of land development and to control nonpoint source pollution. In inventing these controls, local governments have creatively
used a variety of traditional and modern powers that their state legislatures have delegated to them (p.365).

Nevertheless, nonpoint sources of pollution continue even today to be largely responsible for our nation’s inability to meet its goal of providing “fishable” and “swimmable” waters. This failure is the result of certain efforts pursued by the national government. As Lowry suggested in 1992, it appears as if state and local governments “do not comprehensively assess the impacts of land use on air and water quality and develop ways to mitigate any adverse effects” (US GAO, October 2001, Highlights). There may be a disincentive for these state governments to address NPS concerns. As such, it appears as if the results of NPS-related efforts pursued since the 1980’s are incredibly mixed.

Lowry (1992) presents an interesting review of federalism and environmental concerns, including nonpoint source pollution. The text focuses largely on a notion of state leadership, and its importance in addressing these environmental concerns. It opens with a discussion concerning a lawsuit filed on August 10, 1989 challenging President George H. W. Bush’s policies on automobile emissions (p.1). This mirrors a lawsuit filed on May 2, 2006 against President George W. Bush’s administration regarding its fuel economy standards for SUVs and light trucks (http://ag.ca.gov/newsalerts, retrieved on June 9, 2006). The similarities do not reflect the progress we have made as a nation over the past twelve years in our efforts to address pollution. Lowry (1992) introduces an “alternative hypotheses of state behavior” (p.7). This alternative hypothesis suggests:

That other economic or political variables also affect state behavior [beyond notions of response and need]. In fact, matching has rarely been a popular characterization of state behavior in American political analysis.
Rather, state governments have characterized as responding to factors other than need (p.7).

Lowry goes on to argue:

If the road to hell is paved with good intentions, then the most critical view of state governments is that the road to federal policy failure is paved with state modifications of national intentions. This perspective suggests that private parochial interests at the state level modify national policy efforts to the point that policy outcomes reflect very little of stated intentions. Madison may have been the first to offer this viewpoint, but he was hardly the last. Analysts since Madison have suggested that powerful private interest groups within the state determine state behavior in pollution control policies…This interest group perspective is based on the expectation that state and local policymakers are indeed closer to the people, but also that certain groups of people utilize that proximity more effectively than do others (p.7)

These arguments seem to bear some standing considering the reported shortcomings of the current efforts to address NPS.

Current nonpoint source pollution control efforts rely on national-state cooperation in order to achieve some type of pollutant reduction. The structure of many of these current efforts is the result of a political system that allowed for unfunded mandates to dictate national-state water control relations. Writing in 1984, Elazar stated that “federal government mandating of states and their localities with regard to particular tasks, which has become widespread, is a reflection of this thrust toward broadened [national] conditions” (p.244). The 1990’s saw a push away from unfunded mandates in the hopes that it might lead toward a change in many of the inherent shortcomings associated with previous trends. As Scheberle (2004) notes:

The ongoing devolution of environmental programs and the reinventing government agenda of the NPR also produced a concerted effort by national politicians and top-level agency administrators to change the way they related to stakeholders and to partner with their state counterparts. As one EPA official wryly observed, ‘We’re doing so much partnering
these days, I don’t know if I’m running an environmental program or going to a dance.’ Attempts by federal oversight agencies to redirect their approach to state environmental agencies so as to give state-level implementers more latitude in running their programs resulted in NEPPS [National Environmental Performance Partnership System] and the REG 8 Directive. Both are major efforts at changing the nature of working relationships (pp.26-27).

In spite of the movement away from unfunded mandates, nonpoint source pollution abatement efforts exist in a federal structure that allows for partial-preemption and a focus on state-based concerns.

State and local concerns were the heart of the *Federalist Papers*, which are often considered part of the foundation of the United States Constitution and federalism (Kessler & Rossiter, 1961). Consequently, the focus on partnering, partial-preemption, and state-based concerns seems appropriate. Lowry’s fears concerning national initiatives and state intentions still hold significant weight in an examination of nonpoint source pollution efforts – particularly in lieu of certain views of federalism and the public interest. Although speaking largely in terms of public interest and fiscal federalism, Aranson (1990) provides an interesting assessment of the three considerations key to the public interest hypothesis and its direct relation to federalism (p.20). The first of these considerations focuses on “the level at which one or more of these problems occurs” (p.20). Aranson suggests:

The “catchment” of national defense or international treaty making may be the entire nation, requiring that all or most such decisions be taken at the national level. But the catchment of most road construction, or crime or property law, may be confined to smaller units, recommending that all of most such decisions be taken at the local level. In short, the efficient level and pricing of one or more of these activities may best be chosen at different jurisdictional levels…Failure to get this matter right can have unfortunate consequences. For example, if taxpayers nationally must pay for Atlanta’s public transportation system, then Atlanta will spend too
much for its system. And if, by contrast, decisions are made solely in Ohio concerning air pollution generated there, but afflicting the Eastern states, then Ohio will not adopt the “correct” level of pollution abatement. The general rule is that people must bear the costs of that from which they benefit, and that they must have a right to avoid, or gain compensation for, the costs that others impose on them (pp.20-21).

It seems apparent that the “level” at which nonpoint sources of pollution occur requires stronger national (rather than state or local) attention.

The second consideration raised in Aranson’s discussion “involves economies and diseconomies of scale” (p.21).

Optimal scale occurs at the output where average total cost is minimized, which in turn is the output at which the change in the economies of scale is exactly equal (but of the opposite sign) to the change in the diseconomies of scale. Jurisdictional bounders, therefore, should be adjusted until each jurisdiction provides its output at optimal – least cost – levels (p.21).

While this consideration requires substantial economic analysis, even a cursory review of the shortcomings of NPS abatement efforts indicates our current structure is not operating at an “optimal scale.” For a variety of reasons – including the diffuse nature of NPS, our nation’s inability to effectively measure it, and the incredible costs associated with addressing NPS – it is unlikely that state and local governments have the resources necessary to adequately address the problem. A reliance on state and local governments to put in place programs that effectively minimize average total cost while also sufficiently abating sources of nonpoint pollutants seems foolhardy, if not entirely implausible.

Finally, Aranson discusses “Tiebout forces” (Aranson, 1990: citing Tiebout, 1956). Tiebout wrote about local governmental expenditures and competition (Tiebout, 1956). In Aranson’s view:
The Tiebout hypothesis envisions constructing competing jurisdictions and allowing people to reveal their preferences by ‘voting with their feet.’ The underlying logic is that people will sort themselves out among jurisdictions that best provide the mix of goods and services that they prefer. Improvements in governmental performance will be capitalized into land prices, thus giving citizens and public servants incentives to act in appropriate ways. Other jurisdictions will emulate successful innovations and avoid failures. In short, the Tiebout hypothesis supposes that it is possible to ‘make a market’ in the competitive supply of local public goods and services (pp.22-23).

The Tiebout factor bears certain weight in light of some arguments made surrounding [environmental] federalism.

As Greve (August 2004) notes “federalism is competitive in a different sense” insofar as “a government of limited powers compels states to compete on all margins where the federal government lacks the power to act’’ (p.4) He further suggests that “what the states compete for are the assets, talents, and affections of productive citizens and firms” (p.4). In this instance (referring to nonpoint source pollution), the federal government does not lack the power to act, but chooses instead to focus on partnerships to limit the national government’s focus on centralization (Elazar, 1984). The reality of nonpoint source pollution means states may be forced into a situation in which interstate competition for businesses and industries creates a strong disincentive for state and local governments to adequately pursue NPS abatement efforts.

Certain individuals interested in the relation between federalism and local economic competition have adapted a firm stance regarding the role of each in our current national system. This stance has been explained in the following manner:

Social scientists have explicated the many advantages of federalist competition. Theorists in the tradition of Friedrich A. Hayek emphasize that competition fosters the disclosure of information (we find out what works) and institutional learning, as states will adopt successful
experiments. Other economists stress the so-called “Tiebout effect.” Given a choice, citizens will sort themselves into a jurisdiction that supplies the best mix of public goods and services at the best price. Because individual prices vary greatly, a choice among many differing regimes gives more people more of what they want (relative to a central regime that must accommodate a much wider range of preferences). Public choice theorists have proffered a third, especially potent rationale – discipline in government. The business of politics, they argue, is the transfer of wealth from unorganized groups with small stakes (taxpayers) to concentrated interests with much higher stakes. Federalism provides a defense and remedy for this ill by giving the losers an opportunity to “vote with their feet” (p.4).

While the idea of federalist competition, and the Tiebout effect, may meet some of those notions originally posited by the Framers of the *Federalist Papers* and the U.S. Constitution, it does not sufficiently address the problems associated with nonpoint source pollution. Instead, it may be argued that interstate competition is one of the primary reasons for which the national government became involved in water pollution control policies in the first place. Regardless of the effectiveness of these national policies, one need look no further than the SMCRA to see the truth of this statement. The Tiebout effect holds little substantiality precisely because nonpoint source pollution knows no bounds (or territorial distinctions). Citizens cannot effectively vote with their feet (in spite of the financial costs associated with such efforts) because the nature of nonpoint source pollution inherently prevents them from doing so. No matter how far one might move, nonpoint pollutants may not be far behind.

The public interest hypothesis suggested by Aranson (Spring/Summer 1990), which focuses on the notion that the public interest relies on separate considerations that require different levels of analysis, has particular bearing here (p.22). This analysis concentrates on several notions, including the following:
First, the public sector will confine itself to perform all and only those tasks that have public-interest credentials. Second, the central government will adjust the boundaries and empowerments of lower levels of (subordinate) governments, to accomplish those tasks with a due regard for contingent decentralization means. Stated differently, the national government decentralizes decisionmaking in precisely the same way as would a private sector firm, with the understanding that the full authority to decide on the degree of decentralization remains with the central power (p.22).

The continued failure of the national government to truly recognize nonpoint source pollution as a problem that should receive “federal attention commensurate to its severity” points to a systemic failure in which the national government has abandoned its responsibility to United States citizens (Lowry, 1992, p.99).

The relatively low priority of NPS, as opposed to point source, pollution to federal policymakers is easy to understand in political terms. Point source pollution control provides opportunities for amelioration of highly visible, publicized discharge as well as the pork barrel of waste treatment plant construction. Federal redress of NPS pollution, on the other hand, conveys limited promise of quick tangible benefits. Effective NPS policy also necessarily entails tangling with a powerful, cohesive and well-entrenched agricultural sector, which is quite willing to debate government encroachments on the sanctity of traditional patterns of water usage (p.101).

This political failure has significant costs for our country’s citizens. It results in a system in which the goals of the Clean Water Act remain unattainable. While the focus on partnering and partial-preemption may extend beyond the political hindrances associated with nonpoint source pollution, the reality is that a state-based concentration on NPS is misplaced.

Beyond economic reasons, a state-based focus on nonpoint source pollution is inappropriate because states maintain different “political cultures” (Elazar, 1984).

One of the observations coming out of the various studies of state-federal relations is that the states themselves (or their local subdivisions) well-
nigh shape the impact of federally aided activities within their boundaries…many of these and other differences in state responses within the federal system appear to be stimulated by differences in political culture among the states (p.110-112).

Political culture is defined “as the particular pattern of orientation to political action in which each political system is embedded” (p.112). Elazar suggests that political culture is “a synthesis of three major political subcultures that jointly inhabit the country, existing side by side or even overlapping…the three political cultures may be called individualistic, moralistic, and traditionalistic” (p.114-115). Each bears a significant relationship towards nonpoint source pollution abatement efforts.

The individualistic political culture “emphasizes the conception of the democratic order as a marketplace” (p.115). This view is “instituted strictly for utilitarian reasons” (p.115). Elazar suggests:

A government need not have any direct concern with questions of the good society, except insofar as it may be used to advance some common conception of the good society formulated outside the political arena just as it serves other functions (p.115).

More importantly, “the individualistic political culture holds politics to be just another means by which individuals may improve themselves socially and economically…In this sense politics is a business like any other, competing for talent and offering rewards to those who take it up as a career” (p.115). In this system “political culture is based on a system of mutual obligations rooted in personal relationships” (p.115). In this system “political cultures are usually too complex too maintain face to face ties” (p.116).

The moralistic political culture “is built on the principles of commerce in the broadest sense of the term and that the marketplace provides the model for public relationships in this country” (p.117). In this system, “the commonwealth conception” is
perceived as the “basis for democratic government” (p.117). Individualism is seen as a key component of communal (preferably nongovernmental) action to achieve particular ends (p.117). The “power to intervene in into the sphere of private activities when it is considered necessary to do so for the public good or the well-being of the community” is an integral component of the moralistic culture (p.117). This culture places particular “moral obligations” on those who participate in government (p.117).

By virtue of its fundamental outlook, the moralistic political culture creates a greater commitment to active government intervention in the economic and social life of the community. At the same time, the strong commitment to communitarianism characteristic of that political culture tends to channel the interest in government intervention into highly logistic paths (p.118).

The moralistic political cultural faces substantial difficulties in pursuing its commitments. Elazar (1984) suggests “the moralistic political culture’s major difficulty in adjusting to bureaucracy to the political order is tied to the potential conflict between communitarian principles and the necessity for large-scale organization to increase bureaucratic efficiency” (p.118).

The traditionalistic political culture is fundamentally different than the individualistic and moralistic cultures. It is “rooted in an ambivalent attitude toward the marketplace coupled with a paternalistic and elitist conception of the commonwealth” (p.116).

It reflects an older, precommercial attitude that accepts a substantial hierarchical society as part of the ordered nature of things, authorizing and expecting those at the top of the social structure to take a special and dominant role in government. Like its moralistic counterpart, the traditionalistic political culture accepts government as an actor with a positive role in the community, but it tries to limit that role to securing continued maintenance of the existing social order...Where the traditionalistic political culture is dominant in the United States today,
political leaders play cooperative and custodial rather than initiatory roles unless they are pressed strongly from the outside (pp.118-119).

The individualistic political culture “draws most heavily from the value orientations of commerce, the moralistic political culture from those of agrarianism, and the traditionalistic culture emphasizes those of legitimacy (as its representatives understand the concept)” (p.122).

Elazar suggests that many of the “differences in state responses within the federal system appear to be stimulated by differences in political culture among states” (p.112). Inherently, this leads to certain shortcomings in efforts to address certain problems – particularly those concentrating on national issues that meet public interest criteria. The nature of nonpoint source pollution is such that the differences among states, and their various political subcultures, prevent them from viewing NPS in the same light. The impact of interstate competition, along with the fundamentally complex nature of diffuse pollution, further limits the abilities of the states to adequately address these sources of pollution. Without a comprehensive focus (at either the state or national level) on NPS, it is unlikely that we will witness a significant reduction in water pollution. Current efforts on the part of the national government to increase partnership results through economic incentives are likely to be misplaced and largely ineffective without such an effort. It seems apparent that nonpoint source pollution is not adequately “developed and resolved in the American political system because of the existence of the states (and their localities) in their present form (p.10).

The current national-state partnership results in a system in which nonpoint sources of pollution will continue to plague our nation until other, more comprehensive
efforts, are undertaken. This begs the question ‘what would such efforts look like?’ In other words, what would be an effective balance of national and state interests, which would still allow for a reduction in nonpoint sources of pollution? What shift in our current federal structure need take place to meet this goal? These questions will be addressed in the following chapter.
CHAPTER III

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Introduction

This chapter is separated into three different sections, which include a summary of the study, conclusions, and implications and suggestions for further research. The first section provides a brief restatement of the problem, the assumptions underlying the study, and the basic research hypotheses. The second section presents an examination of the conclusions, or major highlights, within each research question. Finally, the third section, discusses the implication of the research findings, while also identifying any further research that may need to be undertaken to clarify the issue of nonpoint source pollution.

The Problem.

This research surveyed the historical development of national nonpoint source pollution abatement strategies over the past 250 years of the United States. It further sought to document the primary characteristics of modern national abatement and monitoring efforts in lieu of our current federal system. It examined the role federalism, as defined by Elazar, and intergovernmental relations play in determining the overall effectiveness of our nation’s current abatement measures.
Assumptions Underlying the Study.

In order to sufficiently conduct this research examination, several basic assumptions were necessary. First, one must assume that point source and nonpoint sources of pollution comprise the primary forms of water pollution that exist in the United States today. Second, while there are differences between the various sources of nonpoint pollutants, and the policies pursued to abate them, there are also several similarities that allow for certain generalizations to be drawn about the nature of our national NPS abatement efforts. Third, the national government depends on our federal system to develop, address, and enforce many of the primary nonpoint source pollution abatement strategies that exist today. Fourth, a concentration on the impact that federalism and intergovernmental relations play on the general successfulness of NPS abatement strategies provides one of the more practical assessments of the reasons for the continued impairment of our nation’s water systems. Fifth, addressing the shortcomings that exist within our current federal structure, particularly as they pertain to nonpoint source pollution, will lead to a decrease in overall water pollution and impairment levels across the nation. Sixth, these decreases would have enough strength to impact water pollution levels such that an increased number of our nation’s water systems might become “fishable” and “swimmable” again.

The Research Hypotheses.

This survey had two separate research hypotheses. First, current nonpoint source pollution efforts are largely ineffective at reducing nonpoint source pollutants. Second,
the nation’s federal system hampers the effectiveness of current nonpoint source pollution abatement strategies.

Regulating the Environment

There are two main conclusions that may be drawn from the research conducted over the course of this study. In order to fully explore these conclusions, this section will address each as it relates to a specific research hypothesis; beginning first with the notion that current nonpoint source pollution abatement efforts are largely ineffective at limiting nonpoint sources of pollutants, and concluding with a discussion concerning the impact of our nation’s federal system on these abatement strategies.

Having reviewed the historical development of water pollution efforts over the past 250 years of our nation, it is apparent that many early attempts to reduce sources of water pollution were tied directly to the economic well-being of our nation. Indeed, much of our early national legislation found its legitimacy through the interstate commerce clause. It was not until the 1960’s and 1970’s that national legislation assumed an “environmental focus.”

During the 1950’s and 1960’s, the United States began to experience a variety of environmentally-related crises, which impacted our nation in several different ways. Medical and scientific communities saw an increase in severe health problems among U.S. citizens that were purported to be less common in earlier times, including, for instance, cancers among women and children. These health problems were largely attributed to certain human activities, such as dichloro-diphenyly-trichloroethane (DDT) spraying, which sought to regulate and control the environment. At the same time,
environmental catastrophes, such as the fire on the Cuyahoga River, increasingly gained national attention. These events inspired numerous individuals, including the noted author and biologist Rachel Carson, to pursue a variety of avenues that sought to protect the environment from further degradation. Eventually, these efforts inspired Congress to enact several different environmental initiatives.

By the 1970’s, the United States witnessed a rapid growth in environmental measures. The United States Environmental Protection Agency was established in 1971 to manage and address these pollution concerns. In 1972, the Clean Water Act was passed. This Act was touted as the nation’s first comprehensive water quality act in spite of earlier efforts to protect water systems. The Act originally focused primarily on point sources of water pollution. Point source pollution has been defined as any form of “pollution that comes from a specific, identifiable source, such as a pipe or channel” (http://www.epa.gov/trs/, June 9, 2006). The concentration on point sources of pollution has, to some degree, increased the overall health of our nation’s water systems.

Unfortunately, this focus has proved to be inadequate, leaving the national and state governments ill-equipped to achieve the goals of the Clean Water Act, which, in the basic sense, sought to ensure all of our nation’s water systems were both “fishable” and “swimmable” by 1983. In fact, a series of evaluations conducted as late as 1998 indicate approximately 40% of our nation’s waters still fail to meet their designated uses. Recognizing that point source pollution abatement efforts failed to meet the goals of the Act, Congress incorporated a series of amendments into it in 1987. These amendments integrated a series of measures to increase the control of nonpoint sources of pollution. Nonpoint source pollution, or diffuse pollution, does not enter the environment from a
single, easily identifiable outlet or “point,” but instead enters water systems indirectly, primarily through the water runoff from a variety of sources.

Since 1972, the EPA has identified several sources of nonpoint pollutants. However, the primary sources of nonpoint pollution are the result of agricultural, urban, industrial, resource extraction, and silvicultural practices. Because of its uniquely complex and diffuse nature, numerous entities outside of the EPA have become involved in nonpoint source pollution abatement strategies. Over 35 national programs have been identified as addressing NPS in some form. These programs have been found in the Department of Agriculture, the Department of Defense, and the Department of Interior among others. Nevertheless, the EPA remains the primary regulatory agency for environmental concerns.

The incredibly complex nature of nonpoint sources of pollution has made it difficult to effectively measure, let alone abate, the extent of its impairment on our water systems. Consequently, the national government and its agencies have relied on partnerships with state and local governments to address NPS. These partnerships create a system in which the national government establishes particular NPS abatement limits. The state governments are typically responsible for ensuring that these limits are met. However, a state government may also choose to set limits that surpass the national standards. In effect, the national government has set a floor for nonpoint source pollution levels. Interestingly, the national government also relies on a system of partial-preemption, meaning that a state government may choose to pursue NPS abatement efforts of its own accord or may turn over regulation directly to the national government. While these measures may seem incredibly fair and balanced, there are several
shortcomings associated with the current nonpoint source pollution abatement system – particularly in lieu of recent efforts focused on reducing nonpoint pollution through economic incentives.

Our nation’s federal system requires that political powers and authority be distributed among the national and state governments so as “to protect the existence and authority of both” (Elazar, 1984, p.2). Essentially, the state governments are integrated into a national system, but maintain their own inherent rights and political structure/culture. They maintain these rights through a system of “cooperative relationships” that have in common the “task of serving the American people” (pp.1-2). This notion has been a fundamental concept of our nation since The Federalist Papers and the inception of the U.S. Constitution.

Fundamentally this suggests that the national government should focus primarily on abating nonpoint sources of pollution through collaborative efforts with the states. Yet, the inherent nature of nonpoint source pollution (at least at this time) creates a disincentive for many state governments to adequately address the issue. State governments lack the economic means, or tax base, necessary to fund many NPS abatement efforts. Moreover, as point sources of pollution (which are easier to address than NPS) are further reduced across the nation, the cost of water pollution abatement will increase substantially, which creates a substantial burden for those states that [would] choose to be environmentally progressive.

This suggests that the nature of nonpoint source pollution creates a system in which state governments stand to loose jobs and industry to their neighbors by enacting progressive environmental standards, or by allowing their rights to be preempted to the
national government. Additionally, states that choose to accept the responsibility for ensuring water quality standards are met may subcontract the physical act of measuring nonpoint sources of pollution to private companies within their jurisdictions simply in order to save costs. This act, in and of itself, has proven problematic insofar as private companies are cost-bearing entities that may not be particularly concerned with abating NPS.

Given these factors, when coupled with the diffuse nature of nonpoint sources of pollution, it is inappropriate to leave the state governments with the level of control they currently maintain over NPS abatement strategies. Nonpoint source pollution, simply because it knows no boundaries, necessitates a system that does not allow for decisions to be made purely on economic grounds. State governments cannot avoid making a decision based primarily on economic interests or concerns. Even in instances in which states may not largely base their decisions on economic interests, the varied political cultures of these states, as identified by Elazar (individualistic, moralistic, and traditionalistic), prevent individual states from making decisions that effectively meet the abatement needs of the nation as a whole. It seems apparent that nonpoint source pollution has not been adequately “developed and resolved in the American political system [largely] because of the existence of the states (and their localities) in their present form (Elazar, 1984, p.10).

Implications and Recommendations

The inherent nature of nonpoint source pollution prevents the traditional federal framework – one which relies on collaborative partnerships – from serving as an effective
structure within which NPS may be reduced. State governments are not safeguarding their interests “within an intricate framework of cooperative relationships that preserve their structural integrity while tying all planes of government together functionally in the common task of serving the American people” (Elazar, 1984, pp.1-2). Instead, although parochial, these states find it politically and economically infeasible to adequately address nonpoint source pollution as a result of the perceived immediate needs of their local citizenry (i.e. jobs and economic development) which often trump more costly, long-term problematic issues. State-based enforcement of water pollution control standards reveals the complete lack of support for NPS abatement strategies.

At the same time the national government has come to depend on collaborative partnerships with the states to accomplish its objectives. Unfortunately, this dependence only further hampers the overall success of nonpoint pollution control efforts. The national government’s reliance on these partnerships has created a situation in which it has legally given away, or at least significantly limited, its ability to enforce the compliance of national standards through agencies such as the EPA. The focus on collaborative partnerships has led to weak national policies. For instance, nonpoint sources of silviculture pollution remain largely unchecked as a direct consequence of the failure of the national government to assume a stronger role in the federal system with regards to regulating this type of pollution. The national government’s focus on forest stewardship programs as one of the primary methods for reducing silvicultural pollutants demonstrates the reality of such claims. These programs have not only failed to be effective, but seem somewhat embarrassing considering our nation’s economic and technological resources.
Given the veracity of these problems, certain changes must be made to our current federal system in order to encourage greater cooperation and compliance for the NPS abatement efforts undertaken by the state governments. These changes should seek to balance the needs of local, state, and national interests in lieu of the diffuse nature of NPS. In spite of our nation’s historical tendency to leave local land use control to the states and their entities, the character of nonpoint source pollution necessitates that the national government assume greater regulatory and enforcement roles in areas in which particular land uses are likely to have some type of significant impact on [any] water systems.

In order to achieve this goal, public administrators working for the national government must acknowledge the shortcomings of our nation’s political structure, and its impact on water pollution control policies. At a national level many of our current nonpoint source pollution abatement efforts are the direct result of the Clean Water Act of 1972. Even those efforts pursued outside of the Environmental Protection Agency may be attributed in some form to the 1972 Act. Unfortunately, this suggests that many of our national regulatory efforts are the result of a political system that was adapted to meet the needs of issues identified in 1972. These issues, as was mentioned in Chapter Two, were primarily directed towards reducing point sources of pollution. Nonpoint source pollution was added to the legislation by 1987. Nevertheless, the fact that the Clean Water Act originally focused almost entirely on point source, rather than nonpoint source, pollutants has significantly constrained the effectiveness of the 1987 amendments. Simply, the 1972 Act relied heavily on the importance of the states in ensuring the enforcement of water pollution control efforts. This enforcement component
has carried over to subsequent legislation. To increase the enforcement capabilities of the national government, public administrators must use their expertise to direct the legislature to develop some type of meaningful approach to water pollution control that acknowledges the unique nature of nonpoint source pollution.

Public administrators can only achieve this end by recognizing the importance of four separate factors. First, the national government cannot completely rely on water system data collected through the states. States often lack the funding to maintain the technological means necessary to adequately measure water pollution within their boundaries (if they even choose to truly do so). Moreover, their efforts may not capture pollution that crosses state lines. Data collected by private entities on behalf of the states is equally problematic insofar as these entities maintain private interests that do not necessarily reflect the needs of the nation. As such, national agencies such as the EPA must move towards collecting better data, and instituting definitive data collection standards across the nation. These standards would, at the very least, allow for some type of comparison between state efforts.

Second, current economic analyses of water pollution control policies, and particularly those dealing with nonpoint sources of pollution, serve as a poor measure for determining national, state, and local abatement needs and standards. Any efforts to determine the costs and benefits associated with pursuing a particular level of control are likely to be ineffective and too easily influenced simply because we lack the technology necessary to truly, let alone even closely, measure the real extent and costs of NPS. Such determinations should eventually be based on standardized data collected through national efforts.
Third, given the lack of data collected currently, financial incentives for private entities should serve only a minimal role in the regulatory scheme of the national government. These incentives may have some effect in the long-term for reducing overall pollutant levels. However, suggested exchanges that would allow for private entities to trade point source and nonpoint source credits seems foolhardy without an appropriate format within which to measure the differences in impacts caused by point and nonpoint sources of pollution. Based on the lack of data collected by the states at this time, current information is likely to be limited at best.

Finally, the high costs associated with enacting specific national regulatory requirements are liable to create a significant amount of political tension. This is particularly likely as decisions are made concerning the practicality and ultimate effectiveness of certain efforts/standards over others. For those state and local governments and private entities that pursued a standard which is not supported by a regulatory agency such as the EPA the costs of implementing the new standard will be enormous. Still, without direct regulations that lack exceptions and specify the efforts states must pursue nonpoint source pollution abatement efforts are unlikely to be successful, let alone worthwhile.

In spite of these efforts, the national government is likely to face an uphill battle in addressing nonpoint sources of pollution. These pollutants currently lack the same level of notoriety that was eventually required to move the nation towards enacting the Clean Water Act of 1972. Consequently, it seems unlikely that national politicians, let alone public administrators, will garner the support for sweeping regulatory changes to nonpoint source pollution control efforts in the near future. Nevertheless, the fact that
nonpoint source pollutants are largely unregulated at the national level creates an opportunity for interested politicians and administrators to develop some type of regulatory base for these water quality issues. Such a base could serve as the foundation upon which other efforts may be pursued.

In the meantime, national agencies interested in abating nonpoint sources of pollution must direct a certain amount of attention towards providing information to those citizens who [may] engage in some type of activity that could lead to nonpoint sources of water impairment. This focus may help move the nation towards greater support for environmental water pollution control policies.

If these efforts were pursued, it is likely that the economic and political disincentive for state and local governments to pursue nonpoint pollution abatement efforts would eventually disappear. This would occur on two separate fronts. First, the costs associated with enacting NPS abatement efforts would begin to become standard, or at least more fairly balanced, across the nation. Second, as sources of nonpoint pollutants decrease it is probable that many of the early costs associated with these abatement strategies would decrease. Once these occur it might be appropriate to return a certain amount of regulatory control over local land use needs that may impact water systems to the state and local governments.

Suggested Further Research.

Due to the unique and remarkably varied nature on nonpoint sources of pollution there is a significant amount of additional research that could be conducted to clarify these findings. Each type of pollution identified carries unique federalism challenges.
For instance, urban sources of nonpoint pollution are inexorably tied to local
governments and their economic needs. Pollutants that are the result of resource
extraction activities are linked more closely to private entities and their activities. The
differences between the entities affected by each type of pollution abatement strategy are
certain to impact, at least slightly, the efforts needed to reduce sources of nonpoint
pollution while balancing local needs.

This research also inherently suggests there is a significant need to determine
which efforts are currently available and technologically feasible for abating forms of
nonpoint pollution. Having determined which efforts are feasible, further research
should be undertaken to determine which efforts could be most appropriately utilized to
establish national standards that meet local needs and the particular characteristics of
each type of nonpoint source pollution. It would also be interesting to evaluate the most
appropriate manner for implementing these changes.

Conclusions

An analysis of the historical development of our nation’s water pollution
abatement efforts demonstrates the complex nature of sources of water pollution. Many
of these sources have effectively been reduced through point source pollution abatement
strategies. However, it is equally apparent that nonpoint sources of pollution constitute
the most invasive and problematic type of water pollution confronting our nation today.
These sources are responsible for our nation’s inability to obtain the goal of having
“fishable” and “swimmable” water systems. To some degree, this failure is the result of
the inherent nature of nonpoint sources of pollution, which are remarkably varied. As
such, they require an equally varied regulatory approach. Our nation’s current federal structure, at least insofar as it addresses water pollution abatement efforts, leaves much of the regulatory-enforcement process to the state governments. The nature of state governments limits the overall effectiveness of nonpoint source abatement efforts. Because nonpoint source pollution constitutes a national problem that is not contained solely within state borders, the failure of states to abate these pollutants necessitates that the federal government assume a greater regulatory-enforcement role until the nature of those factors that limit the state governments from successfully abating nonpoint sources of pollutants change.
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