State Wetlands and Riparian Area Protection Programs

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ABSTRACT / The protection of wetlands and riparian areas has emerged as an important environmental planning issue. In the United States, several federal and state laws have been enacted to protect wetlands and riparian areas. Specifically, the federal Clean Water Act includes protection requirements in Sections 301 and 303 for state water quality standards, Section 401 for state certification of federal actions (projects, permits, and licenses), and Section 404 for dredge and fill permits. The Section 401 water quality state certification element has been called the "sleeping giant" of wetlands protection because it empowers state officials to veto or condition federally permitted or licensed activities that do not comply with state water quality standards. State officials have used this power infrequently. The purpose of this research was to analyze the effectiveness of state wetland and riparian programs. Contacts were established with officials in each state and in the national and regional offices of key federal agencies. Based on interviews and on a review of federal and state laws, state program effectiveness was analyzed. From this analysis, several problems and opportunities facing state wetland protection efforts are presented.

Since its enactment in 1972, the principal wetlands protection elements of federal clean water law have attracted both harsh criticism and vigorous debate. Much of the controversy concerns Section 404 of the Clean Water Act (CWA). To its critics, the permits authorized by Section 404 represent an unprecedented federal involvement in land-use regulation (Symms 1991). To its defenders, Section 404 is the most effective means of protecting the ever-diminishing wetlands in the United States (Blumm and Zeleha 1989). "There is perhaps no more contentious issue today than that of wetlands protection," according to the former director of the US Environmental Protection Agency (EPA), William K. Reilly (1991).

In addition to legislative initiatives taken by Congress and state legislatures to protect water quality, two presidents have been leaders in policy formulation. President Jimmy Carter issued executive orders 11988 and 11990 (Flood Plain Management and Wetland Protection) in 1977, which made wetlands protection a national policy matter. President George Bush was also clear, "My position on wetlands is straightforward: All existing wetlands no matter how small, should be preserved" (US Department of Interior 1990, p.3). President Bush on "numerous occasions" continued to state his "no net loss" policy across the nation (US Department of Interior 1990, p. 3). President Bush selected an environmentalist, Reilly, to direct the EPA. Before his EPA appointment, Reilly was president of the World Wildlife Fund/The Conservation Foundation, a group active in wetlands protection.

As federal and state agencies have begun to attempt to make "no net loss" real, the intensity of the debate has increased (Fulton 1991). Farm and home builder interests have sought to weaken existing statutes and regulations, while environmental groups fight for stronger laws. Policy makers and scientists have had intense discussions about what should officially constitute a wetland. Amendments have been proposed to alter federal and state laws and regulations, such as the change in the wetlands definition, as proposed by former Vice President Quayle's Council on Competitiveness. However, the former vice president's attemps to change the definition failed. A wetlands definition has been introduced by the US Army Corps of Engineers (the Corps) in 1987 in a definition manual. EPA subsequently issued a more expansive delineation manual in 1989. The Corps and EPA joined the US Fish and Wildlife Service and the US

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Soil Conservation Service in adopting a joint delineation manual with a wetlands definition (Want 1990).

Historically, wetlands and riparian areas were viewed differently than today. Throughout human history, people have located their settlements near rivers and lakes for water supply and waste disposal. As a result, most cities and towns are near, or have replaced, wetlands and riparian areas. Prior to 1970, wetlands and riparian corridors were generally viewed as waste areas that had minimal value for urban uses such as housing and commerce. Because of flooding dangers, areas adjacent to rivers and streams can be dangerous places to locate homes and businesses. As a result, wetlands and riparian areas often became sites for unwanted or undesirable uses such as heavy industry and landfills. With the growth of metropolitan regions, wetland and riparian areas have become more desirable for development. As William Reilly noted before a US Senate panel, "Wetlands are where the country is going. [Population is concentrated] on the coasts; on rivers; around lakes; on flat, undeveloped, cheap and developable land. Wetlands are, and will continue to be, under stress" (Lawson 1991, pp. 77–78).

The past 20 years have brought about a change in the public perception of wetlands and riparian areas. Increasingly, these areas have become recognized for their positive values for flood protection, water quality and supply, recreation, and wildlife and fish habitat. As a result, a few states, then the federal government, and finally several more states enacted laws encouraging the protection of wetlands and riparian areas. Beginning in the late 1960s and throughout the 1970s, there was a host of such laws addressing clean water, flood plains, wild and scenic rivers, the coastal zone, endangered species, and mining reclamation. Beginning in 1985, the preservation of wetlands on farms was required as a prerequisite for federal agricultural subsidies. These federal laws and associated state laws are dynamic and continue to evolve.

Wetlands are generally perceived to be swamps, marshes, estuaries, and similar areas. Some forested areas can also technically be termed wetlands. Riparian areas are those ecosystems within or adjacent to drainageways and/or their flood plains and are characterized by species and/or lifeforms different from the immediately surrounding upland (Lowe 1964). Riparian areas are variously considered by scientists to be a type of wetland (Brown and others 1978) or to be physiographically distinct from wetlands (Odum 1978). Wetlands and riparian areas are considered as two physiographically (but not functionally) distinct ecosystems for federal and state regulatory purposes.

The changing public perception of the importance of wetlands has to do with their many positive ecological functions and the values that people place on these functions. According to Williams, "it is difficult to say where a function becomes a value and there is much imprecision about these terms; . . . the word benefit [can] be used where we cannot clearly separate a function from a value" (1990, p.13).

The functions, values, and benefits of wetlands and riparian areas are perceived to be similar: groundwater recharge and discharge, sediment stabilization, flood flow attenuation, water quality maintenance, fish and wildlife habitat, climate moderation, shoreline protection, food production, and recreation (Cooper and others 1990, Meeks and Runyon 1990). Sixty-six percent of commercially harvested fish depend on wetlands for food or reproduction (Blumm and Zaleha 1989). Riparian areas support 75% of the nation's breeding birds, 50% of the mammals, and more than 100 endangered species (McCormick 1978).

Several approaches have been developed to classify functions, values, and benefits. Tiner (1984) suggests three categories: fish and wildlife values, environmental quality values, and socioeconomic values. Williams (1990) employs four broad groups: physical/hydrological, chemical, biological, and socioeconomic. Williams notes that "none of these categories is exclusive and each can have a profound effect on the other" (1990, p.13). Williams (1990) classifies flood mitigation, coastal protection, aquifer recharge, and sediment trapping as the major physical/hydrological functions. The chemical functions of wetlands include: pollution trapping, removal of toxic residues, and waste processing (Williams 1990). Williams considers productivity and habitats to be the biological functions. The major socioeconomic qualities are consumptive values for farming, fishing, hunting, fuel, and fiber plus nonconsumptive benefits for views, recreation, education, science, and history (Williams 1990).

Wetland losses in the coterminous United States are estimated to be 53% from the 1780s to the 1980s. In the 1980s, wetlands constituted an estimated 5% of the land surface of the lower 48 states (Dahl 1990). Alaska and Hawaii have also experienced losses in wetlands. Wetlands continue to decline nationwide but estimates of decline vary (Leslie and Clark 1990). It is estimated that some 80% of the remaining wetlands are privately owned (*Environmental Reporter* 1990). The causes of wetland conversions from the mid-1950s to mid-1970s were as follows: agriculture, 87%; urban development, 8%; other development, 5% (US Department of Interior 1988).

Wetlands have been lost and degraded as a result of human action and causes. Human actions include: drainage, dredging and stream channelization, deposition of fill material, diking and damming, tilling for crop production, grazing by domesticated animals, discharge of pollutants, mining, and alteration of hydrology (US Environmental Protection Agency 1988). Natural causes include erosion, subsidence, sea level rise, droughts, hurricanes and other storms, and overgrazing by wildlife (US Environmental Protection Agency 1988).

There has been no comprehensive national or regional analysis of the loss or alteration of riparian areas. It has been estimated that 70%–90% of riparian ecosystems have been altered and natural riparian communities now comprise less than 2% of the land area in the United States (Brinson and others 1981, Ohmart and Anderson 1986). Riparian areas are especially important in the West, where they are estimated to constitute 0.5% of the landscape (Ohmart and Anderson 1986, Monroe 1991). Estimated losses for states in the Intermountain West (parts of Nebraska, Kansas, South and North Dakota, Washington, Oregon, California, Arizona, New Mexico, Texas, and Oklahoma) can be found in Cooper and others (1990).

The implications of the trend toward increasing wetland and riparian area losses are significant. Flooding cycles have been altered, resulting in flood damage and associated costs for repair or prevention (Gosselink and Maltby 1990). Human safety and property are put at risk by floods. Long-term food supplies, genetic diversity, and wildlife reserves can also be negatively impacted (Gosselink and Maltby 1990). Gosselink and Maltby (1990, p. 32) observe: "Wetlands are important elements in the global cycles of nitrogen and sulphur . . . Inevitably the continuing loss of wetlands . . . must have significant impacts on these cycles, impacts whose repercussions we do not at present clearly understand." They also note negative consequences for the carbon cycle. The recognition of these trends has prompted action by federal and state governments.

The purpose of this paper is to analyze the effectiveness of state wetlands and riparian programs. Based on a nationwide survey of state and federal agencies and selected public interest organizations, this paper analyzes the effectiveness of state wetland and riparian programs. Representatives of 47 states, key federal agencies, and several public interest groups participated in the survey. The survey was undertaken for the Arizona Department of Environmental Quality and represents a nationwide compilation of information about various wetland and riparian protection programs and strategies. Some states have taken advantage of many of these protection strategies, while others have not. These strategies are:

- Assumption of the CWA, Section 404 permitting program;
- Involvement in implementation of a federal CWA, Section 404 permitting program;
- Implementation of a CWA, Section 401 certification program;
- Promulgation of narrative or numeric standards and/or use of antidegradation standards to protect wetland/riparian areas;
- Other natural resource protection programs that protect riparian areas;
- Establishment of voluntary or mandatory watercourse alteration or streamside forestry best management practices;
- Establishment of protection mandates through executive orders;
- Creation of opportunities for protection through tax incentives, easements, recognition programs, technical assistance, and education;
- Protection by acquisition; and
- Inclusion of riparian areas and wetlands in definitions of "waters of the state" for regulatory purposes.

The emphasis of this study was implementation of the CWA, Section 404 permitting and 401 certification programs. The main source of information was a questionnaire sent to state government staff, mostly in the water pollution control agencies, in all 50 states. Selected representatives of the Environmental Protection Agency, Army Corps of Engineers, and public interest organizations were also sent questionnaires. Telephone calls were made to each of the questionnaire recipients one week to ten days following receipt of the questionnaire to confirm that the questionnaire had been received. In some cases the questionnaire was forwarded to other agencies or more qualified staff to prepare the response. In one case the questionnaire was administered over the telephone rather than receiving a written response. Tables 1 and 2 describe the responses from respective states and total responses. The intent of the questionnaire was:

- To inventory wetland and riparian protection programs;
- To collect pertinent documents;
- To understand how states are implementing state programs; and

Table 1. Summary of responses from state officials

Type of responses	Number of responses
Written questionnaire and other materials	37
Written questionnaire only	5
Telephone questionnaire only	1
Written materials only	3
Letter response only	2
No response	3
Total	50

- To gauge how well the state and federal programs are working and to ascertain if they are effective.

Federal Wetlands Protection

As observed by William Want (1990, p. 1-1), "Most wetlands regulation has been done at the federal level and the federal program of regulation has become very complex." Historically, federal and state governments were concerned about waterways for their navigational values, principally for defense and commerce. Water was relatively plentiful and abundant in the eastern United States. With increased knowledge about sanitation and disease in the 19th century, coupled with the growth of industrial cities, there began to be concern about water quality. As the people of the nation moved West, wetlands were viewed as a nuisance to be converted to productive use as water irrigation systems were developed for agriculture and urban uses. In the late 1960s, the status quo began to change as federal agencies began to protect wetlands for their ecological values (Want 1990). In 1972, with the passage of the Federal Water Pollution Control Act Amendments [the Clean Water Act (CWA)], a new era of water quality protection began that included valuing wetlands differently.

The CWA is the principal law authorizing wetlands regulation (33 USC 1251-1376). A major regulatory program is the National Pollution Discharge Elimination System (NPDES), which is administered by the EPA. Want (1190, pp. 2–7) notes, "Section 301 of the Act prohibits the discharge of any pollutant without a permit. Section 402 of the [Act] authorizes EPA [or an approved state] to issue such permits. Section 404 of the Act carves out from the general EPA permit authority a special authority for the [US Army Corps of Engineers] to issue permits for the discharge of two types of pollutants: dredged material and fill material." As a result, the EPA and Corps jointly administer the 404 program. EPA has veto authority over the issuance by the Corps of the 404 permits. However, EPA has seldom used this power. According to former EPA administrator William K. Reilly (1991, p. 193), the "Corps issues over 10,000 permits every year, and in the 18-year history of the program, EPA has vetoed only 11 projects."

The main purpose of the CWA "is to restore and

Table 2. Summary of responses by state

State	Written questionnaire	Material	Telephone survey	Letter
Alabama	X	X		
Alaska	X	X		
Arizona	X	X		
Arkansas	X	X		
California	X	X		
Colorado	X	X		
Connecticut	X	X		
Delaware				
Florida	X	X		
Georgia	X	X		X
Hawaii	X	X		
Idaho	X	X		
Illinois	X	X		
Indiana	X			
Iowa	X	X		
Kansas	X	X		
Kentucky	X	X		
Louisiana	X			
Maine		X	X	
Maryland	X	X		
Massachusetts	X	X		
Michigan	X	X		
Minnesota	X	X		
Mississippi	X	X		
Missouri	X	X		
Montana	X	X		
Nebraska	X	X		
Nevada	X	X		
New Hampshire	X	X		
New Jersey				
New Mexico	X	X		
New York	X	X		
North Carolina	X			
North Dakota	X	X		
Ohio	X	X		
Oklahoma	X			
Oregon	X			
Pennsylvania	X	X		
Rhode Island		X		
South Carolina	X	X		
South Dakota			X	
Tennessee	X	X		
Texas	X	X		
Utah				
Vermont		X		X
Virginia		X		X
Washington	X	X		
West Virginia	X	X		
Wisconsin	X	X		
Wyoming	X	X		
Total	43	41	1	5

maintain the chemical, physical, and biological integrity of the Nation's water." In the 1987 amendments to the act, Congress established the policy "to recognize, preserve, and protect the primary responsibilities and rights of states to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources..." The 1987 amendments also established the policy of state implementation of Sections 402 and 404 permit programs.

Section 401 of the CWA allows the states "to veto federally permitted or licensed activities that do not comply with state water quality standards" (Ransel and Meyers 1988, p. 340). The states have the responsibility for setting these standards, subject to EPA approval. Section 303 of the CWA gives states "great latitude in formulating their water quality standards" (Ransel and Meyers 1988, p. 344). States may establish designated water uses and water quality standards criteria sufficient to "protect the public health or welfare, enhance the quality of the water and serve the purposes of the Act" (33 USC 1313 (c)(2)(A)).

According to Ransel and Meyers (1988, p. 342), quoting partially from the CWA, " 'any applicant for a Federal license or permit for conducting any activity . . . which may result in any discharge to the navigable waters' [is required] to secure from the state in which the discharge originates a certification that the discharge will comply with several provisions of the CWA related to effluent discharge limitations and water quality standards." Thus, a denial of section 401 certification "operates as an absolute veto" and "the state's decision is not reviewable by the federal permitting agency or the federal courts" (Ransel and Meyers 1988, p. 342). As a result, Ransel and Meyers (1988, p. 343) observe, "the states' most important role in the Section 401 certification process is to determine whether an applicant for a federal license or permit has demonstrated compliance with state water quality standards and, if not, to deny or 'condition' certification so that the activity will comply with those standards."

General State Responses

States have responded to federal law in a variety of ways. For instance, as a result of the CWA, states "may assume responsibility for issuing [404] permits in certain waters under their jurisdiction in accordance with criteria developed by EPA" [US General Accounting Office (GAO) 1988, p. 10]. Thus far, only Michigan has assumed primacy for issuing 404 permits, although several other states have considered or are considering the possibility. Most states have obtained primacy from EPA or the Section 402 NPDES permit program.

According to Salvesen (1990, p. 43), "The resulting programs [of the states], no two of which are identical, vary from those that regulate a wide range of activities such as dredging and draining, to programs that provide tax incentives to protect wetlands permanently." Salveson (1990, p. 43) notes that, in general, states regulate wetlands in two ways: "indirectly, as part of broad regulatory programs such as the coastal zone management program or the water quality certification provisions under Section 401 of the Clean Water Act, and directly, by enacting laws specifically to regulate activities in wetlands."

Although California, Oregon, and Washington have noteworthy coastal programs, western states have been slow in developing overall protection policies. In 1985 Kusler (1985, p. 6) noted that, "no state west of the Mississippi has adopted a comprehensive wetland or riparian habitat protection program for public or private lands, unlike the coastal states which have all adopted some protection for their coastal wetlands and 11 eastern states which have adopted freshwater protection statutes." Western states face a special opportunity and challenge because of the large blocks of public lands. Kusler (1985, p. 6) notes that six western states have adopted floodplain regulatory laws, but "these are narrowly aimed at reducing flood losses and have no provision for vegetation." Conversely, Oregon has adopted statewide planning guidelines for riverside lands and a state tax credit program, while Washington includes inland shorelines as part of its coastal zone program.

According to Griffin (1989, p. 25), "nearly half of the 50 states regulate wetlands uses to varying degrees; however, many of these states protect only coastal wetlands, with inland wetlands being largely unprotected except by federal regulations." These inland areas are significant because they represent the majority of the wetlands remaining in the lower 48 states. Much of this inland wetland is closely associated, physically and biologically, with riparian areas. Griffin (1989) has identified only 13 states nationwide with comprehensive inland wetlands protection laws.

The situation is changing both for inland wetlands and in the western states. For example, the Wyoming legislature passed the Wyoming Wetlands Act in February 1991 (WS 35-11-308 through 35-11-311). In that act, the legislature declared that "all water, including collections of still water and waters associated with wetlands within the borders of this state are property of the state. The legislature further declares that water is one of Wyoming's most important natural resources, and the protection, development and

management of Wyoming's water resources is essential for the long-term public health, safety, general welfare and economic security of Wyoming and its citizens."

Action by Wyoming and other states is important because federal agencies have not been successful in preventing the loss of wetlands. The US General Accounting Office (1988) has been critical of the Corps for not systematically seeking out 404 permit violators or for conducting follow-up investigations of suspected violations. GAO researchers have found that the Corps "rarely uses available civil or criminal remedies and suspends or revokes few permits, preferring instead to seek voluntary correction of the violations observed" (US General Accounting Office 1988, p. 3). The GAO has also observed "limited involvement" by EPA in wetlands program enforcement.

Effectiveness of State Wetlands and Riparian Protection Programs

To gauge state program success, a classification system was developed based on criteria identified by Mazmanian and Sabatier (1981) for determining effective policy implementation. Lowry (1985) has used the same criteria to assess the implementation of federal coast policy, while Steiner (1990) has applied the classification system to soil conservation policy. According to the Mazmanian and Sabatier criteria, policy implementation will be enhanced if the following six conditions are met:

- The enabling legislation or other legal directive sets policy goals that are clear and consistent or at least substantive criteria for resolving goal conflicts.
- The enabling legislation incorporates a sound theory of what kind of actions, in general, will result in the achievement of its policy goals—a "causal theory" or "implementing action"—and it gives implementing officials sufficient jurisdiction and leverage to attain, at least potentially, the desired goals.
- The enabling legislation structures the implementation process to maximize the probability that implementing officials and target groups will perform as desired.
- The leaders of the implementing agency have substantial managerial and political skill and are committed to the stated goals of the legislation.
- The program is actively supported by organized constituency groups and by a few key legislators or the chief executive throughout the implementation process, and the courts are neutral or supportive.
- The relative priority of statutory goals is not undermined later by the emergence of conflicting public policies or by changes in socioeconomic conditions that undermine the statute's "causal theory" or political support (adapted from Lowry 1985).

Each of these criteria can be applied to the evaluation of state wetland and riparian area protection programs. The state enabling legislation should establish clearly the goal of protecting wetlands and riparian areas. The purposes of this goal should be explained by lawmakers to the public. The policy should be linked to implementing actions or causal theories to achieve its goal. In the area of wetlands protection, fundamental actions include the definition of wetlands and riparian corridors, the delineation of areas for protection, and the statutory linkage between water quality and wetland protection. One causal theory is that if there are scientifically sound definitions and delineations, then wetlands and riparian areas can be protected. A second theory concerns the explicit linkage of water quality antidegradation standards to wetland and riparian area protection. The theory is that wetlands protection will result in water quality improvement.

These causal theories should lead to an implementation process that ensures that wetlands and riparian areas will be protected. Such a process should require inventories to identify the environmentally sensitive areas, numeric or narrative standards that must be met before permits are granted, mitigation measures that must be undertaken if the destruction of wetlands cannot be avoided, site plans to describe proposed actions, an honest account of options to the proposed project and of environmental consequences, and penalties for noncompliance. Adequate funding is necessary so that qualified managers and planners can be hired to administer the program. Funding may also be necessary to acquire selected lands fee simple or for conservation easements. States without well-defined implementation processes or adequate funding will have weak and ineffective programs.

An education component for implementation is necessary to explain the purpose of wetlands and riparian protection. It is crucial that the public and elected leaders understand this purpose so that they will support the effort. The process must also ensure that the constitutional rights of both the public and property owners are protected. The regulation of

wetlands under Section 404 provisions is a proper use of the police powers of government and not a taking of private property (Rapoport 1986). However, in "extreme circumstances," it might be necessary for the state to purchase property fee simple or purchase a conservation easement. State educational efforts vary, as do their case law histories. States are likely to have stronger programs if they have ample material explaining their planning process to elected officials, developers, farmers, environmentalists, and the public. States with more regulatory, rigorous efforts have faced more court challenges and, thus, have a more thoroughly articulated body of case law.

The final Mazmanian and Sabatier (1981) criterion addresses the continuity of state programs through time. Adaptability to changing conditions is an indication of continuity. Because of the relative newness of most state wetlands and riparian areas programs, the effectiveness of states in meeting this criterion is difficult to gauge. An effort will be made to evaluate the continuity of state programs after an analysis of the other five Mazmanian and Sabatier criteria as they relate to wetlands and riparian area protection.

Clear Goals

A clearly articulated policy goal to protect wetlands and/or riparian areas is missing in many states. The legal justification for protection is drawn from federal clean water and coastal management laws combined with a variety of state laws. For example, the authority to regulate wetlands in South Carolina is derived from two separate laws: the South Carolina Coastal Zone Management Act (South Carolina Code 48-39-10 et seq.) and the South Carolina Pollution Control Act (South Carolina Code 48-1-10 et seq.) (Sansbury 1990).

Following the lead of President Bush, no net loss in wetlands acreage and/or function has become the goal of several states. According to state officials, North Dakota was apparently the first state to implement a no-net loss law in 1987 (Senate Bill 2035, Chapter North Dakota Century Code). However, the bill actually is a fairly complex and delicate compromise between environmentalists and farmers. The law does clearly state that, "the public health, safety and general welfare, including without limitation, enhancement of opportunities for social and economic growth and expansion, of all the people in the state, depend in large measure upon the optimum protection, management, and wise utilization of all the water and related land resources of the state" (North Dakota State Engineer 1989, p. 1).

Michigan, the only state thus far to assume 404 responsibilities, has clearly articulated policy goals for wetlands protection. The cornerstone of Michigan's wetlands management program is the Goemaere-Anderson Wetlands Protection Act of 1979, which was approved by the governor on 3 January 1980. The act provides "for the preservation, management, protection, and use of wetlands; to require permits to alter certain wetlands; to provide for a plan for the preservation, management, protection, and use of wetlands, and to provide remedies and penalties" (Michigan, State of, 80th Legislature, 1979, Act No. 203).

Michigan has set both short-term and long-term goals. For its shorter term regulatory program, the goal is no net loss by acreage or function. In the longer term, the state would like a net gain of 500,000 acres of wetland by the year 2000.

According to Meeks and Runyon, New Jersey has one of the strongest statements of purpose in the nation. That statement establishes clear goals and reads, in part:

> . . . in this state, where pressures for commercial and residential development define the pace and pattern of land use, it is in the public interest to establish a program for the systematic review of activities in and around freshwater wetland areas designed to provide predictability in the protection of freshwater wetlands; that it shall be the policy of the state to preserve the purity and integrity of freshwater wetlands from random, unnecessary or undesirable alteration or disturbance; and that to achieve these goals it is important that the state expeditiously assume the freshwater wetlands to permit jurisdiction currently exercised by the United States Army Corps of Engineers . . . [referring to Section 404 of the Clean Water Act] [as quoted by Meeks and Runyon 1990].

Wetlands protection is linked to water quality in Massachusetts, where the purpose of water quality standards is "to protect the public health and enhance the quality and value of the water resources of the Commonwealth" (314 CMR 4.0 1(4)). The intent of the Connecticut law is also quite clear: "the preservation and protection of wetlands and watercourses from random, unnecessary, undesirable and unregulated uses, disturbances or destruction is in the public interest and is essential to the health, welfare and safety of the citizens of the state" (Water Resources Unit 1989, p. 1).

In Kansas, the goal to protect wetlands and riparian areas is part of a comprehensive water planning effort. The Water Resources Planning Act directs the Kansas Water Office to ". . . formulate on a continuing basis a comprehensive state water plan for the management, conservation and development of the water resources of the state" (KSA 82a - 901 et seq.).

The California Coastal Act (Ann. Cal. Pub. Res. Code, Section 30121) contains numerous policy goals relating to wetlands, such as ". . . diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary."

Implementing Actions

The definition and delineation of wetlands and riparian areas are fundamental actions necessary to achieve the protection goal. The definitions and delineations must be scientifically sound and clear so that implementing officials have sufficient jurisdiction to protect wetlands, but like definitions and delineation for wetlands and riparian areas, clarity in state statutes and programs is also missing. A South Carolina official, for instance, has observed that "nowhere in the definition" of water in the state statute "is the term 'wetlands' found" (Sansbury 1990, p. 3). The official goes on to justify how indeed wetlands are considered within the state's regulatory jurisdiction.

Michigan, through the Goemaere-Anderson Act, establishes a clearer definition in state law. The definition of Michigan wetlands has two components. First, Act 203 only regulates wetlands "where water (surface or subsurface) is present at a frequency and duration sufficient to support wetland vegetation or aquatic life" (Brown 1988, p. 6). Second, "wetlands are separated according to whether or not they are contiguous to a water body" (Brown 1988, pp. 6–7).

Several activities are exempted from Act 203 permits, but may be covered by the Michigan Environmental Protection Act. Michigan officials have attempted to reduce the unnecessary duplication of permits. Generally, the exempted activities include some existing farming practices, harvesting forest products, some road construction and improvement, power line construction and maintenance, small gas or oil pipeline construction, and iron and copper tailing basins and water storage (Brown 1988). Although some agricultural activities are exempt from the state law, they may be covered by the swampbuster provisions of the federal Food Security Act of 1985 as well as the state's Soil Erosion and Sedimentation Control Act. Both of these laws require farmers to have soil conservation plans.

The Massachusetts Wetlands Protection Act regulates the filling, dredging, and altering of wetlands. According to Klein and Freed (1989, p. 500), "Protected wetlands, also referred to as resource areas, include banks, freshwater wetlands, coastal wetlands, beaches, dunes, flats, marshes, meadows and swamps. To be protected under the Act, these resource areas must border a body of water. ...any activity within 100 feet of the edge of most wetlands is also subject to regulation."

In Kansas, the identification of riparian and wetland areas is accomplished through the state comprehensive planning process. In 1986, riparian protection and wetland protection subsections were included in the Kansas Water Plan as part of the fish, wildlife, and recreation section of the plan. Riparian areas and wetlands are defined in the water plan and their values recognized (Kansas Water Office 1990).

Sound definitions and consistent delineation techniques are significant actions necessary to protect wetlands, but they are only part of the "causal theory" framework, since the major justification for protecting wetlands and riparian areas is enhancing water quality. Antidegradation standards need to be integral to protection efforts. Twenty-nine states apply antidegradation water quality standards to wetlands (Steiner and others 1991). In these states an antidegradation policy applies to wetlands. Violations of these water quality standards result in the denial of 401 certification.

EPA has identified definitions, inventories, and water quality standards as implementing actions states can take immediately to use their Section 401 authority. EPA has urged all states to begin to explicitly incorporate wetlands into their definitions of state waters in both water quality standards and 401 certification standards (US Environmental Protection Agency 1989). EPA suggests that states improve or initiate inventories of wetlands. States need to designate uses for wetlands based on functions associated with the area type. This implies a classification system for state wetland inventories. Such a classification or tiering system could be used to set different standards for various wetland functions and types. EPA suggests that states should make more effective use of their existing narrative water quality standards, including their antidegradation policies, to protect wetlands (US Environmental Protection Agency 1989, Meeks and Runyon 1990).

Implementation Processes and Tools

The implementation of a state wetland protection program is linked to the federal CWA process. According to many of the respondents of the survey, the principal tool used is the 404 permit program regulating the discharges of dredged or fill materials into waters, including wetlands. Section 401 provides the opportunity for states to become involved in the federal permit process. States must provide or waive 401 certification on all 404 permits. This directly ties state

agencies to the federal process. For example, in South Carolina, the 404 permit program "is very much intertwined with State water and wetlands programs. It has been estimated that over 90% of the activities requiring a 404 permit also require a permit from a State agency" (Sansbury 1990, p. 5).

The New Jersey Freshwater Protection Act of 1987 is cited as a comprehensive wetlands statute by a number of analysts (Meeks and Runyon 1990). According to Meeks and Runyon (1990, p. 13), the New Jersey statute "explicitly states that there is a rebuttable presumption that practicable alternatives exist to any wetland activity." To alter a wetlands of exceptional resource value, a compelling public need for the proposed activity must be demonstrated. The New Jersey law defines the following as evidence "that would be admissible to rebut the presumption that alternatives exist to wetland disturbance" (Meeks and Runyon 1990, p. 12). The evidence includes:

1. The basic project purpose cannot reasonably be accomplished using one or more other sites in the general region that would avoid, or result in less adverse impact on an aquatic ecosystem; and
2. That a reduction in the size, scope, configuration, or density of the project as proposed and all alternative designs to that of the project as proposed that would avoid, or result in less, adverse impact on an aquatic ecosystem will not accomplish the basic purpose of the project; and
3. That in cases where the applicant has rejected alternatives to the project as proposed due to constraints such as inadequate zoning, infrastructure or parcel size, the applicant has made reasonable attempts to remove or accommodate such constraints (Meeks and Runyon 1990, p. 12).

In Michigan, the wetlands protection policy is implemented principally through permits. A well-established system of administration and enforcement has been put in place. Act 203 also strengthens local protection efforts. A permit is required for dredging, filling, draining, and developments, with certain exemptions. In addition to specific permits, the Michigan Department of Natural Resources (MDNR) "may issue general permits on a state or county basis for a category of activities that are similar in nature and have only a minimal adverse effect, both individually and cumulatively, on the environment" (Brown 1988, p.7). The MDNR's Land and Water Management Division is responsible for the administration of the permit program. An applicant may also need to request a permit with a local government if it has adopted a wetlands ordinance. The permit program is enforced through strong penalties. "Failure to obtain a necessary permit, or a violation of a condition or limitation in a permit issued under the Act, is subject to civil and criminal penalties" (Brown 1988, pp. 7–8). Legal actions may be initiated at either the local or state level. Guilty parties can face penaltics up to $50,000 per day of violation and up to two years in prison. The act also authorizes municipalities to provide "more stringent definition and regulation of wetlands" in local wetland zoning ordinances (Brown 1988, p. 8).

Wetland permit procedures in Michigan are straightforward. The steps are as follows:

1. Before planning or initiating any construction in a wetland, the property owner contacts MDNR.
2. MDNR makes a wetlands determination.
3. If wetlands occur, then an application is submitted by the property owner to MDNR.
4. Applications are reviewed for completeness.
5. Once an application is complete, the MDNR must make a decision to grant, deny, or modify an application within 90 days, or within 90 days following a public hearing if one is held (adapted from Brown 1988).

The MDNR evaluates permit applications according to Act 203, which stipulates "a permit ... shall not be approved unless the department determines *that the issuance of a permit is in the public interest*, that the permit is necessary to realize the benefits derived from the activity, and that the activity is otherwise lawful" (emphasis added). In determining the public interest, the benefits of the activity have to be balanced against the "foreseeable detriments of the activity." In addition, the permit cannot be issued "unless it is shown that an unacceptable disruption will not result." The permit shall not be issued unless the applicant demonstrates that the "proposed activity is primarily dependent upon being located in the wetland" and a "feasible and prudent alternative does not exist."

According to Brown, if "a permit is issued, performance conditions will be attached assuring that the activity will be completed consistent with applicable law" (Brown 1988, p. 12). Applicants can appeal MDNR decisions to the agency and through the courts. Brown notes that the "use of mitigation is becoming more and more common as a component of applications and permits" and that the "most common procedure is to compensate for wetlands destroyed by creating wetland habitat on site or, where necessary, at another nearby location" (Brown 1988, p. 12).

Michigan does not rely on permits alone to implement its program. It has a system of voluntary wetland protection and benefits to landowners. Land can be donated to a private foundation or a government agency and the landowner will receive a tax deduction. Michigan has a conservation easement provision that allows "certain rights and privileges concerning the use of land or a body of water to a non-profit organization, government body, or other legal entity without transferring title to the land" (Brown 1988, p. 13). Deed restrictions concerning future land use can be placed on the property along with the easement. Michigan also has funds for the acquisition of wetlands fee simple through the Michigan Natural Resources Trust Fund and the Michigan Duck Stamp Program as well as private and federal funding sources.

Other states have similar voluntary programs. For instance, the state of Kansas can "purchase or obtain land in the form of an easement for certain conservation purposes including riparian and wetland preservation and protection" (Kansas Water Office 1990, p. 32). In addition to easements, local conservation districts are to identify riparian and wetlands areas. In the Kansas state plan, there is also a policy recommendation that would "require local conservation districts to develop a county wetland protection program to promote the general protection and management of wetland areas ... such a county protection program would encourage landowners to protect and manage wetland areas as part of a comprehensive conservation plan" (Kansas Water Office 1990, p. 31).

Like Kansas, the implementation of the state wetlands program in Connecticut is done largely at the local level. As in much of New England, the town is an important level of local government in Connecticut. The town's legislative body is responsible for appointing a regulatory agency consisting of citizens from the community. In some Connecticut towns, "the planning and zoning or conservation commission may be acting as the wetland agency. The wetlands agency adopts local program regulations and a map showing the general location of regulated areas within the town" (Water Resources Unit 1989, p. 11). Similarly, in Massachusetts five-member volunteer local commissions are responsible for administering and enforcing the state wetland protection law.

In Connecticut there are consistent statewide guidelines for enforcing the Inland Wetlands and Watercourses Act and for evaluating the impacts of proposed activities on wetlands and watercourses. All municipal regulations are reviewed by the Connecticut Department of Environmental Protection (CDEP) for conformity with the wetlands act. If a local government fails to enforce the act, the the CDEP will. Each local government is required to report decisions and actions to CDEP monthly. The factors that a local commission is to consider include: (1) the environmental impact of the proposed action; (2) the alternatives to the proposed action; (3) the relationship between the short-term uses of the environment and the maintenance and enhancement of long-term productivity; (4) irreversible and irretrievable commitments of resources that would be involved in the proposed activity; (5) the character and degree of injury to, or interference with, safety, health of the reasonable use of property that is caused or threatened; and (6) the suitability or unsuitability of such activity to the area for which it is proposed (Water Resources Unit 1989, p. 12).

These factors for consideration and any other relevant considerations are used to regulate several activities in Connecticut. The act defines "regulated activity" to mean ". . . any operation within or use of a wetland or watercourse involving removal or deposition of material, or any obstruction, construction, alteration or pollution, of such wetlands or watercourses . . ." (Water Resources Unit 1989, p. 13). In addition many Connecticut towns ". . . have adopted setbacks or buffer zones in their regulations and require a permit for such activities taking place adjacent to wetlands or watercourses" (Water Resources Unit 1989, p. 14).

As in other states, some uses are exempt from wetlands protection in Connecticut, including some, but not all, farming operations; the construction of a residential home on a subdivision lot that had received a building permit prior to 1 July 1987; boat anchorages and moorings, not including dock construction; some ancillary, incidental residential uses; and the construction and operation of dams, reservoirs, and other water shortage facilities. Some activities are permitted as nonregulated uses, "provided they do not disturb the natural and indigenous character of the wetland or watercourse" (Water Resources Unit 1989, p. 15). These uses include conservation activities and outdoor recreation facilities.

Individuals who plan work in or around wetlands or watercourses in Connecticut are required to contact their local wetlands agency prior to commencing such activities. In addition to local level approval, some activities are subject to state-level regulation, including: the construction or modification of any dam; the construction, encroachment, or placement of any obstruction within stream channels; construction or placement of any structure or obstruction within tidal,

coastal, or navigable waters; diversion of water including withdrawals of surface or groundwater in excess of 50,000 gallons per day or any change in the instantaneous flow of any surface waters of the state where the tributary watershed area above the point of diversion is 100 acres or larger; discharges into the waters of the state; and discharge of fill or dredged materials pursuant to Sections 401 and 404 of the CWA. In addition to its regulatory program, Connecticut also uses incentives for implementation. Landowners of wetlands can receive tax relief for areas of their property with restrictions placed on it.

Virginia has also shifted the permit issuing authority to local governments in coastal tide areas. As a result of the Virginia Wetlands Act, permits are required for wetland alteration. Local wetlands boards issue permits, and the state provides advice and reviews local permitting decisions (Cox 1989). Although the state government has the authority to reverse local wetland board decisions, "few reversals occur" in Virginia (Cox 1989, p. 535).

EPA recommends that states should immediately develop or modify their regulations and guidelines for 401 certification and water quality standards to clarify their programs, codify their decision procedures, and to incorporate special wetlands considerations into their more traditional water quality approaches (US Environmental Protection Agency 1989). As well, according to EPA, states should incorporate wetlands and 401 certification into their water quality management programs. Integrating this tool with other mechanisms such as point and nonpoint source programs and areawide water quality management plans "will help fill the gaps ... and allow better protection of wetlands systems from the whole host of physical, chemical and biological impacts" (Meeks and Runyon 1990, p. 16).

Commitment and Skill of Critical Implementing Officials

Several states, including Connecticut (Water Resources Unit 1989), Michigan (Brown 1988), and South Carolina (South Carolina Coastal Council and US Army Corps of Engineers no date), have developed detailed guidebooks and handbooks as educational resources for parties interested in their programs. In several instances, these guidebooks and handbooks have been produced cooperatively by federal and state agencies. The Pennsylvania Department of Environmental Resources has developed an instruction booklet for a joint federal/state permit application with the Corps (Pennsylvania Department of Environmental Resources and US Army Corps of Engineers 1987). Local governments have also prepared wetlands guidebooks (Chester County Planning Commission 1987).

Individuals from different state and local agencies sometimes compete for wetlands protection responsibilities and frequently view wetlands protection from divergent perspectives. One state agency may place wetlands and riparian area protection high on its agenda, while another may be lukewarm or even hostile on the issue. For example, in Kansas, the state water office has been critical of local conservation districts for taking "no action in identifying riparian and wetland protection areas" although it is their responsibility (Kansas Water Office 1990, p. 32). The water office has noted also that the Kansas Department of Wildlife and Parks has not used conservation easements for riparian and wetland protection purposes. As a result, the Kansas Water Office has concluded "thus, the [riparian and wetland protection] program which has been on the books for five years has yet to be implemented" (Kansas Water Office 1990, p. 32). This situation appears to be inconsistent with the policy of the Kansas legislature, which "envisioned a cooperative among several state agencies including the State Conservation Commission, the Kansas Department of Wildlife and Parks and the conservation districts" as well as the Kansas Water Office (Kansas Water Office 1990, p. 32).

In other states, cooperation among agencies is better and officials are proud of their programs. A Connecticut publication boasts "Thanks to forward sighted citizens and our State Legislature, Connecticut is in the forefront of wetland protection in the country" (Water Resources Unit 1989, p. 1). Another state publication notes, "Existing Connecticut laws governing the use of freshwater wetlands are recognized as being among the most progressive and protective in the nation" (Department of Environmental Protection 1990, p. 1).

Massachusetts officials also consider their state to be "a leader in mandating the protection of wetlands resources" (Klein and Freed 1989, p. 506), but the decentralized approach taken in Massachusetts has caused some problems with implementation. Local officials do not always have the backgrounds necessary to adequately administer and enforce the program. According to Klein and Freed (1989, p. 503): "Although there is only one Wetlands Protection Act, there are 351 local conservation commissions administering it in their communities. This creates the potential for numerous administrative variations. Although the state environmental agencies strive to

ensure consistency, there are grey areas in the Act which cause confusion at the local level."

In a survey of Massachusetts conservation commissions, it was found that some portions of the wetlands regulations "are not well understood, leading to inconsistent interpretation" by local officials (Klein and Freed 1989, p. 503). As a result of the inconsistent regulatory interpretations, wetlands are being unnecessarily lost in Massachusetts. In addition, the survey also indicated that "commissions perceive themselves to be poorly equipped to adequately administer the Act. The lack of qualified staff and the sheer number of applications is also a factor in commission performance, as the survey showed that the commissions receiving the most filing [for permits] have not necessarily increased their staffing levels" (Klein and Freed 1989, p. 503).

Assessing the commitment and skill of implementing officials is a subjective matter, especially when dealing with programs as new as most state wetlands efforts. Impressions were gained by the authors of this paper during telephone interviews and through the mail survey. The commitment and skill of state officials appears to vary widely nationally. Many officials are enthusiastic and eager to share information. They are self-critical, orally and in writing, and seem eager to improve their program. Other officials seem demoralized. They are discouraged by lack of budgets and staff to perform an adequate job. Another source of discouragement is the situation when state officials have worked hard to design a wetland protection program, only to see it compromised when implemented.

Continued Support from Key Political Leaders and Constituency Groups

Wetlands protection has been advocated by the nation's top leaders. Former President George Bush endorsed a federal policy of preserving the nation's remaining wetlands, although his administration did not pursue this policy vigorously. At the state level, legislators, agency officials, developers, environmentalists, local governments, and farmers have taken an interest in the issue. Several current or former governors, such as New Jersey's Thomas Kean, Delaware's Michael Castle, Washington's Booth Gardner, and Arizona's Rose Mofford have provided leadership in wetlands and riparian area protection.

The National Wetlands Policy Forum stimulated a couple of states to undertake similar efforts. In Delaware, Governor Michael Castle initiated a freshwater wetlands roundtable. The roundtable members included academics, business people, public interest group representatives, environmentalists, farmers, and political leaders. The roundtable endorsed a policy goal of no net loss of freshwater wetlands and recommended a "pro-active public/private partnership strategy to achieve it" (Governor's Freshwater Wetlands Roundtable 1989). The roundtable identified central issues that had to be addressed in Delaware.

South Carolina Governor Carroll Campbell, a co-vice-chair of the National Wetlands Policy Forum, established a Freshwater Wetlands Policy Forum in his state. Suggestions from the governor's forum have been incorporated into proposed state legislation. Also in South Carolina, the state supreme court found that a state agency had improperly certified the alteration and dredging of a wetland. The state agency certified the wetland change because of economic benefits of the proposal. The state supreme court noted that economic benefits cannot override wetlands protection criteria (Sansbury 1990, p. 16).

The South Carolina case was initiated by environmental groups and the League of Women Voters who commenced action to contest the validity of certification for a residential development project. The proposed project involved dredging a canal through freshwater wetlands in order to create waterfront residential lots and provide access to the river. A lower court upheld certification, but the South Carolina Supreme Court reversed the decision. The supreme court found evidence that did not support certification of the project. There was no evidence to indicate absence of feasible alternative sites, to support the conclusion that the project would be without significant environmental impact, or to establish overriding public interst in permanent alteration of the wetland (South Carolina Wildlife Federation v South Carolina Coastal Council, 371 S.E.2d 521 S.C. 1988).

An indicator of political support is the openness of a program to public participation. Such involvement can create awareness and support for wetlands protection. The Michigan program encourages such public participation. For a $25.00 annual fee, anyone can receive weekly notices of all permit applications. If MDNR issues a public notice, it is followed by a formal public comment period. Some large-scale activities result in the public notice being sent "to the municipality where the activity would occur, the adjacent property owners, and any other interested parties that request it including state agencies, public and private organizations, and individuals" (Brown 1988, p. 10). The public has 20 days and local governments 45 days to respond to these public notices. During the 20-day comment period, individuals may request a public

hearing. During the 45-day period, local goverments can hold public hearings.

Adaptability to Changing Conditions

According to Mazmanian and Sabatier (1981), for a program to be effective, the courts need to be neutral or supportive. Legal challenges to wetlands programs are one way to gauge how responsive the programs are to changing conditions. Very little information was provided from the states concerning legal challenges during the survey. It appears that states with more rigorous programs have been challenged more frequently. For example, in 1991 Maryland's state program faced 31 law suits. In 1990 there were 20 challenges to New Hampshire's programs, while South Carolina officials report about two or three challenges a year.

Independent of the survey, most sources report that challenges to state and federal wetlands programs have not been successful (Blumm 1980, Rapoport 1986, Strong 1987, Ransel and Meyers 1988, Want 1990). Strong notes that a public health, safety, or welfare purpose served by a regulation is crucial and, furthermore, this public purpose needs to be clear in state legislation. According to Strong (1987, p. 4), "the importance of explicit state enabling legislation becomes apparent when landowners allege that there is no valid public purpose underlying the regulation. If the state statute lists the public purposes to be advanced by regulation and explains why the state legislature finds these purposes to be important to the state, courts have generally been highly deferential to legislative intent."

Another indication of adaptability to changing conditions is legislative amendments. Most states that have enacted laws to protect wetlands have amended them. For example, Connecticut wetland/riparian legislation has been amended in 1974, 1978, 1981, 1987, and 1990. Generally, there appears to be a tendency toward stronger state laws. Programs also change as a result of budget increase or decrease. The present situation is an odd mixture of more public policies and political support but lower budgets to support responsible state agencies.

In Connecticut, which has one of the older and more well-established programs in the nation, there has been discussion regarding the incorporation of mitigation into the state program. Wetland mitigation is a concept that has developed since the Connecticut program began in 1972. The Connecticut Department of Environmental Protection (CDEP) convened a task force in 1988–1989 "to evaluate the state's regulatory policies on wetlands creation as compensation for the loss or destruction of wetlands resulting from developmental activities" (Department of Environmental Protection 1990, p. 1). A proposed policy was developed by the task force that maintained Connecticut's "progressive and protective" program by not permitting compensation to a state fund where wetland losses or impacts are avoidable or where mitigation is used to make unacceptable wetland losses or impacts acceptable. The task force also suggested that wetland compensation strategies should be considered separately from the development proposal and, if compensation is deemed appropriate, then compensatory mitigation measures must follow rigorous standards (Department of Environmental Protection 1990).

Actually, the Connecticut program is one that has been resilient through the years. For example, the 1987 amendments, strengthening wetland protection, provide: "In the case of an application which received a public hearing, a permit shall not be issued unless the Commissioner [of CDEP] finds that a feasible and prudent alternative does not exist."

By amendment references, this provision was made applicable to local commissions (Sharp 1987). Rather than being undermined by changing conditions, as more is learned about the value of wetlands in Connecticut, protection for the resource has increased.

Policy, like nature, is seldom in balance. Rather, environmental policy is dynamic. Changes are bound to occur. Generally, the major changes at the state level appear to be the increased recognition of the values and functions of wetlands and riparian areas and the growing understanding of the roles of government in their protection. State leaders face a number of challenges to better protect these environmentally sensitive areas. States also have the opportunity to use their authority to ensure that the benefits of wetlands and riparian areas are maintained for future generations.

Summary of Results

Overall, there is relative consistency among all states concerning the role played in Section 404 permitting and Section 401 certification. Only Michigan has assumed primacy in Section 404 permitting, and Georgia is the only state that has not implemented a Section 401 certification program. In all other cases, states defer to federal agencies for Section 404 permitting, but implement a 401 certification program. Fewer states (approximately half) have established narrative or numeric standards and/or use antidegra-

dation standards for wetland or riparian areas. At least 28 states have other natural resource protection programs, including coastal zone management programs, that provide protection for wetland and/or riparian areas. Executive orders for protection are less common, occurring in only seven states. Other nonregulatory programs such as tax incentives, easements, recognition programs, subsidies, technical assistance and education, and acquisition are used by numerous states and in a variety of ways. Most states have some form of nonregulatory program in place. Voluntary and regulatory best management practices are used in well over half the states, more relying on mandatory than voluntary, with 15 using both. Thirty-six states indicated that wetlands and riparian areas are included in the state's definition of "waters of the state." Table 3 summarizes selected programs from all states.

Conclusions: Problems and Opportunities

The surveys of state and federal officials identified several key issues. The major problems are:

- The definition and delineation of wetlands and riparian areas,
- The weak connection between water quality antidegradation standards and wetland/riparian protection,
- Exemptions from permit requirements for certain land uses or activities,
- The division of responsibilities among the federal, state, and local levels of government,
- The lack of cooperation among agencies, especially relating to monitoring and enforcement activities, and
- The need for more funding and better trained staff for wetland and riparian programs.

Jon Kusler has made several recommendations to strengthen riparian habitat protection in the arid and semiarid West, emphasizing habitat protection. First, he suggests "an effort must be made to clear away the semantic clouds" (Kusler 1985, p. 7), and he notes that the protection "of western riparian habitat should be advocated on its own—as a class of lands similar to and as valuable as wetlands—but not meeting strict wetland definitions" (Kusler 1985, p. 7).

The reasons for protecting wetlands and riparian areas need to be clearly explained and the lands that should be protected clearly delineated. Wetlands provide many important functions, values, and benefits (Williams 1990). The "why" of wetlands and riparian area protection relate most directly to water quality benefits. Most water pollution comes from nonpoint sources. Wetlands and riparian areas act as filters removing pollutants before they enter waterways. Such areas are also important for recharging groundwater supplies. Thus, wetlands and riparian areas are vital for water quality and surface and groundwater supply. Ancillary benefits relate to flood control, erosion and sedimentation management, fish and wildlife habitat protection, and recreation and scenic resource enhancement.

To delineate riparian habitat, Kusler (1985) suggests that the following characteristics be considered:

- Location of "riparian" lands along streams, rivers, arroyos, ponds, lakes, other waterbodies,
- Growth of vegetation dependent upon relatively high soil moisture content,
- Periodic flooding,
- Alluvial or other characteristic soils (some, but not all lands),
- Special water-related functions such as erosion control, and
- Special management needs (Kusler 1985, p.7).

State legislation and programs should include delineations based on these characteristics. The delineations, in turn, should be related to the purposes of wetlands and riparian areas protection. Clear goals should provide the bridge between the purposes and delineations and the actions and strategies needed to achieve water quality. Currently, several state officials note that there is a weak connection between water quality antidegradation standards and wetland/riparian protection. Strengthening this link is essential because it provides a "causal theory" for the protection of wetlands and riparian areas. Such standards may be either numeric or narrative or a combination.

Meeks and Runyon (1990) identify exemptions from permit requirements for certain land uses or activities as the major weakness of state wetland protection acts. Another commentator, Sherry Lynn Jacobs, also identifies the substantial weakness to existing state law as exemptions to permit requirements for agricultural practices, utilities, construction and maintenance of roads, mining, and drainage. Jacobs (1987) observes that although agriculture is the single largest cause of wetland loss, accounting for 80% of the conversions, farmers are largely exempted from state regulations.

Kusler (1985, p. 7) also notes that "opportunities for protection should be simultaneously pursued at all levels of government." Currently, jurisdictional frag-

Table 3. Summary of state programs[a]

State	Regulatory						Nonregulatory			
	Assumption of 404 programs by state	Involvement in federal 404 programs	Implementation of 401 certification	Numeric, narrative, or antidegradation standards	Other natural resource protection programs	Mandatory or voluntary best management practices	Executive order for wetland protection	Nonregulatory programs: tax incentives, easements recognition programs, subsidies, technical assistance	Wetland acquisition programs	Riparian and wetlands in definition of waters of state
Alabama	N	Y	Y	N	Y	M	N	O	N	O
Alaska	N	Y	Y	N	Y	M,V	N	T,E,S	N	N
Arizona	N	Y	Y	Y	Y	M,V	Y	E,R,TA	Y	Y
Arkansas	N	Y	Y	N	N	O	N	T,E,S	N	Y
California	N	Y	Y	N	Y	M	N	R	O	N
Colorado	N	Y	Y	N	N	O	N	R	N	N
Connecticut	N	Y	Y	N	Y	M	N	T,R,S,TA	N	Y
Delaware	N	Y	Y	O	Y	O	N	O	O	O
Florida	N	Y	Y	N	Y	M	N	R	Y	Y
Georgia	N	Y	N	O	N	M	N	E,S	Y	Y
Hawaii	N	Y	Y	Y	Y	M	N	E	Y	Y
Idaho	N	Y	Y	N	Y	M,V	N	R,S,TA	Y	Y
Illinois	N	Y	Y	Y	Y	O	N	E,S,TA	Y	Y
Indiana	N	Y	Y	Y	N	O	N	S,TA	N	O
Iowa	N	Y	Y	Y	N	O	N	T,R,S,TA	Y	O
Kansas	N	Y	Y	N	Y	M	N	E,TA	N	Y
Kentucky	N	Y	Y	N	Y	O	N	E,R,TA	Y	Y
Louisiana	N	Y	Y	N	Y	O	N	O	N	Y
Maine	N	Y	Y	N	Y	M	N	E,S,TA	N	Y
Maryland	N	Y	Y	N	Y	M,V	N	E,S,TA	Y	Y
Massachusetts	N	Y	Y	N	Y	O	N	TA	N	Y
Michigan	Y	Y	Y	Y	Y	O	N	E,TA	Y	Y
Minnesota	N	Y	Y	Y	N	O	Y	E,R,S,TA	Y	Y
Mississippi	N	Y	Y	N	Y	O	N	O	N	Y
Missouri	N	Y	Y	Y	N	M	N	E,S,TA	Y	Y
Montana	N	Y	Y	N	N	M,V	N	S,TA	Y	Y
Nebraska	N	Y	Y	Y	N	M,V	N	T,E,S,TA	Y	Y
Nevada	N	Y	Y	Y	N	M,V	N	T,E,S,TA	N	N
New Hampshire	N	Y	Y	O	Y	M,V	N	T,E,S,TA	Y	Y
New Jersey	N	O	O	O	O	O	O	O	O	O
New Mexico	N	Y	Y	N	N	M	N	O	O	N
New York	N	Y	Y	Y	Y	O	Y	T,S	N	Y
North Carolina	N	Y	Y	N	Y	O	N	T,S	N	N
North Dakota	N	Y	Y	N	N	M,V	N	TA	N	Y
Ohio	N	Y	Y	Y	N	O	Y	E,TA	Y	Y
Oklahoma	N	Y	Y	N	N	M	N	S,TA	N	N
Oregon	N	Y	Y	N	Y	O	N	T,E,S,TA	N	Y
Pennsylvania	N	Y	Y	Y	Y	M,V	N	T,E,S,TA	N	Y
Rhode Island	N	Y	Y	N	Y	M,V	N	T,E	Y	Y
South Carolina	N	Y	Y	N	Y	M,V	N	O	N	Y
South Dakota	N	Y	Y	N	N	O	N	O	N	O
Tennessee	N	Y	Y	Y	N	M	Y	E,S,TA	Y	Y
Texas	N	Y	Y	Y	N	O	N	O	N	Y
Utah	N	O	O	O	O	O	O	O	O	O
Vermont	N	O	O	O	O	O	O	O	O	O
Virginia	N	O	O	O	O	O	O	O	O	O
Washington	N	Y	Y	Y	Y	M,V	Y	TA	Y	Y
West Virginia	N	Y	Y	Y	N	M,V	N	TA	Y	Y
Wisconsin	N	Y	Y	Y	Y	M,V	N	R,S,TA	Y	Y
Wyoming	N	Y	Y	Y	N	V	Y	TA	Y	O

[a]N = no, Y = yes, M = mandatory, V = voluntary, T = tax incentives, E = easements, R = recognition programs, S = subsidies, TA = technical assistance and education, O = no data.

mentation exists. A partnership involving federal, state, and local governments as well as private landowners and public interest groups needs to be established. At the federal level, Kusler believes "explicit riparian habitat protection guidelines should . . . be incorporated into the [Corps] Section 404 guidelines since habitat is 'water of the U.S.' although it may not qualify as wetland" (Kusler 1985, pp. 7–8).

Several states, including Virginia, have promoted such a local/state/federal partnership. In his explanation of the Virginia approach, Cox (1989, p. 536) notes:

> Local government traditionally has been delegated primary responsibility for land use control in Virginia; a significant local role in wetlands management therefore is consistent with tradition. But direct state participation is a natural consequence of the recognition that wetlands and the other resources that depend on impacts of wetlands modifications can extend far beyond the local area. . . . Just as state interests in wetlands transcend local interests, a national interest broader than that of any individual state has been recognized, and wetlands protection has become a major federal objective.

The EPA has suggested that the enforcement of Section 404 would be increased if more states were to assume program responsibilities that are allowed by law. EPA has also noted that administrative funds may be necessary "before many more states would be encouraged to assume this responsibility" (US General Accounting Office 1988, p. 62). Currently, funding is not adequate either on the federal or state level. For example, a Corps official notes, "it should be clearly recognized . . . that the Corps staffing and funding resources are not adequate to meet the requirements of the regulatory program" (US General Accounting Office 1988, p. 80), but state-level officials complain that the Corps is ineffective for more reasons than an inadequate budget. For example, in several states there are many district offices of the Corps. These district offices frequently have "significant" differences in program operation and emphasis. The Corps is also criticized by state officials for its engineering and development orientation. Central policy questions facing wetlands and riparian protection concern the level of government at which the primary responsibilities should rest and how adequate funding should be provided.

Even before these questions are addressed, existing programs could be more effectively enforced. The GAO has been critical of the Corps for not emphasizing monitoring and enforcement activities, as were several state agencies in this survey. Although the Corps and EPA have claimed that staff and budget constraints are the primary reasons for the lack of enforcement, GAO notes a better job could be done with existing resources: "if the Corps and EPA better coordinated their combined resources, they could bring about a more comprehensive and systematic monitoring and enforcement effort" (US General Accounting Office 1988, p. 73). The same logic can be extended to state and local governments to accomplish the kind of protection by all levels of government advocated by Kusler.

Such cooperation can be cost effective for governments; however, from this nationwide survey it is clear that state programs are currently inadequately funded and staffed. State officials note a lack of funds for enforcement, monitoring, and education. One respondent observed that politicians are suspicious of the federal 404 and state 401 programs and as a result are not interested in strengthening them through budgets or statutes. However, from this survey it is also clear that the number of citizen, environmental, and public interest groups involved in wetlands and riparian area protection is growing. Jan van Schilfgaarde (1991, p. 18), one of the foremost authorities on western water policy, recently wrote about the renewed growth in environmental interests:

> "We are not witnessing a flash in the pan. The changes we have seen are real and permanent. They're deep-rooted changes *driven by the public*. They are slowly, sloppily, and irrationally being endorsed by the Congress and by state legislatures and reluctantly, belatedly, and halfheartedly being accepted by the bureaucracy" (his emphasis).

From the experiences of other states, the features of an effective wetland and riparian area protection program can be identified. The following features of an effective state wetland protection program are drawn from a North Carolina report (North Carolina Environmental Defense Fund 1989), this survey of state and other officials, and the analysis based on the survey. The features are:

- Policies for the present and clear goals for the future.
- Strategies for achieving the no net loss and eventual gain of wetlands and riparian areas. Such strategies should seek:
  - –To explain the public health, safety, and welfare purposes of wetlands protection.
  - –To define wetlands and riparian areas with explanations of their values, functions, and benefits.
  - –To delineate wetlands and riparian areas to be protected.
  - –To improve the 401 certification program to clar-

ify procedures and codify the decision-making process.
  - –To improve state water quality regulations by adopting numeric and/or narrative standards to strengthening antidegradation requirements.
  - –To assume the 404 program at the state level.
  - –To create a state wetland and riparian area permitting program with no exemptions.
  - –To disseminate information about wetland areas, their functions and values, and protection effort widely.
  - –To provide mechanisms for adequate public participation and local government involvement.
  - –To integrate wetlands and riparian area mitigation requirements into all state programs.
  - –To infuse wetland and riparian area protection into local land-use planning, economic development, and growth management strategies (i.e., general or comprehensive plans, zoning ordinances, and subdivision regulations).
  - –To create financial disincentives for wetlands destruction and financial incentives for wetlands preservation (i.e., through state tax policies, heritage programs, land acquisition, and conservation easements).
- Enforcement mechanisms and significant penalties for non-compliance.
- Funding and staffing at levels to ensure program implementation.

A program with such features requires strong and sustained support from the public and elected officials. The benefits of wetlands and riparian areas are many. The consequences of not acting and not putting in place a comprehensive program are significant. Certainly, there are short-term impacts from the continued loss of wetlands and riparian areas, but the consequences for future generations are likely to be even more profound. The value and benefits of protecting wetlands and riparian areas have been recognized in many states. Several states have put in place model programs. As a result, there are many examples to follow for other states that seek to protect wetlands and riparian areas.

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Literature Cited

Blumm, M. C. 1980. The Clean Water Act's Section 404 permit program enters its adolescence: An institutional and programmatic perspective. *Ecology Law Quarterly* 8(3):409–472.

Blumm, M. C., and D. B. Zaleha. 1989. Federal wetlands: Protection under the Clean Water Act: Regulatory ambivalence, intergovernmental tension, and a call for reform. *University of Colorado Law Review* 60(4):695–772.

Brinson, M. M., L. Swift, C. Plantico, and S. Barclay. 1981. Riparian ecosystems: Their ecology and status. FWS/OBS-81/17. US Fish and Wildlife Service, Washington, DC, 152 pp.

Brown, S., M. M. Brinson, and A. E. Lugo. 1978. Structure and function of riparian wetlands. Pages 17-31 *in* R. R. Johnson and J. F. McCormick, technical coordinators. Strategies for protection and management of floodplain wetlands and other riparian ecosystems: Proceedings. USDA, FS, GTR-WO-12. US Department of Agriculture, Washington, DC.

Brown, S. 1988. Wetland protection guidebook. Michigan Department of Natural Resources, Land and Water Management Division, Lansing, Michigan, 14 pp.

Chester County Planning Commission. 1987. Wetlands. Chester County Planning Commission Bulletin 33. West Chester, Pennsylvania, 14 pp. plus appendices.

Cooper, D., K. Mutz, B. Van Daveren, A. Allen, and G. Jacob. 1990. Intermountain riparian lands evaluation methodology (draft). US Environmental Protection Agency, Washington, DC, 87 pp.

Cox, W. E. 1989. Managing Virginia's coastal wetlands: Local/state/federal interaction. Pages 535-542 *in* D. W. Fisk (ed.), Wetlands: Concerns and successes. American Water Resources Association, Bethesda, Maryland.

Dahl, T. E. 1990. Wetlands losses in the United States 1780s to 1980s. US Fish and Wildlife Service, Washington, DC, 13 pp.

Department of Environmental Protection. 1990. Wetlands compensation, A policy proposal. Inland Water Resources Management Division in cooperation with the Commissioner's Task Force on Wetlands Compensation, Hartford, Connecticut, 4 pp.

Environmental Reporter. 1990. Federal wetland conservation policy may collide with constitutional rights 21(19):377-378.

Fulton, B. 1991. The wetlands morass. *Planning* 57(8): 12–16.

Gosselink, J. G., and E. Maltby. 1990. Wetland losses and gains. Pages 296–322 *in* M. Williams (ed.), Wetlands, A threatened landscape. Basil Blackwell, Oxford, U.K.

Governor's Freshwater Wetlands Roundtable. 1989. Freshwater wetlands in Delaware: A framework for their conservation, protection and management. Dover, Delaware, 12 pp.

Griffin, C. R. 1989. Protection of wildlife habitat by state wetland regulations: The Massachusetts initiative. Pages 22–31 *in* R.E. McCabe (ed.), Transactions 54th North American Wildlife and Natural Resource Conference. Wildlife Management Institute, Washington, D.C.

Jacobs, S. L. 1987. Strengthening wetland protection programs through state regulation. *University of California-Davis Law Review* 21:227–270.

Kansas Water Office. 1990. Kansas water plan summary, Fish wildlife and recreation section. Summary Sheet No. 5, September. Topeka, Kansas, pp. 29–32.

Klein, K. C., and R. Freed. 1989. Implementing the Massachusetts Wetlands Protection Act—the local perspective. Pages 499–507 *in* D. W. Fisk (ed.), *Wetlands: Concerns and successes*. American Water Resources Association, Bethesda, Maryland.

Kusler, J. A. 1985. A call for action: Protection of riparian habitat in the arid and semi-arid west. Pages 6-8 *in* R. R. Johnson, C. D. Ziebell, D. R. Patton, P. F. Ffollion, and R. N. Hamre (eds.), Riparian ecosystems and their management: Reconciling their uses. US Forest Service, Tucson, Arizona.

Lawson, S. 1991. Under stress. *Landscape Architecture* 81(10):76–78.

Leslie, M., and E. H. Clark, II. 1990. Perspectives on wetland loss and alterations. Pages 1–21 *in* G. Bingham, E. H. Clark, II, L. V. Haygood, and M. Leslie (eds.), Issues in wetlands protection: Background papers prepared for national wetlands policy forum. The Conservation Foundation, Washington, DC.

Lowe, C. H. (ed.). 1964. The vertebrates of Arizona. University of Arizona Press, Tucson, Arizona, 259 pp.

Lowry, K. 1985. Assessing the implementation of federal coastal policy. *Journal of the American Planning Association* 51(3):288–298.

Mazmanian, D. A., and P. Sabatier (eds.). 1981. Effective policy implementation. Lexington Books, Lexington, Massachusetts, 220 pp.

McCormick, J. F. 1978. A summary of the national riparian symposium: A proposal for a national riparian program. Pages 362–363 *in* R. R. Johnson and J. F. McCormick, technical coordinators. Strategies for protection and management of floodplain wetlands and other riparian ecosystems: Proceedings. USDA, FS, GTR-WO-12. US Department of Agriculture, Washington, DC.

Meeks, G., Jr., and L. C. Runyon. 1990. Wetlands protection and the states. National Conference of State Legislatures, Denver, Colorado, 26 pp.

Michigan, State of 80th Legislature. 1979. Act 203, Goemaere-Anderson Wetland Protection Act.

Monroe, S. 1991. Arizona riparian area initiative. Paper. Soil and Water Conservation Society, Ankeny, Iowa.

North Carolina Environmental Defense Fund. 1989. Carolina wetlands: Our vanishing resource. Raleigh, North Carolina, 88 pp. plus appendices.

North Dakota State Engineer. 1989. Drainage rules. Bismarck, North Dakota, 31 pp.

Odum, E. P. 1978. Ecological importance of the riparian zone. Pages 2–4 *in* R. R. Johnson and J. F. McCormick, technical coordinators. Strategies for protection and management of floodplain wetlands and other riparian ecosystems: Proceedings. USDA, FS, GTR-WO-12. US Department of Agriculture, Washington, DC.

Ohmart, R. D., and B. W. Anderson. 1986. Riparian habitat. Pages 164–199 *in* B. S. Cooperider (ed.), Inventorying and monitoring of wildlife habitat. US Bureau of Land Management, Denver, Colorado.

Pennsylvania Department of Environmental Resources and US Army Corps of Engineers. 1987. Instruction booklet for commonwealth of Pennsylvania and US Army Corps of Engineers joint permit application. Harrisburg, Pennsylvania, 43 pp.

Ransel, K., and E. Meyers. 1988. State water quality certification and wetland protection: A call to awaken the sleeping giant. *Virginia Journal of Natural Resources Law* 7(2): 339–379.

Rapoport, S. 1986. The taking of wetlands under Section 404 of the Clean Water Act. *Environmental Law* 17(1):111–124.

Reilly, W. K. 1991. A new way with wetlands. *Journal of Soil and Water Conservation* 46(3):192–194.

Salvesen, D. 1990. Wetlands, mitigating and regulating developmental impacts. ULI, The Urban Land Institute, Washington, DC, 177 pp.

Sansbury, C. E. 1990. Regulation of wetlands in South Carolina. South Carolina Department of Health and Environmental Control, Columbia.

van Schilfgaarde, J. 1991. Water futures. *Journal of Soil and Water Conservation* 46(1):17–19.

Sharp, G. A. 1987. The "no feasible and prudent alternative test" increased protection for Connecticut's wetlands and watercourses. Council on Environmental Quality, Hartford, Connecticut, pp. 9–11.

South Carolina Coastal Council and US Army Corps of Engineers, Charleston District. No date. Developer's handbook for freshwater wetlands. Charleston, South Carolina.

Steiner, F. 1990. Soil conservation in the United States. The Johns Hopkins University Press, Baltimore, 249 pp.

Steiner, F., S. Pieart, and E. Cook. 1991. The interrelationship between federal and state wetlands and riparian protection programs. Arizona Department of Environmental Quality, Phoenix, 116 pp. plus tables.

Strong, A. L. 1987. Judicial decisions affecting state and local regulations of floodplains, wetlands, and river corridors (unpublished manuscript). Department of City and Regional Planning, University of Pennsylvania, Philadelphia, Pennsylvania, 28 pp.

Symms, S. 1991. In defense of private property. *Journal of Soil and Water Conservation* 46(4):244.

Tiner, R. W. 1984. Wetlands of the United States: Current states and recent trends. US Fish and Wildlife Service, Washington, DC, 58 pp.

US Department of the Interior. 1988. A report to Congress by the Secretary of Interior. The impact of federal programs on wetlands. Vol. I: The lower Mississippi alluvial plain and prairie pothole region. Washington, DC, 114 pp.

US Department of Interior. 1990. Riparian–wetland initiatives for the 1990s. Bureau of Land Management, Washington, DC, 50 pp.

US Environmental Protection Agency. 1988. America's wetlands: Our vital link between land and water. Office of Wetlands Protection, Office of Water, Washington, DC, 9 pp.

US Environmental Protection Agency. 1989. Wetlands and 401 certification opportunities and guidelines for states and Indian tribes. Washington, DC, 64 pp.

US General Accounting Office. 1988. Wetlands, The Corps of Engineers' Administration of the Section 404 program. Washington, DC, 122 pp.

Want, W. L. 1990. Law of wetlands regulation. (also 1992 revised edition). Clark Boardman Company, New York.

Water Resources Unit. 1989. Wetland protection in Connecticut. Department of Environmental Protection, Hartford, Connecticut, 64 pp.

Williams, M. 1990. Understanding wetlands. Pages 1–41 *in* M. Williams (ed.), Wetlands, A threatened landscape. Basil Blackwell, Oxford, UK.