
Chapter 7

# PROTECTING ENVIRONMENTAL QUALITY DURING DISASTER RECOVERY

*PREMISE. Projects or programs that restore, enhance, or protect natural resources and open space (floodplains, wetlands, and wildlife) from degradation also reduce impacts from natural disasters.*

*COROLLARY. A community that integrates these environmental projects or programs into its disaster recovery saves money, improves its quality of life, and contributes to the overall health, safety, and welfare of its citizens, thus building a sustainable community.*

## INTRODUCTION

Floods, hurricanes, earthquakes, landslides, and wildfires are natural disasters that change the character of a community in moments. Transportation systems shut down as roads tumble into creeks, bridges collapse, and rapid transit lines stop. Public facilities such as schools, power plants, and downtown districts close. Ports no longer serve commerce and trade. Interruption of gas, electric, and water utilities paralyzes the community at the very time that rescue teams and people need service the most.

In addition to affecting the built environment, the consequences of natural disasters are also felt in the natural environment. Erosion accelerates along rivers and beaches. When sewer systems, storm drains, and pipelines break and storage tanks rupture, toxic substances spew into the air, onto the water, and across the landscape.

But people can rebuild a better community after a disaster by protecting or enhancing their local environmental quality. Enhancement strategies, described hereafter as environmental projects and programs, may take any of several forms:

- preservation/conservation/restoration of natural resources (habitat, wildlife, flora, fisheries);
- protection of open space (agricultural, waterfront, rivers, shoreline, other);
- management of stormwater runoff; and
- prevention/remediation of pollution (air, water, soil, other).

Immediately after a disaster, response is uppermost in everyone's mind. But as the community takes action today, it is time to think far into the future. The community should begin environmental projects or programs that make the community less vulnerable and that also address other aspects of sustainability—social equity, economic vitality, and quality of life. In other words, the community can be turned into a sustainable community.

## RECOVERY STRATEGIES FOR PROTECTING ENVIRONMENTAL QUALITY

Protecting or enhancing environmental quality can take place during disaster recovery. A community can start with the *situations* that exist after a disaster, pick and choose among the *options* for improving its environment and among the implementation *tools* available to help pursue each of those options, to develop environmental *strategies* (projects or programs) that are specially tailored to its own needs. The Matrix of Opportunities in Chapter 1 shows some of the options a recovering community could use to protect its environment while it tends to disaster-caused predicaments. The situations and options shown on the matrix, and the tools listed below, are not exhaustive; rather, they are meant to give an idea of the range of possibilities. Likewise, the sample strategies below suggest ways in which some options and disaster-induced situations could be combined to help a community address environmental quality. The strategies suggested below use one or more of the options listed on the Matrix of Opportunities under the fourth sustainability principle, "Protect and/or Enhance Environmental Quality."

**OPTIONS FOR PROTECTING ENVIRONMENTAL QUALITY**

- Preservation/conservation/restoration of natural resources
- Protection of open space
- Management of stormwater runoff
- Prevention/remediation of pollution

Throughout the nation environmental projects and programs protect natural resources and open space while simultaneously reducing damage from natural disasters. Studies by the U.S. Department of Agriculture concluded that restoring wetlands could reduce 100-year floods by 10%. Purchase of full title or easements of approximately 4,850 acres of wetlands and local zoning of 4,650 acres of floodplain in the Charles River basin eliminated the need for $30 million of U.S. Army Corps of Engineers structural flood control (see Chapter 8 for more discussion of this project). Riparian buffers of trees and other vegetation in North Carolina intercept runoff into rivers and lakes and remove sediment, nitrogen, phosphorous, trace metals, and hydrocarbons. To maintain its drinking water supply, New York City decided it was cheaper to purchase buffer land in the Hudson River watershed than to build an $8 billion filtration plant. Buffers stabilize eroding banks in California and Kentucky.

Open space, greenways, and riverside parks serves as habitat for wildlife, birds, and migratory waterfowl, protect streams from pollutants, help maintain water temperatures, and keep people and development from the highest-risk floodplains. Improved water quality raises the recreational and intrinsic values of river basins in Iowa and Illinois. Aesthetic values, recreation, and other functions characterize not only the well-known Rock Creek Park in Washington, D.C., but also the 500-foot greenway along the Chattahoochee River that runs 180 miles from the Appalachian Mountains to Columbus, Georgia. The 19-mile Sims Bayou greenway project in Houston provides habitat for wildlife, enhances the aesthetics of the watercourse, and helps prevent erosion.

Trees can drastically reduce stormwater management costs. American Forests studied Garland, Texas, and calculated that the city's tree canopy reduced stormwater runoff by 19 million cubic feet during a major storm. Annually, the trees save Garland $2.8 million in infrastructure costs and $2.5 in air quality costs and residential energy bills.

In some situations, communities can use alluvial fans, critical habitats, wetlands, or slopes prone to landslides for environmental protection. For example, Orange County, California, owns 1,200 acres on the alluvial fan of the Santa Ana River for aquifer recharge. In Louisiana, the state rebuilds undeveloped barrier islands to dampen the impacts of hurricane storm surge on coastal wetlands. States, counties, and towns across the country are building disaster-resilient and sustainable communities that include environmental amenities. At the same time they are saving money and lives.

After a disaster, a community has an opportunity to reconsider and redesign its development patterns. A chance exists to revise and strengthen the mitigation plan by setting priorities that include environmental projects or programs as an important component. Integrating projects or programs that restore, enhance, and protect the natural landscape into a comprehensive or recovery plan(s*)* can help guide the disaster recovery and reconstruction along paths that will reduce or eliminate damage from future floods, hurricanes, earthquakes, wildfires, and landslides.

This chapter is structured for decisionmakers in medium to small communities where most elected officials are part time and each staff person is responsible for more than one duty. The following sections present a sequence of activities and options for integrating environmental projects and programs into the community's comprehensive plan and disaster recovery plan. The next section lists practical suggestions (maxims) for making important early decisions about environmental quality during the response phase after the disaster and presents a 10-step process for taking action. Next there is a proposed monitoring method to determine if a project or program is succeeding or if changes are needed. The section after that is a menu of tools readily available to a local recovery team. After a short summary, the last section lists agencies agencies and groups with useful information and possible funding sources.

# PURSUING STRATEGIES FOR ENVIRONMENTAL QUALITY

Preferably, all communities should practice pre-disaster planning as well as have long-term comprehensive plans to manage their growth, development, and land use. Unfortunately, many communities will only take action after a disaster strikes. During the response phase to a natural disaster, elected officials and professional staff begin to think about their recovery plan. To be most successful, they should build on several fundamental principles that guide the conduct of the community's efforts. These maxims are the foundation upon which an effective environmental component is built into the local comprehensive and/or recovery plans. The more maxims that apply to a community, the better its chances of achieving its environmental goals.

## Maxims for Protecting the Environment during Holistic Recovery from Disaster

1. During the response phase of restoring power, clearing debris, opening roads, and providing food and shelter for victims, the community will consider environmental projects and programs as part of its recovery plan. The community must designate a lead person, commit staff time, and provide financial support to integrating environmental projects and programs into the comprehensive plan and recovery plan.

2. Recovery from disasters must be addressed in a regional context. After a flood the community will act throughout the watershed; after a hurricane or drought the community will think regionally; after an earthquake or landslide it will work in consideration of the geologic landscape; and in the aftermath of a wildfire it will deal with issues on an ecosystem basis. The recovery plan will build on horizontal partnerships (among county or parish and municipal officials) and vertical partnerships (federal, state, and local representatives).

3. Responsible agencies will use the legal flexibility built into all programs and interpret their duties and mandates in such a way that a county, parish, or town can effectively build a sustainable community. One approach is to include these environmental initiatives into the existing comprehensive plan.

4. Chances of success increase when environmental projects and programs reinforce solutions to other problems, such as wetlands protection, nonpoint source pollution reduction, erosion control, or a need for open space and recreational areas. At the same time, these projects and programs will curtail development in the most dangerous or hazardous locations in the community, thereby saving money and lives.

5. Information on floods, hurricanes, earthquakes, landslides, or fires, and environmental characteristics is available and will for the most part meet planning needs for the short term. As the need arises, the community will collect more detailed data for long-term

actions. As a result, the community's environmental initiative includes actions that can begin almost immediately and will result in achieving broader, long-term actions.

6. Each environmental project and program will be realistic, technically possible, economically feasible, politically workable, and socially acceptable.

## Integrating Environmental Elements during the 10-Step Recovery Process

This section outlines a process by which environmental projects and programs are integrated into a community's recovery plan. It can be adjusted to fit a community's style, capabilities, needs, and setting. However, if the community prefers an alternative planning method, it should keep using it. There is no need to duplicate a community's established planning process. If there is a comprehensive plan, environmental elements can be built into the plan using the process below as a guide. If there is no such plan, strategies for environmental quality can be carried out in the context of the overall disaster recovery. Within the 10-step process described in Chapter 2, the following activities in particular will help ensure that environmental issues are addressed during disaster recovery.

Before a community does anything else, it should review the maxims in the previous section. Is the community ready to commit to integrating environmental projects and programs into the recovery or comprehensive plan?

### Actions to take during Step 1, Get organized.

Put one person in charge of environmental issues and provide staff support. Define the planning area for environmental issues:

- For a flood, use a watershed.
- For a hurricane or drought, use a region.
- For an earthquake or landslide, use a geologic region.
- For a wildfire, use an ecosystem.

A multi-jurisdictional approach allows a community to pool technical, financial, and personnel resources, achieving an economy of scale that benefits all:

- Horizontal partners—county, parish, town, district; and
- Vertical partners—federal agencies and state departments.
- Organize the team and identify working groups: technical, financial, legal, public participation and outreach, other.
- Agree on how the planning team will function and its scope of responsibility.
- Set team goals, objectives, and priorities.

### Actions to take during Step 2, Involve the Public

- Decide on a public involvement process.
- Invite representatives of the public and non-profit organizations to participate.

- Conduct public meetings and workshops for victims and community representatives.
- After presentations, ask for and record comments.
- Incorporate comments into the planning process and plans.

See Chapter 3 for ideas on how to use a participatory process during recovery.

**Actions to take during Step 3, Coordinate with other agencies.**

- Have agency representatives on the planning or recovery team describe their agency's programs.
- Invite other agencies to make similar presentations.
- Establish a regular process for providing information and receiving ideas.
- Make agencies part of the review process.

**Actions to take during Step 4, Assess the environmental problems.**

- Use reliable sources of existing information.
- Map the environmentally sensitive areas.
- Describe the characteristics of the environment.
- Estimate the probable types and degree of damage.
- Identify development trends in the sensitive areas.

**Actions to take during Step 5, Evaluate the problems.**

These are the "situations" brought about by the disaster that has struck a community, some examples of which are listed on the Matrix of Opportunities in Chapter 1. Use this opportunity to examine how strategies to remedy these conditions can also serve to enhance the community's environment.

- Damaged transportation.
- Damaged public facilities.
- Damaged utilities.
- Damaged housing/businesses.
- Environmental damage.
- Disruption of health and safety.
- Assess risks and magnitude of future events.
- Set priorities so the community can focus on planning, funding, and implementing these projects and programs.

**Actions to take during Step 6, Set goals.**

Using the planning or recovery team and public involvement, set goals and objectives. Make goals positive statements.

**Actions to take during Step 7, Explore all alternative strategies and measures.**

Be sure to have a balanced approach. Give full consideration to all sustainability principles; unite economic, social equity, quality of life, disaster resilience, and environmental perspectives. At

the same time, analyze the potential impacts of each alternative on every one of the aspects of sustainability within the community.

Select from the opportunities identified in Step 5, goals and objectives set in Step 6, and the options and tools described in this chapter. Expand and tailor them to meet community needs

- Identify the lead agency for each action and what they will provide or prepare.
- Describe local actions (zoning, subdivision ordinances, building codes, etc.).
- Schedule team meetings, public participation, data collection, report writing.
- Involve the public as soon and as often as practical.
- Consider funding methods and how the community will apply for them.

**Actions to take during Step 8, Plan for action.**
During the step the planning or recovery team drafts a plan for action that fits into the recovery phase or becomes part of the community's comprehensive plan.

- Include a budget.
- Develop a schedule.
- Propose a monitoring and review process.
- Obtain public review and comment as needed.
- Revise and finalize the plan.

**Actions to take during Step 9, Get agreement on or adopt the action plan.**
In many instances, the state, county (parish), and local governments will need to formally adopt the plan of action into the recovery or comprehensive plan. Agreement likewise should be obtained from federal and state agencies as appropriate. Memoranda of Understanding are signed among partners.

**Actions to take during Step 10, Implement, evaluate, and revise.**

- Apply for federal and state programs and funds.
- Work with county or parish and town councils and governing boards on zoning, subdivision ordinances, acquisitions, etc.
- Meet with landowners.

Boone, North Carolina, a small town in the mountainous northwestern corner of the state, is vulnerable to flooding and also subject to development pressure because of its scenic location. The town achieved multiple objectives in a broad post-flood program through partnerships that tackled such community needs as additional affordable housing, the creation of more open space and recreational facilities, providing alternative transportation, and removing damaged buildings from the floodplain. One of the keys to Boone's success was been its ability to attract, integrate, and apply multiple sources of funding to carry out mutually compatible objectives. A total of $4.5 million was raised from several sources: the town, the Federal Emergency Management Agency's Hazard Mitigation Grant Program, the State Acquisition and Relocation Fund, the Clean Water Management Trust Fund, and the Housing and Urban Development's Community Development Block Grant Program.

For more about Boone, see Department of Crime Control and Public Safety, 1999, p. 36.

## Using a Planning Process for Environmental Projects & Programs—An Example

The county suffered a major natural disaster. As it works through the response phase, planners and decisionmakers realize that integrating environmental projects and programs into the recovery plan or existing comprehensive plan will improve environmental quality in the community while also accomplishing other sustainability objectives.

- Begin by considering the maxims previously proposed. Be prepared to commit to integrating environmental projects and programs into the recovery plan or existing comprehensive plan.
- Follow the 10-step process outlined or use a process with which the community is comfortable.
- Organize the team and begin work. Involve the public as soon as possible and then keep them involved throughout the process.
- As the planning team coordinates with the other agencies, consider how to most effectively use the identified programs to further environmental objectives.
- Select projects and programs from the Hazard Mitigation Plan. If the community doesn't have a Hazard Mitigation Plan, apply to the responsible state agency that administers the hazard mitigation plan funding. Begin preparing a mitigation plan whether the community receives these funds or not.
- Apply to the Hazard Mitigation Grant Program (Section 404) for support of environmental projects and programs that address the community's problem. See the list at the end of the "tools" section of this chapter for other potentially eligible projects and programs.
- Use Section 406 (Stafford Act) money to move public facilities out of harm's way. State Revolving Fund loans from the Environmental Protection Agency can be used to relocate wastewater treatment plants damaged by flooding .
- Apply for Rural Housing loans to purchase homes that have been damaged.
- Use Community Development Block Grant money as a match for other programs that reduce exposure to natural hazards.
- Engage the National Park Service through their Rivers, Trails, and Conservation Assistance Program to help in developing a plan.
- For a watershed plan, contact the Natural Resources Conservation Service (PL566 projects) or the Corps of Engineers (Section 22 program).
- Use zoning, subdivision, & building codes to implement environmental projects and programs.
- Seek funding for part of the recovery plan from the Corps of Engineers (Section 206 or Section 1135), the Natural Resources Conservation Service (Wildlife Habitat Incentives Program, Environmental Quality Incentives Program, Wetlands Reserve Program) or the Consolidated Farm Services Agency (Conservation Reserve Program), the Department of Housing and Urban Development, the U.S. Fish and Wildlife Service, or the Environmental Protection Agency.
- Generate local funds through tax incentives.
- Encourage participation by offering a transfer of development rights, land purchase, easements, or donations.
- The planning team should begin by selecting from programs listed above. Be sure to check the most recent sources of information by contacting the agencies directly or going to their website. To find the agency website, see /www.searchgov.com.
- Establish and begin the environmental monitoring process.
- Modify the plan and its implementation in response to monitoring results.

- Measure direct, observable results such as wetlands acres protected, restored, or enhanced.
- Survey decisionmakers and the public.
- Report on accomplishments of team members.
- Use the monitoring reports required as part of a federal program.
- Use the monitoring report proposed in this report or one developed in Step 8, above.
- Modify the recovery plan based on results from the monitoring reports.

## MONITORING ENVIRONMENTAL QUALITY

A locality should monitor the environmental projects and programs it initiates during recovery to determine how effective they are and whether they need to be changed. All monitoring should be simple and easily conducted while at the same time providing pertinent information to local decisionmakers. As an initial review, local officials should read progress reports required by federal and state agencies when local governments participate in the different programs.

A community is best served when it develops its own environmental monitoring procedures. Three performance measures should provide the needed information:

- **objective results** data—statistics that are observable and can be measured, such as number of acres on a fault removed from potential development.
- **surveys and assessments** of results—opinions from county or parish and town decisionmakers and the general public.
- **activity measures**—information on the implementation of the project or program.

Consider using the model shown in the box on page 7-10. It offers a cost-effective method for assembling a wealth of material and insights, based on a method used by the Louisiana Department of Environmental Quality and Department of Natural Resources to manage its contracts. Someone should always be legally obligated to prepare and attest to the validity of the information contained in the monthly monitoring report.

## TOOLS FOR IMPLEMENTING ENVIRONMENTAL PROJECTS OR PROGRAMS

Communities have access to many tools for integrating environmental projects and programs into their recovery plans or existing comprehensive plans. The approach should be tailored to fit a given community's circumstances and not simply reproduce a model or a process from another jurisdiction. When selecting from the following menu, consider the ideas as part of a multi-objective approach that accounts for economic development, social equity, quality of life, and disaster resilience as well as environmental quality. Remember that the community will be working in cooperation with other parties in the watershed, geologic area, or ecosystem.

## SAMPLE MONTHLY MONITORING REPORT

PROJECT or PROGRAM TITLE:

REPORTING PERIOD:

NARRATIVE ON TECHNICAL ELEMENTS

I. WORK COMPLETED TO DATE: (write here or attach monthly progress report)
   A. Activities by Task for this period

   B. Fee Schedule (personnel, hours, rates, direct expenses, fee)

II. DESCRIBE PROGRESS ON THE PROJECT *or PROGRAM*
   A. Tasks and/or milestones accomplished during this period

   B. Tasks and/or milestones not accomplished during this period with an explanation or assessment of:
      1. Nature of problems encountered:

      2. Remedial action taken or planned:

      3. Can minimum criteria for measure still be met:

      4. Likely impact upon achievement of task and project or program:

III. DELIVERABLES (state what delivered, give date, and to whom submitted):

IV. OTHER DISCUSSIONS OF SPECIAL NOTE (Please be specific)

FINANCIAL RECONCILIATION

Invoice No.: _____Reporting Period: _____

Invoice Amount: $_____ Total Contract Amount:$ _____

Total Invoiced to Date: $_____ Balance: $_____

COMMENTS:

PROJECT DIRECTOR: _____*signature*_____ Date: _____

Coordination is essential. Available tools are clustered under the following headings: Regulatory Tools, Incentives, and Programs used as Tools.

### Regulatory Tools

Local governments have several regulatory techniques available to protect natural areas and implement other approaches to environmental protection. Regulations work better if they are in place before a disaster, but there may well be opportunities to improve on existing regulations or get new ones instituted in the recovery period. Some of the more common regulatory measures used by local governments are summarized below.

**Zoning.** Zoning divides land into separate land use districts or zones and establishes the uses (e.g., residential, commercial, or industrial) as well as the density of development allowed in each zone. A wetlands conservation or floodplain area, for example, can be established either by an overlay zone or an incentive zone where zoning already exists, or as a special district when zoning is not yet in place. The overlay zone delineates a conservation district, floodplains, fault lines, and landslide areas on maps and sets the regulations and standards for uses that can take place there. An exclusive wetland or floodplain zone prohibits buildings in wetlands or floodplains, a concept that minimizes conflicts between development and wetlands or floodplain values.

**TOOLS FOR ENVIRONMENTAL QUALITY**

- Zoning
- Subdivision regulations
- Building codes
- Special ordinances
- Tax incentives
- Transfer of development rights
- Easements
- Land purchase
- Voluntary agreements

Incentive zones, also called bonus zones, allow for a compromise between the plans for saving wetlands and floodplains and the desires of the landowners to have intensive development. By allowing the developer to build at a higher density on the more suitable lands, the community protects the wetlands or floodplains as open space. Cluster zoning (grouping or concentrating building units on a smaller land area) achieves the same objectives by modifying densities in approved subdivision plats. For example, assume a parcel of 50 acres is composed of 25 acres of uplands and 25 acres of wetlands or floodplains. The region that contains the tract is presently zoned for one home on each acre. Under cluster zoning, 50 homes would be located on 25 acres, thereby keeping the other 25 acres in wetlands or floodplains.

Buffers protect rivers, creeks, bayous, and lakes from the by-products of the adjacent land uses, for example, by retarding runoff and trapping sediment before it enters the water bodies. Buffer strips can have a fixed width (50–200 feet, depending on their impacts and the importance of the nearby water body) or a specified area with a mechanism for including selected sensitive areas that lie beyond the fixed zone.

**Subdivision regulations.** Subdivision regulations govern the division of land into smaller parcels for development or sale. Traditionally, subdivision regulations focused on the physical aspects of a proposed development: the arrangement of lots, the size and layout of streets, and the provision of stormwater facilities. Now, in addition, they provide for sewers, drainage, and parks and can be used for conserving habitat, wetlands, floodplains, open space, and other environmentally important areas. Developers are encouraged to place buildings on designated sites, avoiding wetlands, floodplains, or areas subject to erosion, faulting, or landslides. In the lower drainageways, wetlands become part of the stormwater system and also a component of the community's open space or park requirements.

**Building codes.** Local governments adopt laws, regulations, ordinances, and other requirements to create building codes. Building codes govern the construction methods used in a structure. Building codes can be used to control development on hydric soils, on unstable soils, in floodprone areas, and near geologic hazards. Disaster-resilient practices should be mandated during recovery (reconstruction, rehabilitation, or alteration), not only to save lives and prevent injuries, but also to reduce the potential for polluting habitat, wetlands, open space, and floodplains. For example, propane tanks can become an environmental hazard if they become part of the debris carried by flood waters; but it is a fairly simple matter to be sure that they are adequately anchored to avoid such a risk. Local building codes can include such provisions.

**Special ordinances.** Obtaining open space, habitat, or wetlands is only one way to conserve their values and functions. Stormwater management ordinances, for example, can be implemented to protect wetlands from nonpoint source impacts by keeping sediment and pollutants out of them. Detention ponds, buffer strips, prohibition of point source discharges into wetlands, and creating artificial wetlands are other methods that communities should consider as they work to improve future environmental quality during recovery.

As an alternative, the community could purchase the rights of first refusal on selected parcels. This basically means that the landowner gives the government the opportunity to purchase the wetlands before he or she sells it to a third party. This may be expensive because the sale price likely will be driven by the market.

### Incentives as Environmental Tools

**Tax incentives.** Economic incentives are a way to modify individual and corporate activities when the people involved may not be enthusiastic about regulations. Tax incentives could compensate landowners directly; the state could then have a mechanism to contribute in-lieu payments to the local governments if they lose tax revenues.

The county, parish, or town can assess the targeted areas at a lower rate than the surrounding properties that could be developed into shopping centers or homes. With the application of differential assessments, the community should institute a penalty when the land changes uses. Compensation could equal the higher rate for the new use multiplied by the number of years an assessment was artificially low. These fines could be applied to the community's open space

program. For example, if a landowner places farmland in the lower assessment category he or she pays lower taxes. However, if in 10 years he or she sells the farmland for a shopping center, the higher assessed value would be paid for the 10 years the property was in open space.

**Transfer of development rights.** In those states with enabling legislation, local governments can enact programs that allow all or part of the density potential, as established in the community's zoning ordinance for one parcel of land, to be applied to a noncontiguous parcel or to land owned by someone else. Through this method, these rights can be sold to someone who has land better suited for development—non-wetlands, parcels outside the floodplain, or lots that are not as environmentally sensitive as the original parcel. This technique is similar to easements because the land stays in the private sector, undesirable development is avoided, property taxes are still paid, new development continues, and the landowner is compensated for the development rights he or she relinquished. Again, this technique is useful any time, not just during recovery from a disaster.

**Easements.** Fee simple ownership is full ownership that carries with it the right to do many different things with the land. These rights include keeping people off the land, selling it, leaving it to heirs, building structures on it, and otherwise using it. Naturally, these activities must comply with established regulations and standards to prevent them from being nuisances or adversely affecting the public health, safety, and welfare.

Development rights that can be separated from the property and sold create an easement. An easement is a legal agreement between a property owner and another party to restrict the type and amount of development that may take place on the property. Construction may or may not be prohibited or may be restricted in amount or type. For the development rights, the landowner receives payment that can be used to purchase additional land, make improvements on the existing operations, or fund other projects. Perpetual easements last forever and go with the land while term easements extend for a specified period of years.

**Land purchase.** Purchase is usually considered for only the most exceptional lands. Purchase, also known as fee simple acquisition, has many advantages. This technique gives total ownership and thus affords the best protection for the parcel. It allows for implementing a multi-objective program, including public access to and use of the land for recreation, and habitat restoration, enhancement, and protection. Once a community owns a tract it can develop a management plan to correct past mistakes that may have degraded the value and functions of wetlands or floodplains.

On the other hand, costs are usually high. Initial financing may be difficult to obtain and funding agencies could have different goals now or in the future from those the community identified. Other disadvantages include disruption of the community, especially if condemnation is used; the long-term responsibility and expense for operating and managing the tract; and the potential for the community's policies to change and the land reverts to intensive development.

Variations of the purchase option should be considered and may have significant benefits that stimulate a transaction when it may not have been possible under different circumstances. The community could purchase the property and retain those parts of the parcel that are most desirable for building a sustainable community. Less desirable lands could be sold with deed restrictions. But there still remains the high cost and long-term operations and maintenance obligations.

A second option is to purchase the property and then lease it with restrictions. Lease charges generate income that can be used to offset long-term operations and maintenance costs and property taxes. This option gives greater control over activities on the land.

Finally, a community can purchase the property and agree to life-time grants with restrictions for a defined period, such as the life of the present owners. Although this is still costly, it allows for a smoother transition to a conservation use.

**Voluntary agreements.** Voluntary agreements are yet another method for conserving lands. A major deficiency of this approach is that the agreements may not be binding and could be terminated at will or with the mutual consent of those involved.

**Donations—**A recovery program should allow for donations. There are tax benefits for the donor, the extent of which must be determined by a Certified Public Accountant with a full knowledge of the tax code and the land. Donations may be outright, or the landowners can retain the use of the property for their and another person's lifetime. This approach allows for maximum use of public funds.

**Leases—**A second form of voluntary agreement is a lease between the community and the property owner. Leases are simply rents for the contracted period with the landowner retaining title and the tax obligation. The community is not committed to the property in perpetuity, but there are important problems. If the land is not in public ownership, then long-term site planning is restricted. Without a plan or ownership there may be limitations on public expenditures that can be made on the property. Finally, an annual lease fee must be paid.

**Covenants—**It is possible for the community to arrange a mutual covenant among neighboring landowners when there are no funds for obtaining the property or there is some distrust of the local government. The landowners agree on use controls and the activities that can take place. Signed documents are recorded with the county or municipality and the information is attached to the property until cancelled or modified by a written agreement of all parties.

**Charitable deductions—**A community could offer charitable tax deductions for donations of interest in lands.

## Federal, State, and Private Programs as Environmental Tools

The following programs present opportunities for mixing and matching environmental projects into a recovery or comprehensive plan. The summary of each program explains how it can be integrated into a community's strategy for environmental quality. Some of these programs are available any time; some are triggered by a Presidential disaster declaration and thus are particularly appropriate for a recovery strategy. For the most recent information about the option, established requirements, or names and telephone numbers of contacts, review the agency's website or contact the agency directly. This list and program descriptions build upon an unpublished document (Emmer, 1991) prepared for the Environmental Protection Agency.

**Conservation Reserve Program** (Catalog of Federal Domestic Assistance No. 10.069)
The Consolidated Farm Service Agency administers the CRP for conserving and improving natural resources such as wetlands, waterfowl habitat, filter strips, or riparian buffers. Participants received direct payments for specified uses. Eligible owners or operators may place highly erodible or environmentally sensitive cropland into a 10–15 year contract.

**Small Flood Control Projects, Section 205 of the Flood Control Act** (Catalog of Federal Domestic Assistance No. 12.106)
The U.S. Army Corps of Engineers Section 205 projects reduce flood damage through projects not specifically authorized by Congress. The Corps of Engineers can develop and construct small control projects that are clearly shown to be feasible from an engineering standpoint and economically justified. Each project is limited to a federal cost share of not more than $5 million. The total local contribution is 35% of the project cost. Nonstructural alternatives are viable options for funding and include such measures as flood warning systems, raising and/or flood proofing of structures, and relocation of floodprone facilities.

**Aquatic Ecosystem Restoration (Section 206)**
The U.S. Army Corps of Engineers aquatic ecosystem restoration projects improve the quality of the environment. The projects must be in the public interest and cost-effective. The Corps carries out the study and implementation of the project in conjunction with a non-federal sponsor.

**Project Modifications for Improvement of the Environment (Section 1135 Program)**
This program provides for ecosystem restoration either directly modifying the structures and/or operations of water resources projects constructed by the U.S. Army Corps of Engineers, or restoring areas where a Corps project contributed to the degradation of the area. This program can be used to restore wetlands in the flood area, opening oxbows by Corps levees or navigation features, or realignment of a Corps levee to allow areas between the levee and the channel to revert to historic floodplain.

**Planning Assistance to States Program (Section 22)** (Catalog of Federal Domestic Assistance No. 12.110)
This U.S. Army Corps of Engineers program assists states, tribes, local governments, and other non-federal entities in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. A 50:50 cost-share is required.

**Post-Disaster Economic Recovery**
Congress may appropriate supplemental funds to the Economic Development Administration after a disaster. Economic Development Administration construction project grants to states, local governments, and certain non-profit organizations may be used for construction of infrastructure. Loans may be used for relocation of non-farm and non-governmental structures, which is one way this program can help with environmental protection projects. The cost share may be as high as 100% for a project located in a Presidentially declared area for which EDA received an application for assistance under a supplemental appropriation within 18 months of the date of the declaration. Otherwise, public works direct grants have a cost share of 80% federal and 20% local. Contact the EDA or visit the EDA website at www.eda.gov for the most recent information.

**Nonpoint Source Pollution Grants** (Catalog of Federal Domestic Assistance No. 66.460)
Counties and towns share the problem of dealing with stormwater runoff. Impervious surfaces and disturbed lands change the quantity and quality of precipitation that flows overland to rivers, bayous, and lakes. As a result, water bodies become polluted. Through the Clean Water Act, the Environmental Protection Agency supports the implementation of best management practices to protect water quality. The community may now be required to prepare a stormwater management plan. Coastal communities should see whether their state is in the process of implementing a coastal nonpoint pollution control program as required by Section 6217 of the Coastal Zone Act Reauthorization Act of 1990.

When a stormwater management or nonpoint source pollution control program exists, the county or town can work to build on the value and function of wetlands, floodplains, and open spaces to store and cleanup runoff. In many cases, a simple redesign of a control structure or modification of an operating schedule can result in significant benefits downstream. In other instances, open space in the impact zones for landslides or along faults could be kept as open space and integrated into the stormwater management plan, thereby serving several objectives. These wetlands and detention/retention ponds may also provide habitat for waterfowl and an outdoor laboratory for middle and high schools.

**Clean Water State Revolving Funds** (Catalog of Federal Domestic Assistance No. 66.458)
The Environmental Protection Agency provides loans at below-market interest rates for up to 20 years. These loans can be used to relocate, repair, or replace wastewater treatment plants damaged by flooding. Contact should be made with the State Revolving Fund Agency.

**Drinking Water State Revolving Funds** (Catalog of Federal Domestic Assistance No. 66.468)
The Environmental Protection Agency loans can be used to repair, replace, or relocate community water systems (public and private) damaged by flooding. Loans are below-market interest rates for up to 20 years, although disadvantaged communities may qualify for 30-year loans. Additional information may be obtained from the State Revolving Fund Agency.

**Watershed Assistance Grants**
River Network and the Environmental Protection Agency team up to offer the Watershed Assistance Grant. The WAG program supports the growth and sustainability of local watershed partnerships in the United States. Requested amounts cannot exceed $30,000. For more information see the River Network's website at www.rivernetwork.org/wag.

**Flood Mitigation Assistance** (Catalog of Federal Domestic Assistance No. 83.536)
The Federal Emergency Management Agency will help a state and communities carry out cost-effective measures designed to reduce the risk of flood damage to structures covered under contracts for flood insurance and reduce the number of repetitive-loss structures. Eligible projects include mitigation activities that are technically feasible and cost-effective. Eligible projects include: acquisition, elevation, or relocation of NFIP-insured structures; minor, localized structural projects; and beach nourishment. All funding is on a cost share of 75% federal and 25% non-federal. Only half of the non-federal share can be in-kind work (12.5% of the total). Funds are not contingent upon a Presidential disaster declaration.

- In Del Rio, Texas, a HMGP grant was used to move more than 164 homes along the San Felipe Creek out of the floodplain. The cleared land was dedicated to open space.
- In Lincoln County, Montana, 30 acres of floodprone land near a residential area were purchased and then turned into community parkland with the help of HMGP funds.
- The Castaic Union School District in northern Los Angeles County used $7.2 million HMGP grant and the sale of local bonds to relocate school facilities out of a dam inundation area and far removed from high-pressure oil pipelines. The school district agreed to turn the land over to the Newhall County Water District as soon as the relocation effort was underway. The old school property is located above two active wells, which the water district can use to supply their customers in Castaic. In doing so, they changed the property deed to restrict human habitation and development, and to return the site to natural open space.

**Hazard Mitigation Grant Program, Section 404, The Robert T. Stafford Disaster Assistance and Emergency Relief Act, as amended** (Catalog of Federal Domestic Assistance No. 83.516)
These Federal Emergency Management Agency grants can be used for implementing long-term hazard mitigation measures after a major disaster declaration. These funds are based on the federal funds spent on the Public and Individual Assistance programs in response to the disaster, minus administrative expenses, and can be used for projects that protect both public and private property. Funding under Section 404 increases from 15% to 20% depending on an acceptable mitigation plan by the state that demonstrates its interest and intent to track the effectiveness of this program. Types of eligible projects include, but are not limited to, elevation, acquisition, or relocation of structures and retrofitting of facilities. The cost-sharing requirement is 75% federal and 25% other, i.e. state, local, or both. Up to 7% of the Section 404 funds are available to states to be used in developing mitigation plans. Funds are available after a Presidential declaration.

The HMGP offers the most immediate source of funding for environmental quality projects. Project types allowed through Section 404 include:

- Construction of detention ponds/basins
- Stabilization of riverbanks and shorelines
- Purchase of land in hazard zones
- Acquisition and demolition or relocation
- Seismic retrofitting
- Improvements to stormwater, wastewater, and water treatment facilities and pumping stations
- Repair or reconstruction of fuel storage tanks

- Infrastructure improvements to roads and bridges
- Beach nourishment
- Stabilization and/or restoration of sand dunes, roadway banks
- Vegetation management programs
- Erosion controls
- Slope stabilization
- Brush clearing, controlled burns, fuel breaks
- Miscellaneous land improvements.

These projects must demonstrate a positive benefit-cost ratio, be proven to avoid certain losses, and be a part of a state's funding priority.

**Public Assistance Program, Section 406, The Robert T. Stafford Disaster Assistance and Emergency Relief Act, as amended** (Catalog of Federal Domestic Assistance No. 83.516)
The Federal Emergency Management Agency makes funds available to state and local governments for the repair, restoration, and replacement of a public facility or to a person who owns or operates a private nonprofit facility that is damaged or destroyed by a major disaster. The federal share is 75% of the cost. Funds, not exceeding 90%, may be used may be used to repair, restore, or expand other selected public or other selected private nonprofit facilities, to construct new facilities, or to fund hazard mitigation measures that the state or local government determines to be necessary to meet a need for governmental services and functions in the area affected by the major disaster. Funds are available after a Presidential declaration. Repair and restoration work carried out with these funds can help a community with its environmental protection objectives. For example, these funds may allow a community to replace its flood-damaged water treatment plant with a new one at a different site, leaving the original site for community open space or wildlife habitat.

**Increased Cost of Compliance Coverage**
Each flood insurance policy under the National Flood Insurance Program includes a $75 premium to fund the Increased Cost of Compliance program. When a NFIP insured structure (home or business) within the special flood hazard area is declared substantially damaged or repetitively damaged, the property owner may receive up to $20,000 for the cost of mitigation measures. Mitigation measures include elevation, floodproofing, demolition, and relocation. ICC coverage provides for the payment of a claim to help pay for the cost to comply with state or community floodplain management laws or ordinances after a flood event. This $20,000 can be used as part of the 25% non-federal match required under the HMGP. These funds can contribute to a community's environmental goals during recovery if, for example, they are used to help in the relocation of insured structures out of floodprone areas so that the floodplain lands may become part of a nature preserve.

**Partners for Fish and Wildlife**
This U.S. Fish and Wildlife Service program provides financial and technical assistance to private landowners interested in restoring wetlands and riparian habitats on their land. The program uses a non-acquisition approach to voluntary habitat restoration on private lands. The cost sharing agreement is negotiated.

**Land Acquisition**
This U.S. Fish and Wildlife Service program identifies and acquires high quality lands and waters for inclusion into the national wildlife refuge system. The program focuses on acquiring lands or purchasing easements to protect important fish and wildlife habitats. Funding is 100% federal.

**North American Wetland Conservation Fund**
This U.S. Fish and Wildlife Service program provides federal cost-share funding to stimulate public-private partnerships to protect, restore, and manage a diversity of wetland habitats for migratory birds and other wildlife. Cost sharing is 50% non-federal.

**Disaster Recovery Initiative**
Department of Housing and Urban Development grants must be used for buyouts, relocation, long-term recovery, and mitigation. Activities that can be funded include:

- Acquisition of real property, including the buyout of properties in a floodplain and the acquisition of relocation property;
- Relocation payments and assistance for displaced persons, businesses, organizations, and farm operations;
- Repair, rehabilitation or reconstruction of residential and non-residential structures;
- Acquisition, construction, reconstruction, or installation of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes; and
- Acquisition, construction, or reconstruction of buildings for the general conduct of government damaged or destroyed as a direct result of a Presidentially declared disaster.

These funds are available to states and local governments which experience a Presidentially declared disaster.

**Community Development Block Grant - Entitlement Communities Program** (Catalog of Federal Domestic Assistance No. 14.218)
Department of Housing and Urban Development CDBG grants can be used for acquisition of real property, clearance, relocation, housing rehabilitation, public services, public facilities and improvements (such as water and sewer facilities, streets, and neighborhood centers), or mitigation activities directly related to an event. The program targets low- and moderate-income people in metropolitan cities and urban parishes. The non-federal match is 25%.

**Community Development Block Grant - State Administered Program** (Catalog of Federal Domestic Assistance No. 14.228)
Department of Housing and Urban Development CDBG grants can be used for acquisition of real property, clearance, relocation, housing rehabilitation, public services, public facilities and improvements (such as water and sewer facilities, streets, and neighborhood centers), or mitigation activities directly related to an event. The program targets low- and moderate-income people in non-entitlement areas. Non-entitlement areas are cities with populations of less than 50,000, and counties or parishes with populations of less than 200,000. The non-federal match is 25%.

**Section 108 Loan Guarantee Program**
The Department of Housing and Urban Development provides loan guarantees to public entities for community and economic development. Loans may be used for acquisition of real property; relocation of property, homeowners, and businesses; rehabilitation of publicly owned property such as water and

sewer systems; and housing rehabilitation, including elevation of properties. The target is low- and moderate-income persons.

**Home Investment Partnerships Program** (Catalog of Federal Domestic Assistance No. 14.239)
Department of Housing and Urban Development grants can be used to assist renters, new home buyers, and existing homeowners with acquisition, new construction, rehabilitation, and tenant-based rental assistance. The target is low-income persons. A 25% match is required, but this may be waived due to fiscal distress or in Presidentially declared disaster areas.

**Single Family Home Mortgage Insurance for Disaster Victims - Section 203(h)** (Catalog of Federal Domestic Assistance No. 14.119)
Department of Housing and Urban Development mortgage insurance for individuals provides coverage on a new principal, single-family residence after displacement by a disaster. This Federal Housing Administration program supports relocation of residences outside of the floodplain. The borrower may finance 100% of the annual cost of the insurance.

**Rivers, Trails, and Conservation Assistance Program** (Catalog of Federal Domestic Assistance No. 15.921)
Staff from the National Park Service facilitate activities that help local groups gain public support for a project and find funds for implementation. Although the program provides no grants or loans, their personnel bring expertise and extensive experience in open space and community-based conservation programs. Rivers & Trails works with non-profit groups, local and state government appointed commissions, local government agencies, and others on rivers and trails projects. This program has expanded to include work on developing greenways, scenic byways, and heritage areas. See Chapter 3 for more information on this program.

The Rivers & Trails Program helped

- the Buffalo Bayou Partnership to develop the Houston East End Trail, an 8-mile rail-trail that connects a predominately Hispanic neighborhood with downtown Houston, Texas;
- the San Miguel Watershed Coalition, which restored 80 miles of the San Miguel River watershed in Colorado, through a watershed plan adopted by eight communities and seven government agencies; and
- The Providence Plan, a non-profit group that breathed new life into the Woonasquatucket River Greenway in Rhode Island, by organizing interpretive walks and the First Greenway Festival and by bringing other cooperators like the Trust for Public Land, the Lila Wallace Readers Digest Fund, and others.

**Coastal Zone Management Program** (Catalog of Federal Domestic Assistance No. 11.419)
The Office of Ocean and Coastal Resources of the National Oceanic and Atmospheric Administration provides Section 309 grants that may be used for implementing non-structural coastal flood and hurricane hazard mitigation projects identified in the state Coastal Hazard Mitigation Plan. The state must cost-share 50% of the project.

**Water Bank Program** (Catalog of Federal Domestic Assistance No. 10.062)
The Natural Resources Conservation Service pays landowners to set aside wetlands for a specified period of time.

**Wetlands Reserve Program** (Catalog of Federal Domestic Assistance No. 10.072)
The objectives of this Natural Resources Conservation Service program are to restore and protect farmed wetlands, prior converted wetlands, wetlands farmed under natural conditions, riparian areas, and eligible buffer areas through permanent or long-term agreements.

**Environmental Quality Incentives**
EQIP is a voluntary conservation program for farmers and ranchers facing threats to soil, water, and related natural resources. The Natural Resources Conservation Service provides technical, financial, and educational assistance on installing or implementing structural, vegetative, and management practices called for in 5- to 10-year contracts for most agricultural land uses. EQIP works primarily in priority areas where significant natural resources problems exist, such as erosion, water quality and quantity, wildlife habitat, wetlands, and forest and grazing lands. Cost sharing may pay up to 75% of the costs of certain conservation practices. For additional information contact the County Agent, the Cooperative Extension Service, or go to the internet site: www.nhq.nrcs.usda.gov/OPA/FB96OPA.

**Wildlife Habitat Incentives Program**
WHIP is a voluntary program administered by the Natural Resources Conservation Service to improve wildlife habitat. Nationally, acres were distributed among four major habitat types: upland wildlife habitat; wetland wildlife habitat; riparian and instream aquatic wildlife habitat; and threatened and endangered species.

**Small Watershed Protection and Flood Prevention (PL-566 Program)** (Catalog of Federal Domestic Assistance No. 10.904)
This Natural Resources Conservation Service program provides technical assistance for planning and implementing plans for the protection, development and utilization of land and water resources in small watersheds (less than 250,000 acres). Financial assistance is provided for sharing costs of measures for watershed protection, flood prevention, agricultural water management, sedimentation control, public-water-based fish, wildlife, recreation. The program also extends long-term credit to help local interests with their share of the costs.

**Physical Disaster Loans and Economic Injury Disaster Loans** (Catalog of Federal Domestic Assistance No. 59.008)
These disaster loans are available from the Small Business Administration after a declared disaster to non-farm, private sector owners of disaster damaged property for uninsured losses. All loans must be repaid although at a low interest rate of 4% (as of December 2000) and a 30-year term. Loans may be used for relocation of non-farm and nongovernmental structures.

# SUMMARY

Everyone sees the community and its inherent features, for example, clean air. The town cherishes its open space for recreation and being surrounded by agricultural fields. More natural areas such as meadows and woods shelter birds and wildlife; unpolluted rivers, lakes, or estuaries support fishing and boating; and views unobstructed by signs and buildings are aesthetically pleasing. Residents enjoy a greenway through the business district and a designated natural area on the steep hills west of town. Nationally, local decisionmakers are rethinking how they address

the sprawl that now characterizes even the smallest towns. They are working to keep development from hazardous or important locations, such as floodplains, wetlands, agricultural fields, riparian strips, alluvial fans, fault lines, and slopes that experience landslides.

To be most effective, decisionmakers must remain alert to ways they can mix and match federal and state programs to local initiatives. The process outlined above and the menu of tools provide opportunities to improve the quality of the community while recovering from a natural disaster—and thereby move toward local sustainability. With minimal additional effort on the local government's part the community can integrate practical environmental projects and programs into short- and long-term recovery activities and build on opportunities through federal and state programs. By creatively applying these options the local government can contribute to a recovery plan that creates a sustainable community. A community that has a comprehensive plan should build on it to create its recovery plan and strategy and not duplicate efforts or add another layer of planning.

# REFERENCES

Department of Crime Control and Public Safety. 1999. *Hazard Mitigation Successes in the State of North Carolina*. Raleigh, NC: North Carolina Emergency Management Division. 80 pp.

Emmer, R.E. 1991. "Wetlands Conservation through Local Community Programs." Unpublished report prepared for the U.S. Environmental Protection Agency. Washington, D.C.: EPA.

# WHERE TO FIND MORE INFORMATION

## Training Courses and Workshops

Federal Emergency Management Agency, Emergency Management Institute, National Emergency Training Center. Emmitsburg, Maryland. (301) 447-1035; www.fema.gov/emi [accessed June 15, 2001]

- FEMA Program Responsibilities: Coordinating Environmental and Historical Compliance." Federal Emergency Management Agency Course G253.
  This 3-day course is an introduction to environmental and historic compliance. It examines the importance of fully integrating the compliance steps stipulated by the National Environmental Policy Act and the National Historic Preservation Act into the administration of the Public Assistance and Hazard Mitigation Grant Programs. This course is directed to those at environmental/historic entry levels, and others whose primary function is not environmental/historic.

## Organizations

Columbia University, Center for International Earth Science Information Network (CIESIN).
The findings at this site were jointly developed by CIESIN, the Yale University Center for Environmental Law and Policy, and the Global Leaders for Tomorrow Environment Task Force of the World Economic Forum. The Environmental Sustainability Index (ESI) identifies 22 major factors such as urban air quality, overall public health, and environmental regulation, and measures these factors using 67 different variables, such as levels of sulfur dioxide in urban air, deaths from diseases associated with poor sanitation, and percentage of land protected from development.
See "Environmental Sustainability Index" at www.ciesin.columbia.edu [accessed August 3, 2001]

Environmental Finance Center, The University System of Maryland.
According to its mission and purpose statement, the Environmental Finance Center was created to assist local communities in finding creative ways to pay for environmental projects. The

Center promotes alternative and innovative ways to manage the cost of environmental activities, provides training and development opportunities in environmental management, and works to increase the public and private sector's awareness of the benefits associated with sound environmental management policies.
See: www.mdsg.umd.edu/EFU/index.html; efc@mdsg.umces.edu. or (301) 314-6383.

Environmental Protection Agency.
Water: www.epa.gov/OWOW [accessed August 3, 2001]
"Green Communities:" www.epa.gov/greenkit/sitedex.htm [accessed August 3, 2001]
EPA Wetlands Information Hotline Publication List: e-mail: wetlands-hotline@epa.gov

The Rivers, Trails, and Conservation Assistance Program in the National Park Service.
The RTC has information on funding sources. Its website The site provides a list of organizations that offer financial support for locally lead conservation projects. You must contact each organization directly for more information.
See: www.ncrc.nps.gov/rtca/funding.

Federal and state government agencies.
Up-to-date government information is available via the Internet at: www.searchgov.com.
The screen gives links to all the federal departments, independent agencies, and each state. Click on the agency or state and work through their website. Most materials can be ordered from the website with a credit card.

- Agency documents may be obtained by writing the agency or going to the website and ordering a publication. Many federal documents are also available at university libraries that serve as Federal Depositories. Contact a local university for assistance.

- Maps, satellite images, aerial photographs, technical reports, and related hazard information are available from the federal agencies or their representative in each state: U.S. Geological Survey, U.S. Fish and Wildlife Service, the Federal Emergency Management Agency, the U.S. Department of Agriculture, Environmental Protection Agency, and the U.S. Army Corps of Engineers.

- State agencies that may have information relevant to environmental projects include the geological survey, departments of public works, emergency preparedness, environmental quality, natural resources, wildlife and fisheries, and agriculture and forestry.

- For information on Congressional activities, go to the Library of Congress website: loc.gov. The link to THOMAS allows for bill tracking and other activities.

Natural Resources Conservation Service.
See: www.nhq.nrcs.usda.gov [accessed August 3, 2001]

Also check out NRCS's "Wildlife Habitat Incentives Program." at
www.nhq.nrcs.usda.gov/PROGRAMS/wwd/whipindex.htm [accessed August 3, 2001]
New England Grassroots Environment Fund.
This organization provides grants to communities working on local environmental protection and restoration projects.
See: www.grassrootsfund.org/index.html [accessed August 3, 2001]

The Trust for Public Land.
This is a good site for information on financing alternatives—state funding for parks and open space, conservation, the Trust for Public Land Public Finance Program, Public Finance Case Studies, and more. The website also references materials on building green infrastructure and provides examples. The Toolbox includes discussions on local park financing techniques, a matrix of financing options, examples of funding, and community profiles. The matrix for local finance is definitely worth studying.
See: www.tpl.org [accessed August 3, 2001]

United Nations.
This UN document, "Natural Resource Aspects of Sustainable Development in the United States of America" gives an overview of U.S. policy and law associated with environmental sustainability in the United States.
See: www.un.org/esa/agenda21/natlinfo/countr/usa/natur.htm [accessed June 15, 2001]

## Books, Articles, and Papers

Association of State Floodplain Managers. 1996. *Using Multi-Objective Management to Reduce Flood Losses in Your Watershed*. Madison, WI: Association of State Floodplain Managers. 72 pp. Abstract available at www.floods.org/PDF%20files/PUBSLIST.pdf.
This publication documents the results of a multi-year project, funded by the Environmental Protection Agency and conducted by ASFPM, to explore planning and implementation techniques for multi-objective watershed management. It provides a general introduction to multi-objective management and the planning process that helps a community select the flood-loss reduction measures most suitable to its situation. It explains how to define problems and goals, build partnerships, combine needs and solutions creatively, and begin formal implementation procedures. Both riverine and coastal flood watersheds are examined. Much of the document focuses on multi-objective management planning details, involving subjects such as fish and wildlife issues, water supply, housing improvement, transportation and lifelines. Preparation of a M-O-M plan involves problem definition, involvement of non-local groups, and public and official acceptance of the plan.

Association of State Floodplain Managers, Inc. 2000. *National Flood Programs in Review–2000*. Madison, WI: Association of State Floodplain Managers, Inc. 47 pp.

This conceptual paper explains how many environmental protection measures support flood mitigation and vice-versa.

Burban, Lisa L. and John W. Andresen. 1994. *Storms Over the Urban Forest: Planning, Responding, and Regreening–A Community Guide to Natural Disaster Relief.* St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northeastern Area. 154 pp.
When severe wind or ice storms strike a community, downed trees, power lines, and damaged property are major hindrances to response and recovery. Severely damaged trees often must be removed in a hurry to allow passage of emergency response vehicles, and sometimes only several weeks or months following a storm does the amount of damage and loss of trees become apparent. This is a guidebook for local governments in coping with such events. It discusses mitigation, preparing for and responding to natural disasters; cleaning up and "regreening" a community; working with disaster relief organizations; and experiences of Midwest communities in recovering from tornado damage, community experiences with Hurricane Andrew, and technical resources and information. Additional resources are listed and numerous references accompany each chapter. The manual also contains reprints of relevant journal articles, educational blurbs from environmental organizations, and checklists.

Bush, David M.,Rodney Prado, Kathie Dixon, and Orrin H. Pilkey. 1991. *Principles of Property Damage Mitigation and the Impact of Hurricane Hugo*. Durham, NC: Duke University, Department of Geology, Program for the Study of Developed Shorelines. 167 pp.
Prepared as a field-trip guide for the study of damage caused by Hurricane Hugo along the Carolina coast, this report shows that simply cleaning up and rebuilding should make way for more active steps to enhance and preserve the protective capabilities of the natural setting. It also suggests principles of reducing hurricane-caused property damage given expected sea-level rise, barrier island migration, and increased storm severity, and encourages environmentally sensitive approaches to hurricane mitigation. The document contains an account of pertinent hazard mitigation legislation and hazards research, a matrix of mitigation options, a general description of the shoreline affected by Hugo, and detailed descriptions of various sites included in the field trip.

Clayton, Tonya D., Lewis A. Taylor, Jr.,William J. Cleary, Paul E. Hosier, Peter H.F. Graber, William J.Neal, and Orrin H. Pilkey, Sr. *Living with the Georgia Shore*. Durham, NC: Duke University Press. 200 pp.
This latest addition to Duke University's highly regarded "Living with the Shore" series, is a guide for residents, visitors, developers, planners, and others concerned with the condition and future of the Georgia coast. The authors recount both the human and natural history of the region's barrier islands, particularly examining coastal erosion and the implications of various human responses to this process. They also discuss the pressures created by rapid recreational and residential development. The book includes an introduction to each of the Georgia barrier isles, an overview of federal and state coastal land- use regulations, pointers on buying and building at the shore, a hurricane preparation checklist, a history of recent hurricanes in Georgia,

an extensive annotated bibliography, and a guide to government agencies and private groups involved in issues concerning coastal development.

Department of Energy. 1994. *Rebuilding Your Flooded Home: Guidelines for Incorporating Energy Efficiency*. DOE-EE-0019. Washington, D.C.: U.S. Department of Energy, Office of Building Technologies, 36 pp.

After disasters, the natural tendency is to return to one's home and restore it to the way one left it. Due largely to recent advances in building technologies, it is possible to rebuild a residence with a little extra care–and not much more time and cost–and have a home that is much more energy efficient than it was prior to the disaster. By doing this, family comfort will be improved, energy consumption and utility bills can be reduced, property value can be enhanced, and money and energy can be saved for years to come. Because many house components will have to be replaced, i.e., insulation, it makes sense to purchase the most energy-efficient equipment and materials available. Following sections about drying out a flooded house and on personal safety when cleaning up, the document explains how to analyze the property for building shell problems (air leakages, foundations, flooring, etc.), then considers building systems and equipment issues (electric motors, air conditioning, and appliances). Suggestions are presented and tips are provided for financing energy-efficient solutions, such as buying materials in bulk if many properties are affected.

Eleff, Bob. 1999. *Minnesota's Flood Recovery Efforts: Good for the Environment?* St. Paul, MN: Minnesota Center for Environmental Advocacy. 41 pp.

In this report, the Minnesota Center for Environmental Advocacy (MCEA) examines the state's recovery efforts after the devastating floods of 1997. Figures that MCEA has collected from various sources indicate that at least $740 million was spent on emergency operations, rebuilding damaged infrastructure, and on preventive measures aimed at reducing the risks and potential damage from future flood events. This reports seeks to determine the extent to which Minnesota's decisionmaking process following the 1997 floods reflected this policy.

Federal Interagency Floodplain Management Task Force. 1992. *Floodplain Management in the United States: An Assessment Report.* Volume 1: Summary. Boulder, CO: Natural Hazards Research and Applications Information Center. 69 pp.

This assessment of floodplain management in the United States was commissioned in 1987 by the Federal Interagency Floodplain Management Task Force. Its purpose was to provide an evaluation of floodplain management activities in order to report to the public and to the Congress on progress toward implementation of "A Unified National Program for Floodplain Management." Thus, it is a compilation of available information concerning the nation's floodplains, experience with tools and strategies to reduce loss of life, property, and environmental resources, and a perspective of what has been accomplished.

Federal Interagency Floodplain Management Task Force. 1994. *A Unified National Program for Floodplain Management*. Washington, D.C.: Federal Emergency Management Agency. 43 pp.
This version of *A Unified National Program for Floodplain Management* responds to the directive in Section 1302(c) of the National Flood Insurance Act of 1968 that the President transmit to Congress any further proposals needed for a unified national program. Prior reports in response to this directive were submitted in 1976, 1979, and 1986. This report: 1) takes account of changes in economic, environmental, and social trends; 2) responds to a number of concerns raised during the nationwide assessment of the status of floodplain management completed in 1992; and 3) addresses the criticism leveled at the Unified National Program by the National Review Committee. The conceptual framework of this report focuses on the need to 1) reduce the loss of life, disruption, and damage caused by floods; and 2) preserve and restore the natural resources and functions of floodplains.

Federal Interagency Floodplain Management Task Force. 1995. *Protecting Floodplain Resources. A Guidebook for Communities*. Washington, D.C.: Federal Emergency Management Agency. 41 pp.
This guidebook provides information for local officials, citizens, landowners, and groups interested in protecting and restoring the natural resources and functions of floodplains. The guidebook focuses on local "grassroots" efforts needed to effectively manage and protect the resources of the floodplain environment including wetlands, riparian habitats, historic sites, and aesthetic amenities. The guidebook introduces a conceptual framework for floodplain management and provides a planning process that can be used in virtually any of the some 20,000 floodprone communities in the United States.

Flink, Charles A. and Robert M. Searns. 1993. *Greenways: A Guide to Planning, Design, and Development*. Washington, D.C.: Island Press. 351 pp.
Within the developed landscape, greenways serve a dual function: they provide open space for human access and recreational use, and they serve to protect and enhance remaining natural and cultural resources. This manual provides interested organizations and concerned individuals with background information about planning a greenway project, how to enlist local assistance in organizing project support, funding the project, related water recreation, greenway safety and liability, management, and planning for the care of rivers, streams, and wetlands. Information is provided on preserving stream and river functions, the impacts of urbanization on riparian regimes, and the establishment of organizational partnerships to plan, realize, and preserve greenway arrangements.

Godschalk, D.R., T. Beatley, P. Berke, D.J. Brower, and E.J. Kaiser. 1999. *Natural Hazards Mitigation. Recasting Disaster Policy and Planning*. Washington, D.C.: Island Press. 575 pp.
This book describes and analyzes the way that hazard mitigation has been carried out in the United States under the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The authors determine how the requirements of this law, establishing a national system for hazard mitigation, have worked in practice and how they might be made to work better.

Kline, Elizabeth. 1997. *Sustainable Community: Topics and Indicators.* Available online at ase.tufts.edu/gdae/modules/modinstruct.html [accessed June 22, 2001]
These narratives about sustainable community indicators were developed under a contract with the U.S. Environmental Protection Agency. The primary audiences are community practitioners and technical resource people.

May, Peter J., Raymond J. Burby, Neil J. Ericksen, John W. Handmer, Jennifer E. Dixon, Sarah Michaels, and D. Ingle Smith. *Environmental Management and Governance: Intergovernmental Approaches to Hazards and Sustainability*. New York, Routledge. 254 pp.
The book addresses aspects of environmental management that raise fundamental questions about human actions and government roles. The authors examine "cooperative" and "coercive" governments by comparing polices in New Zealand and Australia with the more coercive and prescriptive approaches used in the U.S. They also focus on how the different regimes influence choices by local governments about land use and development in areas subject to natural hazards. Separate chapters are devoted to growth management in Florida, resource management in New Zealand, and flood management in New South Wales. Other chapters describe how policy design is implemented, the role of regional governments, policy compliance and innovation at the local planning level, strategies for sustainable development, and examine the outcomes of cooperative policies.

Mazmanian, Daniel A. and Michael E. Kraft, eds. 1999. *Toward Sustainable Communities: Transition and Transformations in Environmental Policy.* Cambridge, MA: The MIT Press. 322 pp.
This book reviews and assesses environmental policy over the past three decades, primarily in the United States but with implications for other nations. The editors place U.S. environmental policy within the framework of the transition from 1970s-era policies that emphasized federally controlled regulation, through a period of criticism and efficiency-based reform efforts, to an emerging era of sustainability in which decisionmaking takes place increasingly at the local and regional levels. The book looks at what does and does not work and how social, economic, and environmental goals can be integrated through policy strategies ground in the concept of sustainability.

Philippi, Nancy S. 1996. *Floodplain Management: Ecologic and Economic Perspectives*. San Diego, CA: Academic Press. 225 pp.
When economic and ecological concerns conflict, effective floodplain management often suffers. The author examines the reasons behind these conflicts and points to solutions. She discusses the challenge of managing floodplains, the need for floodplain management, the public interest and how to define it, governments and their roles, harmful effects of floodplain management, case studies of the Mississippi and American Rivers, and scenarios for effective management. Appendices reprint several important documents useful for the understanding of floodplain management in the United States.

Schwab, Jim, Kenneth C. Topping, Charles C. Eadie, Robert E. Deyle, and Richard A. Smith. 1998. *Planning for Post-Disaster Recovery and Reconstruction*. PAS Report No. 483/484. Chicago, IL: American Planning Association. 346 pp. Abstract available at www.planning.org/apapubs/details.asp?Num=1178.

This document helps community leaders and planners educate their constituents on how informed decisions and choices can affect the rebuilding process and yield a safer, more sustainable community. This report introduces planners to their roles in post-disaster reconstruction and recovery, and provides guidance on how to plan for post-disaster reconstruction side by side with all other players involved. A key theme throughout this report is to rebuild to create a more disaster-resistant community. The report contains many references to technical resources.

U.S. National Science and Technology Council. 1994. *Technology for a Sustainable Future: A Framework for Action*. Washington, D.C.: U.S. National Science and Technology Council. 154 pp.

This report summarizes the Clinton White House's plan for developing a comprehensive environmental technology strategy. It examines the use of environmental technologies to facilitate long-term environmental, energy, and economic goals and asks for suggestions for improving federal policies related to advancing environmental technologies. It includes a section on technology needs for natural disaster reduction. The document also provides examples of avoidance, monitoring and assessment, and remediation and restoration. Appendices contain lists of federal sources for agency offices (names, contact information) and online data resources.

U.S. President's Council on Sustainable Development. 1997. *Sustainable Communities Task Force Report.* Washington, D.C.: U.S. Government Printing Office. 186 pp.

This report and its companion volume, *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future*, published in 1996, lay out a set of policy recommendations for planning for sustainable communities. One of the recommendations is to "shift the focus of the federal disaster relief system from cure to prevention." The appendix contains case studies of communities that have set forth sustainability principles, profiles of communities in the 50 states, state-led sustainability initiatives and organizations, and a list of resources for sustainable communities.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford, UK: Oxford University Press. Abstract available at www.oup.co.uk/isbn/0-19-282080-X#desc. [accessed September 21, 2001]

In 1983, the World Commission on Environment and Development was asked by the United Nations General Assembly to formulate "a global agenda for change." This document, also known as the Brundtland Report, is the report of the Committee chaired by Gro Harlem Brundtland. The Committee undertook to: 1) propose long-term environmental strategies for achieving sustainable development by the year 2000 and beyond; 2) recommend ways concern for the environment may be translated into greater cooperation among developing countries and between countries at different stages of economic and social development and lead to the

achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development; 3) consider ways and means by which the international community can deal more effectively with environmental concerns; and 4) help define shared perceptions of long-term environmental issues and the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, a long-term agenda for action during the coming decades, and aspirational goals for the world community.

## Additional Reading

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