CHAPTER

10

Planning and Managing Wetlands

The national goal of no net wetlands losses still has not been met.

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Wetlands are vital natural resources that provide a variety of environmental services: flood protection, erosion control, stormwater absorption, filtering of sediment and pollutants, aquifer recharge, fish and wildlife habitats, carbon sinks, and open space. Wetlands hold enormous amounts of carbon and thus are important in regulating climate as well as recycling carbon. Wetlands act as a buffer between land and waterways, and stabilize shorelines. Wetlands remove significant amounts of biological oxygen demand (BOD), which leaves more oxygen available for fish and wildlife. By acting as reservoirs or sponges, wetlands accumulate and then slowly release the water they retain, either into streams and rivers or into groundwater to recharge aquifers. This process is especially helpful in maintaining water supplies during times of drought. Wetland ecosystems provide essential habitats for waterfowl, beavers, muskrats, fish, shellfish, cranberries, wild rice, and small organisms at the bottom of the food chain. Many of the federally listed threatened and endangered species rely on wetlands for their survival. Wetlands serve as stopover spots for migrating birds and waterfowl, and provide valuable recreational benefits, as evidenced by the more than $600 million a year that hunters spend harvesting waterfowl (Dennison and Berry 1993).

Wetlands vary in their size, location, type, plant and animal species, and value to the environment. Wetlands can be identified according to three criteria:

1. *Plant life:* Wetlands support special hydrophytic plant communities, such as Brook-Side Alder, Royal Fern, and switchgrass;
2. *Surface water:* Wetlands are subject to permanent or periodic flooding or wet soils at a depth of 18 inches for at least a week during the growing season; and
3. *Soils and groundwater:* Wetlands contain wet (hydric) soils, that are poorly drained and have a high water table (less than half a foot from the surface for at least one week of the growing season (Cowardin 1979).

There are two general types of wetlands: inland and coastal. Inland wetlands are referred to as fresh-water or palustrine wetlands, and are found along rivers and streams (riparian wetlands), in depressions surrounded by dry land in the Midwest (prairie potholes), in areas of high water tables that reach to the earth's surface (fens), and where soils are made wet for a season or longer by precipitation (bogs) (see Figure 10-1). Coastal wetlands are known as tidal or estuarine wetlands. They are found along the Atlantic, Pacific, Alaskan, and Gulf coasts.

PRESSURES ON WETLANDS

Historically, most Americans viewed wetlands as swamps, wasteland, or cheap land that could be drained, dredged, filled, and either farmed or developed for residential, commercial, or industrial purposes. About 53% of the original wetlands in

the lower 48 states—about 117 million acres—have been filled in. Fresh-water wetlands account for 95% of all wetland losses, and more than three-fourths of the fresh-water wetland losses have been for agricultural uses (Platt 1996, 437). Twenty-one states have lost more than half of their original wetlands. In the major farming states of California, Illinois, Iowa, Missouri, and Ohio, roughly nine-tenths of the original wetlands are gone, mostly to cropland (Council on Environmental Quality 1996, 304-305). In addition, more than 1 million acres of wetlands have been dredged to become open water (Platt 1996, 437). About 100 million acres of wetlands remain in the United States, of which about 20 million acres are isolated wetlands and are not part of navigable waterways.

Suburban and Exurban Sprawl

As people and development spread farther into the countryside and along coastal areas (see Chapter 11), wetlands are often disturbed or filled. On the one hand, it is important for new development to be sited a certain minimum distance—usually 100 feet—from a wetland. On the other, the drawing of water from wells can deplete nearby wetlands, and wetlands can be polluted by effluent from on-site septic systems.

10-1 Fresh-water wetland, Albany County, New York.

Source: Katherine Daniels

Valuing the Environmental Services of Wetlands

In the last quarter of the 20th century, wetlands became recognized as valuable resources, performing environmental services that by some estimates are worth tens of thousands of dollars per acre each year (Maltby 1986). It is important to accurately value wetlands to help a local, state, or federal government agency determine whether a wetland should be filled. Wetlands do not necessarily work in isolation; they filter water across a watershed. Moreover, as wetlands become fewer and farther between, entire wildlife migration routes can be threatened. Waterfowl stop to feed and rest at regular intervals along their routes; however, when wetlands at key intervals are lost, flocks may not be able to bridge the distance to the next wetland. Destruction of wetlands results in the release into the atmosphere of large amounts of carbon dioxide and methane gases, which contribute to global warming (Bridgham *et al.* 1995). Weighing the dollar value of the environmental services of a wetland and the potential value as developed real estate is not easy. However, if cost-benefit analysis is going to be used in the decision-making process, the benefits of wetlands and the cost of their destruction must be estimated.

FEDERAL WETLANDS PROTECTION EFFORTS

As of 2001, almost 70% of the remaining wetlands in America were privately owned (Ducks Unlimited 2001, 13). Federal wetlands protection efforts feature the regulation of the dredging and filling of wetlands, land acquisition, and a combination of voluntary financial incentives and agreements with landowners.

Section 404 Federal Wetlands Permits

Section 404 of the Clean Water Act Amendments of 1972 and 1977 established a permit process for the review of projects that would involve the

dredging or filling of wetlands (33 U.S.C. 1344). The Clean Water Act defines wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions." However, the differing interpretations of this definition and the actual identification and delineation of wetlands have created shifting standards, uncertainty, and considerable friction between landowners and state and federal agencies.

Section 404 is administered by both the Army Corps of Engineers and the U.S. Environmental Protection Agency (EPA). The Corps of Engineers derives its authority from Section 10 of the Rivers and Harbors Act of 1899, which gives the Corps responsibility for any action that affects the course, location, or condition of the waters of the United States. The EPA drafts guidelines for the Corps to follow in administering Section 404 permits, and the EPA may override a Corps decision (Section 404(b)(1)).

Section 404 referred to dredging and filling "in the waters of the United States," leaving it unclear whether this meant all waters or only navigable coastal and riparian waters. In 1986, the Army Corps of Engineers began regulating the dredging and filling of isolated fresh-water wetlands under the Section 404 permit review process. In 2001, the U.S. Supreme Court rescinded federal authority over these isolated wetlands, ruling that the jurisdiction of the Corps applies only to wetlands that are part of "navigable waters" (*Solid Waste Agency v. United States Army Corps of Engineers,* No. 99-1178). The court upheld the right of states to regulate isolated fresh-water wetlands because they do not involve interstate commerce. As much as one-fifth of the nation's wetlands—about 20 million acres—are isolated fresh-water wetlands, and the continuing loss of these wetlands has been cited as a threat to migratory birds and drinking water supplies.

The Corps of Engineers has issued two types of wetland permits: nationwide and individual. Individual permits tend to involve large development projects where compliance with other federal laws and regulations must be reviewed. Most Corps permits used to be called nationwide permits and referred to 40 categories, including impacts of wetlands filling on navigation, flood control, utilities, and highway crossings. From the 1970s until 1996, nationwide permits allowed for the filling of up to 10 acres of isolated wetlands. Environmentalists claimed that developers used this permit to fill too many wetlands and to avoid the expense of the longer and more intensive individual permit review. A 1996 lawsuit by the Natural Resources Defense Council compelled the Corps of Engineers to reduce the threshold size for nationwide permits from 10 to 3 acres and to reassess this standard. In 2000, the Corps of Engineers adopted a much stronger standard, requiring a project that would fill more than half an acre of wetland to be reviewed as an individual permit.

To receive an individual permit, the Corps must determine whether the applicant's project is in the public interest and complies with a variety of federal laws including the National Environmental Policy Act (NEPA); the Coastal Zone Management Act (CZMA); the Marine Protection, Research, and Sanctuaries Act; and the Endangered Species Act (ESA). Under NEPA, the Corps must consider alternative sites for the proposed development project. The EPA may also review any permit application submitted to the Corps and may prohibit permits in certain wetlands. Obtaining an individual permit can take up to several months, but nearly all applications are approved. Yet, conditions are attached to about half the permits granted, and many applications for individual permits are withdrawn before they are processed (see Table 10-1).

Section 401 of the Clean Water Act requires a landowner to obtain a state Section 401 certification before the landowner can acquire a Section 404 permit from the Corps of Engineers. The Section 401 certification stipulates that the state has

Table 10-1
Section 404 Approval Process for Federal Wetlands Permit

1.	At a preapplication meeting between the U.S. Army Corps of Engineers district office and landowner, the conceptual design of the project is discussed, and the Corps makes suggestions about improving the design of the project and on-site or off-site mitigation measures. This meeting is similar to a sketch plan meeting between a subdivider and a local planning commission.
2.	Landowner submits a formal application to the district office. Project manager reviews application, including whether the Corps has jurisdiction. Public notice published and public comment period of 15-30 days begins. A public hearing may be held.
3.	Project manager decides whether the activity meets one of the 40 nationwide permit categories. If so, project manager makes a recommendation to grant or not to grant a permit to the district engineer who sends the applicant a letter verifying approval or denial of the permit. A letter granting a permit may include specific conditions about construction, best management practices, and mitigation.
4.	If the project will have major impacts, the district engineer may require an individual permit, which involves a more detailed review. The review invokes the National Environmental Policy Act, Section 404(b)(1), calling for the consideration of practicable alternatives to the proposal, a determination of public interest, and compliance with other federal resource protection laws.
5.	The Environmental Protection Agency has the power to veto a permit granted by the Corps, but this has happened very rarely.
6.	The district office bears the responsibility for monitoring and enforcing the terms of the nationwide and individual permits.

done a preliminary review of the project. If the wetland to be filled is in a coastal area, a landowner must also provide evidence that the proposed project complies with the state Coastal Zone Management Program before a Section 404 permit will be issued.

Section 404 allows individual states to approve general permits for minor dredging and filling actions that affect a half-acre or less of wetlands. These permits are processed through the state department of natural resources or environmental conservation. General state permits make up the large majority of wetlands permits. For example, in fiscal 1995, about 60,000 permit applications to dredge and fill wetlands were submitted nationwide; over 50,000 involved general state permits with little or no federal review. The average time for the general permit reviews was 17 days (Perciasepe 1995).

An important concern is monitoring and enforcing the terms of the permits. The Corps of Engineers investigates about 5,000 alleged violations of Section 404 permits each year (U.S. Army Corps of Engineers 2001). If a violation is found, the Corps can issue a cease and desist order. Remediation of the violation may involve voluntary compliance by the landowner or legal action.

Wetlands Mitigation

In deciding whether to issue a permit, the Corps must consider the water dependency of the proposed project, and proposed mitigation efforts designed to minimize or replace the loss of water quality, wildlife habitat, and recreational use from dredging or filling. When evaluating water dependency, the Corps must determine whether the particular use can be sited away from the wetland. For example, a marina requires access to water; a restaurant does not. Mitigation involves minimizing the environmental impacts of dredging or filling the wetland on fish and wildlife, recreation, flood damage prevention, water supply and qual-

ity, navigation, and public safety. Key issues for on-site mitigation include the wetland site characteristics, appropriate filling procedures, the location of any fill, materials used as fill, and the control of fill materials.

Section 404 guidelines allow for off-site mitigation, defined as the "restoration of alternative degraded sites"; that is, if a development project will unavoidably dredge or fill a wetland, the developer can submit a mitigation plan along with the 404 permit application. The developer can restore a wetland, construct a new wetland elsewhere, or pay a third party (such as a land trust) to do the work. In 1989, President Bush declared a policy of no net loss of wetlands—a policy that has been maintained by subsequent presidents. In the 1990s, mitigation became very popular among developers as a way to obtain a 404 permit. Between 1993 and 1998, the Corps gave permission for the filling of 63,144 acres of wetlands in exchange for 72,542 acres of created or restored wetlands (*Realty Times* 2000). Yet, a National Academy of Sciences study noted that the Army Corps did not track or verify whether the mitigation had actually been completed (National Academy of Sciences 2001). Moreover, the study reported that from 1987 to 1996, the rate of loss of wetlands was about 58,000 acres a year.

Off-site wetlands mitigation is decided on a case-by-case basis. It is important that the mitigation create, restore, or protect a wetland of equal size and quality to the wetland being lost, and preferably in the same watershed. It is possible for constructed wetlands to function as successful ecosystems, but some constructed wetlands have been known to fail where sites are poorly chosen. A 2001 report by the National Academy of Sciences found that artificial wetlands do not come close to recreating the functions of a natural wetland (*ibid.*). The report also contended that the Army Corps of Engineers has done little monitoring of developers' compliance with constructed wetlands requirements. Constructed wetlands alter the existing soil, hydrology, and plant life in an area. This in turn affects the larger ecosystem, creating new wildlife habitat while displacing existing habitat. A cheaper, quicker, more beneficial, and more successful solution is to restore wetlands that have been previously drained or filled (Hunt 1998).

For long-term protection of restored or constructed wetlands, a developer can be required to donate a conservation easement to a land trust or government agency on the new or restored wetland mitigation site. The developer should be required to provide a stewardship fund to the land trust or government agency for proper long-term monitoring and maintenance of the wetland.

A mitigation bank can be set up by a government agency, a land trust, or other private, nonprofit organization to preserve wetlands through the sale of mitigation credits to developers seeking a 404 permit (40 CFR Part 1508.20 and 40 CFR Part 230). A mitigation bank can be established on public or private land, and can involve an agreement or partnership between a government agency and a private organization. The mitigation banks will either have already created or restored wetlands and banked mitigation credits or will use the payment from the developer to create or restore additional wetlands. Thus, mitigation banking relieves the developer of having to physically create mitigating wetlands as part of the development proposal. This can speed the development approval process. Moreover, a mitigation bank may consist of large parcels with more valuable wetland resources that those slated to be dredged or filled, and the larger wetlands can be better managed and protected. As of 2001, more than 700 mitigation banks across the nation had been approved.

A state agency or local government should review and certify a nonprofit organization's ability to maintain a new or restored wetland, consistent with state and federal statutes. A private organization or government that is proposing to create a mitigation bank must submit a prospectus to the Corps of Engineers. A mitigation bank proposal

SIDEBAR 10-1

Constructed Wetlands for Wastewater Treatment

There is a growing interest in using constructed wetlands for wastewater treatment, especially in rural areas that do not have access to central sewer systems. Unlike "enhancement" wetlands that attempt to serve the many functions of natural wetlands, wastewater treatment wetlands attempt to replicate the plants, soils, and microorganisms found in natural wetlands to remove contaminants from municipal or private residential, commercial, or industrial wastewater.

Constructed treatment wetlands come in a variety of sizes to meet the needs of a few residences, individual businesses, or large subdivisions. Constructed wetlands can work well for secondary and tertiary wastewater treatment. The City of Davis, California, has incorporated wetlands with ponds and lagoons to receive stormwater and tertiary-treated wastewater. The water is then further cleansed before being released into the Sacramento River (Beatley 2000, 15-16). Treatment wetlands are also being used to handle dairy wastewater, stormwater runoff, and even acid mine drainage. As of 2001, more than 500 wastewater and stormwater treatment wetlands have been built around the United States.

Treatment wetlands usually feature either subsurface flow or a free-water surface wetland, although it is possible to combine both types in a single treatment system. A free-water system most resembles a natural wetland, and the wastewater flows over the soil at a shallow depth. In subsurface flow systems, wastewater is run through a channel or cell containing gravel or crushed rock. There is a lining or barrier at the bottom of the wetland to limit seepage. The flow rate is regulated so that untreated water does not rise to the surface. Plants filter out the contaminants, and microorganisms digest organic material, all of which settle to the bottom of the wetland as sludge. The treated water is then held as surface water or used as spray irrigation onto land (often farmland).

The effectiveness of a constructed treatment wetland depends on the design, operation, pollutant types and loadings, and climate. A well-designed and managed wetland can remove about 80% to the biological oxygen demand, nitrogen, phosphorus, and suspended solids in wastewater (Moshiri 1993). One limitation to treatment wetlands is they are unable to remove heavy metals, which can gradually accumulate in the sediment. However, their use for rural and residential uses makes heavy metals less of an issue. Most treatment wetlands are found in the warmer climates of the United States, where freezing temperatures that would interfere with the treatment function of the wetland are rare or brief.

Attractive features of treatment wetlands are little odor, low maintenance and operating costs, aesthetic benefits, and wildlife habitat. On the other hand, liability remains an important concern for homeowners' associations, municipal treatment operators, and owners of private systems. Wetlands should be fenced to keep out small children and trespassers. Periodically, the sludge from the bottom of the wetland needs to be removed and properly disposed of to minimize odors and the build-up of heavy metals.

that involves filling wetlands to create cropland is made to the Natural Resources Conservation Service (NRCS). The public has an opportunity to comment on a proposed mitigation bank.

A proposal to create a mitigation bank needs to describe:

- the physical wetlands aspects of all the sites to be included in the bank;
- a method to determine mitigation credits at the sites and debits from wetlands to be filled by the developers seeking 404 permits;
- management and maintenance of the wetlands in the mitigation bank; and
- reporting and monitoring policies.

In sum, a landowner proposing to develop a wetland has three choices:

1. build at a certain distance from the wetland (e.g., no closer than 100 feet);
2. purchase wetlands mitigation credits from a mitigation bank and then fill and develop the wetland; or
3. apply for a permit to fill a wetland and agree to create a new wetland somewhere else.

Federal Wetlands Acquisition, Incentives, and Restoration

Most fresh-water wetlands have been filled for agricultural purposes. Two federal acts are designed to discourage the conversion of wetlands for farming. The Swampbuster provision of the 1985 Farm Bill made farmers who plow up wetlands ineligible for federal farm subsidies. The 1990 Farm Bill created the Wetlands Reserve Program, administered by the NRCS within the USDA, to protect privately owned wetlands and adjacent farmlands from development. The program has three voluntary strategies:

1. cost-sharing agreements with landowners to restore existing wetlands in which the federal government pays 75% of the cost;
2. the purchase of 30-year term conservation easements at 75% of the value of a permanent easement and with the federal government paying 75% of the cost of restoration; and
3. the purchase of permanent conservation easements along with the federal government paying 100% of the cost of restoring the wetland.

By 2001, more than 1 million acres of wetlands had been protected through the Wetlands Reserve Program (NRCS 2001a). The 2002 Farm Bill authorized an additional $1.5 billion for the program and raised the acreage enrollment cap to 2.275 million acres (Ducks Unlimited 2002).

The Conservation Reserve Enhancement Program, begun in 1996 and managed by the NRCS, makes payments to farmers to plant riparian buffers of trees and grass near rivers and streams, and to restore wetlands. This helps to reduce soil erosion, improve water quality, and provide wildlife habitat. Farmers and ranchers voluntarily enter 10- to 15-year contracts, and state money can be used to match federal funds. By 2002, 368,000 acres in 20 states had been enrolled (Farm Service Agency 2002).

In 1989, Congress passed the North American Wetlands Conservation Act to provide federal cost-share grants to implement the North American Waterfowl Management Plan. The purpose of the plan is to restore, protect, and manage wetlands for migratory birds and other wildlife. Federal grants are matched by state and local governments and nonprofit organizations on a dollar-for-dollar basis. As of 2002, more than 8.5 million acres of wetlands had been restored in more than 900 projects in the U.S., Canada, and Mexico, at a total cost of $1.3 billion (Ducks Unlimited 2002).

The U.S. Fish and Wildlife Service (FWS) administers the Coastal Wetlands Planning, Protection, and Restoration Act of 1990. In the eight years through 1998, the service made $52 million in grants to 24 states for the conservation of more than 87,000 acres of coastal wetlands. States, local governments, and nonprofits have contributed

matching funds and are responsible for the management of the wetlands. For example, in fiscal 1999, a $940,000 federal grant helped the Alabama Department of Conservation and Natural Resources purchase forested wetlands in the Mobile-Tensaw Delta adjacent to Mobile Bay—one of the largest wetland ecosystems in the United States (U.S. FWS 1998). The FWS also maintains a National Wetlands Inventory that includes wetlands data available in digital map form and viewable over the Internet. As of 2002, the inventory included nearly the entire nation. Like the NRCS soil survey maps, the wetlands inventory maps are not meant for regulatory use.

The EPA's State Wetlands Grants Program offers grants to states, tribes, and local governments for wetlands restoration and protection projects. Grant funds can be used for wetlands conservation plans, creating or updating a wetlands database, physically restoring wetlands, and ecological monitoring and assessing wetlands. A total of $15 million was available in fiscal 2000.

Finally, federal Land and Water Conservation Funds have been used to purchase wetlands to create wildlife refuges.

While the data are not conclusive, government and private wetlands protection efforts point to progress in reducing the annual amount of wetlands loss. In the 1980s, about 80,000 acres of wetlands on nonfederal land were converted each year (NRCS 1999). According to the National Resources Inventory conducted by the NRCS, between 1992 and 1997, about 32,600 acres of wetlands were lost each year (NRCS 2001b). However, in its 1998 Water Quality Inventory, the EPA found that wetlands were being lost at a rate of about 100,000 acres per year (U.S. EPA 2000, 1).

The large difference in annual loss of wetlands reported by the two federal agencies reveals a fundamental lack of clarity and consensus on what constitutes a wetland: wet soils, a quarter-acre bog, or land that floods periodically. For instance, the 1987 Corps of Engineers *Wetlands Delineation Manual* for wetlands identification has been called "unreadable" (Easterbrook 1996, 439). In the midst of this controversy, the "no net loss" policy, however well intended, has little meaning. The lack of a clear definition of wetlands has caused widespread concern among landowners who fear that their land will be declared unbuildable. The Clinton Administration took a large step to relieve farmers' concerns by ruling that 53 million acres of farmland that had been created from wetlands before 1985 would be considered "prior converted wetlands" and not be subject to the regulations of Section 404.

STATE WETLANDS MANAGEMENT

State governments, through their departments of natural resources or the environment, have been active in identifying and delineating wetlands and in the review of wetlands permits. Many states have published handbooks on identifying and delineating wetlands. Like many other federal programs, wetlands regulation is being gradually shifted to state control. For example, in 1994, New Jersey gained formal control of the Section 404 permit program within its borders. States have long exercised review of proposed development of wetlands through the CZMA, Section 401 of the Clean Water Act, and Section 404 review of general permits for filling or dredging small wetlands of less than half an acre in navigable waters. Also, the federal government and individual states can regulate wetlands under the ESA if rare and endangered species are found in a wetland (see Chapter 9), or under the Safe Drinking Water Act if the wetland influences surface drinking water (see Chapter 3). Some states have even declared certain wetlands to be of statewide importance and hence worthy of extra protection. For instance, in 1988, the Maine legislature passed a Natural Resources Protection Act establishing state regulatory authority over wetlands.

The size of nonnavigable wetlands under state authority varies from state to state. For example,

SIDEBAR 10-2

Big-Time Wetlands Restoration: The Florida Everglades

The Florida Everglades is a swampy region at the southern end of Florida that has shrunk from 4,000 square miles to about 2,700 square miles due to water diversions, farming, and development (McCormick 1995). Still, the Everglades remains the world's second largest wetland and is famous as the habitat for alligators, the American crocodile, and many species of fish and water birds. The landscape is a mix of saw grass, open water, clumps of trees, and mangrove forest. The Everglades are best thought of as "a river of grass"—a description that conservationist Marjorie Stoneman Douglas used as the subtitle of her famous book, *The Everglades*. The Kissimmee River empties into Lake Okeechobee, and the overflow from the lake supplies the Everglades, where the water flows at a gentle rate of about 2 feet per minute. The unique and diverse ecology of the region became widely recognized when 2,190 square miles of the Everglades were declared a national park in 1947.

Ironically, in 1948, after two hurricanes had put much of south Florida underwater, Congress directed the Army Corps of Engineers to drain half a million acres south of Lake Okeechobee, and the Kissimmee River was rerouted in a series of canals, levees, and pumping stations. About 1.7 billion gallons of fresh water a day—or about four-fifths of the fresh water supply—were diverted from the Everglades and out to sea, to the detriment of native fish, plants, and wildlife (*The New York Times* 2000, A28). The main beneficiaries of the water control projects were sugar cane growers and the inhabitants along Florida's south Atlantic coast. Besides the loss of water, agricultural and urban runoff have created water pollution problems. Invasive species pose additional threats to native species.

In 2000, Congress agreed to work with the State of Florida to restore the Everglades. The estimated cost would be nearly $8 billion over 36 years, with the federal government covering most of the expense, but the State of Florida also contributing (Schmitt 2000, A21). Part of the project would involve returning the Kissimmee River to much of its old winding course. However, the centerpiece would be the construction of huge reservoirs to store rainfall and then release the water into the Everglades through redesigned canals. The water storage proposal is an attempt to satisfy the water demands of sugar cane producers and urban residents, while providing an adequate water supply to the Everglades ecosystem.

in Michigan, the state has authority over the filling and development of nonnavigable wetlands of 5 or more acres; wetlands of less than 5 acres are under local control. In New Hampshire, the state reviews all wetlands proposals that would impact more than 3,000 square feet; projects affecting 3,000 to 20,000 square feet are treated as minor projects; and those above 20,000 square feet are considered major projects and also require a review by the Army Corps of Engineers.

A number of states have drafted State Wetland Conservation Plans to integrate and expand wetland protection and management programs. A main thrust of these plans is educating landowners and the general public about the importance of wetlands. Voluntary stewardship is part of the plans in Texas and Maine. Tennessee maintains a list of priority wetlands for acquisition and/or restoration.

Maryland has both tidal and a nontidal wetlands programs. State tidal wetlands are those below mean high water; private wetlands are those above the mean high water line and in private ownership. Mitigation is required for unavoidable impacts, with a preference toward on-site mitigation (Maryland Department of the Environment 2002). The nontidal wetlands program protects isolated wetlands by requiring a 25-

foot buffer from proposed developments. The buffer requirement increases to 100 feet for nontidal wetlands of state concern. The nontidal wetlands program also requires mitigation for any wetland losses. Finally, the nontidal wetlands program provides for the development of watershed management plans, which can be used as a basis for regulatory decisions to protect wetlands (*ibid.*).

LOCAL PLANNING FOR WETLANDS

Even though there are state and federal requirements governing the development of wetlands, local governments should be prepared to take an active role in protecting wetlands. This is especially true given the 2001 U.S. Supreme Court decision limiting the authority of the Army Corps of Engineers to regulate wetlands only in navigable waters. Also, some states regulate only large, nonnavigable wetlands. For example, New York State regulates isolated wetlands of 12.4 or more acres, leaving the local governments to regulate smaller, isolated wetlands; however, many local governments do not regulate the development wetlands at all.

Local wetlands provide a variety of important environmental services, and local governments should identify important wetlands in determining the location, type, and density of future development through the comprehensive planning process. The comprehensive plan serves as the legal basis for local zoning and subdivision regulations to protect wetlands.

Inventory

Local governments should identify wetlands as part of the Natural Resources Inventory section of the comprehensive plan. National wetlands maps and Geographic Information System databases are available from the FWS. NRCS county soil survey maps identify hydric soils, some of which include wetlands. State environmental agencies and many county planning offices have wetlands maps as well. Local mapping of smaller wetlands not included in the state or federal databases should be encouraged.

Analysis

A land suitability analysis will indicate limitations for development in areas with wetlands or hydric soils. Wetlands can be evaluated and rated for significance by size and by the environmental services they provide, such as wildlife habitat or aquifer recharge. Potential for wetlands mitigation and banking should also be assessed.

Goals and Objectives

Local planning officials should draft goals and objectives to protect wetlands as part of the comprehensive plan (see Table 10-2). The protection of wetlands should be listed as a goal in the Natural Resources section of the comprehensive plan. Objectives to achieve this goal should be included in the Economic Base section, given the valuable benefits and economic activity that arise from wetlands. Also, the Land Use and the Community Facilities sections should have objectives to direct development away from wetlands.

Action Strategy

The Action Strategy should present techniques and programs for achieving wetland protection goals and objectives as well as a timetable. Wetland protection benchmarks should be identified and progress toward those benchmarks evaluated in an annual report on the environment. Specific recommendations might include the following:

- Use a zoning overlay district to protect large, contiguous areas of wetlands.
- Explore the use of constructed wetlands for wastewater treatment.
- Explore the creation of a wetlands mitigation bank with private nonprofit organizations.
- Protect wetlands through outright purchase and the purchase of conservation easements.

Table 10-2
Sample Wetlands Goals and Objectives in the Comprehensive Plan

Natural Resources	
Goal	To protect important wetlands that provide water recharge, flood protection, wildlife habitat, aesthetic, and educational benefits.
Objective	Adopt local wetlands protection standards for isolated fresh-water wetlands, and all wetlands of less than half an acre in navigable waters.
Economic Base	
Objective	Protect wetlands that are important to local hunting, fishing, and birding businesses.
Land Use	
Objective	Direct development away from important wetlands.
Community Facilities	
Objective	Avoid locating growth-inducing community facilities near wetlands.

Zoning Ordinance

The main purpose of local regulations that affect wetlands is to control land uses near wetlands to ensure that they do not discharge pollutants and sediment into the wetlands, to ensure that proposed buildings are set far enough from wetlands so that high water tables and hydric soils do not flood basements, and to minimize the dredging and filling of wetlands.

A setback requirement from the edge of identified and delineated wetlands is appropriate in the zoning ordinance (e.g., no dwellings may be erected within 100 feet of a wetland of more than 1 acre). Some communities use a wetlands protection overlay zone to direct development away from areas with large amounts of wetland where on-site septic systems could cause water pollution and on-site wells could dry up the wetlands.

An overlay zone may be specific for the protection of wetlands or may be a multipurpose conservation zone that protects a range of natural features, including wetlands. For instance, riparian wetlands are typically protected through a floodplain overlay zone. Other zoning standards include limiting development density and hence the likely impacts of development on wetlands. This can be done through rural residential zoning in 3- to 5-acre minimum lot sizes, density and siting standards, or agricultural or forestry zoning in 20-acre or more minimum lot sizes.

Local governments may choose not to allow the dredging and filling of wetlands, even where the state or federal government would permit it. For example, in the famous Wisconsin case of *Just v. Marinette County,* the court upheld a county wetlands protection zoning ordinance with this opinion: if you pay swamp prices, you get swamp uses (*Just v. Marinette County,* 210 N.W. 2d 761, 1972).

Farming, forestry, and residences create runoff carrying pesticides, herbicides, fertilizers, manure, and sediment. Communities can work with cooperative extension agents to make sure that farmers, foresters, and rural homeowners are educated about integrated pest management so as to minimize the use of pesticides near wetlands.

Subdivision Regulations

The subdivision and land development ordinance should spell out conditions under which on-site septic and wells are acceptable; otherwise, central sewer and water can be required. Stormwater runoff should be contained on site as much as possible through vegetation, swales, filter strips, and retention basins. Roads and impervious surfaces

should be strictly controlled to minimize runoff into wetlands. The subdivision ordinance should require buffering berms, filter strips, and vegetation between development and nearby wetlands.

For large developments, the subdivision ordinance should require the developer to conduct an environmental impact assessment, including an evaluation of likely impacts on wetlands (see Appendix). Wetlands mitigation requirements should be spelled out in the subdivision ordinance unless the state standards are considered adequate. The ordinance should also allow constructed wetlands as wastewater treatment systems according to specific design and management standards.

Capital Improvements Program

Local planning officials should use the capital improvements program (CIP) to direct growth and development away from large wetlands or groupings of smaller wetlands. Major roads, schools, and extensions of sewer and water systems can generally be kept out of these areas in order to discourage intensive growth and development. If appropriate, the CIP could include plans for constructed wetlands to service the community, its schools, or other public uses.

The CIP could include funding programs for the public purchase of wetlands or the acquisition of conservation easements. Partnering with land trusts and sports groups could be pursued. For instance, since 1937, Ducks Unlimited has helped protect more than 1.5 million acres of America's wetlands (Ducks Unlimited 2001, 8).

What to Look for in a Development Review

What a community can look for in a development review involving wetlands depends on the goals and objectives in the comprehensive plan and, more importantly, the standards and requirements spelled out in the zoning and subdivision regulations and other relevant ordinances (see Table 10-3). The existence and size of wetlands on the property and on adjacent properties should be ascertained. The design of the proposed development project for mitigating impacts to wetlands on site and on neighboring properties should be assessed. Finally, it is important to review any wetlands permits the developer has received from the relevant state agency or Army Corps of Engineers.

Table 10-3
A Checklist of Wetlands Issues in a Development Review

1.	Are there wetlands on or adjacent to the site proposed for development?
2.	Is the proposed development allowed in the particular zone?
3.	Are the minimum distances of proposed buildings, on-site septic systems, and wells from wetlands met?
4.	Should the applicant be required to conduct an environmental impact assessment, including impacts on wetlands?
5.	Is filling, dredging, or drainage of part or all of a wetland proposed?
6.	Is there a wetlands mitigation plan?
7.	Will stormwater runoff from the proposed project affect nearby wetlands? How will this be mitigated?
8.	If a wetland is proposed for treating wastewater, has the design of the wetland been reviewed by the municipal or county engineer?
9.	Has the developer obtained any necessary state or federal wetlands permits?