

A comprehensive holistic approach looks at an entire watershed or floodplain as an interrelated environment and attempts to satisfy numerous needs while utilizing a long range vision. This watershed approach requires the planning group assess two major items: the resources necessary to undertake the plan; and the organization appropriate to oversee actual watershed assessment and management. Adjoining communities must be agreeable to dedicating their own efforts to a collaborative process.

The chosen approach also implies how the floodplain planning group will be organized, e.g., private, public, agency driven, private-public partnership, etc.. As noted earlier, the authors urge the planning group to use a participatory approach that involves all stakeholders and allows for as much participation as possible within the various planning tasks. Once the group is organized, goals and objectives are initially set, and a planning approach is specified, then the planning group is ready for floodplain assessment. The following offers some basic steps for assessment:

### Step 1: Identify the Planning Area.

Obtain a base map of the principle drainages and sub drainage basins as well as the floodplain area. Planning should include all the land area from which floodplain problems are perceived to arise. This might include an entire watershed, but more likely will include a section of the floodplain and a land area of not fewer than several hundred feet landward from the banks of a stream or river. The area delineated should not include less than the "100 year" floodplain and should remain flexible because the boundaries may change as information becomes available and updated. As an example, some areas, such as latter tributary buffer zones, may or may not actually lie within a definite floodplain. The maps of your community's floodplain provided by FEMA are a good place to start.

### Step 2: Conduct an Inventory and an Analysis of Land Use and Environmental Concerns.

Broad stakeholder participation is important for the inventory and analysis stage. Participation is useful because as stakeholders become familiar with the floodplain natural resources and management issues, this paves the way for more understanding and agreement on management and implementation steps (see Figure 14).

Choose a reference scale that will be consistent for all maps. This is important so that all recorded information will facilitate accurate comparison of data in analyzing development trends and environmental constraints (see Figure 16).

### Natural and Cultural Resource Inventory and Assessment

The first stage of the inventory should be the collection of data regarding the natural and cultural resources in the planning area. For each category of resource data, we have suggested a particular, appropriate resource as well as participatory opportunities in the Table above. The table is illustrative of the types of information needed for the natural and cultural resources inventory. The key is to gather enough information to understand how floodplain natural resources and functions are part of an ecosystem, e.g. how the vegetative communities and wildlife depend on local water levels and flows. Particular attention should be focused on areas needing special management or protective measures, e.g. wetlands, wildlife and fisheries habitat, water bodies, and habitats of rare and endangered species.

The inventory should be based on reliable and acceptable sources of information such as those indicated in the middle column; however, opportunities abound for local participation in data acquisition if this work is carried out in a methodical manner (see Figure 14). In fact, some types of information, such as scenic resources, are best inventoried by local citizens. Information might also be obtained from regional and local

*Figure 14 - The planning process works best when all stakeholders are involved.*



S. Shannon

*Figure 15 - Inventorying floodplain resources in the field.*



R. Swardson

**Table 2 - Natural Resource Data Categories, Sources, & Participatory Options. Acronyms and abbreviated agency names:**

DNR = Department of Natural Resources or equivalent state agency  
 FEMA = Federal Emergency Management Agency  
 NRCS = Natural Resources Conservation Service  
 NWS = National Wetlands Inventory  
 USFWS = United States Fish and Wildlife Service  
 USGS = United States Geological Survey

Category Option	Expertise Source	Participation
surficial/bedrock geology	USGS office files surficial/bedrock maps	field trip to identify land forms apparent
soils, soil depth, erodibility, soil structure wetness, percolation & slope	NRCS office & published county soil survey, county extension agent	field trip to sample soil types & attributes
vegetation types & species	existing vegetation mapping aerial photos, local vegetation experts state natural heritage program	field trip for identification & major veg. communities
surface & ground water hydrology, water quality class	USGS office files state env. quality office	limited fieldwork options - note hydrologic surface features
aquifers & recharge areas-water bodies	USGS files & maps	limited fieldwork
historic/archeological sites & districts	local historians & archeologists	look for local historic archeologic studies & maps
wetland location & assessment	USFWS office & State DNR office	fieldwork to check NWI maps or state agency for wetland existence, equivalent & vegetation health
fish & wildlife habitat by species	state fish & game office or USFWS surveys	fieldwork to observe wildlife & fish during different seasons
rare & endangered plant & animal species	consult local experts or existing surveys in study area & USFWS	check for lists of endangered species or the area - combine w/fieldwork
floodplains & areas of tidal inundation	Check existing FEMA maps	look for flooding not on existing maps
areas of outstanding scenic quality	look for any existing visual perception surveys	do local surveys, e.g., nominate scenic areas & self-employed photography

planning agencies, county environmental management councils, and local conservation advisory boards or equivalents. Many of these agencies have prepared natural resource inventories, open space indexes, and natural resource plans.

The next step is to assess the existing functions and benefits that the natural resources in the planning area provide to the community. This assessment would include functions such as flooding reduction, nutrient cycling, biological diversity and habitat support, maintaining water quality as well as open space benefits including recreation, aesthetics, heritage and cultural resource maintenance.

### Existing Land Use and Development Trends

Evaluate existing land use including county and local economic development trends in the planning area that may impact it. Include in the evaluation such growth inducing factors as current and anticipated major public and private capitol investments, including:

- industrial expansion
- major commercial development
- suburban residential development
- development of natural resources (e.g. forestry, mining, recreation, etc.)
- other social and economic trends

The evaluation should include:

- a) development that has occurred over the last few years,
- b) current development activities that are influencing the patterns and magnitude of growth, and
- c) development now in the early stages of planning which may impact the river or stream corridor in the future. The evaluation should show patterns and intensity of land use in the planning area, including urban and non-urban uses planned for undeveloped areas. The relative density and zoning classification, i.e. industrial, commercial, residential, etc., should be mapped, especially if the need for urban, urban fringe, or expanding land use is apparent. Obviously, if the community is primarily rural or wild land — this may be less of an immediate issue; however, projecting all future land use possibilities is always wise.

### Environmental Analysis

Information from the natural resources inventory should be used to evaluate growth and development in the planning area such as floodplains, critical wildlife habitats, high erosion potential, historic landmarks, scenic vistas, high ground water table, wetlands, etc.. This can be done in a number of ways.

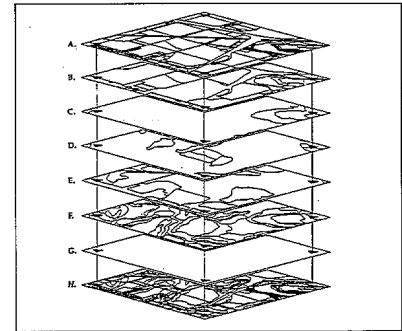
The first way is a weighting of factors from the natural resources inventory as constraints to development ranging from “slight” to “moderate” to “severe.” Transparent overlay maps with shades of gray corresponding to the three levels of constraint can be juxtaposed to indicate the degree of constraint or incompatibility with proposed land use development (see Figure 16). This is called a weighted overlay method.

Another approach is to look at the functions (benefits) provided by the natural floodplain environment such as flood minimization, nutrient cycling, biological diversity, water quality maintenance, contribution to ground water supply and quality, as well as open space functions. The question is to what degree existing or proposed development impacts or reduces these functions (benefits). If these functions are valued, specific controls or performance conditions should be placed on future development in the floodplain such as no net loss of flood storage or conveyance capacity, alteration of existing hydrological processes, disruption of existing habitat values, perceptible change in landscape character, or reduction in open space, etc.. The focus is not so much about a particular land use being incompatible; the focus is more about designing particular land uses or activities so they do not impact the existing ecosystem functions. One could even go further and describe restoration of lost functions in an urban or heavily impacted floodplain.

A third approach is to involve the local stakeholders in discussing and prioritizing both:

- 1) the floodplain natural resource values and functions
- 2) development issues.

*Figure 16 - The inventory of environmental characteristics, such as flood zone, land use, and vegetation types is best accomplished by mapping each characteristic individually. The synthesis of this information requires the ability to consider multiple characteristics and their spatial interaction, such as through the use of weighted overlay analysis or computerised GIS modelling.*



Adapted from R. Hawks

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In this way, some intermingling of local development needs and natural resource protection could be achieved by facilitating town meetings, advisory boards, even negotiations or mediation rather than dictating “professional planning” directives. Such stakeholder discussions are needed if realistic, supported implementation is expected.

In undertaking whatever approach is selected for the environmental analysis, it is useful to consult with other planning agencies, environmental management councils, conservation commissions, and professional resource managers to assist in the classification and interpretation of information in the natural resource inventory.

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### Step 3: Conduct a Problem and Need Assessment

This is one of the most important steps in the assessment process. Problems and needs can be separated into three categories:

- in-stream problems
- floodplain corridor problems
- watershed problems

#### **In-stream Problems and Needs**

In-stream problems and needs directly affect the bed and banks of the water body. Problems include, for example, destruction of fisheries habitat through stream channelization, removal of stream bank vegetation, sedimentation, and problems related to the pollution of the stream bed including debris and wastes, affecting both water quality and aesthetics. The location of these problems and sources should be mapped on a base map overlay or some other information storing device such as a geographic information system. Management needs such as fisheries management, water quality management, floodplain management, recreation development, restoration or rehabilitation of scenic resources, etc. should be discussed and linked to implementation.

#### **Floodplain Management Problems and Needs**

The floodplain is the land that normally has the greatest influence on the quality and character of a river, stream or creek. A stream or river is most vulnerable to sediment from erosion and runoff which originates in the corridor. It is also vulnerable as a result of the heat gained through the removal of a corridor’s vegetative canopy. Thus, flood-prone areas and land activities in the corridor which adversely affect a river, stream or creek should be identified and mapped - especially if they are related to agriculture, forestry, construction/urban encroachment, or mining activity. A description should be made of these activities and how they are impacting the water body or associated wetlands, for example, whether it is a quality or quantity alteration of the ecological structure (see functional analysis in the earlier assessment section). Professional resource managers from your state Department of Natural Resources (DNR) or equivalent, County Soil and Water Conservation Districts, County and local planning agencies, and environmental management councils should be consulted as necessary.

#### **Watershed Management Problems and Needs**

If local communities are to protect and conserve the resources of the streams, creeks and rivers—they may have to look beyond the watercourse and corridor and consider the watershed in its entirety. Because of the cause-effect relationships of the various processes inherent in the land use of streams, creeks, and rivers, water courses serve as an index of the health of the entire watershed. Accordingly, water management problems such as non-point pollution that are related to various land use activities that extend beyond the stream corridor and which are more watershed wide concerns should be described and mapped if the planning group opts to include a watershed wide approach.

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#### Step 4: Define the Corridor Management Boundary

While no precise scientific formula for determining the optimum boundary location for any given corridor management unit can be offered, completion of the preceding steps should help in establishing a “floating” working boundary.

A floating flood plain conservation and management corridor varies in width according to the location of important natural resource features and environmental constraints that exert a strong influence on the character and quality of the stream and its surroundings. Wooded areas, wetlands, flood plains, scenic vistas, and areas having land use constraints, such as steep hillsides or soils having high erosion potential, should be included in the management corridor. However, it may be adequate to focus on the floodplain areas as delineated in your flood maps provided by FEMA.

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#### Step 5: Develop an Action Plan/Agenda

The next step is to move from problems and opportunities to developing an action plan for implementation of various measures that might be needed to protect natural resources in the flood plain. It is especially at this stage that maximum participation of all stakeholders is needed. Ideally, meaningful public participation has been continuous up to this point.

To create an action plan or agenda, there are three activities:

- review goals/objectives and philosophical perspectives;
- create the Action Agenda; and
- determine the sequence of events.

For the first activity, when developing and reviewing your goals and objectives, you can find guidance in the President’s letter transmitting the 1994 document *A Unified National Program for Floodplain Management* to the Congress:

[The Unified National Program] recognizes the importance of continuing to improve our efforts to reduce the loss of life and property caused by floods and to preserve natural resources and functions of floodplains in an economically and environmentally sound manner. This is significant in that the natural resources and functions of our riverine and coastal floodplains help to maintain the viability of natural systems and provide multiple benefits for the people.

It is in this spirit that your organization should review basic goals and objectives as well as adopt an overall strategy to protect floodplain resources.

According to “A Unified National Program in Floodplain Management” (1986 & 1994) two basic strategies can be employed to protect a floodplain’s natural resources:

- 1.) *Preservation of Resources*: Preventing alteration of floodplain natural and cultural resources, and maintenance of the flood plain environment as close as possible using all practical means.
- 2.) *Restoration of Resources*: Re-establishment of a setting or an environment in which natural functions can again operate.

Preservation strategies focus on strict control or prohibition of development in sensitive or highly hazardous areas (through establishment of wildlife sanctuaries, for ex-

ample) while restoration strategies focus on actions to improve the quality or functioning of degraded floodplains (by restoring damaged wetlands, for example). It is not always possible, however, to make a clear distinction between the two strategies. Preservation and restoration of floodplain natural resources are often accomplished, either directly or indirectly, through a wide variety of development controls or by means of regulatory standards designed to protect valuable natural resources or minimize adverse impacts to those resources.

Preservation strategies do not exclude management activities that are compatible with sustaining floodplain functions. Preservation strategies, for example, can include activities to improve habitat conditions and the nonpoint pollution control functions of forests at the water's edge. Types of regulatory activities and management programs that directly or indirectly contribute to the restoration and preservation of living resources/habitat resources include:

- single and multi-purpose resource protection and management programs that include objectives for habitat and living resources protection that apply to floodplains
- incorporation of provisions for protection of habitat and living resources in zoning, subdivisions, and other land-use regulations that apply in whole or in part to floodplains
- incorporation of specific provisions related to living resources and habitat protection in floodplain management programs and regulations.

These kinds of programs can be directed toward inland and coastal wetlands, estuarine and coastal areas, barrier beaches and sand dunes, rare and endangered species, riverine and coastal fisheries, and wild and scenic rivers. Most of the nation's wetlands, coastal barriers

*Table 3 - Strategies and Tools for Floodplain Management* - Source: Federal Interagency Floodplain Management Task Force. *A Unified National Program for Floodplain Management*. Washington, D.C.: Federal Emergency Management Agency, 1986, 1994.

<p>STRATEGY - Modify Susceptibility to Flood Damage and Disruption:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> floodplain management land use regulations</li> <li><input type="checkbox"/> building codes</li> <li><input type="checkbox"/> acquisition/relocation</li> <li><input type="checkbox"/> development and redevelopment policies</li> <li><input type="checkbox"/> information and education</li> </ul> <p>STRATEGY - Modify Flooding:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> dams, levees, floodwalls</li> <li><input type="checkbox"/> channel alterations</li> <li><input type="checkbox"/> land treatment measures</li> <li><input type="checkbox"/> on-site detention facilities</li> </ul> <p>STRATEGY - Modify the Impact of Flooding on Individuals and the Community</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> flood insurance</li> <li><input type="checkbox"/> disaster assistance</li> <li><input type="checkbox"/> information and education</li> <li><input type="checkbox"/> tax adjustments</li> </ul> <p>STRATEGY - Protect and Restore the Resources and Functions of Floodplains:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> floodplain, wetland, and coastal barrier resources regulations</li> <li><input type="checkbox"/> land use planning</li> <li><input type="checkbox"/> conservation easements</li> <li><input type="checkbox"/> watershed management</li> <li><input type="checkbox"/> tax adjustments</li> <li><input type="checkbox"/> information and education</li> </ul>
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and marine sanctuaries are located within riverine and coastal floodplains, and restoration and preservation of the living resources and habitat resources of floodplains are often accompanied through multi-objective programs or regulations aimed at protecting inland wetlands, coastal wetlands and barrier islands.

Preservation and restoration of floodplain water resources has been accomplished through a variety of water supply, watershed management, agricultural erosion control, and water quality maintenance and improvement programs.

Protection of floodplain cultural resources has been accomplished through open space and recreation planning and urban renewal programs, especially in older cities where early settlement concentrations occurred in the floodplain. Some of these programs include waterfront redevelopment projects, historic and cultural resources protection programs, and a variety of multi-purpose open space programs including programs that focus on the development of water-oriented recreation, public access and greenbelts.

The second activity is to create the Action agenda utilizing strategies from Table 3 with specific tools from Table 4. For each action come up with preliminary answers for the following questions, remembering that none of them are carved in stone, but can be changed as needed.

**Who will take responsibility for initiating and implementing the action?** One group could take the lead role, or the work could be shared among a number of groups or individuals. If no firm commitment to take a leadership role exists, consider ways of generating interest in carrying out this action in the future, rather than immediately.

**How will the action be taken?** Break it down into main components. For example, creating a riverfront bike trail could involve meeting with elected officials, fundraising, preparing a slide show to publicize the effort, and asking a local university for design assistance.

**When will the action be taken?** Sometimes a fixed deadline is approaching that will determine your timeframe. For instance, a hearing date may be scheduled for a proposed flood protection project. In other cases you may need to know only that a given action, such as a water quality monitoring program, should be accomplished within the next year or by the end of the following summer. Perhaps one action will begin only after another is completed. These timeframes provide a general guide for planning your work.

The third activity is to determine the sequence of events. The action agenda outlines a framework for taking actions in a logical sequence leading to the fulfillment of your natural

#### TOOLS FOR:

##### FLOOD STORAGE AND CONVEYANCE:

- Minimize floodplain fills and other actions that require fills, such as construction of dwellings, factories, highways, etc.
- Require that structures and facilities near wetlands provide for adequate flow circulation.
- Use minimum grading requirements and save as much of the site from compaction as possible.
- Relocate non-conforming structures and facilities outside the floodplain.
- Return the site to natural contours.
- Preserve free natural drainage when designing and constructing bridges, roads, fills and built-up centers.
- Prevent intrusion on and destruction of wetland, beach, and estuarine ecosystems, and restore damaged dunes and vegetation.

**Table 4** - Examples of Tools for Protecting and Managing Natural Floodplain Resources. - Source: Federal Interagency Floodplain Management Task Force. *A Unified National Program for Floodplain Management*. Washington, D.C.: Federal Emergency Management Agency, 1986 & 1994.

Table 4 - (Continued.)

#### WATER QUALITY MAINTENANCE:

- Maintain wetland and floodplain vegetation buffers to reduce the build-up of sediments and the delivery of chemical pollutants to the water body.
- Support agricultural practices that minimize nutrient flows into water bodies.
- Control urban run off, other storm water, and point and nonpoint discharges of pollutants.
- Support methods used for grading, filling, soil removal, and replacement, etc. to minimize erosion and sedimentation during construction.
- Restrict the location of potential pathogenic and toxic sources on the floodplain, such as sanitary landfills and septic tanks, heavy metals wastes, etc.

#### GROUND WATER RECHARGE:

- Require the use of permeable surfaces where practicable and encourage the use of detention/retention basins.
- Design construction projects that eliminate, reduce, or hold back runoff.
- Dispose of spoils and solid waste materials so as not to contaminate ground and surface water or significantly change the land contours.

#### LIVING RESOURCES AND HABITATS:

- Identify and protect wildlife habitats and other vital ecologically sensitive areas from disruption.
- Require topsoil protection programs during construction.
- Restrict wetland drainage and channelization.
- Reestablish damaged flood plain ecosystems.
- Manage timber harvesting and other vegetation removal.

#### CULTURAL RESOURCES:

- Provide public access to and along the waterfront for recreation, scientific study, educational instruction, etc.
- Locate and preserve from harm historical and cultural resources; consult with appropriate government agencies or private groups.

#### AGRICULTURAL RESOURCES:

- Minimize soil erosion on cropped areas in floodplains.
- Control, minimize, or eliminate the use of pesticides, herbicides and fertilizers.
- Limit the size of fields and promote fence rows, shelter belts, and strip cropping for improved wildlife habitat.
- Strengthen water bank and soil bank type programs in a manner consistent with alternate demands for use of agricultural land.
- Minimize irrigation return flows and excessive applications of water
- Eliminate feedlot-type operations.
- Discourage new agricultural production requiring the use of drainage.
- Retain agricultural activity on highly productive soils where flood risk is compatible with the value of the crops grown.

#### AQUACULTURAL RESOURCES:

- Construct impoundments in a manner that minimizes alteration in natural drainage and flood flow. Existing natural impoundments such as oxbow lakes and sloughs may be used with proper management.
- Limit the use of exotic species, both plant and animal, to those organisms already common to the area or those known not to compete unfavorably with existing natural populations.
- Discourage mechanized operations causing adverse impacts. Machinery such as dredges, weeders, and large scale harvesting equipment may lead to environmental problems such as sediment loading in adjacent watercourses.
- Use extreme caution in the disposal of animal waste.

#### FORESTRY:

- Control the practice of clear-cutting, depending on the species harvested, topography, and location.
- Complement state laws governing other aspects of harvest operations such as proximity to water courses, limits to road building, equipment intrusions, etc..
- Include fire management in any overall management plans. Selective burning may reduce the probability of major destructive fires.
- Require erosion control plans on all timber allotments, roads and skidways.



resource conservation goals. An effective action agenda will show concisely the scope of your whole effort, but it is not specific enough to include all the tasks that will actually go into the work. Organizing your time, resources and people is often necessary to make actions come to life. Not every action or event will require a detailed list of tasks, but in many cases a complex project becomes more manageable when broken down in this way.

What you can do to get started is to make lists of everything and everyone you will need as part of the major actions. These lists can be arrayed on a time-line by weeks or months, and ordered in a logical sequence. People can be assigned to the tasks and deadlines can be set for each step. Once you're satisfied that this process will lead you in the right direction - producing the maximum results with the minimum effort - you are set to begin.

This is where talking and planning end and action takes over. Your assessment of floodplain natural resources and issues, your public involvement efforts, goal-setting and selection of alternatives have led you to this point. You have given form to your ideas and you are ready to achieve results.

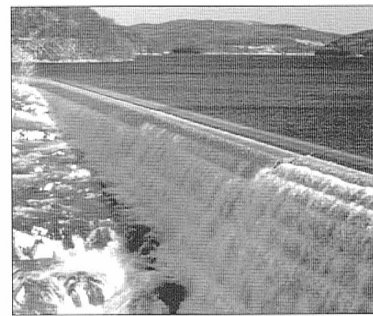
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### Final Step 6 - Implementation and Monitoring of the Action Plan

Once an action is begun, it generates its own momentum, and its success is sometimes difficult to evaluate objectively. It is important to keep track of your progress to be sure that you are accomplishing your floodplain conservation goals, as outlined in the action agenda. Are you meeting the timeframe that you expected? Are the responsible parties continuing to carry out their actions? If not, should responsibilities be shifted or shared with another group?

While monitoring your work, it is also important to continue to publicize your efforts, with an eye toward continuously expanding your base of support. Periodic public events - an annual floodplain festival, a traveling slide show, a clean up day - are good ways to achieve this purpose, and to keep the public aware of the river as a valued resource. Events also serve as a way to celebrate your progress and show appreciation for those who have worked with you. A scheduling chart for implementation can also include monitoring activity as well. Communities should be aware of the opportunity to integrate with the National Flood Insurance Program's Community Rating System to acquire open space as this will result in lower flood insurance rates. Monitoring is another opportunity for broad participation of the stakeholders and should include assessing current status of floodplain resources and problems as well as implementation progress.

A good example of the development of an effective action plan is the recent effort to protect the New York City water supply. Over a period of years, the quality of the surface water in a number of reservoirs has degraded due to increasing development and other activities within the watersheds. To meet safe drinking water standards, a water treatment plant costing upwards of \$8 billion would be needed if the quality of the water supply could not be maintained. The City and State of New York, local communities within the watersheds, and environmental groups worked together to develop a watershed management plan that would protect water quality while still allowing for economic development. Although there were a number of contentious issues, and it took several years to formulate, an agreement was reached by all the stakeholders. This is not only a good example of the planning process working, but also clearly demonstrates that economic growth and environmental quality are mutually compatible goals. However, it will be a number of years before the efficacy of the plan can be fully evaluated.



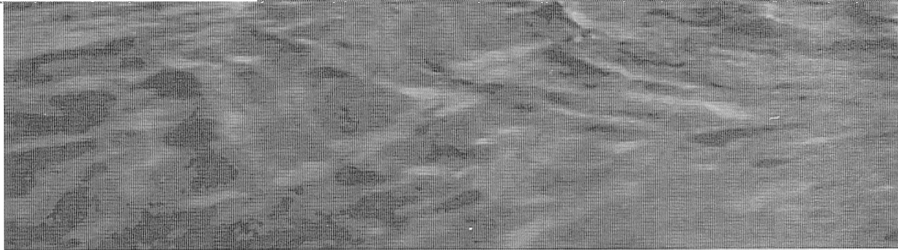
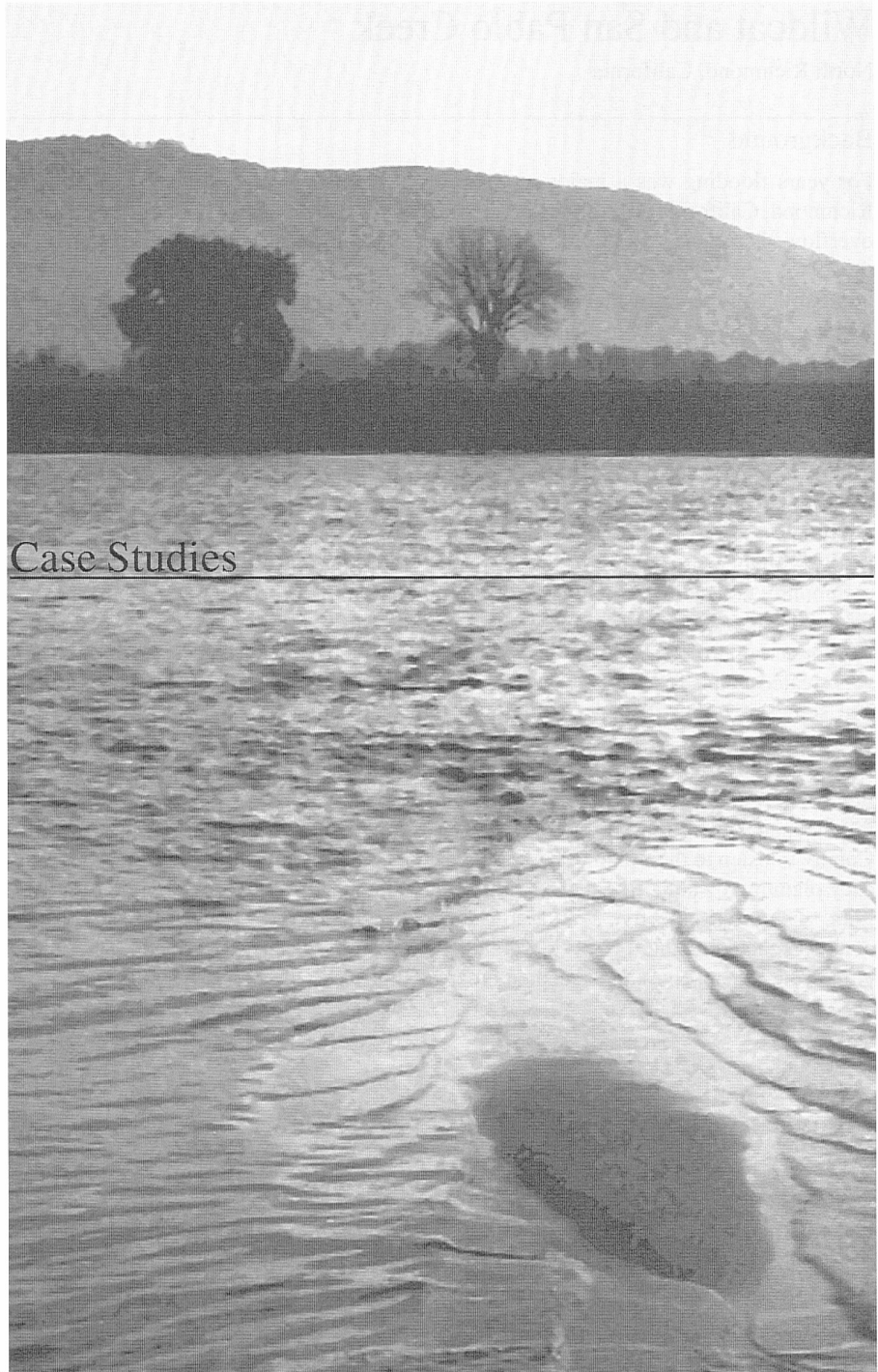
J. McShane

*Figure 17* Though still meeting safe drinking water standards, some of New York City's 19 reservoirs have been adversely impacted by runoff and other non-point source pollution in recent years. Protecting floodplain resources throughout the watershed, such as by preserving and restoring vegetated riparian buffers, will help to maintain and enhance the drinking water for over 9 million people.

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**5** Case Studies

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# Wildcat and San Pablo Creek

North Richmond, California

## Background

For years flooding was a major problem in the unincorporated community of North Richmond, California. The impoverished community faced annual floods as a result of overflowed creeks and poor drainage, and more serious floods every few years. During the 1940s and 1950s, the Army Corps of Engineers conducted a study of Wildcat and San Pablo Creeks, but decided against launching a project to remedy the community's problems because the low value of the structures in North Richmond's floodplain made a flood control project unjustifiable in the government's cost-benefit analysis.

During the 1970s, the U.S. Department of Housing and Urban Development approached the community with a "Model Cities Plan" aimed at promoting social well-being, environmental quality, and economic redevelopment. The plan was initiated with a cost-benefit analysis that finally enabled the community to get federal help for its flooding problems. The citizens of North Richmond responded favorably and worked enthusiastically with the Corps of Engineers to create a flood control plan that also included such community enhancing features as recreation areas and landscaping. But the plan collapsed when the community was unable to raise the 50% funding that it was required to pay for certain aspects of the project. In the early 1980s, the County Board of Supervisors created a scaled-back plan that addressed only the flood control aspects of the project. But some citizens still had visions of a plan that could serve a wider range of the community's needs. After the scaled down, take it or leave it, "Selected Plan" presented by the County Board of Supervisors, a community coalition (made up of citizens and interested organizations) came up with its own plan (Modified Plan) and also showed the inadequacies of the Selected Plan. They attended public meetings and forced the County to listen to their plan. They used a 1960's participation strategy known as advocacy planning by soliciting their own paid and unpaid experts to develop the Modified Plan. The multi-objective stream corridor management effort that resulted when this coalition came together provides a great example of how an impoverished community empowered themselves and accepted the challenge to direct their own future.



Figure 18 - Location Map

Figure 19 - Wildcat Creek near the marshlands of San Francisco Bay



A. Riley

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## Implementation

The coalition was determined to come up with a floodplain management strategy that also addressed environmental concerns and broader community needs. They presented their plan at public meetings as an alternative to the Selected Plan. After heated debate between the two plans the County Board of supervisors approved the Selected Plan. However, the Selected Plan did not meet a series of regulatory approvals because of environmental deficiencies with their plan. The two creeks were classified by the State as one of the last remaining streams in the area with an almost continuous riparian environment. The Selected Plan would have created an ugly concrete and earth lined channel destroying much of the natural setting. Also, there were major concerns that sedimentation would disturb the marsh and wetland areas. Further, high maintenance costs would be incurred by the local community for the periodic cleaning of the channels where sediments would build up.

A new design team was then formed out of a crisis situation caused by the lack of support for the project on the part of State and Federal regulatory agencies and by the negative publicity of the Selected Plan, and not out of the philosophy of consensus planning. The design team was made up of representatives from both plans and they were to build the "Consensus Plan", which combined both environmental and flood control goals.

The planning process for the Consensus Plan was crucial in creating a plan that would break the 29 year logjam. The process considered all the relevant stakeholders to be co-equal and allowed the community of North Richmond to determine its own fate. The planning sessions were grueling, but unbiased leadership and inclusion of all interested parties made the meetings successful. Implementation of the Consensus plan began two years after its inception, breaking the stalemate.

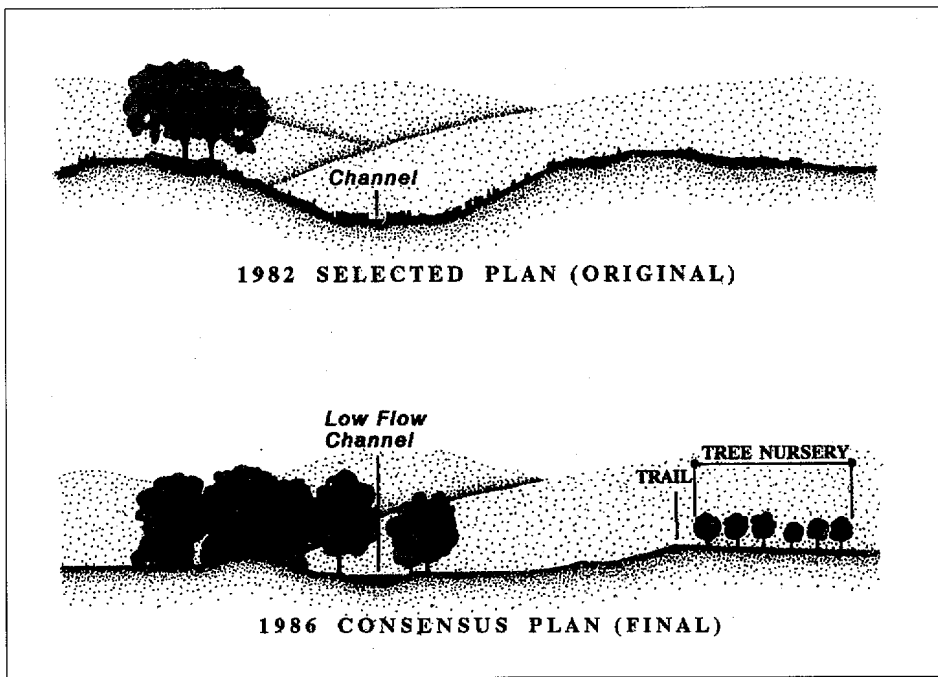
Funding for the Consensus Plan was critical to the project's success. The project's broad range of objectives made it eligible for funding from agencies unable or unwilling to contribute to single-objective flood control ventures. Citizen groups in this impoverished community found funding through government agencies, foundations and environmental groups. The East Bay Park District provided funding which was matched by the Corps of Engineers for connecting a regional trail system to the two creeks and to create a nature study area. This idea was originally in the Model Cities Plan but funding was unavailable at that point.

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## Natural Resource Protection Opportunities

Unlike most waterways in the San Francisco Bay area, Wildcat Creek is still endowed with riparian habitat along its entire length. For this reason, team members felt that it would be a mistake to replace the natural streambanks with concrete channels. Instead, they modelled the channels after natural features, using meandering, low-flow channels and planting streamside trees whose shade would prevent bullrushes from growing and obstructing flow in the waterways. These strategies enabled the project to stay within the 180-foot right-of-way required by the Selected Plan.

Experts working with the Coalition suspected that sedimentation would be aggravated by the flood control project, damaging wetlands and reducing the channels' capacity. Because of the propensity of many Western areas for flash flooding and associated erosion and even mudslides, the Consensus Plan's design adopted a wetland transition zone with high-velocity low-flow channels upstream to ensure that sediment would be deposited upstream and in the bay, where it would be least harmful.



**Figure 20** - These cross-sections illustrate the two alternative creek channel designs for Wildcat and San Pablo Creeks. The original 1982 plan utilizes a typical box cross-section, high-capacity channel with little or no adjacent floodplain; the 1986 plan eventually implemented includes a shallow low flow channel with floodplain intact allowing trails, tree nursery, etc.

Adapted from the National Park Service

### Summary

There were three key aspects of the Consensus Plan that made it an innovative accomplishment. Citizens, unable to participate in the planning process, can stall a project for years and dramatically increase its cost through law suits and hearings. This can be seen through much of the North Richmond case. Probably through default, citizens were finally allowed an active role in the Consensus Plan. This feeling of empowerment made them part of the process and allowed the plan to go through much more quickly. The average time spent planning a US government assisted flood-control project before construction begins is 26 years; North Richmond took 33 years. The second aspect was the multi-objective nature of the plan. With all the varying interests involved the plan had to satisfy their needs. Although multi-objective planning is much more complex, the benefits can increase substantially. Funding for multi-objective planning increases because state and federal agencies are much more apt to fund these type of projects. Also a high level of participation can attract financial contributors and political support which can only be positive. The third aspect was the use of the creeks natural features to convey the "100 year" flood instead of using a purely structural approach. The sediment loads were taken care of much more easily, the aesthetic values remained substantially untouched and the natural setting was enhanced to convey the flood.

Case study adapted from Ann Riley. 1989. "Overcoming Federal Water Policies: The Wildcat-San Pablo Creeks Case" *Environment* 31(10), pp. 12+.

Contact: Coalition to Restore Urban Waters, 1110 Chaucer St., Berkeley, CA 94702

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# Blackstone River National Heritage Corridor

Massachusetts and Rhode Island

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Figure 21 - Location Map

## Background

The Blackstone River Corridor was a center for industrial development in the eighteenth and nineteenth centuries, when the river's potential as a power source attracted industry and workers to the area. The region is noted as the birthplace of the American Industrial Revolution, and by the late nineteenth century the Blackstone was dubbed America's "hardest working river," with the corridor serving as home to a booming textile industry. During the 20th century, the area experienced economic decline, as textile production increasingly shifted to southern states. Years of industrial stagnation and neglect have spared much of the historical and natural landscape from destruction. However, a new demand by people to settle in this region has raised concern over a possible haphazard suburban sprawl.

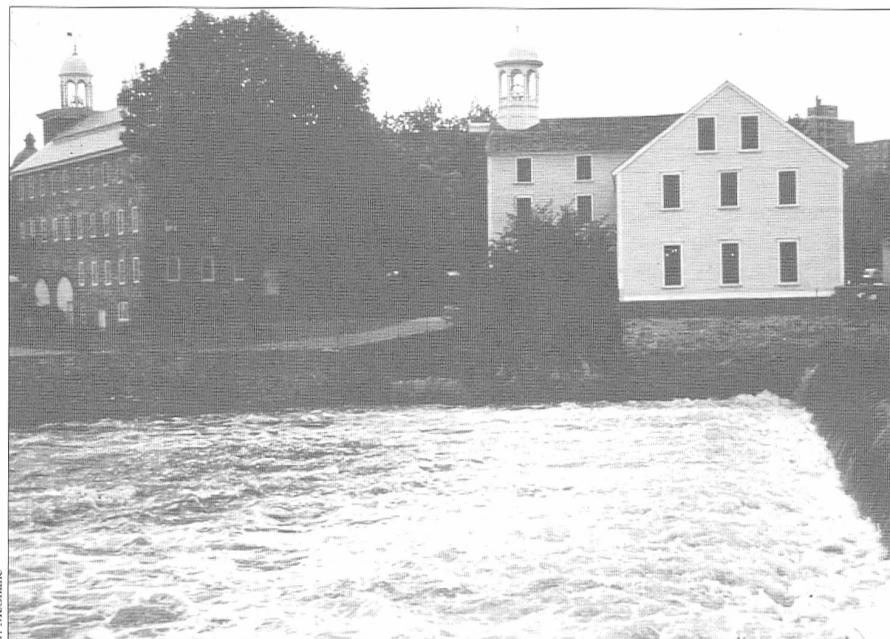
Today, the region is nationally recognized as the site of an important part of America's cultural heritage. Its designation as a National Heritage Corridor is the basis for a renewed sense of pride and has spurred efforts to preserve valuable aspects of the past while revitalizing the present. This corridor, which is 46 miles long and spans two states, is the subject of a coordinated effort among federal, state and local governments, as well as many private interests.

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## Implementation

In 1986 the federal government passed legislation authorizing the creation of the Blackstone River Valley National Heritage Corridor Commission. Made up of representatives from the National Park Service, state and local governments, and private citizens, the federally created Commission has no legal authority to enforce preservation of the corridor. Nor does the federal government own or manage land in the Blackstone River Valley. Instead, the federal government contributes 50% of the funding for the work of the Corridor Commission, and works in partnership with the states and localities in activities such as comprehensive planning, technical assistance and environmental education. Much of

Figure 22 - View of the Blackstone River at Slater Mill, a designated National Historic Site built in 1793.



J. McShane

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the work on the corridor is performed by state and local governments working with private businesses and nonprofit organizations to protect the resources of the valley.

Each of the two state governments involved handles its relationship with the Commission and localities differently. The Rhode Island Office of State Planning requires towns to adopt comprehensive plans with certain mandatory components. This provides an opportunity for the state to set standards that each community will follow, and affords some degree of coordination in overall land use planning efforts.

The Central Massachusetts Regional Planning Commission, in contrast, simply offers advice and coordination assistance to localities, while comprehensive planning is left up to the initiative of each community and is not mandatory. In both Massachusetts and Rhode Island, multiple state agencies bring expertise to the management of the corridor's economic, historic, and natural resource elements.

Local governments play a key role in managing the corridor, because it is their planning, zoning, and general land use management strategies that will ultimately have the greatest impact on the corridor's landscape. Thus it is very important for communities within the corridor to coordinate their planning efforts. The commission's role is to help facilitate comprehensive planning. Their strategy emphasizes integrated, linked actions rather than single, stand alone projects. Balanced action in each of these areas is critical to achieving harmony among preservation, recreation and development.

The private sector also has an important role to play, as capital investment in the maintenance and restoration of the natural and cultural resources in the corridor contributes to the overall quality of life in area communities and attracts tourism to historic towns. Many of the historic sites are being restored and used in different capacities. The restoration of many of the old mills has increased tourism in the area and old factory sites are being reincarnated as schools, retirement homes, libraries and parks. The local residents overwhelmingly support the plan which would increase tourism in the area.

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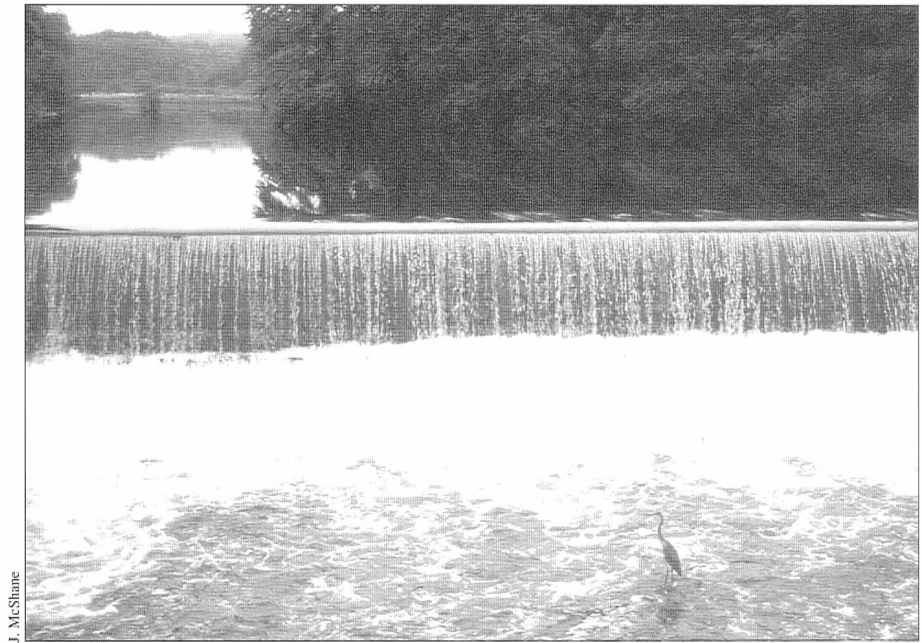
### Resource Protection Opportunities

One of the Blackstone River Corridor's greatest assets is its "working landscape" — a combination of farms, villages, cities and riverways that are a part of the region's cultural heritage. Preservation efforts focus largely on historic and cultural resources from the industrial revolution, such as Slater Mill (America's first factory) and the ethnically diverse communities that emerged as waves of immigrants came to the booming region to find work.

The commission's efforts also include recommendations for protection of water quality, vegetation and open space. The industrial boom and subsequent economic decline took a toll on the "hardest working river" by becoming one of America's most polluted rivers. Consequently, part of the commission's goal is to take steps that will contribute to improving the river's water quality, through such measures as encouraging the use of vegetative buffers by landowners adjacent to river. Also conservation easements and land trusts are two methods now being used to try and preserve the corridor. While there are opportunities and widespread support for developing parks and recreation areas along the river many sections remain underutilized. Currently a bike path spanning the entire length of the river is now being built by the two states. The bikeway, along with nature trails and boating on the river will open the riverway to local families and visitors for recreation. Projects that link Valley-wide resources will be priorities for the commission. Another key component to cleaning up the river is to increase enforcement of illegal pollution discharges along the river. Although the river has become cleaner much progress can still be made.

*"I had not seen this corridor before, and I saw... an extraordinary landscape of history, of generations of empathy and relationship to the land a river once again alive with fish, a second revolution taking place... and I said, take me further..."*  
*-Bruce Babbitt, Secretary of the Interior, July 1995*

*Figure 23 - View of the Blackstone River with a Great Blue Heron. These magnificent birds have returned to the Blackstone in recent years, indicating improved water quality in the river and adjacent wetlands.*



J. McShane

The commission, through its recommendations, has tried to create a vision for the Blackstone corridor which, at its core, would preserve the Valley's cultural heritage. Its concentration of mill villages and towns separated by extensive rural landscape is a characteristic feature that the commission does not want to lose. Preserving and enhancing the cultural and natural landscape are goals which the commission hopes will promote tourism and revitalize the Blackstone Valley.

Contact: Blackstone River Valley National Heritage Corridor; One Depot Square; Woonsocket, RI 02895; (401) 762-0250..



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# Verde River Corridor Project

Arizona

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## Background

The Verde river in Arizona runs through a variety of terrains, beginning in forested mountains, then flowing through grasslands and desert. The river corridor has tremendous scenic character, as well as diverse ecosystems, which are particularly valuable in a state that has many dry regions. The floodplains represent a large proportion of the habitats available for plants and animals in the state. The Verde is one of the few rivers in Arizona that is still perennial, and it also flows freely for two hundred kilometers. Because the Verde is one of the last significant "natural" rivers left in Arizona, there is increasing concern that uninhibited development and destruction of habitats along the waterway might threaten the viability of its ecosystems.

Although there was no official mandate to implement a river corridor project for the Verde River, state agencies and local citizens were eager to protect the valuable cultural and natural features of the landscape while also maintaining the economic vitality of the region. A proactive river corridor project was initiated featuring a high level of public participation.

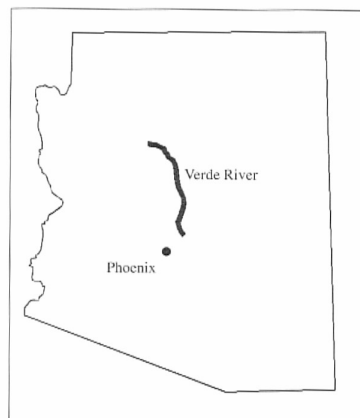


Figure 24 - Location Map

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## Implementation

Past efforts to protect the Verde have met with varying success. A 9.7 km greenway was established in the early 1980's and residents in 1989 initiated a Verde River Days festival to promote awareness and appreciation of the river. However, efforts to comprehensively protect the Verde have fallen short. In late 1989, the Arizona Department of Commerce (ADOC) initiated discussions about the river's future. The planning principles used were encouraged by the National Park Service (NPS) and the early meetings were facilitated by the ADOC and Arizona State Parks Board (ASPB). Citizens groups, businesses, universities, and private organizations were to be responsible for issue identification, decision making, and information gathering for the project. Representatives of state and federal agencies acted as facilitators in public meetings and as sources of

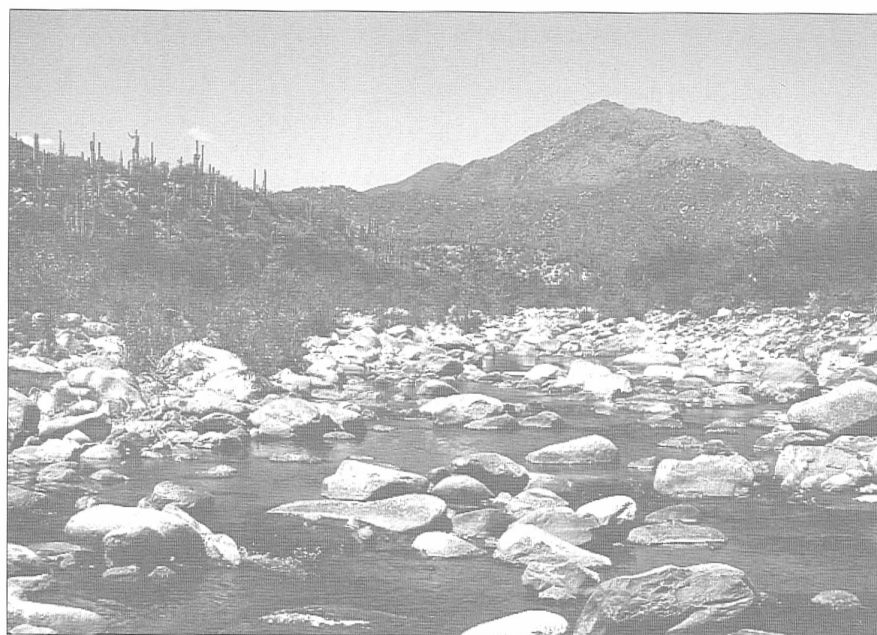


Figure 25 - View of the Verde River north of Phoenix

S. Shannon

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technical expertise. The ASPB organized several public meetings, distributed questionnaires, and kept people informed of the project through mailings.<sup>1</sup>

A steering committee was created to direct the planning process, and it included 26 people representing all the different stakeholders. The issues to be dealt with were broken down into five categories that were addressed by different subcommittees: (1) economic and commercial uses of the river, (2) land conservation, (3) private property, (4) recreation, and (5) water. Steering committee members plus other active citizens of the communities affected made up the subcommittees. The subcommittee members drafted reports and recommendations and presented their findings to the steering committee in a public forum. A very diverse steering committee voted on the recommendations presented by the subcommittees and reached consensus on an overwhelming majority of the issues involved. A report from the steering committee was then produced for all the local communities within the watershed. The local communities then decided which recommendations they would adopt.

Land along the Verde River falls under federal, state, local and Native American jurisdictions, and a significant portion of the land is in private ownership. Maps created by project workers showed floodplain data, vegetation types, land use, slope, and land ownership. Area residents participated in a visual assessment study identifying areas of great scenic quality in the valley. Tools recommended by the committees for managing land along the corridor included greenways and conservation easements. The committees also recommended the use of published reports for use by local governments and individuals, covering such topics as legal issues, and the rights and responsibilities associated with private property ownership. A watershed association was formed to deal with water resource issues throughout the basin.

Although the plan is still in early stages of implementation, many of the recommendations of the VRCP report are being adopted by the local communities. Those involved assert that the planning process itself has helped to make the communities in the Verde basin more aware of what is necessary to protect the river corridor's valuable resources. Also because the communities within the VRCP were active participants in the planning process they were more apt to accept and use the recommendations made by the VRCP. The current success of the VRCP can be attributed to many different factors. However, a few stand out: local empowerment, effective project facilitators, and high citizen participation. The VRCP was not controlled by an agency; it was a cooperative approach between citizens and the government.

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### Resource Protection Opportunities

The agriculture and ranch-related features of the corridor's landscape are important parts of the heritage of the region, and serve to provide open space. Conservation easements and tax relief were two recommendations made to ensure that agricultural lands remain part of the corridor's landscape. Also to enhance water quality, instream flow, and to lower water bills, the Economics and Commercial Uses Subcommittee recommended that farmers, irrigation companies, conservation groups, and state agencies work together to develop more efficient irrigation practices. The Environmental Defense Fund gave a presentation on the potential water conservation savings that could be achieved by municipal, industrial, and agricultural sectors of the Verde Valley. Sand and gravel mining are also important economic enterprises that affect the landscape because much of the mining occurs in or near river beds, thus destroying vegetation and causing increased erosion. Educational brochures were recommended on the laws and procedures that must be followed when doing such work near rivers. In addition, the USFS initiated land exchanges with mining companies for the land the USFS owns in order to move sand and gravel operations away from the river.

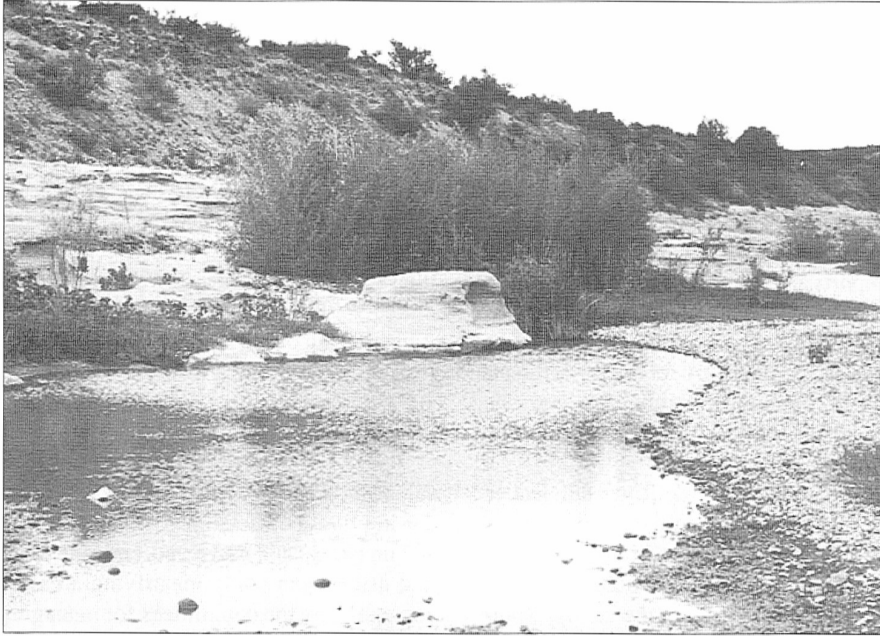


Figure 26 - The Verde River upstream near Cottonwood.

F. Steiner

Land conservation concerns addressed in the project included the protection of wetlands and riparian ecosystems, restoration of abandoned sand and gravel sites, and protection of the tremendous scenic values of the Verde River corridor. In addition, an inventory was conducted to determine archeological and historic sites along the river. Recreation was also an important issue, as it is related to both the economic advantages of tourism and the general land conservation issues.

Water quality was a major concern, as the corridor's groundwater is the principal public water source of the region and surface water is used for irrigation and recreation. A major recommendation from the Water Subcommittee was to establish a permanent entity to protect water resources within the Verde valley. Substantial progress has been made to establishing the Verde Watershed Association (VWA) which will help local communities plan for future water needs and ensure sufficient flows in the river.

This case study was based on: E. Averitt, F. Steiner, R. Ammerman Yabes and D. Patten. 1994. "An Assessment of the Verde River Corridor Project in Arizona." *Landscape and Urban Planning* 28(2-3), pp. 161-178.

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<sup>1</sup>The U.S. Environmental Protection Agency (EPA) recognized the community and state's desires to grow economically while valuing and protecting their aquatic resources, and in 1989, initiated enforcement actions to bring sand and gravel miners that were excavating riverbeds into compliance with the Clean Water Act (CWA). In addition, EPA began an Advanced Identification (ADID) to qualitatively identify and map the functions and values of the river, work with the public and government entities to recognize present and future needs in and along the river, and to provide guidance as to which of these areas are likely to be suitable or unsuitable for future filling pursuant to §404 of the CWA. The findings of the ADID provide guidance to state and local planners concerning the likelihood of getting permits for future river-related fill activities. The Advanced Identification was completed in 1994 and the sand and gravel sites were restored by 1995.

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# Chattahoochee River

Atlanta, Georgia



Figure 27 - Location Map

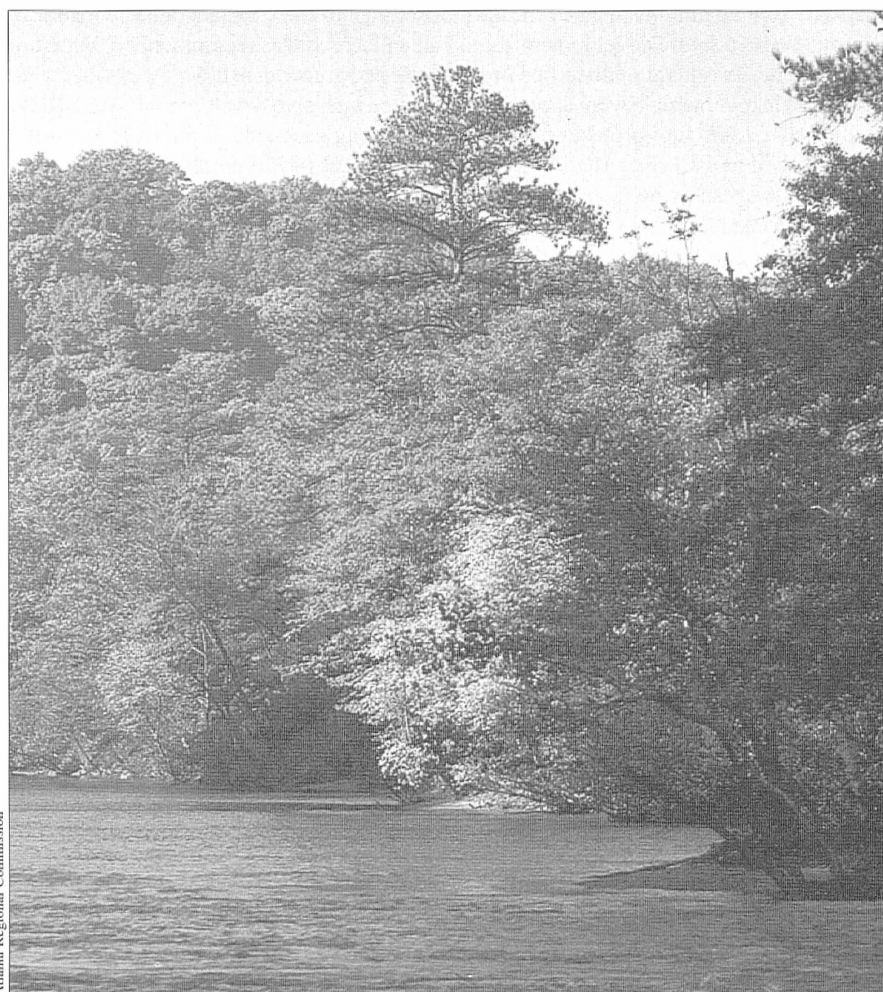
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## Background

The Chattahoochee River originates in the Appalachian mountains of northeastern Georgia. The river flows southwesterly through Atlanta and joins the Flint River which then empties into the Gulf of Mexico. The area of major concern for the Chattahoochee's ecological integrity is a 48 mile section which flows through the city of Atlanta and its surrounding suburbs. North of Atlanta, the river flows through a rapidly developing area of narrow floodplains and steep-walled valleys. In Atlanta the river crosses areas of industrial development and urban sprawl, yet it is still considered by many to be one of the most unspoiled and scenic rivers within a metropolitan area of the U.S.

The Chattahoochee River supplies over seventy percent of the drinking water to the Atlanta Region. In addition to supplying water for one quarter of Georgia's population, it provides many diverse recreation and educational opportunities, spectacular views and numerous historic sites, and assimilates treated wastewater from the city of Atlanta. The multitude of diverse cultural amenities provided by the Chattahoochee makes it the lifeblood of the rapidly expanding Atlanta region. With this rapid expansion, concern was raised about the long-term health of the river and its related environment. Several

Figure 28 - The Chattahoochee near Atlanta



Atlanta Regional Commission

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protection proposals from state and federal agencies were debated and the Georgia General Assembly considered the Metropolitan River Protection Act (MRPA), in 1971, which would protect water supply rivers in regions with populations over one million people. During this period the newly established Atlanta Regional Commission (ARC), which is made up of local elected officials and citizen appointees, conducted a comprehensive management study on the river within the Atlanta region and made recommendations on future growth along the Chattahoochee corridor. Based on the findings of the ARC the MRPA was passed in 1972 and required a comprehensive plan for the Chattahoochee. The ARC then developed a plan of action which maintained a natural river corridor and integrated conservation with development within the growing metropolitan area of Atlanta.

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## Implementation

From the beginning the ARC structured goals based on the notion that the Chattahoochee would remain an urban river. The primary objective was to preserve the water quality of the river. Additional objectives that were incorporated into the plan were protection of scenic, historic and other unique areas, respect for private property rights, prevent erosion, siltation and the intensity of development, and provide for location and design of land uses. During the planning process the ARC included citizens and interest groups in the meetings to get their feedback.

The ARC studied and inventoried the natural settings of the Chattahoochee corridor to determine where future development should take place. It was recommended that more vulnerable zones remain undisturbed or be developed at low densities. Areas that were considered less vulnerable were appropriate for more intensive development. The MRPA established a 2,000 foot protection zone corridor along each side of the river including the streambed and all river islands. The Act gave local governments responsibility to implement the plan by reviewing and permitting development, monitoring land disturbing activities and enforcing restrictions in accordance with the Act and the plan within the corridor. The Act also gave the ARC responsibility to review permits that were approved by local governments. If the ARC does not agree with the permit the local governing body must have a two-thirds majority in order for the permit to go through.

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## Natural Resource Protection Opportunities

All land in the corridor was placed into six categories based on its vulnerability to development. Maximum limits on land disturbance and impervious surfaces were set for each category. Buffer zone standards were also set which required fifty feet of vegetation be left in its natural state along the banks of the river and 35 feet along the banks of streams flowing into the Chattahoochee. Within 150 feet of the river, the plan generally prohibited any structures or impervious surfaces except for walking paths and bridges. Floodplain standards were also set requiring that the floodplain storage and conveyance function should not be altered from its present state.

One of the main objectives of the plan was to ensure that the location and design of land uses minimize the adverse impact of urban development on the river's water quality. Development and growth will take place. It is the ARC's goal to provide the information and technical assistance to local governments so development occurs on land least vulnerable to modification. Another purpose of the plan is to use the Chattahoochee as a centerpiece to promote recreation, education and community well being within the Atlanta region. With proper planning, the Chattahoochee is not only a water supply, but a place where people can congregate and enjoy a natural setting within a metropolitan area.

Contact: ARC; 3715 Northside Parkway; Atlanta, GA. 30327; (404) 364-2500



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