CLEAN WATER in YOUR WATERSHED:

A Citizens Guide to Watershed Protection

Acknowledgments

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Contents

Introduction

What This Guide Is and How to Use It

This guide is designed to help citizen groups work with local, state, and federal government agencies to design and complete a successful watershed protection or restoration project. It walks you through four deceptively simple tasks:

⬦ Educating everyone about the potential for water pollution problems in the area,

⬦ Developing solutions that can work in your community,

⬦ Obtaining the resources necessary to install pollution controls and prevent pollution in the future, and

◆ Installing and maintaining the controls necessary to keep the watershed healthy.

Thus, the guide focuses on the role of citizens in the watershed protection process.

Everyone has different wants, needs, expectations, desires, or visions for their community, but we all want a healthy place to live, work, and play. Use this guide to help your community find a balance.

Because each state approaches watershed protection differently, this handbook is only a guide to the general or universal principles applicable to all watershed projects. It is most applicable to watersheds of 20,000 acres or less although it can be used to conduct much larger projects. It is designed to work as a companion to a U.S. Environmental Protection Agency (EPA) document entitled *The Watershed Protection Approach: A Project Focus*. Most state and federal agencies in your area will receive a copy of this manual, which is now in preparation.

This guide is also designed to help you evaluate how your community can balance jobs, security, and comfort with a clean and healthy environment—the essentials of long-term community stability. Each topic in this guide is divided into two parts: the first explains the basic activities or steps of any watershed project; the second highlights possible roles and activities for groups and individual citizens to perform to support or guide the project at each step.

This guide does *not* provide detailed technical knowledge and expertise to solve the complex environmental issues facing every community. Nor does it provide detailed guidance on how to organize citizens committees or groups. It does, however, offer a basic description of the important role that citizens must perform to ensure that our communities' resources are adequately protected. Thus, this guide outlines the basic decisions that communities need to make and the skills that each citizen needs to work with neighbors, the government, private agencies, and technical experts to design and implement a project that actually cleans up our water resources.

Note also that while this guide is arranged logically, it is not necessarily in step-by-step chronologic order. Some activities occur simultaneously, and others continue throughout the project. Timetable Tips are listed in Appendix C.

The sections in this guide labeled ✔ **STOP** are to help you think about the information that must be gathered and the decisions that must be made. You will need to keep a written record of your observations. Therefore, when you reproduce the ✔ **STOP** forms, insert a number of blank spaces in which to compile your data, record watershed project decisions, or list your findings. When you have completed all the ✔ **STOP** forms and supporting maps, you will, in fact, have completed a watershed project plan.

What Is a Watershed

Do you know your watershed address? No matter how far you live from a river or lake, you always live—indeed everyone—lives in a watershed. However, unless you tried to manage where and how water flows across the land, you may not have noticed. A watershed is an area of land from which all the water drains (runs downhill) to the same location such as a stream, pond, lake, river, wetland, or estuary.

A watershed can be large, for example, the Mississippi River drainage basin, or very small, such as the 40 acres that drain to a farm pond. Large watersheds are often called basins and contain

many smaller watersheds. How you characterize your watershed depends on what you want to do. If a small lake that serves as your community's drinking water supply is threatened by pollution, you will need to define (and manage) a much larger watershed than if your goal is to protect a 20-acre wetland site that the school uses for an outdoor classroom.

Figure 1.—
What a Watershed Is
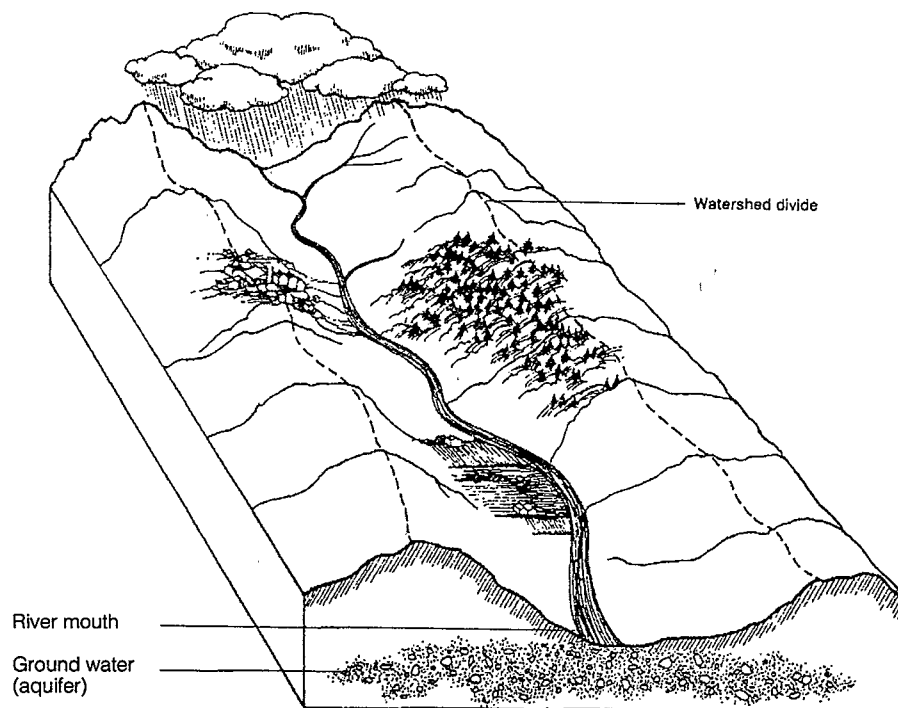
Source: Puget Sound Water Quality Authority.

CITIZEN ACTIONS Take a drive or walk across town, around the block, or across the farm. See if you can discover how and where water drains. Find the creek at the bottom of the hill and follow it to a larger stream. Observe what happens to the water, to the streambanks, to the land and plants that surround the creek as the water speeds up or slows down. Once you have "sensed" how water flows across the landscape and how varied the landscape can be in just a short distance, you will not only have a more valid appreciation of the task ahead; you will also be a more valuable member of the watershed team.

Why Have a Watershed Protection Project in Your Community

Are the water resources in your community safe, clean, and ample for everyone's needs? Do you want them to stay that way as your community continues to grow?

♦ *Then you need a program to maintain the quality of your water and land.*

Are the water resources in your community less attractive, less clean, less abundant than they were in previous years? Do the water quality and the health of your watershed seem to be declining?

♦ *Then you need a project that reverses this downward trend and restores the best possible uses of the water or at least prevents it from further degradation.*

Are the water resources in your community clean enough to support all their uses? Is there clear, visible evidence that other types of environmental degradation are occurring—for example, are streambanks crumbling or is soil eroding from other places?

♦ *Then you need a project to restore the quality of the water and other resources in your watershed and to keep the water clean.*

A Brief Glossary

Throughout the guide, you will find a few terms used repeatedly. They are defined here to get everyone speaking the same "language."

Beneficial Use—the uses of a waterbody that are protected by state laws called water quality standards. Some waters are used for habitat; others for aquatic life, or for recreational fishing, boating or swimming.

Best Management Practices (BMPs)—pollution controls for nonpoint source pollution. BMPs consist of structural, vegetative, or management systems that human beings can perform or install to prevent water pollution originating from human activity. Legally, BMPs refer strictly to controls for nonpoint source pollution; in this guide, for simplicity, the term is used generically to refer to all pollution controls, and is also used interchangeably with the term pollution control measures.

Ecological Integrity—a measure of the health of the entire area or community based on how much of the original physical, biological, and chemical components of the area remain intact.

Nonpoint Source Pollution—water pollution that originates from diffuse sources such as rainfall runoff or snowmelt.

Point Source Pollution—water pollution that is discharged from a discrete location such as a pipe, tank, pit, or ditch.

Stakeholders—anyone who lives in the watershed or has land management responsibilities in it, that is, individuals who represent the major land uses in the watershed. Stakeholders include (among others) government agencies, businesses, private individuals, and special interest groups.

Watershed Project—a group of activities undertaken in a geographic area to restore the beneficial uses of a waterbody already affected, degraded, or threatened by point and nonpoint source pollution.

Watershed Program—a group of activities undertaken in a geographic area to maintain clean water once it is obtained.
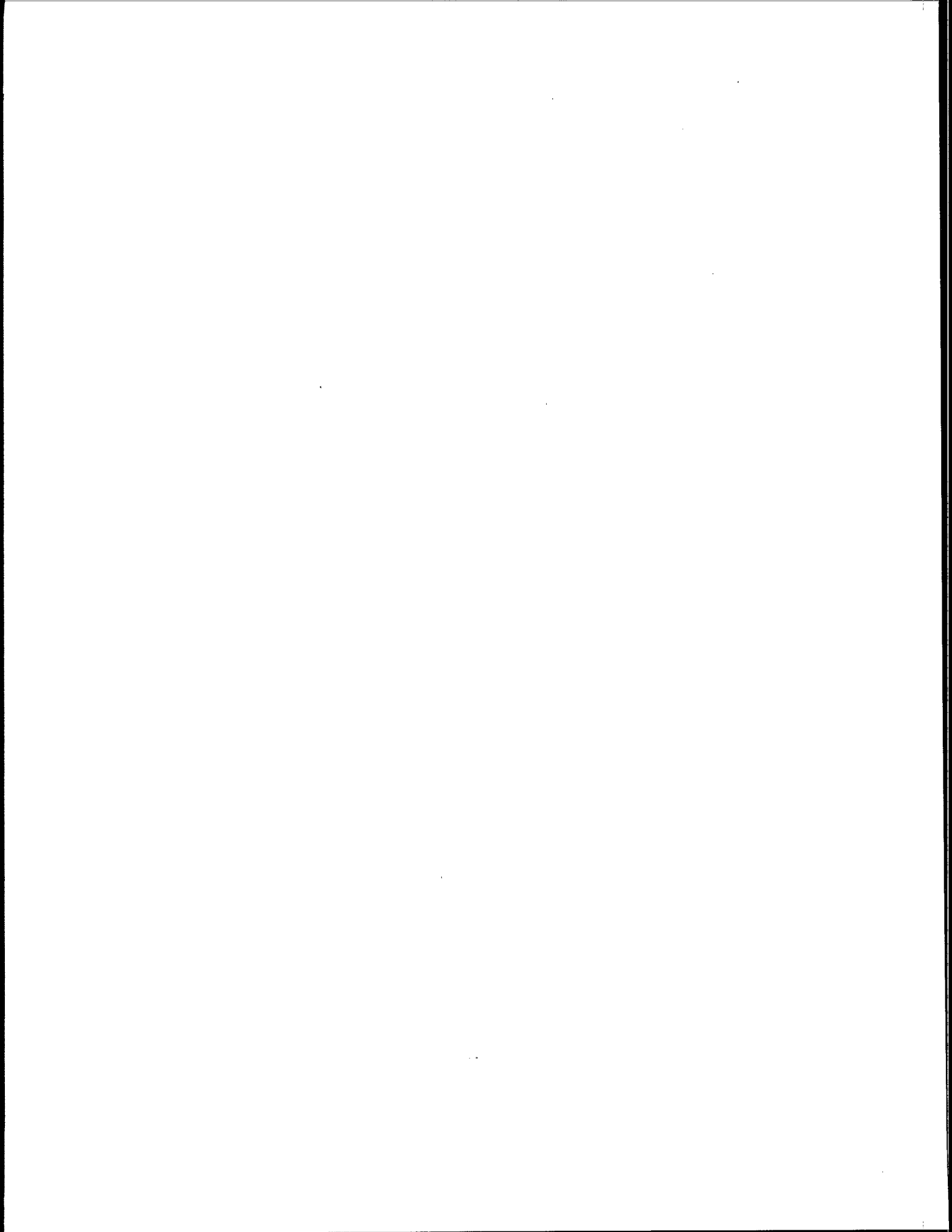
Ingredients for a Successful Watershed Project

Teamwork—building and keeping a team of stakeholders working together—is a key element of project success.
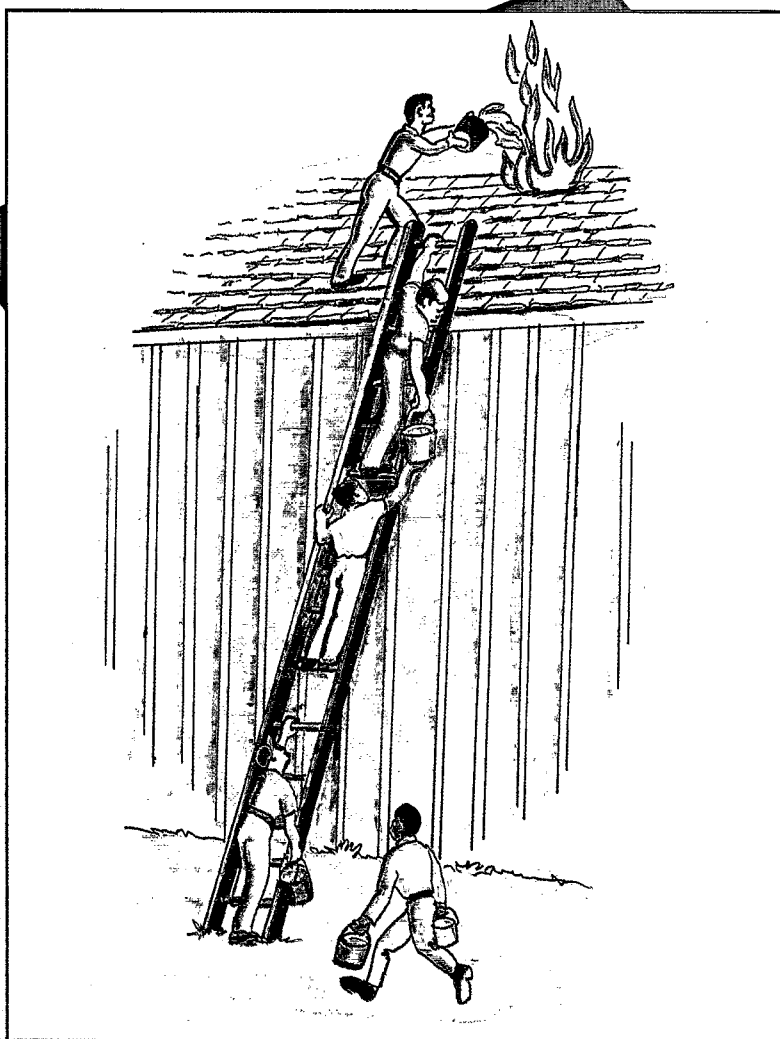
Cooperation is the key to a successful watershed project. Getting private citizens and governmental agencies to cooperate on a set of actions designed to accomplish specific goals is not easy. Organizing committees, finding time to meet, and participating in subsequent activities are initial tasks. Environmental protection efforts are sometimes thwarted, and people are often bombarded with doomsday messages that change with each edition of the nightly news. Responding to and remaining focused on a long-term project is difficult for anyone and requires up-front work. Figure 2 illustrates

the many activities that constitute a successful watershed project grouped according to major topics. Although tasks related to different elements can and do enter the project cycle at any time, the central element never changes. A successful project's central focus is on "Building a Project Team and Public Support."

Figure 2.—
Elements of a Successful Watershed Project
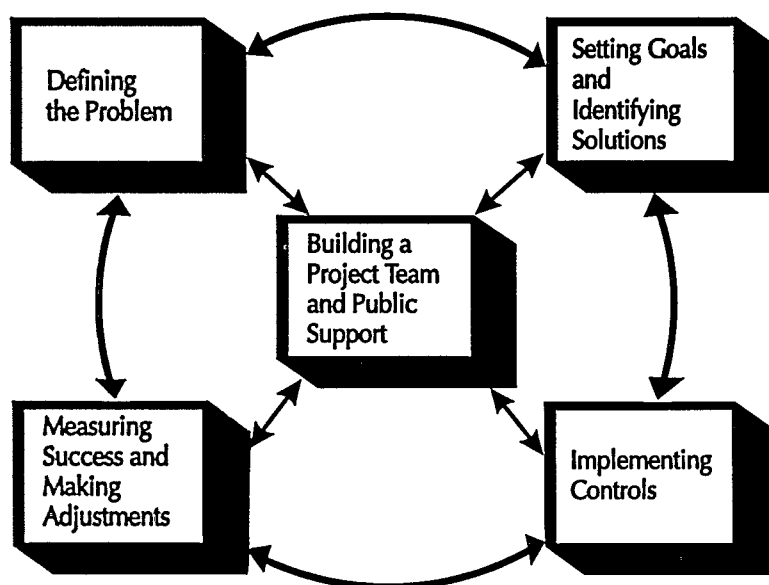
Source: U.S. Environmental Protection Agency. The Watershed Protection Approach: A Project Focus.

Build a Project Team and Gain Public Support

A watershed project is more complex than single activities like recycling. To keep people from being overwhelmed by the work that needs to be done and the fear of something new, lead them gently to the idea that they personally influence how clean their water is and will remain. Many citizens groups get this point across by arranging community activities with a water focus. Start by getting people to the water, and keep the message and activities upbeat. Some community projects include

◆ streambank trash pickup days,

◆ canoe races,

- raft floats,
- crazy boat contests,
- stream walks or monitoring activities to gather actual environmental data,
- guided nature trips,
- picture-taking events to document pollution (using camcorders and cameras loaned to citizens), and
- fishing tournaments.

If people realize that their community has a unique set of valuable resources that need proper management, they will want effective and constructive ways to make their voices heard. Learning how to raise issues in a constructive manner so that problems are solved is a true skill and one of the cornerstones of an effective project.

Almost all watershed projects go through some predictable phases to gain public support. Phase one involves public disbelief that a problem exists or could exist and "blaming" the source of the problem on some other sector of society. Phase two, designing a solution, is actually a process of negotiation or conflict resolution among affected parties. The main issues are whether this project will be voluntary or regulatory, who will be in charge, and what process will be used to ensure that decisions involving private property fully involve the land's owners and users?

Phase 3, implementing the negotiated plan, requires that all groups—local governments, federal agencies, and citizens—have ownership of the plan, be comfortably involved in its development, and committed to its application. Phase 4 is often termed the "feedback loop" or mid-course correction stage. It must be factored into the process at the very beginning so that the public understands that unresolved issues can be revisited after each decision has had a chance to work.

The Project Team

This guide does not explain how to organize and run a citizens group, but many fine references are available to help you (see Selected References: Where to Get Help). The basic team-building process includes identifying who should be involved, organizing all participants into logical groups that can function collectively as the watershed team, and keeping everyone informed.

Responsibilities for Everyone

Your focus may be to protect the high quality of your community's life and its natural resources (water, air, soil, trees, wildlife, and fish) or to solve particular pollution problems—either way a team approach is essential. You cannot depend on local, state, or federal governments to manage these natural resources without help. You must take responsibility for what happens on your land and in your community. Successful watershed projects unite citizen groups, researchers, and

government agencies who have an interest in the outcome of the project. Such a broad base of stakeholders creates a team that combines the expertise, authority, and interests of each organization. It also creates a team with different ideas and sometimes conflicting goals. Teamwork is essential to clarify mutual goals, to identify who is responsible for what, and to agree on remedial actions.

Committees

Some projects divide team members into committees to do the actual work. Committees can be formed along administrative lines (resulting in large committees) or along objective lines (resulting in many small committees). You must find the right balance or mix for your community. Some projects use at least three committees—an oversight committee, a technical committee, and a citizens committee. Citizens should, however, be represented on all committees.

Begin the Education Program

Many people think that an educational program is a separate element in the overall project. Actually, education is an integral part of the project's success. The conservation cycle (Fig. 3) indicates its importance at all stages of a project. Efforts are cumulative and education is the glue that holds them together. For example, citizens and legislatures must be educated to realize that environmental problems exist and to allocate money and staff to solve the problems. The team cannot develop workable solutions to environmental problems or ensure that solutions are implemented unless everyone is knowledgeable. Education is also needed to help us modify our approach should existing solutions prove ineffective.

Thus, an educational program is not one isolated set of activities; it is a number of small projects aimed at different people for different purposes. To cause effective short-term changes, education must focus on helping various sectors of the adult population try something different whether the sector is urban homeowners, dairy owners and operators, or government agencies. Many excellent references describe how to design and carry out education programs. Whichever you choose, make sure that your program has

- ◆ specific goals and actions,
- ◆ clear and narrowly defined audiences for each action,
- ◆ messages or directives that can be stated concisely in the language of the group, and
- ◆ personal, honest, and interactive contacts with each audience.

If your audiences are moved from simple awareness of the problem to personal readiness to take specific actions, your education program is effective.

Figure 3.—
The Conservation Cycle
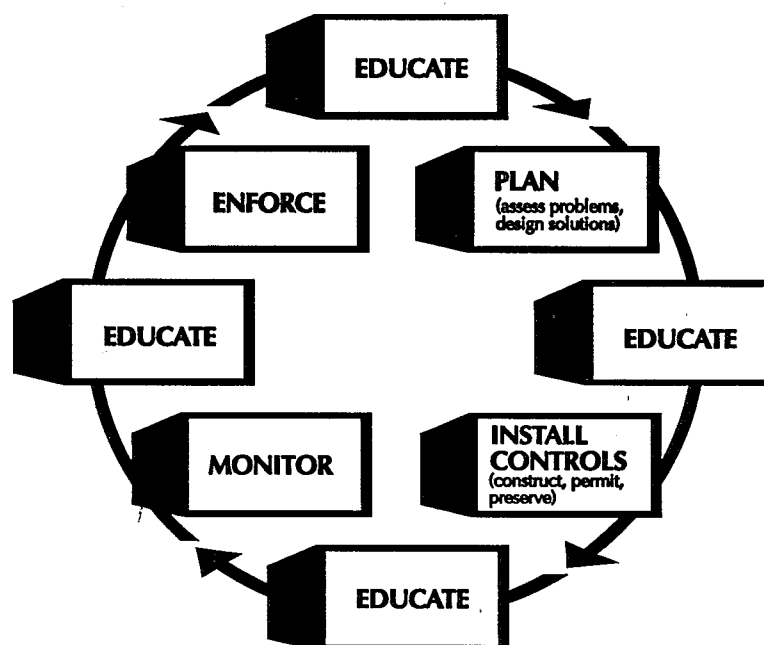
Know the Key Elements of Successful Projects

From the evaluations of numerous watershed projects located throughout the country, some of which span more than 30 years, a few "simple truths" about successful projects emerge. Keep these principles in mind as you plan and implement your project and refer back to them to keep your project on track.

Have Clear, Specific Water Quality Objectives

If a project does not have specific goals and objectives, no one will ever be able to measure its success. Many different types of goals can be set, but the best goals define a project's level of environmental improvement, help focus its implementation, and measure its progress (see Chapter 4).

Treat All Significant Sources of Pollution

In a watershed, many different pollutants from many different sources enter the water at different rates and times, and the water may not fully recover until the major problems have been cleaned up. For example, if a stream receives discharges from five refineries and a mine, and runoff from a city and farm fields, the water may be polluted with chemicals or the stream's biology may be altered from a variety of causes. If all the refineries install pollution controls and

all the farms install appropriate BMPs, the water may contain less petroleum by-products (from the refinery) and less sediment and nutrients (from the farms) but the water's fish and animal communities may still suffer from uncorrected acid mine drainage or contaminated runoff from the urban area.

Implement Pollution Control Measures in Areas Contributing the Most Pollution

Because limited time, funds, and other resources are available to control pollution, we cannot afford or justify working on minor problems until the major ones are taken care of. Allocating resources only to discrete areas of the watershed is often difficult in projects based totally on voluntary participation. To win cooperation from the "worst" polluters, the community needs to address this issue early in the project (see the section on targeting and scheduling considerations in Chapter 5).

Be Sure Your Project Has Public Support

Public support is an essential step, and educating the public and local government is the key to gaining this support. For example, citizen review groups and technical committees have been successfully used to gain support from diverse interests in the watershed; they also provide an accessible core group of community leaders to keep the project going once agreements have been reached.

Choose and Install Water Quality Best Management Practices or Other Pollution Control Measures

Some best management practices control pollution better than others because certain practices were originally designed for other purposes such as improving drainage from city streets or increasing a farm's productivity. To really clean up a watershed, the most effective water quality protection BMPs must be implemented first before other "support" practices are applied. For example, fencing livestock out of the stream is a water quality BMP. Providing alternative water sources and shade for livestock that are fenced out of the stream are secondary practices to that BMP—they allow livestock production to continue on that property. All three practices are routinely applied in voluntary programs to encourage landowner adoption of the fencing BMP, the most effective BMP for water quality protection.

A Profile of the Watershed—Defining the Problem
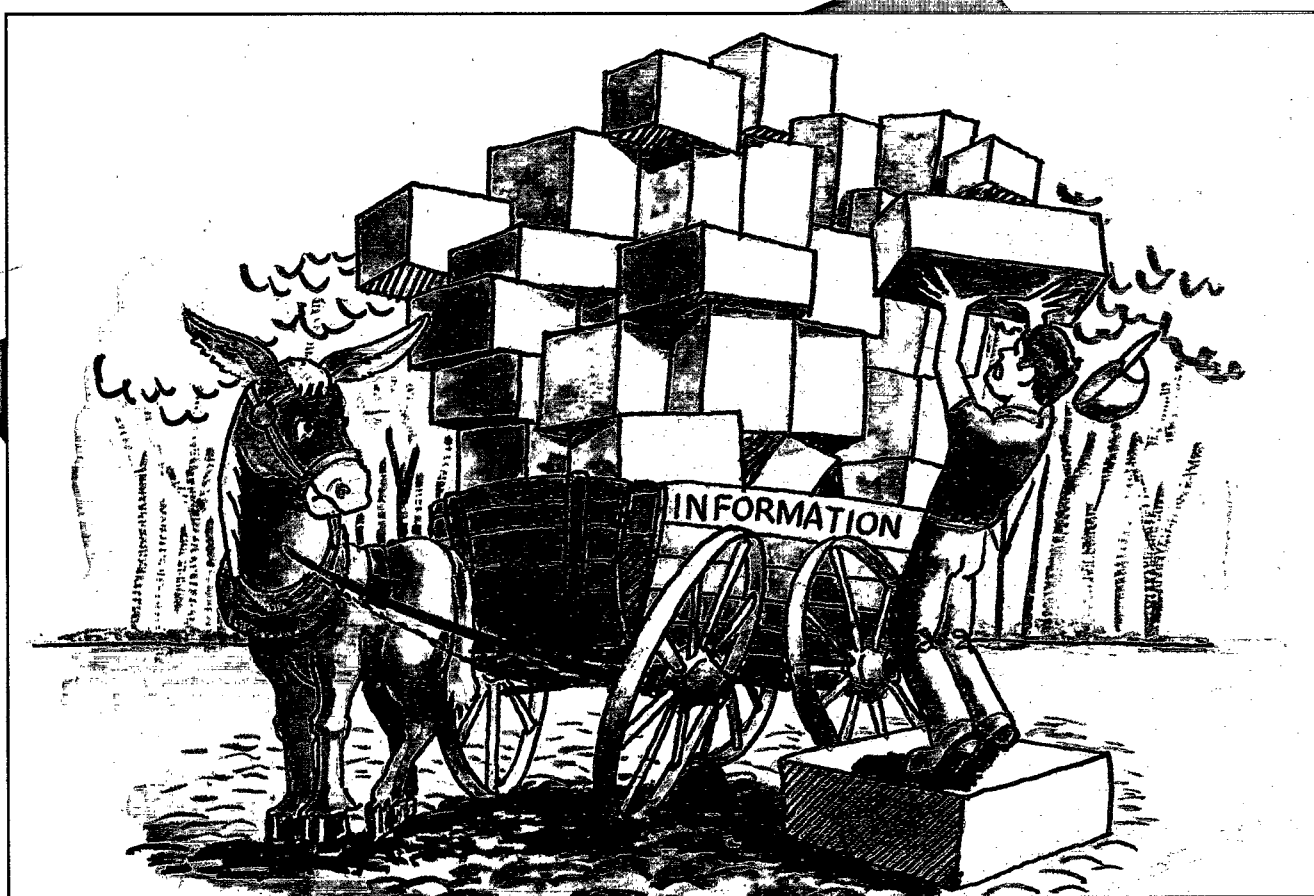
How do you know if you have a problem? How do you know when you've gathered enough information to get started on a project? Use the information in this chapter to help you answer these questions.

Different projects may need to begin at different points depending on what is currently known about the natural resource problems in the watershed. In some cases, a complete watershed assessment is needed but in others, information gaps only need to be filled. Start by looking at the water for any visible signs of pollution or its effects. For example, an area may have too many aquatic weeds or be less cold or clear than it was. These are important signs to the stakeholder community that the water is not meeting all of its uses. To determine your project's starting point, consider the following alternatives:

♦ If the public perceives that the rivers, streams, lakes, or wetlands in the watershed are affected by a particular

pollutant or exhibit a specific problem but has no data to support that perception, a complete assessment is warranted.

♦ If people in the community and scientists can see the water pollution problems and have some data that indicate the source, severity, and extent of most problems, then a few limited studies to document the situation will suffice.

✔ **STOP** At which starting point is your project?
  (a) Name and locate your watershed.
  (b) Describe any visible signs of pollution or its effects.
  (c) List any data you already have about the source(s) and extent of this pollution.

CITIZEN ACTIONS

Organize or participate in an initial public meeting or forum at which community members can express their perceived or documented water quality concerns. Now is the time to involve everyone in the planning process. Invite everyone who may eventually participate in the project to help plan it, even if they do not want to help (see "Know the Key Elements of Successful Projects" in Chapter 2). Decide how to disseminate information throughout the process to minimize complaints of being left out. Newsletters and newspaper inserts are inexpensive ways to communicate, but more active forms of involvement are also needed. Begin to compile a list of activities that your group can do to involve other citizens in the watershed. Any activity that brings people to the water to see the resources they are protecting is enlightening.

Define Your Watershed and Its Possible Sources of Pollution

Much of the existing information and data about natural resources is organized along political boundaries such as counties, states, and school districts. This information should be reorganized along hydrologic boundaries (the way water flows). Sophisticated mapping tools such as Geographic Information Systems (GIS) are wonderful inventions that computerize this information; however, they are beyond the scope of most small projects. You and your cooperating agencies can prepare this information accurately but inexpensively using basic maps, mylar overlays, pushpins, markers, and stickers.

First, obtain three maps of your area: a county highway map, a U.S. Geological Survey topographical map, and your county's soil survey map (from the Soil Conservation Service office).

Second, use these maps to

◆ identify the watershed boundaries,

◆ mark waterbodies showing visible signs of pollution,

◆ identify waterbodies (surface water) and aquifers or recharge zones (groundwater), and

◆ identify critical areas (those with the most potential for problems).

Two types of critical areas are found in every watershed: the first type includes areas adjacent to or near the waterbody; the second includes areas that may contribute large amounts or high concentrations of pollutants to the watershed regardless of their location. Your group should consider the following critical areas:

◆ areas adjacent to a waterbody;

◆ areas near a waterbody (within one-fourth mile);

◆ areas that contain direct discharges to a waterbody (pipes, ditches, tanks);

◆ areas that have intense land-use patterns, such as trailer parks and animal feedlots;

◆ areas that are used for higher risk purposes, and

◆ geologically vulnerable areas (natural or constructed), such as shallow soils overlying fractured limestone, bedrock, or areas where many test wells were drilled and abandoned.

Having done this, you now have a general idea of the size of your watershed, the location of its water resources, and the extent of potential pollution sources, but you lack the specific information to make rational decisions. You need professional assistance to help quantify your problem.

CITIZEN ACTIONS Make sure that these consolidated maps are made available to the public and checked for inaccuracies. Older citizens who have lived in the area for a long time are invaluable for locating areas that are no longer in use, for example, an abandoned creosote facility, old pits, or disposal sites.

Gather, Quantify, and Evaluate Environmental Data

If adequate information is not collected before the installation of pollution control or watershed restoration measures, the project team will be unable to demonstrate environmental improvement. Therefore, it is important to understand the extent of the problems needing correction before beginning a project. It is cost effective to use

existing data, but it is also beneficial to have at least one year of watershed-specific chemical, physical, and biologic water quality data to serve as a clear "before" picture. Therefore, monitoring activity should begin immediately. Since monitoring programs are site and project specific, it is important to obtain professional help when designing the monitoring strategy (for additional guidance, see Chapter 8).

Before your group launches a year-long field investigation, you should identify and examine what information is already being collected. In a watershed project sponsored by an agency, this search is normally performed by agency staff. Citizen groups can help solicit this information from other agencies, assist in its analysis, or act as a "watchdog" to make sure that all sources of information are analyzed. They can also help to disseminate the findings of each study to the public and elected officials through the education program. Should the project be a total grassroots effort, citizens themselves can obtain this information and use it—both to understand their problems and to urge action by responsible agencies, groups, and industries.

State water quality agencies prepare Water Quality Inventory Reports (the 305(b) Report) every two years. This report contains stream-specific monitoring data and physical evaluation information. Other special water quality studies exist, and some may be applicable to your area. These important sources of water quality and environmental data are collected under proper procedures. Be aware, however, that your area may not be included in these reports—not because it is problem-free but because there are not enough funds to fully inventory every watershed completely. Use chart 1 at the end of this chapter to identify information available from various sources.

To obtain help from various government agencies and other experts, ask specific questions appropriate to the agency you are contacting. Use the table in Appendix A to determine a detailed list of each agency's responsibilities by program. Contacting the appropriate program office directly can save time and frustration. Use your maps, lists of critical areas, and information gleaned from 305(b) reports to help you form your questions.

Don't ask general questions such as, "Can you do something about the pollution problem we have in our county?" Do ask specific questions:

♦ What dischargers are located on *(name of stream or lake)*, and what are their permit limits?

♦ How many dairy cattle are in *(name of county)*? How much manure will an adult cow produce per day, and what is the average nitrogen and phosphorus content of dairy manure?

♦ How many households in *(name of county)* use septic tanks five years old or older and which area of the county has the most concentrated use?

This information should be used to make a list of pollution sources (mark them on your map in some way) and to calculate—roughly—the extent of the pollution "loads" coming from each source. Determining actual pollutant loads is a complex task best accomplished by technical experts in the appropriate agencies.

Who might have it—Use the table in Appendix A to find out more about each group listed below. Then contact these agencies to obtain the information you need.

Chart 1—Information Resources.		
TYPE OF INFORMATION NEEDED		**SOURCES**
Natural Resource Assessment, Inventories, and Other Data	**Water Quality Data**	U.S. Geological Survey, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, state water quality agencies, state fish and game departments, state departments of health, and tribal environmental offices
	Land Use Data	U.S. Department of Agriculture's Soil Conservation Service and Agricultural Stabilization and Conservation Service, U.S. Forest Service, Bureau of Indian Affairs, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, state cooperative extension services, state land office, tribal environmental or agricultural offices, local government offices such as city planners and county commissioners
	Economic Data	County Extension Service, Councils of Government, Economic Research Service, chambers of commerce, state departments of commerce, tribal councils, real estate agents, private consultants
	Demographic Data	Council of Governments, census reports, chambers of commerce, state statistics bureaus, almanacs
Pollution Control Methods or Best Management Practices	**Agriculture**	U.S. Department of Agriculture's Soil Conservation Service and Agricultural Stabilization and Conservation Service, U.S. Environmental Protection Agency, County Extension Service, Agricultural Research Stations, state soil and water conservation commissions, state departments of agriculture, state water quality agencies
	Urban	U.S. Environmental Protection Agency, Council of Governments, state water quality agencies, city planners, private engineers
	Mining & Other Resource Extraction Processes	U.S. Office of Surface Mining, Bureau of Land Management, U.S. Forest Service, U.S. Minerals Management Service, U.S. Environmental Protection Agency, Tennessee Valley Authority, state departments of mining and minerals, state water quality agencies
	Roads	U.S. Department of Transportation, U.S. Environmental Protection Agency, U.S. Department of Agriculture's Soil Conservation Service, U.S. Forestry Service, Bureau of Land Management, state highway departments, state water quality agencies, private engineers, county commissioners, parish police juries (LA), county extension services
	Forestry	U.S. Fish and Wildlife Service, U.S. Forest Service, state departments of forestry, private consultants, timber companies
Funds		Any agency listed in Table 1 (Appendix A). Different funding sources may have certain restrictions or requirements so tailor your request to the appropriate fund.

Citizens can make sure that the results of pollutant loading calculations are known to the public and elected officials and especially to the persons living and working in the areas that exhibit the highest loading rates.

✔ **STOP**   List the sources of pollution in your watershed by critical area. Estimate (roughly) the extent of each pollutant.

Critical Area	Pollution Source	Types of Pollution	Extent of Problem

Assess the Socioeconomic Condition of the Watershed

Information about past, present, and projected economic and social conditions in your community is also needed to make a complete and accurate evaluation of the watershed. Chambers of Commerce, Councils of Government, city and county budgets, tax offices, state departments of human resources, local libraries, tribal records, census reports, and County Cooperative Extension Service offices are good sources.

Evaluate the statistics (e.g., unemployment rate, average income, population projections, and education level) and determine what makes your community special, such as cultural or recreational attractions, or a superior school system. This information is especially important for Native Americans and other ethnic or cultural groups who may need to protect a threatened resource not only for its environmental significance but also for its cultural or religious significance. You may discover a trend in the decisions made by your local and state governments and you may see varying indicators or trends in different communities within a single watershed. Make a note of any correlations that are evident.

CITIZEN ACTIONS Make sure that socioeconomic data is incorporated into the watershed assessment. With so many pressing social problems facing them, decisionmakers may give environmental considerations a low priority. Citizens can ensure that project sponsors work to solve environmental and social problems simultaneously, thereby making more efficient use of tax dollars. This activity is also an excellent way to get youthful citizens involved with the project in a meaningful way. Young people can interview older citizens to get historical perspectives and generate ideas and solutions based on long-term life experience and creative, unfettered thinking.

✔ **STOP** List the social, economic, and environmental conditions that characterize the communities in your watershed and environmental correlations (if any).

COMMUNITY (TOWN OR DISTRICT)	SOCIAL	ECONOMIC	ENVIRONMENTAL	CORRELATIONS (BETWEEN THE COMMUNITY AND THE ENVIRONMENT)

Recognize the Time for Decisions

You may never gather enough data or information about a particular problem or about the interaction of all problems in the watershed to convince some people that a problem exists. Nevertheless, you cannot continue to assess the problem forever. When it's time to take action, the stakeholders and community must decide between alternatives. They may shelve the project, determine that the situation needs further study, or decide to initiate only part of the project. Or they may commit to doing the full project and build in evaluations and opportunities for modification along the way. There is much value in getting started, even in a small way, on pollution prevention and control.

This decision is a crucial one for the project. If the watershed team has actively involved all stakeholders in the community and identified significant environmental concerns, people will want something done. Yet information that convinces one person may not convince another. Thus, the decision really has two aspects:

♦ The community and majority of the stakeholders must be ready to move ahead with at least one portion of a project.

♦ Those members not personally convinced of the need for environmental restoration or pollution prevention must agree not to block the project from moving forward.

While state and federal agencies often do not have budgets for special studies, they do have experienced staff who can provide technical assistance and oversee such studies, and it is vital to involve these agencies. When contracting for a special problem assessment, be prepared to pay $25,000 to $250,000, depending on the complexity of the local situation.

CITIZEN ACTIONS

Should the community decide to continue with a special study, make sure that it does not provide more data than is needed. Most current pollution control measures are relatively simple. For example, it is not necessary to know that one creek in the watershed is contributing 0.05 milligrams per liter more nitrogen than another because BMPs and other pollution control measures can only be evaluated grossly (for example, BMP "a" should remove twice as much nitrogen as BMP "b").

A Goal for the Future—
Identifying Solutions
and Project Goals
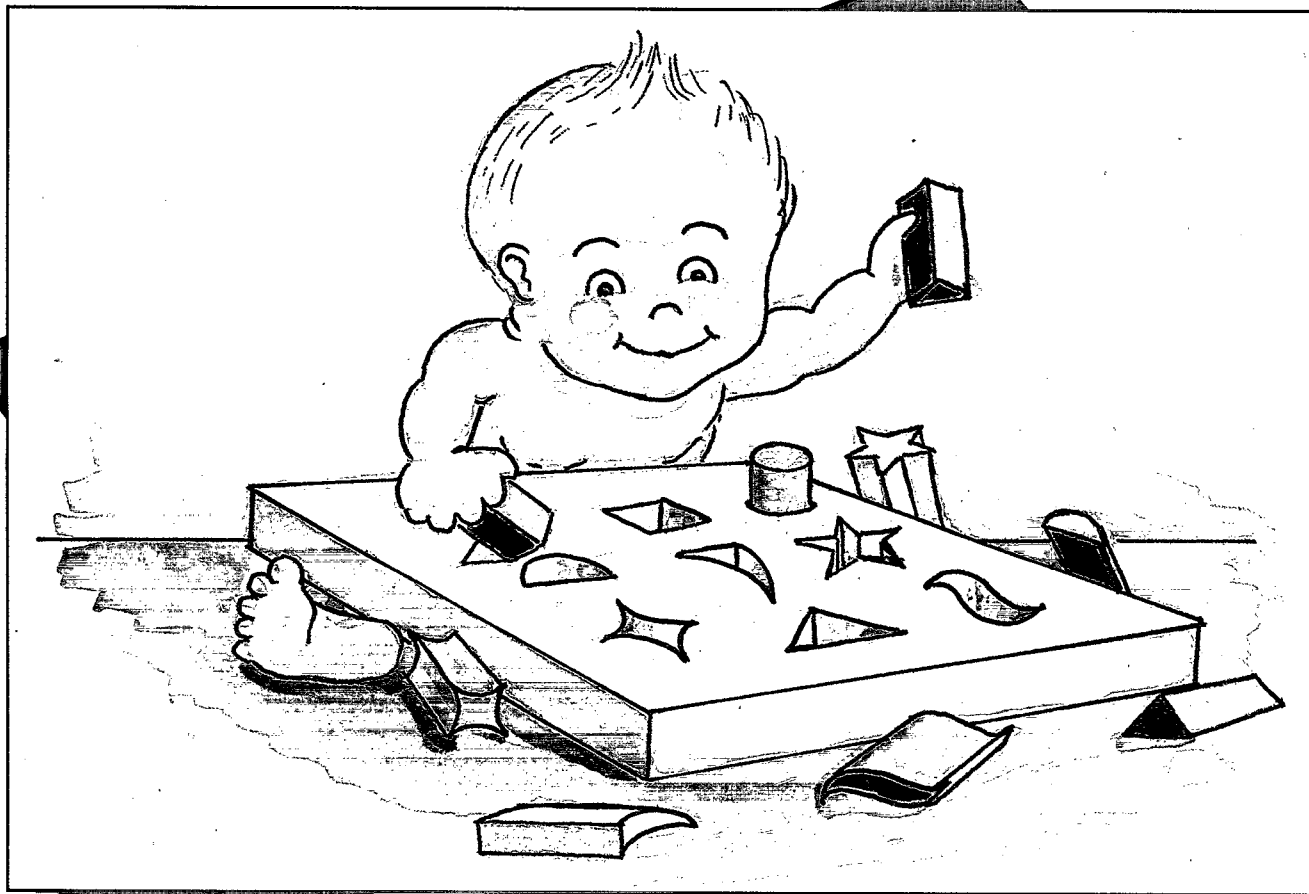
Finding and choosing the right solution for each particular problem is not easy. It takes thought and sometimes trial and error, but it certainly will not happen unless you are persistent.

Many guides will tell you to begin setting goals for the project at this time. In fact, each person on the watershed team probably already has an idea or two of how the project should look and what he or she wants to see accomplished. It is too soon, however, to make firm decisions because you have not yet explored all your options (even those you will not choose). This section and the next will lead you through important though somewhat simultaneous or circular steps. Through them, you will make three decisions:

1. **Determine the end result of this project.**

   ◆ Set overall environmental and water quality goals for the entire watershed.

2. Determine what actions are needed to achieve the overall water quality goals.

◆ Develop a list of BMPs and other pollution control measures (solutions).

◆ Match solutions to particular problems in each part of the watershed (set pollution control measure goals).

◆ Identify the implementation process (set activity goals).

3. Determine what actions can and should be done first.

Later, you will decide more specifically where and when to install the critical solutions.

Gather Information on How to Solve the Problems in Your Watershed

Before your group sets its overall project goals, determine whether any problems are solvable with existing technology. General solutions for each type of pollution (for example, nutrients, metals, or bacteria) found or suspected in your watershed should be compiled into separate lists. Make a list for each source of pollution, such as cropland runoff, construction site runoff, or discharges from septic tanks. Later, site-specific BMPs and other pollution control measures will be selected, but at present, your goal is simply to understand the available technology.

Care at this point will ensure that the most effective pollution controls are included on each list. Consider also how much each solution will cost. Be sure to include BMPs that involve management or behavioral changes, for example, recycling and nutrient management, as well as more obvious structural and vegetative pollution controls.

CITIZEN ACTIONS

Citizens can assist in gathering this information by contacting agencies and water resource professionals, by performing literature searches, or by contacting and interviewing watershed project team members from different projects. Citizens can also review the list of general solutions using knowledge of the community to think ahead—who must be educated about what before BMPs or other pollution controls can be installed?

✔ **STOP**   Develop a list of pollution controls by pollution source and effectiveness.

PROBLEM	SOURCE	MOST EFFECTIVE BMPS	COSTS

Set Overall Project Goals

The watershed team needs to develop two sets of goals—long and short range—and a set of corresponding objectives and actions needed to achieve each goal. To compile a three-tiered list—goal, objectives, actions—for each long- and short-range goal, each team member should envision what he or she wants the watershed and community to be like in 5, 10, or 20 years (broad goals) and decide to what degree pollution must be prevented or controlled to achieve each goal (measurable objectives).

CITIZEN ACTIONS The active participation of citizens in this portion of the project is crucial to its success. Citizens can ensure that all members and sectors in the local community are involved in the goal-setting process. Additional public meetings, letter campaigns, opportunities to comment by telephone or newspaper ad can help the project team see the big picture. Such activities can also help resolve the conflicting views and needs of various stakeholders. Citizens can also begin an education program that will emphasize the need for individuals to modify their behavior to achieve overall project goals.

A quick glance at the general pollution/solution chart (on page 22) will indicate that you probably do not have enough resources (e.g., funds and human resources) to do everything that needs to be done at once. You do, however, have a good idea of what *should* be done. So set your goals for the total resource you want to protect. Later, you can refine these goals and add a schedule that will allow you to begin some projects while you search for additional money and help to do the rest. The task here is to envision your watershed as it will be.

■ **Make a specific list of what you want to accomplish in your area.** You will use this list to develop goals for your watershed restoration and protection project. Concentrate on environmental goals, but be aware that you can often achieve significant social goals at the same time.

■ **Tie these environmental goals to specific outcomes.** For example

♦ improve the local lake or stream until it can support a reproducing game fish population;

♦ reduce the loading of pollutants in streams and lakes so that the water will become (or remain) safe for swimming, drinking, and fish consumption;

♦ stabilize the eroding banks of the river or creek and clean up accumulated trash and junk to prevent sedimentation in downstream ponds and to protect property values and public safety; and

♦ increase the streamside parkland to provide a buffer greenbelt and more space for public recreation.

■ **Quantify the broad goals so that they can be measured.** For example

- ◆ reduce the bacteria count in the Big River to 200 colonies per 100 mL or less;

- ◆ reduce the level of phosphorus entering Lincoln Lake by 20 percent so that nuisance algae blooms are eliminated;

- ◆ stabilize the two miles of streambanks below the highway bridge so that erosion is reduced to less than one ton per acre; and

- ◆ increase parkland from one 25-acre park to 160 acres situated along both sides of the creek running through town.

✔ **STOP**   List your specific watershed goals and quantify each goal.

_____

_____

_____

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_____

You now have a draft of your water quality goals. As you progress, you may need to adjust these goals, but at some early point in the project you also need to commit permanently to some of them. Remember:

- ◆ These early goals, although often the most difficult to set, are the most important because they relate directly to the resource you are trying to protect.

- ◆ It is best if water quality goals are measurable or quantifiable.

- ◆ Ideally, these goals should relate to pollutants in your watershed and to the impaired or threatened uses of the water to be restored.

Use Interim Goals to Show Progress

The taxpaying public deserves to know how a project is progressing and whether or not it's on track. Water quality goals are the most important indicator of project success, but they are difficult to document in a short time, so it is important to set some interim, measurable goals as "surrogate measures" of success. These goals must also be real and significant steps toward pollution reduction and prevention. Goals that are easily attained but nonproductive do not measure anything. Successful projects check periodically to see if and how each goal is being met. Such goals may be revised as more information is obtained.

Develop a series of goals to measure your project's progress. BMP, program, and activity goals are three types of interim or surrogate measures that have proven helpful to successful projects.

Pollution Control Measures

Determine which BMPs, pollution control measures, or other environmental improvement practices will be installed in particular locations to solve certain problems. BMP goals are the next best thing to clean water goals because we can often assume that the installation of appropriate BMPs or other pollution controls will directly result in cleaner water. BMP goals can be set for structural, vegetative, or even management measures. "Stabilize and revegetate with native plants three miles of streambanks on the portion of Alligator Creek adjacent to fields planted in soybeans," is an example of a BMP goal that can be used to achieve the environmental goals set for streambank protection and control of sediment pollution.

Activity Goals

Activity goals are really a "to do" list of actions to be taken by various participants to achieve other goals. For example, "state department of health instructors will conduct three training sessions for all county sanitarians in the watershed on proper septic tank installation procedures" is an activity goal. A companion activity goal might be "county sanitarians will inspect the installation of and monitor all new septic systems installed in the watershed."

Program Goals

Government agencies will possibly change their internal policies about what they normally do and how they normally operate through program goals. For example, one might ask the agency responsible for road construction to "require all newly constructed roads to discharge drainage water into a buffer zone or detention pond instead of directly to streams."

CITIZEN ACTIONS

Citizens can make sure that specific BMPs, program, and activity goals are set for each type and source of pollution.

Citizens can also be especially effective in encouraging nonparticipating agencies, businesses, groups, and individuals to adopt BMP and activity goals germane to the project. Citizens can use site visits, letter campaigns, newspaper ads, flyers and posters, television and radio broadcasts to help encourage specific individuals, businesses, and agencies to become more active in the goal-setting process and subsequent cleanup efforts.

Citizens groups should set clear activity goals for themselves—especially for key areas of citizen involvement:

- ◆ education programs and projects for other citizens and special audiences,
- ◆ "watchdog" or oversight activities, and
- ◆ specific community cleanup activities, such as litter removal, landscaping, or streambank plantings.

A Strategy for Action—Linking Actions to Goals

Agreeing and following through on critical actions requires negotiation, honesty, and an open mind.

With a number of goals and solutions to choose from, and limited funds, the project team must decide what actions to take and in what order. Two important questions arise.

1. Do you want to deal with one source of pollution at a time or try to control multiple types at the same time?

Successful watershed restoration generally attacks many sources of pollution simultaneously. Not only does this approach make sense ecologically; it also makes good social sense: treating all sources diffuses the "blame" for pollution problems among various responsible parties. Less time is wasted arguing about who to blame when everyone agrees to having been at least a small part of the problem.

Dealing with one pollutant source (for example, agriculture or urban runoff) may seem to be the simplest approach. Most agencies and groups involved in the watershed specialize in one land management activity. Progress in installing controls or changing behavior is also easier to document when you are concentrating your efforts in one segment of the population. The problem is that this approach rarely results in clean water! What often happens is that one problem is "cleaned up," while other problems become more evident; a disillusioned public perceives that its money has been wasted, and support for the project evaporates. Natural systems must be managed holistically since all things interact with others.

2. **Do you want (and will you be able) to place greater emphasis on problems that are more extensive, easier, and cheaper to fix, or problems that are of higher "risk" to the human and ecological health of the watershed?**

Some geographic areas in the watershed may be contributing higher or more concentrated pollutant loads than others, and some pollutants pose greater risks to human and ecological health than others. Successful projects often try to work on one highly visible but relatively simple or inexpensive problem at the beginning of the project to build momentum, then tackle the higher risk or more pervasive problems. Nevertheless, the project should be careful not to neglect the more serious problems.

Select BMPs and Other Pollution Controls

Selecting BMPs and other pollution controls for specific sites is a job that should usually be left to technical experts. The material in this section will help you to ensure that the project team considers program as well as technical issues during BMP selection. Table 2 in Appendix B contains additional information about site-specific BMP selection. It is intended to help you understand the process used by the technical experts—not as a guide for actual BMP selection.

Pollution control measures for both point and nonpoint source pollution benefit society but often do not provide an economic benefit or return to the individual, group, or industry that installs them. Therefore, selecting controls may be a point of contention: some team members may argue for the least costly methods; others may prefer the most effective methods, regardless of cost. Many watershed projects rely on voluntary implementation of BMPs and since little profit can be made on them, other incentives must be provided to encourage installation. Some past projects have tended to select the most "palatable" BMPs (those most likely to be implemented on a voluntary basis). However, using this method may result in the water quality problem remaining even after a project has achieved or exceeded its BMP goals.

CITIZEN ACTIONS Citizens can help the project avoid these pitfalls by ensuring that the project address four critical issues:

♦ **Decide** if you wish to set a minimum level of treatment for each land use (a very equitable approach), or if you have enough information and resources available to pinpoint the origin of each pollutant and solve it on a case-by-case basis. It may also be necessary to merge the two techniques.

♦ **Use all three types of BMPs** (structural, vegetative, and management) or other pollution control measures in concert or conjunction with each other even if it seems that a single solution will do. Engineering or structural solutions in particular should be integrated with other treatments. Appendix B includes a chart of some BMPs organized by selected pollutant. This chart can be used as a guide for formulating questions about BMPs.

♦ **Prioritize** the controls available for each source and pollutant and decide which ones should be implemented first. Base this decision on the control's estimated water quality effectiveness, but do not ignore costs. Some published information about BMP effectiveness or consultation with professionals is probably needed here. It is important that the project select some priority BMPs for each pollution source and install them simultaneously.

♦ **Target** critical areas for protection first. Implement the most effective water quality BMPs in these areas first.

At times project challenges seem overwhelming. Don't despair— often just knowing what and where your challenges are is a big step forward.

Plan to Overcome Challenges

Every project has obstacles. Identifying these challenges before you begin will help you get pollution controls installed, though it may seem to be an exercise designed to halt the project before it gets going. Instead, it is a way to overcome political, social, and technical challenges so that no money is wasted planning for solutions that can never be acceptable in your community.

CITIZEN ACTIONS

Because many communities give up the project at this stage as too complex, too controversial, or just plain hopeless, it is important for citizens to keep pressuring elected officials, agency personnel, and others to continue to work through project obstacles. Doing this as part of the official watershed planning team is probably best, but it can also be an independent activity that can be widely publicized and its results made available to all stakeholders. Reaching consensus may be a long process if the challenges and issues are especially volatile, such as land use restrictions and zoning changes. One way to make progress is to act out different options and possible consequences.

- ◆ Take a moment to brainstorm some "what if" scenarios to get an idea of how one action affects another. For example, some people in the project planning group may want to require that all suburban homeowners use organic fertilizer; others in the group may point out that the organic fertilizer supply is insufficient to meet such a demand, associated fly and odor problems may create nuisances, and commercial fertilizer dealers may sue the city. Some good ideas can come from this session, including a clearer indication of what is "really needed" for total pollution control and what can be achieved without adversely affecting the community.

- ◆ Identify ways to overcome these challenges if you must take unpopular actions to achieve your clean water goals. Some watershed projects find it helpful to determine the most influential interest group associated with a particular challenge and personally invite that group to be an integral part of the project. This group will then help overcome the specific challenge.

✔ **STOP** What challenges must be overcome before installing BMPs?

"What If" Scenarios		
BMPs	UNPOPULAR CONSEQUENCES	HOW TO OVERCOME

Define Success

Three decisions should be made to maintain stakeholder confidence that the project will achieve its environmental objectives. They are to put actions in priority order, to determine how the adequate completion of each action will be described, and to determine how the project's achievements will be measured.

Put Actions in Priority Order

By listing the actions needed to install the most effective BMPs and other pollution control measures in priority order, the project team shows its awareness that some actions are more critical than others and provides the project with its first definition of success. This step is the best way for the project to become accountable to the public. Expenditures of limited funds, time, and other resources must be directed to the most efficient actions as well as the most effective BMPs.

For example, a project may discover that 10 actions or activities are needed to meet one BMP goal yet have only enough resources and community support to do two or three. Pick the two or three that will get the most (and best) BMPs implemented this year and save the others for subsequent years. Thus, even if the project does not clean up the water or meet its BMP goal, it will make progress in the right direction.

Determine How the Successful Completion of Each Action Will Be Measured

Suppose your first critical action is to zone 50 acres bordering the river that runs through town as parkland (thus restricting all development). Suppose further that the zoning board and city council approve only 30 acres for zoning. Has the action been adequately completed? Has enough land been set aside in this action to meet the BMP and environmental goals? When coupled with the completion of other actions and BMPs, is the environmental goal achievable?

Determine How to Measure Goal Achievement

For each BMP, activity, and program goal, the watershed team should agree on the methods that will be used to measure its achievement and who will be responsible. Some goals are fairly easy to measure because they are clearly defined. The 50 acres in our example is easy to see and measure (nearly everyone is familiar with an acre of land). Other goals may be more difficult to measure because their measurement techniques are more specialized or because the monitoring techniques are more complex. For example, the goal of decreasing bacteria levels by 25 percent in the discharge from a single source, such as a dairy, is more easily measured than the goal of decreasing bacteria levels by 10 percent in the three miles of stream below Ponca City. In turn, these goals are more eas-

ily measured than the goal of decreasing the bacterial loading rate by 5 percent from all confined animal feeding operations in the watershed. Measuring the first goal involves taking water samples from one location; measuring the second goal involves taking multiple samples from multiple locations, and the third goal involves both multiple direct measures of runoff and discharge from multiple operations and additional mathematical calculations to extrapolate those numbers to other areas in the watershed.

✔ **STOP** List the critical actions to be taken in your watershed, organized by goal. Then describe how you will measure each critical action.

SPECIFIC GOAL	CRITICAL ACTION(S)	MEASUREMENT TECHNIQUES

Include Targeting and Scheduling Considerations

The heart of a developing watershed project is its ability to allocate resources, especially time. In the targeting and scheduling step, the project team should agree to implement point and nonpoint source pollution controls in specific critical areas (those contributing the most pollutant loads) within a determined time frame. The order in which actions are undertaken is important to ensure that environmental results are obtained. Therefore, the schedule that the stakeholders are committed to in this step should reflect the priority actions identified previously.

At this stage of the project, agreements may seem to evaporate, yet committing to a specific schedule is essential. The project team should allow additional negotiations at this time to ensure that all parties are clearly informed and in as much agreement as possible.

Don't get caught in a corner. Work hard to ensure that the most effective BMPs are installed in the most critical locations first.

Technical guidance is available to assist the agencies cooperating in your project to select critical areas for targeted implementation and to schedule actions that will ensure that the most effective controls are the first to be installed. Consult the reference section for assistance.

It is easier to plan targeted implementation than to do it, because in voluntary programs (and most watershed projects begin as voluntary programs), only those individuals who wish to cooperate do so. Thus, the project has few ways to force the implementation of BMPs or other pollution controls. However, incentives and ways to improve the chances that BMPs will be implemented in the targeted areas exist (see the section on providing incentives in Chapter 6). Targeted implementation presents problems for agencies accustomed to distributing programs or services along administrative lines. These agencies must now agree to redirect their programs and resources from the typical broad-based, countywide approach to one that concentrates activities and money in discrete areas. You can expect the issue of equity to be a hot negotiating topic at this point.

CITIZEN ACTIONS

Through oversight or "watchdog" activities, or as part of an organized watershed team, citizens can ensure that these key issues are fully addressed by the entire watershed team and stakeholders:

♦ Identify the project's critical areas (places to target implementation).

♦ Reach consensus with agencies, local governments, and land user groups on at least one redirected action for each critical area.

♦ Lobby each responsible or designated agency or group for early implementation of the most effective BMPs.

   The public must perceive "that someone is finally doing something" and agencies should establish a precedent within their group for action on this matter. Otherwise, one of Murphy's laws will be invoked: the longer a bureaucracy delays action, the more difficult the initial inertia is to overcome.

♦ Consider seeking back-up regulation at the local level.

   Back-up regulation is a process that gives individuals incentives (such as technical assistance, cost-share funds, or tax advantages) to install certain BMPs. But if the BMPs are not installed and the local committee or agency determines that the property is still causing a water quality problem, then fines or other penalties are assessed. Sometimes called "bad actor" laws, this type of regulation is successful because it is developed and enforced by the local community (see the section on using local regulations in Chapter 7).

If the watershed team has not prepared a formal watershed plan—a written document available to all stakeholders for review and comment—it should do so now. The following chart outlines the minimum information that should be included in the plan.

✔ **STOP** Prepare a draft Action Plan to identify who does what (exactly); when (by month); where (specify critical areas); how, and with what resources (money and time).

CRITICAL BMPs	WHO	WHAT	WHEN	WHERE	HOW	WHAT RESOURCES

Installing Controls

Installing controls are visible proof that your project is working and a great opportunity for citizen volunteers.

etting pollution controls installed is a two-stage process. The first stage is political; the second is both technical and administrative. In the political stage, the task is to get to a consensus that a problem exists, that solutions are available, and that agencies' priorities can be rearranged to implement these solutions.

The task in the technical and administrative stage is to make sure that controls are designed and installed to operate correctly, that funds are accounted for properly, that implementation is proceeding on schedule, and that everyone is aware of the project's progress. A project effectiveness monitoring and evaluation program should also be designed and implemented at this time (see Chapter 8).

Appoint an On-site Project Manager

So much is going on simultaneously that each project needs an on-site project manager. Most successful projects use a full-time paid manager as the central contact, but many options exist. The manager can be a citizen or citizens group, an agency person assigned to the project, a nonprofit organization, or a consultant hired expressly for the job. The job is so demanding and time consuming that volunteers will have difficulty donating enough time to be effective. Volunteers are, however, especially helpful in support positions. The manager is the key to orderly, efficient, and effective installation of BMPs and other pollution controls. In an ideal situation, the manager will take part in the planning process. This manager or on-site coordinator should know and support

- ◆ the science of watershed management (not just one facet of it);
- ◆ the policies of the various cooperating agencies, citizens groups, and local governments; and
- ◆ *all* programs that are part of the project (not just the easy-to-implement or high-profile ones).

In addition, the manager should be accepted and respected (which, of course, is quite different from being liked) by all members of the community.

Don't you wish it were this easy? Fundraising is a time consuming but essential job. You can help! Use some of the tips here to help your project team begin the search for financial and other kinds of help.

The project manager can coordinate the scheduling of BMPs and other pollution controls for greatest effectiveness, seek additional funding sources, conduct and coordinate the public education program, and assist the land management agencies in design, installation, and inspection of BMPs.

Obtain Funds and Other Assistance

Everything costs someone, something. Citizens need to know how to get the funds to move their projects forward because few watershed projects come with sufficient federal and state funding to assess, plan, educate, implement, and monitor all phases of the project. Different activities will be funded by different funding types; thus, the project budget will probably include funds from different sources. Not all activities will require "cash" funding; some may be completed using the resources of cooperating agencies and organizations. Thus, the project is really paying for two different things: people (staff to educate, monitor, inspect, and enforce or to implement, plan, and build the project); and actual structural and vegetative controls (e.g., concrete, grass seed, tree seedlings, tractor time, gasoline, and equipment).

*F*unding

Funding is needed at each stage of the project: during planning, for installation of controls, for various monitoring tasks, to pay for enforcement activities, and to support the educational program. One way to organize your search for funds is to divide the actions listed in the watershed plan into various categories, then seek funds from a matching category. Table 1 in Appendix A provides information about types of assistance and funds available from various agencies or groups organized by agency name and program, but you can use Chart 3 in this chapter to begin your search. It contains information about some, but not all, federal funds. Orient your search for state, local, private, and corporate funds similarly.

*F*undraising

Fundraising is a time-consuming activity. Each type and source of funds will probably have different application criteria, procedures, and deadlines, and may be limited to certain types of activities. Make sure that you allocate sufficient time and resources for fundraising and obtaining other assistance. Use the following **CITIZEN ACTIONS** and ✔ **STOP** list to help you outline the funds you need and the work you must do to obtain them.

CITIZEN ACTIONS In any project, but especially in projects sponsored by a government agency, citizens can research the variety of funds available for various activities, write letters, and make the necessary phone calls to learn about application procedures.

Chart 2.—Overview of Funds and Support from Federal Agencies*

ACTIVITY	AGENCY
Write Watershed Plans	U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency
Education Program	Almost every agency
Monitor Present Conditions	U.S. Environmental Protection Agency, U.S. Geological Survey, U.S. Department of Agriculture, National Oceanic and Atmospheric Administration
Monitor Project Results/Progress	U.S. Environmental Protection Agency, U.S. Geological Survey, U.S. Forest Service, National Oceanic and Atmospheric Administration
Environmental Analysis and Pollutant Load Calculations	U.S. Department of Agriculture (Cooperative Extension Service, Agricultural Research Service), U.S. Environmental Protection Agency, U.S. Forest Service, Bureau of Land Management, National Oceanic and Atmospheric Administration
Build Large Public Pollution Controls	State Revolving Loan Fund
Lake Restoration	U.S. Environmental Protection Agency
Build Pollution Controls on Private Lands	U.S. Department of Agriculture (Soil Conservation Service, Cooperative Extension Service), U.S. Forest Service
Improve Wildlife Habitat	U.S. Department of Agriculture (water bank Soil Conservation Service), U.S. Fish and Wildlife Service, U.S. Environmental Protection Agency
Restore Wetlands	U.S. Department of Agriculture (Wetland Reserve Program, water bank Soil Conservation Service)
Buy Land	Farmers Home Administration
Enforce Laws	U.S. Environmental Protection Agency, U.S. Forest Service, Department of Interior (Bureau of Land Management)
Maintain BMPs and Other Pollution Controls	Original funding agency
Write Regulations	U.S. Environmental Protection Agency
Design BMPs	U.S. Department of Agriculture (Soil Conservation Service, Cooperative Extension Service), U.S. Environmental Protection Agency, U.S. Forest Service

* This partial listing will help you begin your search. Use Table 1 in Appendix A to continue looking for project funding.

✔ **STOP** Organize your watershed activities by funding category.

ACTIVITY	FUNDING CATEGORY	POSSIBLE RESOURCE	DATA NEEDED	STRATEGIES (to obtain funds)

Don't get discouraged if you do not immediately obtain enough money or help to complete your project or even a portion of it. Begin with the resources you have; concentrate on doing an exemplary job, and document your success. Additional funds tend to become available to projects that not only show favorable results but are organized in a manner that increases the probability of continued favorable results. People like to back a winner.

Funds and other assistance, such as people and time, may originate from local, state, or federal sources. Each funding source has advantages and disadvantages. In general, federal funds can come from many agencies or interagency departments. Most are used to support agency staff who in turn carry out specific duties; however, some may be spent for special projects. Most agencies administer funds and programs along administrative or program lines rather than geographic boundaries, though agencies can change their program focus and redirect funds to a specific watershed. In addition to requesting special funds directly from an agency, citizens can have some input into how agencies allocate their normal resources through the National Environmental Policy Act (NEPA) and other public participation processes.

State funds may come from almost as many different agencies as do federal funds. Some state funds originate directly with state resources; others are "pass through" funds that originate in federal sources. To obtain pass-through funds, applicants must meet both state and federal requirements. Some state funds are earmarked for specific items, although some come from general revenue sources. Important needs, such as education, jobs, law enforcement, solid waste problems, and the environment, compete for these funds.

CITIZEN ACTIONS Work with state legislatures to earmark certain general revenue funds for watershed restoration work, and help support special bond sales, taxes, set-asides, or other new income-generating actions.

Local funds are often best for local problems and are especially suitable for actual installation of pollution controls. Local funds can come from direct sources, such as sales taxes, bonds, or contributions, or from indirect sources such as having landowners pay for certain things. The indirect method normally requires the adoption of local ordinances or regulations.

The following list is a general guide to the types of funds that can be used to support a watershed project.

■ **State General Assembly Appropriations.** Annual appropriations can be used for specific short-term projects or programs that the state government is not sure will become a regular part of the state bureaucracy. Continuing appropriations—those that have been codified into state law—can be used to support the ongoing stable programs of specific state agencies.

■ **State Income Tax Credit.** In states having a state income tax, tax credits may be established for individuals who install certain BMPs or other pollution controls.

■ **Bonds.** General revenue sources or special elections may raise bonds designed to pay for special purposes or projects. Bonds are commonly used to finance new school buildings, jails, and roads, but these funds can also be used to acquire park land and greenbelt areas or to pay for conservation work.

■ **State Taxes.** Most states levy a variety of taxes including sales, luxury (alcohol, cigarettes), inheritance, raw materials (coal, oil, timber), manufacturing, and income. A portion of certain tax revenues can be earmarked for special purposes including watershed rehabilitation and planning. Taxes on raw materials and products have been used in many areas to fund pollution controls and research within the industry that is taxed.

■ **Easements and Direct Land Purchases.** Easements are used effectively to purchase permanent rights on private property. Property can be purchased outright, obtained through condemnation, or donated by landowners. Money for easement purchases comes from a variety of sources.

■ **Lottery.** A number of states have instituted state lotteries to obtain funds for state programs without raising taxes. In some states, the proceeds from lottery sales are earmarked for certain programs and projects; in others, the money goes to a general fund for division by order of the state legislature. Earmarking funds for conservation and pollution control work is the preferred way to ensure that environmental needs are not out-competed by other needs when the state allocates lottery profits.

■ **Loans.** A variety of agencies make short-term, low-interest loans to municipalities, nonprofit organizations, or individuals for pollution control work. The State Revolving Loan Program administered by the EPA and state water quality agencies is one of the largest loan programs. It makes significant loans to local communities for pollution control work.

■ **Percentage Fees.** The sale of hunting and fishing licenses and species-specific stamps are commonly used by state and federal wildlife agencies to pay the enforcement personnel costs for protecting wildlife resources. These specific privilege fees, unlike a general tax, are paid by the individual who actually uses the resource, but the entire public benefits from well-managed natural resources.

■ **User Fees.** Specific services rendered to individuals, usually by some type of public or private corporation, can be paid for by user fees. Services such as water, sewage lines, and trash removal benefit the individuals paying the fee as well as other inhabitants of the watershed.

It seems that the most effective incentives (for everyone) offer both a reward and a potential punishment.
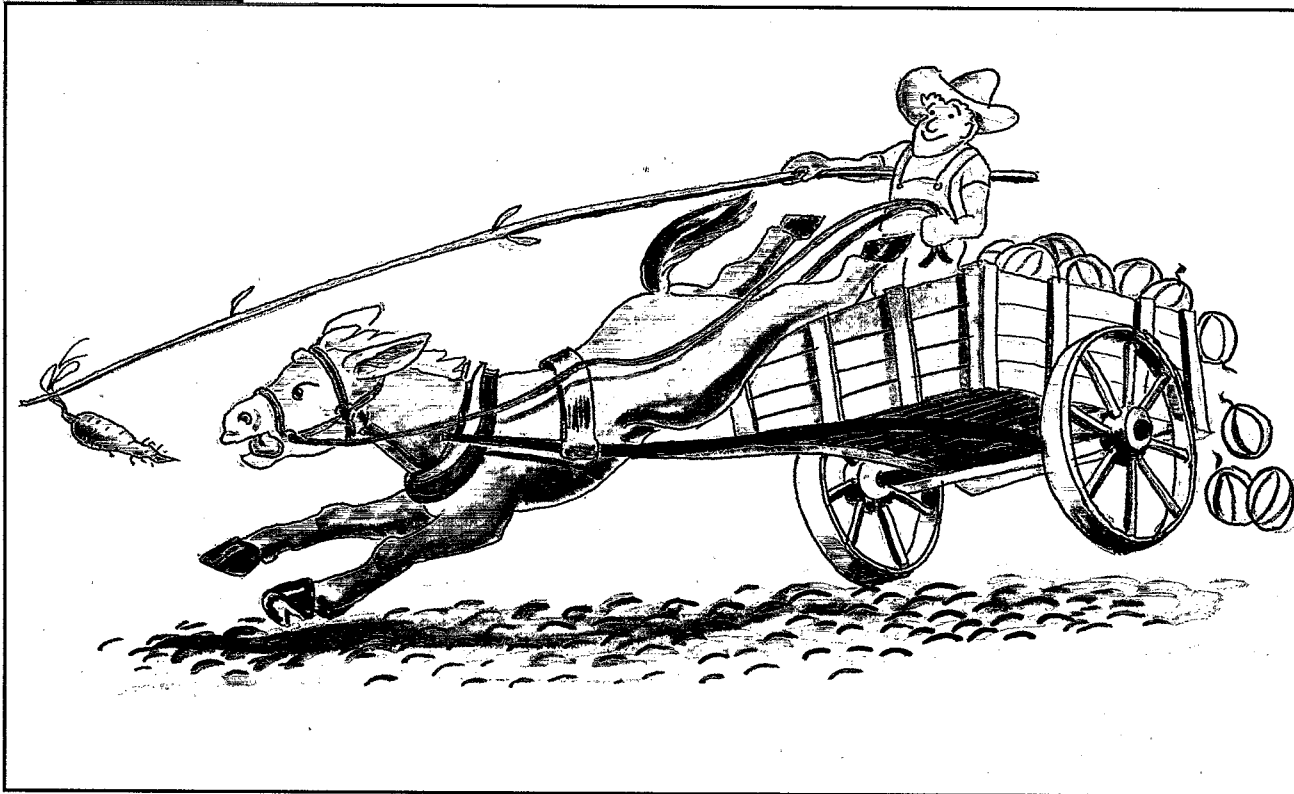
CITIZEN ACTIONS In addition to working with state legislatures and local governments to earmark funds for the project, citizens can attract modern, progressive businesses into the community by maintaining a clean environment. Many companies choose to locate in areas that provide employees the best quality of life possible, and that includes a clean environment. New money in the community can stimulate even more effective conservation and pollution prevention efforts.

Provide Incentives

In most watershed projects, the majority of BMPs and pollution controls installed on private property will provide a greater benefit to society than to the individual landowners who install them. Therefore, to ensure that BMPs are implemented, an incentive is usually provided by society. Incentives can be internal (the landowner is self-motivated) or external (society offers some reward or avoidance of punishment). Internal incentives are most likely to provide the behavioral changes that are necessary to prevent pollution in the long term, but prompting individuals to become self-motivated is not an easy task. External incentives are more effective if both a reward and a fear of punishment is present; however, once the motivational force is removed, many landowners will revert to their old ways, so external incentives are generally short-term solutions.

A number of incentives are available to your project. The following list briefly explains some of the major incentives that have been used.

■ **Education.** This incentive provides knowledge of "what to do" and "how to do it" and the confidence the stakeholder needs to implement BMPs. Small education projects that define key audiences and tailor both the message and method of presentation to the audience are most effective. Each project should include technical training about the operation and maintenance of controls (or behavior changes) that the audience is expected to adopt.

■ **Technical Assistance.** One-on-one interaction between the professional water quality staff and the affected stakeholder is an important part of proper technical assistance. It should also include recommendations about environmental conditions and controls appropriate for the specific site. Technical assistance should provide on-site engineering or agronomic work throughout the installation of BMPs or other controls.

■ **Tax Advantages.** State and local taxing authorities or changes in the federal taxing system can be used to provide tax advantages to stakeholders who install BMPs or other controls.

■ **Cost Share to Individuals.** Direct payment to individuals for installation of specific BMPs (for example, terraces on farm fields) has been effective in some areas. The cost-share rate must be high enough to compensate the stakeholder for perceived and real risks associated with using the BMP.

■ **Cross-compliance Legislation.** Cross-compliance legislation can be built into existing programs. It is in effect in the current U.S. Farm Bills and transportation acts. Such legislation is generally a quasi-regulatory incentive or disincentive that makes certain requirements or the performance of certain actions a condition for receiving the program's benefits.

■ **Direct Purchase of Lands or Special Areas.** Land purchase is used extensively by groups such as the Nature Conservancy. Use of community-owned greenbelts in urban areas is another variation.

The costs of direct purchase are generally high, but their effectiveness can also be exceptional. The practice may be used by government or groups to obtain control of land whose owner is not willing to install needed BMPs through existing programs.

■ **Nonregulatory Oversight or Site Inspections.** A site visit by the local, state, or federal regulatory agency to encourage BMP installation can be a powerful incentive for voluntary installation of BMPs. Any individual, group, or agency performs better when assured of personal attention.

■ **Peer Pressure.** Social acceptance by one's peers can motivate some individuals to install BMPs. For example, if a community values a clean environment or certain agricultural BMPs, stakeholders in those communities are more likely to install them.

■ **Direct Regulation of Land Use and Production Activities.** Regulatory programs that are simple, direct, and easy to enforce are quite effective. Such programs can regulate how the land is used (like zoning ordinances), or the kinds and extent of activities allowed (like pesticide application rates). They may also set performance standards for the level of environmental damage that will be allowed (such as retention and reuse of the first inch of runoff from the property).

■ **Consumer Demand.** Demand for a particular product or for a commodity produced in a certain way (for example, organically raised wheat or vegetables) can create a market that may pay a premium for these items and encourage their production.

■ **Private Sector Support Services.** In areas or watersheds that have successfully implemented nonpoint source pollution controls with long-term results, a number of private enterprises have been used to support the implementation, operation, and maintenance of the recommended BMPs. These companies supply services and equipment that individuals could not afford to own. Thus, the support service provider has a profit motive tied to the adoption of BMPs that provides added incentives for the project. Without these services or equipment, the tendency is to neglect BMP maintenance once the incentive (cost-share or land easement rental payment) expires. Some examples include the following: firms specializing in animal waste lagoon pump-out (cleaning) and land application; companies that specialize in prescribed burning for brush control and range management; or professional associations, such as the Association of Independent Crop Consultants, which is skilled in the use of integrated pest management techniques.

CITIZEN ACTIONS Citizens are especially successful when applying the age-old technique of public embarrassment to noncooperating businesses or individuals as part of the project incentive package. A number of creative and nonharassing ways can be devised to show the rest of the community that particular stakeholders are not cooperating with the project.

Recent evaluations of ongoing or completed watershed projects have provided new information about the successful use of incentives:

◆ Without vigorous, targeted, and effective education and information programs, technical assistance and cost-share programs cannot secure adequate BMP implementation.

◆ Regulatory programs can be effective. They often provide more equitable solutions and achieve results faster than the more random voluntary programs; however, poorly enforced regulatory programs or programs that do not contain an effective education and information program are little more effective than voluntary cost-share programs.

◆ The most successful projects use a mix of voluntary and regulatory incentives to achieve water quality results. The most effective incentive packages offer variable cost-share rates, market-based incentives, and regulatory back-up coupled with corporate and governmental support services to keep the BMPs maintained and operating properly.

To design an effective set of incentives for your project, you need to know what practices can be most easily adopted and which ones need special help to get them installed. You will also need to know what incentives are available to your community. The number of incentive options open to your project that no one is taking advantage of may surprise you. Use the chart below to assist you in this evaluation.

✔ **STOP** List the incentives available and needed in your community.

BMPs NEEDED	INCENTIVES AVAILABLE	INCENTIVES NEEDED	WORK THAT MUST BE DONE TO OBTAIN NEEDED INCENTIVES

Secure Commitments

Ensuring that the people and organizations who agree to cooperate during the planning stage of the project actually carry-out their obligations can be a challenging task—especially if the project has not secured extra resources and funds. Emergencies or unforeseen circumstances that cause agencies to redirect funds and resources elsewhere, and misunderstandings between various stakeholders regarding acceptable levels of performance and goal attainment are the two most common reasons that commitments are not fulfilled.

Two types of commitments are needed for effective watershed protection. The first commitment should come from agencies, groups, industries, or governments who will administer, fund, and monitor the effectiveness of programs, BMPs, and other controls. The second is from the individuals, corporations, or municipalities that will actually install the controls. These commitments are most effectively secured through formal written agreements or public accountability (plain old public embarrassment).

*F*ormal *Agreements*

To avoid disappointment and misunderstanding, all agreements on all topics (no matter how trivial they may seem) should be documented in writing. Agencies often use a formal process known as the Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA) to document commitments and positions on certain topics. The agreement directing or redirecting already limited resources to your watershed project could certainly be the subject of an MOA. Any formal agreement should

- ◆ list the specific actions to be taken by each party to the agreement,

- ◆ include specific deadlines for each action,

- ◆ include a conflict resolution process should misunderstandings occur, and

- ◆ include a definitions section for words that may mean one thing to one person and something totally different to another.

*P*ublic *Accountability*

A public record of decisions can help all stakeholders keep track of the participants' level of commitment. Periodic public reporting by each stakeholder—in which each participant updates the others on the progress being made on specific tasks—also helps to ensure that public and private funds are spent effectively. These meetings can serve as a test of each party's commitments. If you have agreed to nebulous actions or indistinct commitments, these meetings will be an exercise in frustration. If you have agreed to clearly defined actions, everyone will know how the project is progressing.

CITIZEN ACTIONS

Citizens can be the motivating force to ensure that formal commitments are secured by the watershed team. One way to get started on a project involves compromise. If each participant or stakeholder can agree to one or two small commitments without an accompanying increase in funding, the larger commitments can be allowed to evolve gradually. Once success is demonstrated in meeting smaller commitments, larger ones will usually follow. Public pressure, effective use of the media, and letting your concerns and suggested solutions be known to elected representatives are often needed.

If your citizens group has something to offer the various agencies you approach, commitments from others will be easier to secure. Examine the resources of your group. How can you help each agency perform its critical actions? Never underestimate the value of unpaid volunteer time and effort. If you and members of your group are willing to follow directions and agree to perform specific tasks on a routine schedule, you can be an invaluable aid to the project.

Another way citizens can help stakeholders formally agree to specific commitments is to offer to give up or to pay more for certain routine services, thus allowing agencies to use those "freed-up" resources for new priorities. Determine what you are willing to do without in order for the agency or group to fulfill your request. For example, are you and your neighbors willing to forgo a routine road grading so that your county crew may redirect its efforts to erosion control near county bridges? Go to the negotiating session with this knowledge and a commitment not to complain if services are cut. Your group might even offer to perform some of these services.

✔ **STOP**   List the commitments needed from you and each cooperating agency.

AGENCY OR GROUP	SPECIFIC ACTIONS	SPECIFIC DEADLINES	CITIZEN COMMITMENT

Design and Install Site-Specific BMPs and Other Pollution Controls

Pollution control measures for both point and nonpoint source pollution must be tailored to the hydrology and geology of the site (i.e., the amount and speed of water flowing across various kinds of soil, rocks, and vegetation). The operating needs and capabilities of the land managers must also be determined (i.e., the types and sizes of equipment and space, and the amounts of access and labor that are available). Each site needs a plan, simple or complex, that is tailored to the BMP or pollution control being installed.

For structural practices, an engineer, a surveyor, and their technicians are needed to survey the property and to shape the BMP to the site; to stake out or mark the placement of any structures on the land; and to work with the equipment operators (bulldozer or log skidders, for example) to ensure that their actions are correct.

For vegetative practices, agronomists, soil scientists, range conservationists, horticulturists, irrigation engineers and technicians, and wildlife biologists may be needed to determine soil types and limitations, proper seeding or planting rates and times, and the proper design of vegetative controls, such as the width of filter strips or the size of wildlife corridors.

For management practices, the assistance of engineers, economists, agronomists, and others may be needed to suggest the best management options for a particular site or specific operation.

CITIZEN ACTIONS Depending on where the controls are being installed, private citizens have two roles. If BMPs or other controls are to be installed on your land, it is standard procedure for government agencies or private firms to consult and work with you as a team to design BMPs to fit your operation. If the BMPs are to be on someone else's property, many government agencies welcome volunteer assistance with the simple and routine chores involved with survey work. Volunteers must be willing to be trained and follow directions.

Allow sufficient time in the watershed planning schedule for this labor-intensive step. Be aware of any agency personnel limitations when scheduling BMP implementation and setting goals, especially in an area in which there is a high seasonal demand for these workers.

Inspect BMPs and Other Pollution Controls After Installation

BMPs and other pollution controls must be properly installed or implemented to be effective. While selecting the right control and ensuring its proper design are important first steps, correct installation

is also essential. Improperly installed controls have the potential to concentrate flows inappropriately or cause other damaging hydrologic disruptions.

Each site should be inspected immediately after installation and at regular intervals thereafter to ensure proper operation and maintenance. Inspections should be performed by qualified professionals but properly trained citizens can assist. Even professionals disagree about the adequacy of some BMP installations, so reaching agreement on what constitutes a properly installed and useful BMP and who will make the inspections is important. Some federal and state cost-share projects require mandatory inspections and have detailed inspection criteria. Even if postapplication inspections are not a requirement of your funding source, it is advisable to complete them anyway. Citizens can share in this activity by participating on BMP inspection teams.

One approach that worked well in the Pacific Northwest during forestry BMP inspection included the formation of interdisciplinary, multiple agency teams of government foresters and hydrologists, logging company staff, and biologists who randomly spot checked all BMP installations on all forest lands (whether public, private, or industry owned). Afterwards, each agency or industry checked only the BMPs that fell within its normal jurisdiction. This approach has a number of benefits:

◆ It builds confidence in unbiased and equitable installation of BMPs regardless of property ownership.

◆ It serves as a way to ensure that all agencies and team members use the same standard of judgment.

◆ It expands the resources available to perform inspections.

✔ **STOP**   List the party responsible for BMP inspections. List inspection team members if you use this method.

NPS CATEGORY	BMP TYPE	RESPONSIBLE PARTY	INSPECTION TEAM MEMBER

Preventing Pollution

Effective education is always essential and regulations are often necessary for complete watershed restoration or pollution control.
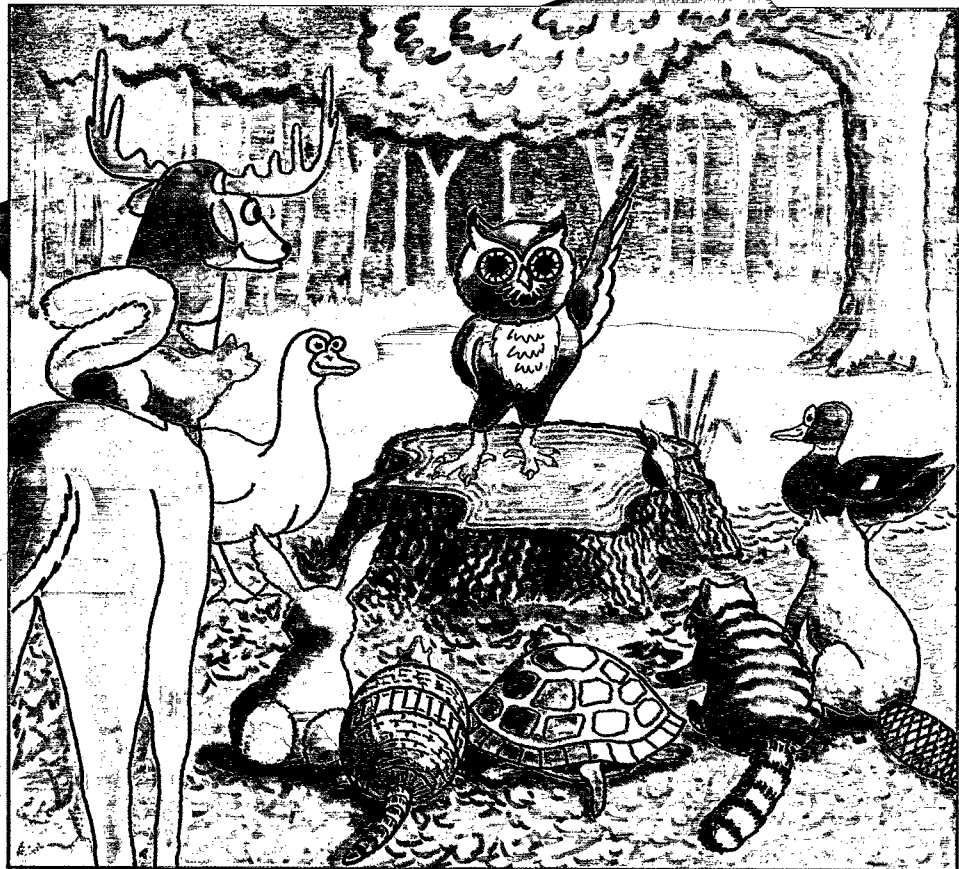
Preventing pollution is more cost effective than controlling pollution. Once a natural system is polluted, it is difficult to repair. This fact is especially true of groundwater where often the only effective treatment is an expensive "pump and purify" system. All watershed projects should have two types of pollution controls—those that clean up existing problems and those that prevent the same problem from recurring (or different ones from happening).

Effective ways to prevent pollution are through careful and judicious use of local regulations and educational projects.

Use Local Regulations

Most laws and regulations are designed to provide cost-effective public services or benefits in response to the public's need for safety, consistency, protection, and welfare. Sometimes a watershed project can use existing laws and regulations; sometimes it will have to de-

velop new ones to fulfill the environmental goals set by the stake-holders and project team. Regulations are a type of pollution prevention. They are designed to prevent problems through use of control methods such as installing treatment facilities, regulating certain production methods and raw materials, or permitting certain land uses and behaviors in particular areas.
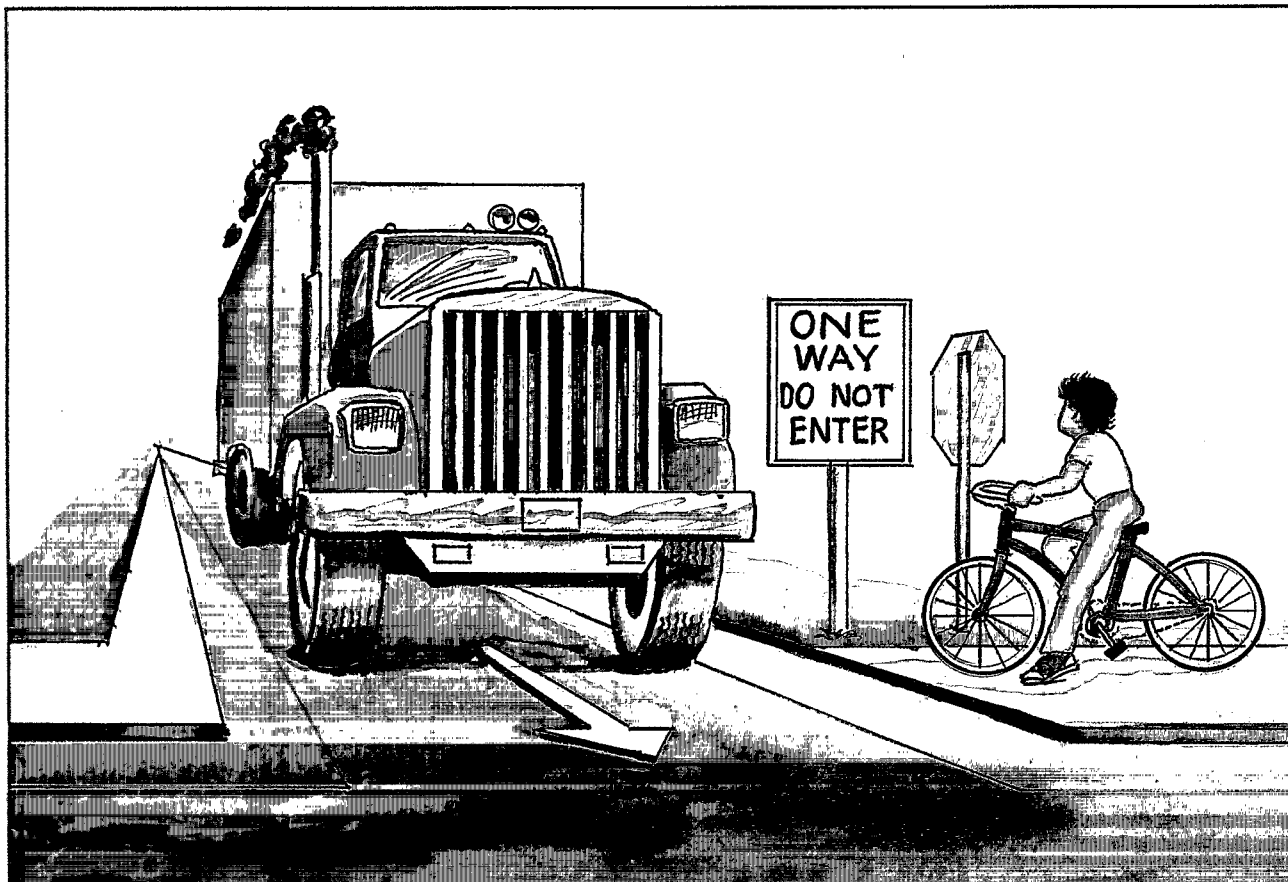
Local regulations cannot allow behaviors that are illegal at the state or federal level. They can, however, make state and federal laws stronger and more focused and can be more effective than either state or federal laws. Because federal or state laws generally provide an equitable basis for minimum levels of pollution treatment, it is futile for a company or individual to search for a location that is more lenient about environmental protection. Sometimes, however, state and federal laws are so general that questions arise as to whether they apply in specific situations. Local laws can clarify state and federal laws, tailor them to the local situation, and administer them much more closely.

The following paragraphs identify issues that you need to consider when developing or using a regulatory program as part of a watershed project.

Sometimes the mere thought of regulations is scary, but consider what can happen without them. Regulations protect us when we do not know or have forgotten the possible consequences of our actions.

Learn About Federal, State, and Local Pollution Prevention Laws

Often a community is surprised to learn that a number of laws and regulations already exist that could be used to prevent or control pollution. Finding and understanding the laws applicable to your area will help you determine whether you need new laws or simply more effective enforcement of existing ones.

CITIZEN ACTIONS Citizens can obtain information about environmental laws and regulations from many sources.

◆ State and federal agencies usually know about the specific laws or sections of the law under which they operate. They should be able to tell you how such laws and regulations apply to the local situation.

◆ Environmental and social advocacy groups often have departments that specialize in environmental litigation. They can help you narrow your search to particular laws so that the questions you ask agencies or private lawyers are more direct. The Natural Resources Defense Council, the Sierra Club, the Conservation Foundation, and the National Wildlife Federation are examples of this source.

◆ The county judge, the district attorney's office, the justice of the peace, city planner's office, zoning boards, and Chambers of Commerce are other good sources of information about local laws and regulations.

◆ Law firms, private lawyers, and consultants who specialize in environmental law can give specific advice about special issues or general information about laws. Most will charge a fee for their services.

Many types of regulations can be used to prevent pollution problems. Your watershed project team should also research laws that are not aimed specifically at pollution prevention but which might be useful to your project. Some examples include hunting and fishing regulations that often contain county-specific limitations, and county building and zoning boards' restrictions that often specify lot sizes and housing density on a community basis. The "restrictive covenants" that many commercial or private developments or small communities use to maintain property values and aesthetics may also be useful. Some of these covenants also protect human health, for example, community-specific septic tank requirements in areas without state or county septic tank laws.

Decide Whether Your Community Needs Additional Laws

Before you set out to write local laws, determine whether such laws or regulations are really needed. Have other possibilities been explored?

Citizens should ensure that local laws are evaluated for effectiveness and that the results of the evaluation are public information. Often the conclusions reached by agencies administering a program (voluntary or regulatory) are different from those of the citizens whose community is affected by the regulations.

✔ **STOP**   Evaluate regulations and voluntary programs in your watershed. Use the decision tree format to guide your discussion.

PROBLEM TO BE SOLVED
↓
Are any federal, state or local laws available to control or prevent this type of pollution?

YES / **NO**

YES →
Are these laws effective?

- **YES** → Why does the problem still exist?
- **NO** → Why not? → Do people know about them?
  - **YES** → Are incentives or disincentives adequate?
    - **YES** → Are enforcement and compliance measures adequate?
      - **YES**
      - **NO** → Revise
    - **NO** → Develop more effective incentives
  - **NO** → Educate and train them.

NO →
Are any voluntary programs available?

- **YES** → Are they effective?
  - **YES** → Why does the problem still exist?
  - **NO** → • Are more incentives needed?
- **NO** → Why not? → • Are more incentives needed?
  - • Is adequate support available?
  - • What happens if stakeholders do not comply? → Nothing → Regulations needed

After going through this decision tree for each law or program, you may indeed decide that local laws are needed. Begin by writing some that can be accepted by the communities within the watershed.

*W*rite or Build Support for Local Regulations

■ **Characteristics of Effective Regulations.** When writing a law, ordinance, or regulation, it is important to remember that you must also get it passed. If it passes the following tests, it has a better chance of getting enacted. First, will it effectively control and prevent pollution (is it strong enough)? Second, will it be equitable, reasonable, and enforceable? Some of the most effective regulations

♦ require a minimum of simple actions,

♦ apply to everyone in the situation equally, and

♦ are simple to enforce because violations can be easily seen or noted.

■ **Types of Regulation.** Basically there are two types of watershed protection laws: pollution prevention and pollution control. Planning laws, such as zoning ordinances, regulate behavior and land use or attempt to stop pollution before it occurs. Designed to provide the greatest good to the largest number of people or resources at the least cost, these laws can be quite effective. However, they are sometimes challenged on the basis of denying a person the profitable use of his or her property without just compensation.

Planning laws are only as effective as their enforcement and applicability. If numerous situations arise in which the regulation or law does not apply, or if variances or other exceptions are routinely allowed, such laws are not effective.

Pollution control or technology-based laws are a second type of watershed protection law. They change current practices, structures, and methods to meet new or more advanced criteria. The installation of a waste treatment lagoon at an existing dairy is an example of a technology-based law. Established agencies need to devote significant support to educate the community about these laws, review engineering and agronomic designs, inspect practices, and monitor water, air, and soil. These laws also require enforcement against violators.

Because someone must pay for administration and enforcement, a dedicated funding or revenue source is needed. Taxes, fees, penalties, and grants from state offices are possible sources of revenue or support.

CITIZEN ACTIONS Local regulations cannot be written or supported by any group or agency acting alone. This step requires that you build allies not enemies. Citizen participation in the education process is the key.

- ◆ **Educate the Rest of the Community.** Voters should understand that environmental problems exist despite everyone's best efforts to alleviate them. Use the documentation from your ✔ **STOP** activities to make this point.

- ◆ **Inform Agencies and Governments** that existing programs are not working and provide your analysis of why they are not. They may already know about existing problems, but you can help them garner public support—a very important role for citizens.

- ◆ **Educate Yourselves by Talking to All Experts**—agencies, local government officials, citizens, corporations, and commodity groups—to learn how they would approach effective regulation. Ensure appropriate officials that they will be included in the rulemaking process.

- ◆ **Justify Your Position.** Discussions about any type of regulation tend to be heated. Discussions about land use regulations (which is how many people approach nonpoint source regulations) can be volatile. Now is not the time to retreat to the position of "Let's give our existing voluntary programs more time." If your documentation shows that the problem remains after existing programs have had time to work, then it's time to try a different approach.

- ◆ **Determine How Many Regulations You Will Need.** Finally, consider whether a number of specific laws (regulations) about each problem is best, or whether one general law, with administrative requirements for each implementing agency is all you need. The more accurately your regulations are scaled to the needs of your community or watershed, the more successful they will be.

*S*upport Effective Enforcement

Again, a law or regulation is only as effective as the strength of its enforcement. A true commitment from the entire community for equitable and effective enforcement of local ordinances is essential. Local laws, ordinances, and regulations have the potential to be the most effective and most applicable of regulations; however, they also have the potential to be the most poorly enforced, and that is particularly true of laws regulating behavior that the community does not consider significant. Local laws are administered by local officials and tried in local courts with locally elected judges and jurors. In some jurisdictions, stiff convictions and fines are handed down; in others, neighbors are reluctant to enforce regulations against neighbors. Educating stakeholders and establishing a defined process for enforcement within the regulation or ordinance can minimize some of these problems.

Key points that such an ordinance should address include a definition of noncompliance and answers to the following questions: Who will check for compliance? Where? When? How often? By what method?

An ordinance should also include specified penalties and a process for resolution. It may, for example, require a written warning and

a schedule of corrective actions to be taken by a specified date, a provision for inspections and for rechecking the premises, or an automatic penalty for noncompliance. If financial penalties are assessed, the ordinance should include a collection method and a method for the accused offender to file a grievance or contest findings through a court of law. Some ordinances also include a resolution process for settling contested findings.

Educate Different Audiences

■ **Effective Education vs. Ineffective Public Awareness.** Reaching the right audience with the right message at the right time to produce a change in behavior is the core concept of a successful education program. Effective educational projects move an audience from ignorance through awareness, knowledge, understanding, ability, and desire to active participation. Education is not to be confused with public awareness, which is a very different concept.

Public awareness campaigns are passive and frustrating. The "recipient" learns that problems exist but receives little direction about actions needed to solve the problem and insufficient information to make up his or her mind about solutions. Thus, significant actions do not result. By contrast, a public education program results in problem-solving actions, whether these are single actions by a limited number of individuals or hundreds of actions by various agencies, groups, businesses, and individuals.

An education program is actually a series of small projects each with its own audience, purpose, and activities. Effective education programs are tailored to speak directly to an audience in language and symbols that are interesting and meaningful. They include

◆ the problems that exist and their significance,

◆ available controls and their effectiveness,

◆ specific actions or controls that individuals in the audience are expected to install or perform,

◆ training or other assistance to prepare individuals to install and maintain BMPs or other pollution controls, and

◆ how the controls will be evaluated, once they are installed.

CITIZEN ACTIONS Active participation in a properly designed education program is probably the area in which citizens will have the most lasting effect on a watershed project. Agencies often develop and carry out well-intentioned but ineffective education programs. Citizens should take the lead in this area. They are well-suited to design and carry out most of the educational activities in the project especially if supported by government agencies and the business community. Effective education programs are time consuming, but recall the conservation cycle (Fig. 3 in Chapter 2); they are also integral to the success of the watershed project. Use the information provided here and in Chapter 2, ideas and information from other references, knowledge of your community, and creativity to design the most effective set of education projects possible.

■ **Match the Message to the Audience.** Choose your audiences carefully to achieve both short and long-term results. Watershed projects need to educate people to accomplish both short- and long-term project goals. Audiences who can make immediate decisions on private, corporate, or public lands and facilities should receive messages related to short-term project goals—what this audience can do now. Audiences in whom you wish to inspire an environmental ethic such as children or who can enact policy changes or influence legal decisions—not only to solve problems but also to prevent problems from recurring or getting worse—should receive messages related to long-term project goals.

Audiences are different; so also are the methods of approach, the purpose, and the desired results. Decide how many resources you can devote to each audience and goal. If measurable environmental results within your watershed are necessary within a short time (less than 10 years), then concentrate your resources on teaching the audiences—however difficult they may be to reach—what actions you want them to do immediately.

The same educational techniques and messages will not fit all audiences. To create an effective education program, tailor each small project to fit the needs of your particular audience. Use the environmental, BMP, program, and activity goals set by the watershed team to divide your audience into primary and secondary audiences. Primary audiences are those particular stakeholders—individuals or businesses—whose behavior must be changed. They are contributors to the problem. Secondary or supporting audiences are those stakeholders who must be educated to help the primary audiences change their behavior. For example, a primary audience may include containerized nurseries with more than 100 acres of gravel growing beds. The accompanying secondary audiences would then include landscape architects, contractors, fertilizer dealers, and retail customers, among others.

■ **Define Each Audience as Narrowly as Possible.** Many watershed projects do not adequately define each audience. Typical short-term audiences that need narrower defining are

- ♦ individual landowners and users (farmers, ranchers, suburbanites, or rural residents),
- ♦ public land and public health managers (state and federal agencies, city and county governments),
- ♦ corporate land-use interests (logging, mining and petroleum extraction, commercial fishers, banking, construction, or raw materials processing), and
- ♦ legislative representatives.

The same principle applies to long-term audiences. Students and youth groups, civic organizations, social organizations, and teachers are too broad an audience to target effectively. Thus, the too general audience of farmers in the example above could be divided into upland cotton farmers on sandy soil and rice farmers on bottom-land soils.

■ **Identify Specific Actions to Be Taken by Each Audience and Give Them the Skills They Will Need to Complete These Actions.** You can use the following ✔ **STOP** chart to list specific changes in behavior or actions that each target audience must accomplish to meet a BMP or an environmental goal. Be careful not to confuse your method for delivering the message with the message itself (desired behavior change), or confuse the activity with the result. Remember that success is not that you did an activity (e.g., conducted three workshops) but that the primary audience made the changes you wanted.

Identify the actions that the education team must take to help the primary audience make the appropriate behavior changes or install the correct BMPs. Some watershed projects have worked cooperatively with the group or entity that is most respected or wields the most influence with a particular audience to design and implement successful educational projects.

✔ **STOP**   Target audiences and their goals.

PROBLEM	PRIMARY AUDIENCE	BEHAVIORS TO BE CHANGED	ENTITY MOST RESPECTED	STRATEGIES	ACTIONS THE EDUCATION TEAM MUST TAKE TO HELP AN AUDIENCE TO CHANGE

■ **Match the Message with the Correct Delivery Method.** The most effective education efforts involve one on one interactions with the individuals whose behavior (actions) need changing. Education efforts structured as activities (e.g., streamwalks, tree planting days) that can result in a meaningful or useful product or outcome for the community and other stakeholders are the most effective techniques for actually changing behavior. Use the delivery method that is best suited to a particular purpose. For example, newspaper announcements are a great way to inform people about an upcoming event. For this purpose, they have a high effectiveness rating. However, newspaper announcements rarely result in getting people to make major behavior changes, so for this purpose, they would have to be assigned a lower effectiveness rating. Chart 3 describes the effectiveness of some methods commonly used to deliver educational messages.

Chart 3.—Commonly Used Education Methods

METHOD	MOST EFFECTIVELY USED FOR	RESULTS
Newsletters	announce meeting time and dates, update information on actions already taken, list issues to be discussed at upcoming meeting	public awareness
Newspaper Articles	same as newsletter—provide additional detail about local success stories, photos of citizen activities. Feature articles provide information about problems and solutions.	public awareness
Demonstration Sites	exhibit new innovative technology—should be accompanied by signs, brochures, or permanent on-site interpretive staff.	public awareness, knowledge, understanding, ability (occasionally)
Printed and Taped Material (e.g., Factsheets, Videos)	explain new technology, describe case studies, provide training information for new employees, outline facts to stakeholders	public awareness, knowledge, understanding, ability (occasionally)
Signs	mark watershed boundaries, identify critical areas, promote specific behaviors in specific places, identify cooperators in project, explain adjacent project and its BMPs or provide interpretive natural resources information	public awareness, knowledge, understanding, action (occasionally) (directive signs)
Meetings	share information, plan actions, evaluate progress	public awareness, knowledge, understanding, desire/ability to act (occasionally)
Field Trips	observe resources to be protected, view BMPs installed, learn how BMPs operate, take the opportunity to monitor (assessment or compliance type) BMPs	public awareness, knowledge, understanding, desire/ability to act, or action (occasionally)
Self-completed Lists	identify problems or risks, evaluate pollution control and BMP systems installed	desire/ability to act, action
On-site Inspections	identify problems, recommend corrective actions, evaluate effectiveness of pollution controls, identify noncompliant stakeholders, educate individuals	action
Training	provide new skills to stakeholders	action
Technical Assistance	identify problems, recommend solutions, assist with installation of BMPs, educate individuals, evaluate effectiveness of solutions	understanding, desire/ability to act, action

Evaluating Progress and Making Adjustments

Don't forget how crucial routine maintenance must be. Citizens can ensure that a project includes maintenance for all types of BMPs—structures, vegetation, and management.
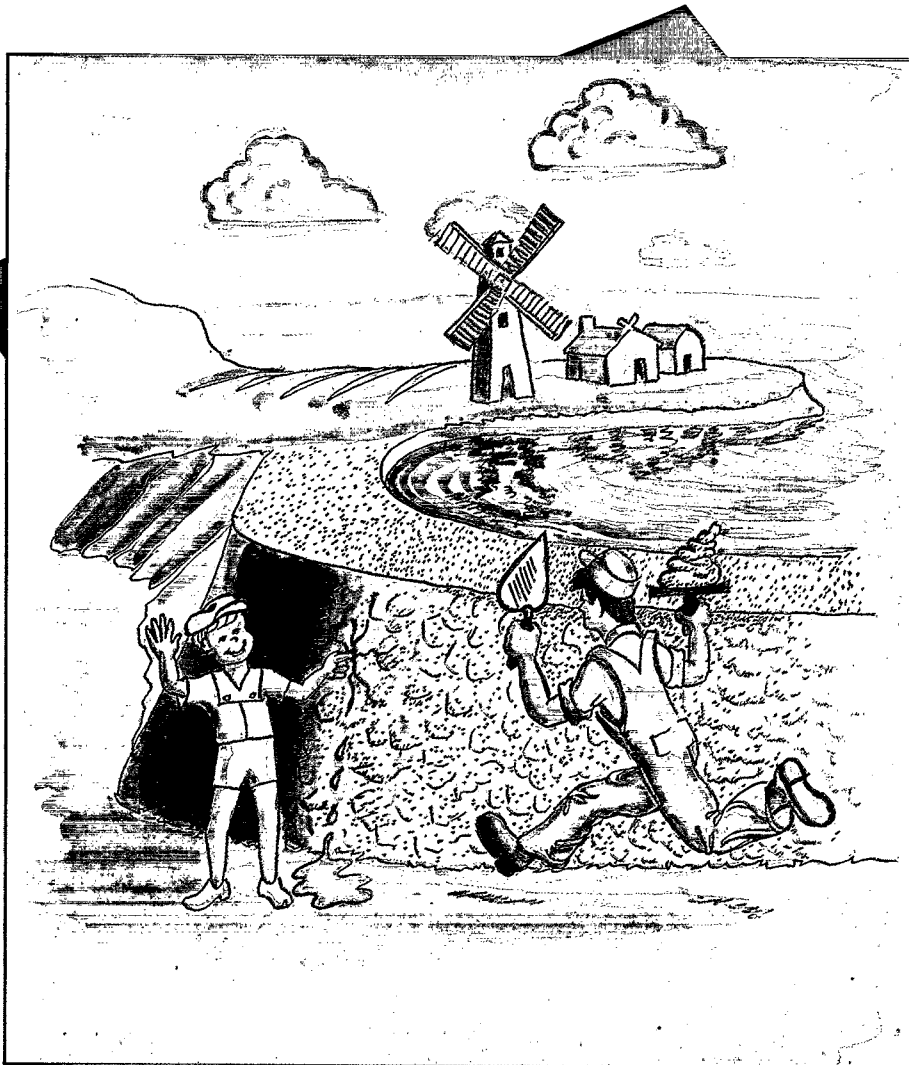
No one wants to spend money and get nothing in return. People want a return on their investments; they want a guarantee that if they invest in pollution control and prevention, they will reap the benefits of a clean environment.

Projects must show that the time and money spent were for the most effective solutions based on the best available technology and resources. Thus, even though the project team cannot guarantee that the project will be successful, because natural resource systems are too complex, being accountable is essential to maintaining public

support for the project. The environmental results of the project should also be measured as part of the accountability process.

A full project evaluation consists of measuring the achievement of administrative goals (program, BMP, and activity goals) and monitoring the observed and documented environmental results of the project. A detailed discussion of monitoring design and techniques is beyond the scope of this guide, but some general pointers are outlined in the following paragraphs. Chart 4 lists various monitoring methods that you can use to evaluate a project's progress.

Small projects are not likely to need as much monitoring or as sophisticated a monitoring strategy as larger projects. Large and complex projects will need much more data (because much more money is being spent and the system is so complex). Consult appropriate technical experts about the monitoring system design. One design shown to be especially effective in the watershed approach compared two similar small subwatersheds, one with BMPs and the other without BMPs. The subwatersheds were monitored simultaneously.

CITIZEN ACTIONS

Citizens can provide invaluable support to the project by helping agencies or governments measure BMP installation and by taking water quality samples or evaluating other environmental measures. A number of excellent citizens monitoring programs are in use throughout the country. Training in proper sampling procedures is available from well-organized national or state programs. Some watershed projects have even used citizen-gathered information in regulatory decisions. An excellent reference, *Volunteer Water Monitoring: A Guide for State Managers,* is available from EPA's Office of Water in Washington, D.C. It provides details on the components of successful programs. Private organizations such as the Izaac Walton League's Save Our Streams Program can also be a valuable source of information and training for your group.

Design a Monitoring Program

There are two types of environmental monitoring: baseline and effectiveness.

Baseline monitoring documents the existing condition of water resources and determines how much pollution each location emits. It should begin in the project planning phase before the installation of pollution controls.

Effectiveness monitoring determines the pollution removal efficiencies of various controls, documents overall environmental improvements, and monitors long-term maintenance of the improved watershed. It should begin during the implementation of BMPs and other watershed restoration measures.

Designing a monitoring program that is constant and consistent is the key to demonstrating progress. Take samples using the same parameters, locations, conditions, and methods before, during, and after project implementation so that meaningful comparisons can be made.

The monitoring program should evaluate, to the extent possible, physical, chemical, and biologic changes in the environment so that the overall health of the watershed can be determined. Such an integrated sampling strategy will monitor changes in the water column, fish and wildlife habitat, and the extent and diversity of aquatic life, to give stakeholders a holistic view of the progress and improvements being made. Monitoring only one type of change (for example, water chemistry) may not show progress as quickly as a more diverse monitoring strategy. Remember—early progress backed by actual environmental data strengthens your project.

The monitoring program should be consistent with project goals. Thus, if the project has program, activity, BMP installation, and environmental goals, the monitoring program should measure progress on all four goals. Some measurements will be actual water quality, fish, or vegetation samples. Other measurements may include counting the installation of BMPs or other pollution control measures, taking before and after photographs of rehabilitated areas, and keeping track of program changes and actions.

Documenting Administrative Accomplishments

Showing actual environmental improvement can take years. Project managers and supporters need continual feedback. Other measures of improvement can be used to document interim progress. The following list contains a number of methods that can be used to measure particular goals:

■ **Program Goals:** periodic written reports, public meetings, management and financial records (for example, documentation of shifts in time and resources by key agencies or stakeholders).

■ **Activity Goals:** simple tracking or reporting forms, systems, or data files for each responsible agency to report progress by activity (for example, data on the number of educational presentations given, number of irrigation systems evaluated, number of septic tank installations inspected).

■ **BMP Goals:** lists, maps, reports, photographs by problem and by small subwatershed area of specific BMPs installed within a time period (for example, number of animal waste lagoons in subwatershed A, number of suburban landscapes installing native plants, number and location of detention ponds in subwatershed B).

■ **Interim Water Quality Goals:** loading calculations based on models or equations comparing before and after movements of chemicals and sediment through the watershed. Results from actual water or biological samples collected at specific locations.

TYPES OF PROJECT EVALUATION	LOCATIONS FOR SAMPLE COLLECTION, DATA RECORDING, AND USEFULNESS
Chart 4.—Monitoring Methods	
Physical Water Quality Monitoring (DO, pH, etc.)	in-stream—tributaries above and below BMPs or at the mouth of the watershed. Edge of field—runoff from the edge of a land area vadose zone—water samples taken from below the root zone of plants aquifer—samples collected from special wells
Chemical Water Quality Monitoring (Metals, Nutrients, Hydrocarbons)	all of the above
Biological or Aquatic Life Measurements (Insects, Algae, Fish, Habitat)	in-stream—tributaries above and below BMPs or at various points in the mainstem of the major waterbodies
Habitat (Riparian)	see "biological" above
Photographic or Visual Evidence	of BMPs, of water samples collected in clear jars (turbidity), of sediment sample depth, of the streamside vegetation before, during, and after the project, of the water before, during, and after the project
Inventory of Number and Location of BMPs	tally number and kinds of BMPs per subwatershed, plot BMPs on maps
Upland Vegetation Density and Composition	the adequacy of vegetative cover during various seasons—record on maps or use as data for mathematical models
Wildlife Population	transect surveys and biological inventories
Soil Erosion Rates	edge of field and sometimes edge of watershed—a simple mathematical calculation used for comparison or as partial data for a more complex model
Loading Calculations	based on environmental measurements taken within the watershed area before, during, and after BMP installation

Make Mid-Course Corrections

Midway through the project at least one or more complications may appear:

- ◆ you are solving the wrong problem;
- ◆ you have solved one problem but find another, more difficult one behind it;
- ◆ the project is not effectively reaching any goal;
- ◆ the project will reach some program or activity goals but no water quality goals;
- ◆ you have set the wrong water quality goals; or
- ◆ your water quality goal is set for the right parameter, but is too low to solve the problem.

These problems are standard complications for any project because even projects with extensive land use and water quality databases and the most sophisticated mapping and modeling tools have information gaps. Project decisions must be made based on the best information available, and some of those decisions will not be completely right.

Recognize this reality from the first day of the first planning meeting. Build into the project yearly evaluations and a point at which all aspects of the project can be reviewed and revised if necessary. If the evaluation identifies problems, be prepared to change time frames, goals, objectives, actions, incentives, regulations, or BMPs to put the project back on course.

Regular evaluations can help spot project problems early. One way to evaluate progress is to have different groups of stakeholders, including citizens, independently review each portion of the project using the same evaluation criteria. Agree on the criteria before the project begins. An annual meeting of all evaluators should be held to compare and discuss their conclusions and to reach a consensus on overall project performance, list of activities that must be modified, corrected, or changed completely, and the process and timetable to do so.

The following evaluation questions have been used by other watershed projects to make mid-course corrections.

- ◆ Are the correct BMPs and other pollution control measures being installed in the target areas?
- ◆ Are pollution controls being installed correctly and on schedule (in critical areas and throughout the watershed)?
- ◆ Do the BMPs and other controls appear effective?
- ◆ What visual evidence supports these findings?
- ◆ What do the water quality data show?
- ◆ How is the biological system responding?

- ◆ Are all stakeholders "doing their part" (meeting commitments for time, funds, labor, and other resources)?

- ◆ Who is lagging and why?
  - ▪ Agencies?
  - ▪ Local government?
  - ▪ Business interests?
  - ▪ Individuals/private citizens?

CITIZEN ACTIONS

Citizens should participate on evaluation teams and ensure that the annual evaluation is widely publicized. Stakeholders who are not fulfilling their commitments should be publicly identified. Citizens should ensure that corrective action schedules are sufficiently rapid.

Practice Continual Maintenance

One of the least discussed and most difficult parts of a project is maintenance. Many times project planners forget to include a complete maintenance outline in the workplan and forget to secure or provide funding for continued maintenance. It is often assumed that maintenance takes care of itself or that delegating responsibility to local governments without any additional support is workable. Projects tend to collapse and the stakeholders to disband once BMP installation funds are expended or when the initial problems are solved. A watershed pollution control program without regular and ongoing maintenance cannot work—the problem will come back.

Current stakeholders must continue to maintain BMPs and pollution controls even if the economics of the situation change. New growth, like housing developments, dairy farms, highways or bridges, must be held to the BMPs and pollution control measures used in the project (or to a higher level of treatment if needed) possibly without compensation in the form of cost-share or other grant monies. For these newcomers, the cost of pollution control is a part of doing business. Consider these key points:

- ◆ Education and training of newcomers and continuing education and reinforcement for current cooperators are essential project components.

- ◆ Regulations can help ensure controlled growth in the community.

- ◆ Maintenance programs must be self-supporting. Individuals and businesses will need to absorb the cost of these activities on the land and facilities under their control, while municipalities and other local governments or agencies will need to absorb the costs of education and program administration.

◆ If the project develops and encourages private enterprise support services for BMPs or other pollution control maintenance (for example, an animal waste lagoon pump-out service, a household hazardous waste collection service, a landscape design service and nursery specializing in resource efficient plants), ongoing maintenance will be easier; however, the project itself cannot relinquish its maintenance responsibility.

When agreeing on critical actions, scheduling activities, and securing commitments, be sure to include ongoing and routine maintenance as part of the plan.

CITIZEN ACTIONS If you and the project team have come this far, you are obviously careful and committed folks! And you will know from experience that watershed projects involve complex but not impossible tasks. Common sense, getting the most pollution control for the least tax dollars, and keeping everyone working together even when they don't all agree are hallmarks of a successful project. Above all, don't be shy. Ask questions. Find out what others are doing. Your involvement will—it can be hoped—ensure that additional support services become available for grassroots projects. Consult your state's water quality agencies for new databases and advice.
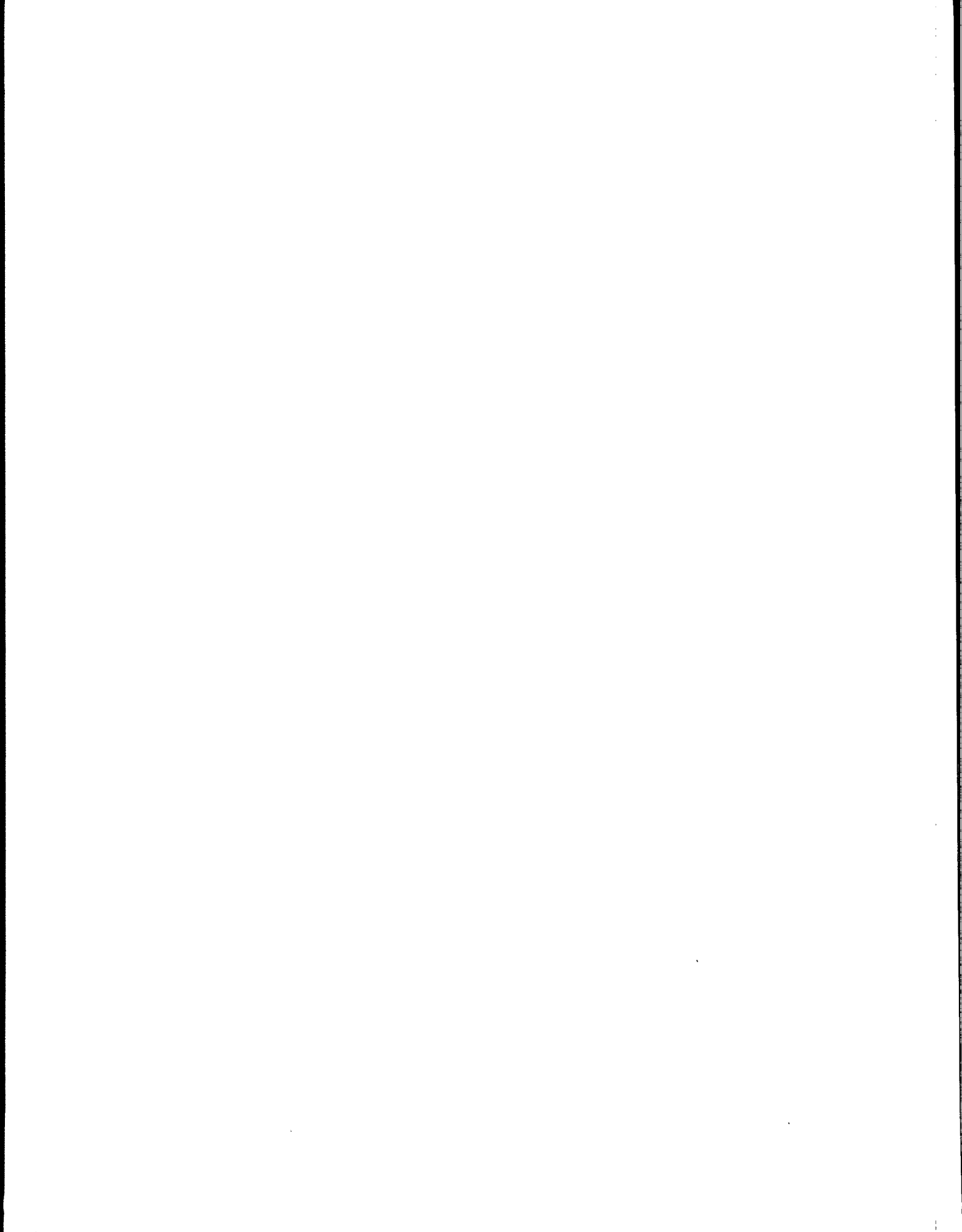
Watershed Restoration and Pollution Control Summary of Programs

Table 1.—Summary of Watershed Restoration and Pollution Control Programs

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Environmental Protection Agency (EPA)	Administers educational and regulatory programs designed to protect the environment (prevent and control pollution). Provides environmental assessments, water quality monitoring, regulations and regulatory oversight, education, planning, technical assistance, grants and loans for pollution control. *Works mainly with state, federal, regional, and local agencies on pollution control efforts.*	Staff, information, and data, laboratories and research facilities, grants and loans for pollution control, educational materials, monitoring equipment. *Offices located in 10 regional centers and Washington D.C.*
EPA Permits	NPDES permits for industries, cities, and confined animal feeding operations. Enforcement for noncompliance.	Staff for technical assistance with modeling and permit drafting, site inspections, and compliance monitoring. Funds for special studies or projects.
EPA Pesticides	Regulation of pesticide labeling and registration, which includes application rates, allowable crops and pests, environmental and human health cautions, disposal procedures. Licensing of restricted use pesticide applicators.	Staff for review of research results, assistance with strategic planning, education and training, oversight of enforcement procedures of states. Funds for special projects and studies.
EPA Water Quality	Overall water quality planning and management **1.** Nonpoint Source Control program oversees and approves state development of water quality assessments and implementation of management programs designed to control NPS. Directs funds to high priority watersheds or projects. **2.** Clean Lakes program provides funds to restore or enhance publicly owned lakes.	Staff for technical assistance to state and local agencies, review and approval of state programs, research and special studies. Grants to states for most water quality protection activities, educational materials and programs. Funds for special studies or projects.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)		
AGENCY AND PROGRAM	**PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES**	**RESOURCES AVAILABLE AND POSSIBLE ROLES**
U.S. Environmental Protection Agency (continued)		
EPA Water Quality (continued)	**3.** Water Quality Standards program provides technical assistance in developing numeric, narrative and biological limits (standards) to protect water quality and its use. **4.** Coastal Zone programs oversees a number of different programs and initiatives designed to assess coastal resources and study ways to protect coastal waters. Includes the National Estuary program. Administers the new CZMA.	Staff for technical assistance to state and local agencies, review and approval of state programs, research and special studies. Grants to states for most water quality protection activities, educational materials and programs. Funds for special studies or projects.
EPA Groundwater	Administers the Sole Source Aquifer Protection Program and provides technical and programmatic assistance to state wellhead protection programs.	Staff for technical assistance. Funds for special studies.
EPA Wetlands	Cooperatively administers with the Corps of Engineers on wetlands dredge and fill permits. Enforcement actions for illegal wetlands filling. Technical support for wetlands delineations. Research and education about wetland values and function.	Staff for oversight and enforcement activities, monitoring of wetland status, health and trends. Funds for special studies, educational materials and programs. Data.
EPA Monitoring and Surveillance	Environmental assessment, data analysis, oversight of state monitoring programs, special studies and agency research, EPA lab and Office of Research and Development coordination.	Staff for technical assistance to states and citizens on monitoring programs and projects, special studies and data analysis upon request, water quality monitoring at select locations.
EPA Drinking Water	Regulates public drinking water supplies and suppliers, special studies on human health and risk, develops drinking water criteria and maximum contaminant levels (MCLs). Administers a special program that allows watershed treatment work to be done to decrease pollution loads to drinking water supplies if installation of the BMPs is cheaper than the water treatment method needed.	Staff for technical assistance in setting drinking water standards. Special studies, oversight and compliance monitoring of public water supplies and suppliers.

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Environmental Protection Agency (continued)		
EPA National Environmental Policy Act (NEPA)	Reviews and comments on other federal agencies' environmental impact statements (EISs) and prepares EISs for EPA-sponsored projects.	Staff for technical assistance in preparing NEPA documents. Staff for review of pollution control techniques required as part of federal action.
EPA Office of Research and Development (ORD)	Conducts basic and applied research to support EPA's mission, including biological and physical studies on fate and transport of environmental contaminants. Studies ecosystems at large.	Reports, data, maps, monitoring equipment, study and demonstration sites. Staff for technical assistance in interpreting research results. *Laboratories and research stations located throughout the country.*
U.S. Department of Agriculture (USDA)	Stabilizes and supports the efficient production, marketing and distribution of food and fiber. In addition to commodity and public welfare programs, USDA administers a number of conservation programs designed to assist private and federal land owners or managers in natural resource conservation and multiple use management. *Works mainly with private individuals on improving resource management.*	Staff, technical assistance, information and data, educational materials, cost-share funds, engineering equipment. *Unless otherwise indicated, each agency has field offices located in almost every county or parish, and state offices in each state and Washington D.C.*
USDA—Multiple agency administration of the 1985 and 1990 Farm Bill programs:		
Conservation Reserve Program	Program to conserve and protect highly erodible or other environmentally sensitive land from production by putting it in permanent vegetative cover through 10 year easements and annual rental payments.	In most cases responsibilities within these programs are divided between various USDA departments: **SCS**—technical assistance in planning, design and implementation of BMPs.
Wetlands Reserve Program	Program available only in pilot states to return drained wetlands to wetland status and protect existing wetlands. Uses same easement/payment method as CRP.	**ASCS**—Administrative oversight of program and cost-share funding disbursement. **CES**—Education and information about the variety of conservation and economic choices available.
Sustainable Agricultural Research and Education Program	A practical research and education and grant program to promote lower input methods of farming.	**CSRS**—Research, data, and the results of demonstration field trials of new technologies.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Department of Agriculture (continued)		
Conservation Cross Compliance (Sodbuster and Swampbuster)	A quasi-regulatory program that denies subsidy payments to farmers who plow highly erodible land or drain wetlands.	In most cases responsibilities within these programs are divided between various USDA departments:
Water Quality Incentives Program	A watershed treatment program designed to improve or protect soil and water resources in watersheds impacted or threatened by NPS pollution.	**SCS**—technical assistance in planning, design and implementation of BMPs. **ASCS**—Administrative oversight of program and cost-share funding disbursement. **CES**—Education and information about the variety of conservation and economic choices available. **CSRS**—Research, data, and the results of demonstration field trials of new technologies.
USDA Soil Conservation Service (SCS)	Technical assistance on planning, site specific design, and installation and management of soil and range conservation, animal waste, and water quality management systems. Special land and water resource assessments and inventories. Cost-share funds for installation of BMPs on private lands are available from some programs.	Staff and equipment in field offices for technical assistance including engineering designs, survey work, and planning for water resource protection.
USDA SCS—Small Watershed Program (PL-566)	Evaluation and treatment of small agricultural watersheds with multiple resources to protect. Includes targeting of resources for both technical and financial assistance and educational programs.	Staff for technical assistance to landowners and decisionmakers in the watershed and funds for demonstration projects.
USDA SCS—Great Plains Conservation Program (GPCP)	Intensive conservation treatment for individual farms located within the Great Plains ecoregion through long-term agreements (3-10 year contracts) with farmers.	Technical assistance and cost-share funds up to 75 percent of the average cost of selected high priority conservation practices.
USDA SCS—Resource Conservation and Development Program (RC and D)	Program to provide local governments in authorized areas help in planning and using natural resources and in solving local problems.	Planning assistance for small communities for communitywide resource protection. Provides financial assistance up to 25 percent of a project—not to exceed $50,000.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Department of Agriculture (continued)		
USDA SCS—River Basin Program	Program to assist states and local governments to identify water and related land resource problems, evaluate alternative solutions, and develop their implementation program.	Staff for technical assistance to decisionmakers for inventory and planning activities.
USDA SCS—Natural Resource Assessment Programs: Soil Survey, Natural Resources Inventory	Various programs to map and assess the condition of natural resources (soil, water, vegetation and wildlife) and conservation treatments.	Maps, reports, data information, statistical analysis.
USDA Agricultural Stabilization and Conservation Service (ASCS)	Provides administrative oversight and cost-sharing programs for approved conservation practices from ASCS and other USDA administered programs. Tracks crop production and other statistics. Distributes crop subsidy and deficiency payments.	Maps, conservation practice status information, cost-share funds.
USDA ASCS— Agricultural Conservation Program (ACP)	Cost-sharing on an annual basis for a number of soil conserving, production improving and water quality practices.	Funds for cost share, generally limited to $3,500 per farm per year.
USDA ASCS— Emergency Conservation Program (ECP)	Cost-sharing on an annual basis to replace conservation treatments (mainly structural) that were destroyed in areas designated as natural disaster areas.	Funds for cost share of high priority conservation practices.
USDA ASCS—Water Bank Program	Designed to improve and restore wetland areas through financial compensation for 10-year easements on private property.	Funds for easement compensation on eligible lands in participating states.
USDA ASCS— Colorado River Salinity Control Program (CRSCP)	Financial assistance on farm projects that seek to control salinity levels delivered to the basin, primarily irrigation water management.	Funds, reports, data on level of conservation treatment and demonstration sites. Funds for cost-share, monitoring and education.
USDA ASCS— Forestry Incentives Program (FIP)	Cost-share to revegetate and improve timber stands on private lands.	Cost-share funds

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)		
AGENCY AND PROGRAM	**PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES**	**RESOURCES AVAILABLE AND POSSIBLE ROLES**
U.S. Department of Agriculture (continued)		
USDA Cooperative Extension Service (CES)	Educational programs and information to aid individuals in the selection, operation, and maintenance of the most beneficial conservation treatments. Economic analysis and data for each farm or ranch. Provides technical assistance in integrated pest management and landscape issues. Programs generally carried out in cooperation with state land-grant universities.	Staff to offer educational programs and technical assistance and personalized economic analysis. Coordinates small scale demonstrations on local farms. Educational materials.
USDA Cooperative State Research Service (CSRS)	Applied research, usually at state experiment stations on agricultural production and soil and water conservation generally using demonstration plots. Conducts the Sustainable Agriculture Research and Education program (SARE). Many projects in cooperation with state land grant universities.	Reports, data, equipment. Occasionally has funds for joint or special projects outside the normal research agenda. Grants for Agriculture in Concert with the Environment (ACE) program.
USDA Forest Service (FS)—National Forest System (NFS)	Management of national forests and grasslands for sustained production and multiple use. *Works with individuals, industries and other agencies.*	Staff, maps, reports, equipment for construction and monitoring, educational materials. Occasionally has funds for special projects. *Field offices located in each national forest, regional offices located in 9 areas. Washington D.C. office.*
USDA NFS—Permit Program	Oversight of timber sales and harvest contracts, grazing leases, and minerals developed on FS property. Provides technical assistance to permittee in proper resource use.	Staff for technical assistance and compliance monitoring.
USDA NFS Air and Watershed Programs	Overall environmental planning and technical support for forest management decisions. Special studies and watershed demonstration projects in certain areas.	Funds for special studies and watershed demonstration projects. Natural resource inventories and reports, water quality or habitat monitoring, environmental analysis of resource trends and conditions.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Department of Agriculture (continued)		
USDA NFS—Research	Basic and applied research on range and forest lands.	Technical papers on effects of management on water quality.
USDA NFS—State and Private Forestry—Forest Stewardship Initiative	Technical assistance and cost share to private inholding or lands adjacent to National forest lands for installing BMPs.	Funds and technical assistance to individuals.
USDA Farmers Home Administration (FmHA)	Loans and loan guarantees to eligible producers for operating expenses, land purchase and conservation measures.	Funds and loans for property improvement and conservation, treatment installation, and water conservation practices. *Located in counties, states, and national offices.*
USDA Agricultural Research Service (ARS)	Basic and applied research on agricultural production and conservation measures, including fertilizers, pesticides and BMP effectiveness.	Reports, BMP effectiveness and environmental fate and transport data, demonstration sites, occasionally funds for joint sponsored projects. *Research stations located throughout each state, most specialize in particular types of investigations.*
U.S. Department of Commerce—National Oceanic and Atmospheric Administration (NOAA)	Administers programs in cooperation with states to inventory and manage coastal resources. Funds and performs basic research and assessments relating to coastal eutrophication. Maintains data base for agricultural pesticides and nutrient loadings.	Funds to state coastal programs. Staff for technical assistance. Data, reports, and educational materials. Occasionally administers funds for special demonstration projects.
NOAA—Coastal Zone Management Act Programs (CZMA)	Administers a quasi-regulatory coastal protection program (in cooperation with EPA) that sets performance-based management measures for control and prevention of nonpoint source pollution in coastal areas for all land use activities.	Staff for technical assistance. Funds for plan development.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)		
AGENCY AND PROGRAM	**PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES**	**RESOURCES AVAILABLE AND POSSIBLE ROLES**
U.S. Department of Defense (DOD) Army Corps of Engineers (COE)	Oversees construction and operation of large flood control and public water supply reservoirs and conducts water quality monitoring on lakes within its jurisdiction. Regulates in lake activities and shoreline development. Cooperatively administers wetlands dredge and fill permit program with EPA and Fish and Wildlife Services. Can enforce permit requirements for wetland BMPs or other mitigation measures.	Maps, special studies, water quality monitoring data. Staff and funds for improvement of existing projects. Staff for review and oversight of 404 (wetlands) permits. *Field offices located in various districts through out states. Washington D.C. office.*
U.S. Department of the Interior (DOI)	Oversight, management, or monitoring of national natural resources, including land, water, and wildlife.	Staff, maps, reports, demonstration sites, educational materials, monitoring equipment. *Offices located in regional centers, field offices in each management area, Washington D.C. office.*
DOI Fish and Wildlife Service	Oversight and regulation of the nation's wildlife resources. Management of national wildlife reserves, enforcement of federal game and fish laws, cooperative administration of national wetlands program with the Corps of Engineers and the Environmental Protection Agency. Cooperative projects to enhance wildlife habitat, special studies especially fisheries investigations.	Staff for enforcement of Endangered Species Act and other laws on public and private land, research reports and data on habitat, populations and management of wildlife. Funds for cooperative projects. Educational materials, teacher training, curricula, and maps.
DOI Bureau of Land Management (BLM)	Administration and management of federal lands. Oversight of grazing leases, mineral exploration and extraction bids and leases on BLM lands. Technical assistance to permittees on BLM land in proper resource use. Oversight of recreational users of BLM land.	Staff for environmental analysis and trend evaluation on BLM land, technical assistance, and oversight. Funds for special studies and cost-share for permittees for certain conservation practices (generally grazing/range management). Funds for range improvement, riparian area management, and recreational area development projects. Maps.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
U.S. Department of the Interior (continued)		
DOI Bureau of Indian Affairs (BIA)	Technical assistance to tribes on tribal lands mainly for social services. Some assistance for conservation work and educational programs. Natural resource inventories and monitoring of ground and surface water.	Maps, natural resource inventories of Indian and tribal lands. Funds for special projects. Staff for technical assistance to tribes.
DOI Bureau of Reclamation	Administers, constructs, and oversees water supply facilities in western states. Regulates discharge from these facilities. Joint administration of the Colorado River Salinity Control Program with many agencies to set consistent salinity standards and manage public and private lands within the basin. New initiative to reclaim lands damaged by federal irrigation projects.	Staff for oversight of projects and management of federal property and facilities, assessment of water quality around reservoirs as part of the national irrigation water quality program. Maps and reports, some data.
DOI National Park Service	Administers and manages national parks for preservation of natural resources.	Staff for oversight and administration. Funds for special studies and occasionally cooperative projects on land adjoining park boundaries.
DOI Office of Surface Mines (OSM)	Regulates the removal and reclamation of surface mined minerals mostly coal on private lands.	Staff for oversight and technical assistance in mining operations, reclamation efforts, and engineering studies. Vegetative site inspections and monitoring of resources. Educational materials, data and reports.
DOI U.S. Geological Survey (USGS)	Long-term baseline monitoring of water resources (quantity, flow, and quality), hydrologic and geologic investigations and data, special intensive short-term studies.	Maps, data and information on hydrology and water quality status and trends. Staff for technical assistance in designing a monitoring plan.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)		
AGENCY AND PROGRAM	**PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES**	**RESOURCES AVAILABLE AND POSSIBLE ROLES**
State Water Quality Agencies	Administer many programs (similar to EPA's) for protection of water quality in ground and surface waters, including the NPDES permit program, water quality standards regulations, the nonpoint source program, and ambient statewide monitoring programs.	Staff for technical assistance to local governments and individuals implementing BMPs. Water quality monitoring, data, and reports. Funds for pollution control projects, educational materials, and programs.
State Natural Resource Agencies	Administer programs for wetlands and coastal protection programs.	Staff for technical assistance to local governments. Monitoring of natural resource trends, reports, and data. Educational materials and programs.
State Departments of Agriculture	Regulate pesticide registration and use and administer marketing and rural development programs. Sometimes issues permits for fertilizer or feedlots.	Staff for oversight of pesticide applicators and other regulatory functions.
State Forestry Commissions or Departments	Oversight of activities on state forest lands. Administration of forest practice laws or BMP regulations.	Staff for site inspections, technical assistance, and education for private landowners and state forests. Information about forest resources.
State Cooperative Extension Services	Natural resource, family health, and agricultural production education and training programs for citizens.	Staff, reports, educational materials, technical assistance. *Field offices located in each county or parish, or state office connected with land grant universities.*
State Parks and Tourism Departments or Bureaus	Administer programs to promote tourism and the use of state parks for recreation.	Maps, signs, educational materials. Occasionally small grants for historic preservation or local development.
State Natural Heritage Commissions or Boards	Administer programs to educate people and preserve historic and cultural resources.	Maps, signs, educational materials.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

| AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
State Water Quality Agencies (continued)		
State Highway or Transportation Departments	Oversee design, construction and maintenance of state and federal highways. Provides assistance to local governments on road related issues. Responsible for erosion and pollution control along highway right-of-ways and during construction and maintenance activities.	Maps, signs, educational materials, maintenance equipment, and flower and grass seeds. Technical assistance for local governments. Sometimes funds for special studies or beautification projects.
State Public Lands Commissions or Boards	Oversee the administration of state lands. Generate revenues for state treasury.	Natural resource information and maps.
State Natural and Scenic Rivers Commissions	Oversee use and protection of state designated scenic rivers. May levy taxes and take enforcement actions to protect the river.	Staff for river protection and (sometimes) assessments. Occasionally funds special protection or improvement projects.
State Livestock and Poultry Boards or Commissions	Regulates health, welfare and safety of livestock, poultry production and products.	Staff for site inspections, technical assistance, and enforcement actions. Sometimes special studies and reports.
State Water Well Board	Regulates the drilling of new wells and the sealing of old ones.	Staff for site inspections, technical assistance and enforcement. Educational materials and training for drillers.
State Oil, Gas, and Minerals Department or Commission	Oversees the leasing, production, and administration of state and privately owned natural resources. Responsible for spills and environmental programs related to petroleum.	Staff for oversight and inspection including site-specific environmental audits and spill prevention and clean-up.
State Plant Board	Administers programs that evaluate mainly agricultural plants and conservation plantings.	Staff for technical assistance. Special studies and reports.
State Departments of Health	Administers septic tank and public drinking water regulatory programs. Monitors water supplies. Provides technical assistance to local governments.	Staff for technical assistance to local governments, monitoring, and educational programs. Data, reports, and educational materials.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
State Water Quality Agencies (continued)		
State Soil and Water Conservation Commissions	Administer cooperative programs with the USDA SCS to conserve soil and water resources on private lands. Provide technical assistance to individuals.	Staff for technical assistance to individuals, engineering or construction equipment, services and supplies that support BMP implementation. Some states have state cost-share funds for BMPs.
State Fish and Game Agencies	Regulate the harvest of fish and wildlife resources by individuals and commercial operations. Responsible for cost recovery to state of lost fish and wildlife due to environmental contamination.	Staff for enforcement of state fish and game laws and for technical assistance in wildlife and fisheries management for private individuals. Educational materials, natural resource inventory data.
State Water Rights Agency	Responsible for allocation of water rights (mostly in western states). Regulates consumptive use of water resources.	Staff for permit writing and oversight. Data and reports on water flow.
Local Planning and Zoning Boards, City Planning Commissions, County Planning Boards	Specify land use zoning and boundary determinations, general community planning, oversight of program operation	Maps, long range plans, inventory of local resources, special reports, budget information, staff for technical assistance.
Local County Judge, Commissioners Court or Parish Police Jury	Manage, construct and maintain county roads and bridges, oversight and approval of county budgets for all county programs. Taxing authority.	Information on county conditions, equipment for construction and maintenance, budget reports Occasionally funds for special projects.
Local SWCDs	Local field office of state agency see above	
Local Erosion and Sediment Control Districts	Responsible for oversight of activities which could cause erosion and sedimentation.	Staff for on-site inspections, technical assistance, and sometimes enforcement actions.
Local Irrigation or Acequia Districts	Regulate local water use and maintain public or jointly owned irrigation projects. Responsible for control of pollution and erosion from projects.	Maintenance workers.
Local Flood Control, Water Management or Subsidence Districts	Regulate water and land use and management to prevent subsidence or flooding.	Staff for on-site assessments and inspections, maps, reports, land use data, zoning information.
Local School Board and School Administration	Oversee public education within jurisdictional boundaries. Can set local curricula requirements and priorities. Taxing authority, bond issuing authority.	Information on status of current educational programs, assistance in developing new initiatives.

Table 1.—Summary of Watershed Restoration and Pollution Control Programs (continued)

AGENCY AND PROGRAM	PROGRAM DESCRIPTIONS AND AGENCY RESPONSIBILITIES	RESOURCES AVAILABLE AND POSSIBLE ROLES
Local Planning and Zoning Boards, City Planning Commissions, County Planning Boards (continued)		
Local Municipal Utilities Districts	Oversees construction and maintenance of public works projects for water and sewer (occasionally energy). Taxing and bond issuing authority.	Information and special reports on water issues. Funds for special projects to enhance system operation and reduce costs.
Regional River Authorities	Manage and coordinate activities within their basin for flood control, water quality protection, energy development. Taxing authority.	Data, reports, maps, water quality monitoring. Staff for technical assistance to local government and other agencies or groups. Funds for special projects.
Regional Planning Commissions and Councils of Government	Assist in the coordination of activities of all governments within the councils area. Provides technical assistance, information and promotes special projects of benefit to all.	Staff for technical assistance to local governments. Occasionally water quality monitoring, reports and data about local conditions. Funds for special projects.
Others—Commodity Groups	Various groups usually formed to improve marketing and lobbying capabilities for specific crops or livestock interests. Almost every major crop has at least one such group.	Staff for data gathering and analysis, public education campaigns, technical support to growers, legislative and market analysis. Funds from members for special projects.
Environmental Organizations	Various groups formed to protect, conserve or preserve the environment in general or to address a specific issue. Lobby for environmental laws and programs as well as funding. Many perform volunteer services such as water quality monitoring, natural resource rehabilitation work, cost-share or other funds for special projects. Too numerous to list, consult a directory.	Staff and volunteers for assistance with local projects. Educational materials and programs. Reports and data on environmental conditions and trends. Occasionally funding for cooperative work.
Social and Service Clubs	Formed for reasons other than resource protection: most do have local projects that enhance or beautify the community. Staffed with volunteers, these organizations can provide labor, supplies and equipment on mutually beneficial projects as well as insight into the community.	Volunteers for special projects.
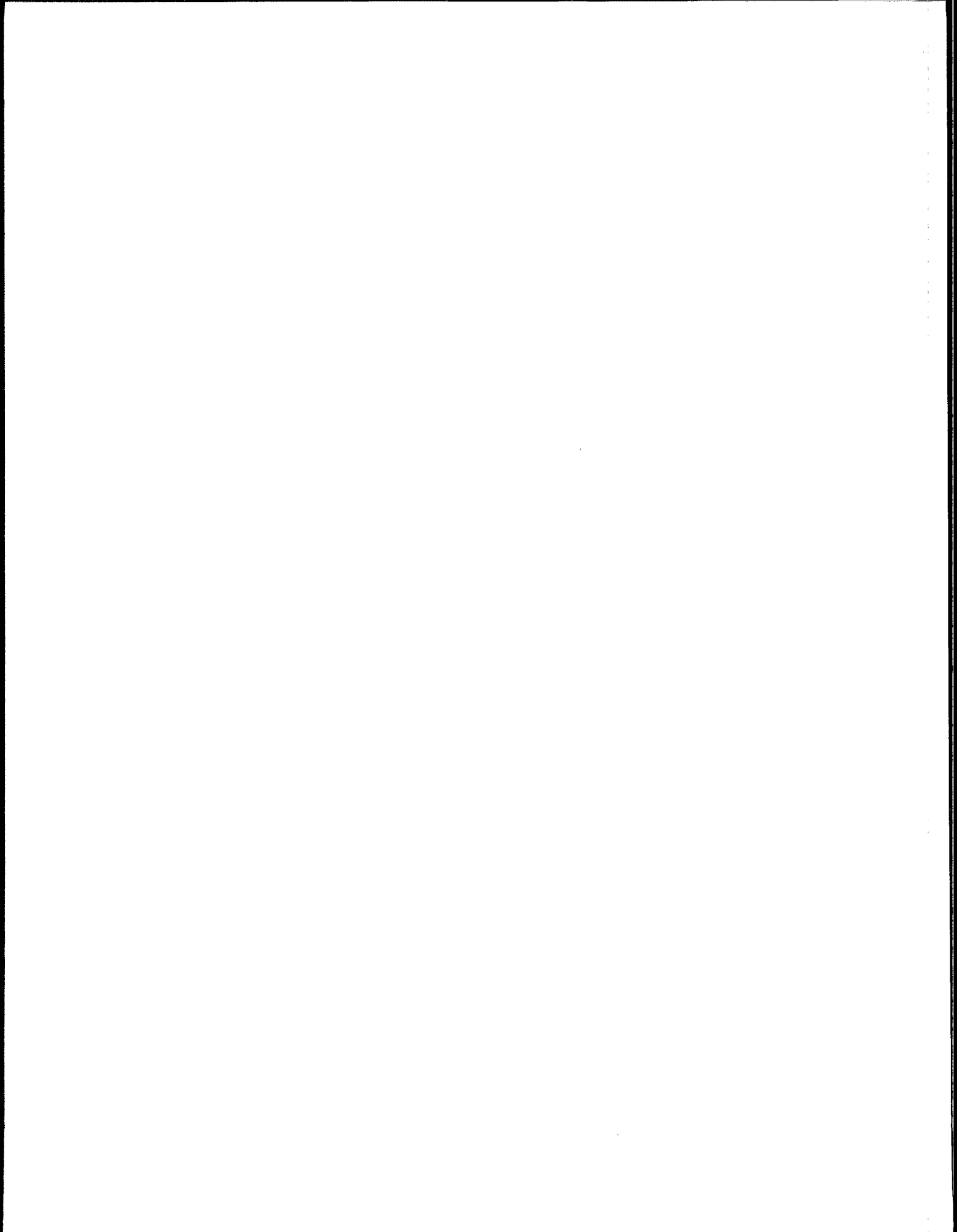
Selecting BMPs and Other Pollution Control Measures

There are two ways to decide which pollution controls or BMPs to install—by source or by pollutant. They are generally used for different purposes. Selecting BMPs by pollution source is most effective in preventing pollution or minimizing the impact of any pollutant on the environment. Selecting BMPs by pollutant goes the next step further; it prevents new pollution from occurring but also attempts to clean-up or solve problems caused by past actions. When selecting BMPs by source, the watershed project chooses from a predetermined list of minimum BMPs for that particular source or land use. Thus, for example, on land used to grow nonirrigated cotton, a specific series of BMPs would be installed that would be different from those installed on land used for construction of homes. When selecting BMPs by pollutant, water quality is monitored and environmental assessments performed to determine the type of pollutants or environmental changes affecting the specific water and disrupting its use. The BMPs are then chosen based on the results of the chemical, physical, and biological analysis of the water and the watershed. With both methods, after the installation of pollution controls, the water and the landscape must be monitored to make sure the problem is corrected. If not, additional controls must be installed.

Most BMP and other pollution control guides are organized by source (for example, in land use or industrial facilities), but most environmental information is based on observation and analysis of specific pollutants and the changes produced in the ecosystem. It is usually necessary to use both methods simultaneously as complementary mechanisms.

Selecting BMPS by Source

BMPs and other pollution control measures can be chosen by pollution source using a technology-based approach. In the past, this method has been most often used in state and federal point source control programs in which industries are required to install certain standard pollution controls called Best Available Treatments (BATs). In this way, all similar industries are treated equitably and none has an unfair trade advantage because the cost of pollution controls is the same for all competitors. This technique has also been used successfully in watershed projects (which treat both point and nonpoint source pollution problems at the same time), for example,

in the Chesapeake Bay. For each land use a minimum set of BMPs are to be installed by the responsible party. Some coastal watersheds are also requiring this technology-based approach. The EPA has a compendium of minimum nonpoint source controls for its coastal programs that can be useful anywhere. Similarly, the states also use regulations and special technical guidance setting minimum loads and specifying treatment for point source dischargers.

Selecting BMPs by Pollutant

BMPs and other pollution controls can be selected based upon the types of pollutants found in the water or the environmental damage (e.g., denuded streambanks) that must be corrected. The following table is for illustration purposes only. It can be used to help stakeholders understand the process and many options that technical experts must evaluate when selecting BMPs.

Table 2.—Selecting BMPs by Pollutant: Rules of Thumb (continued)				
POLLUTANT	METHODS OF CONTROL	STRUCTURAL	VEGETATIVE	MANAGEMENT (O&M AND BMP)
Sediment: (TSS = Total Suspended Solids, Cobble Embeddedness Turbidity)	Control erosion on land and streambank	• Terraces • Diversions • Grade stabilization structures • Streambank protection and stabilization	• Cover crops and rotations • Conservation tillage • Critical area planting	• Contour farming • Riparian area protection • Proper grazing use and range management
	Route runoff through BMPs that capture sediment	Sediment basins	• Filter strips • Grassed waterways, • Stripcropping • Field borders	
	Dispose of sediment properly			Beneficial use of sediments—wetland enhancement
Nutrients: N = Nitrogen, P = Phosphorus, (Nuisance Algae, Low Dissolved Oxygen, Odor)	Minimize sources	• Animal waste system (lagoon, storage area) • Fences (livestock exclusion) • Diversions • Terraces	• Range management • Crop rotations	• Range and pasture management • Proper stocking rate • Waste composting • Nutrient management

		Table 2.—Selecting BMPs by Pollutant: Rules of Thumb (continued)		
POLLUTANT	**METHODS OF CONTROL**	**STRUCTURAL**	**VEGETATIVE**	**MANAGEMENT (O&M AND BMP)**
Nutrients: **N = Nitrogen,** **P = Phosphorus,** **(Nuisance** **Algae, Low** **Dissolved** **Oxygen, Odor)** **(continued)**	Uptake all that is applied to the land or contain and recycle (dissolved form control—commercial nutrients)	• Terrace • Tailwater pit • Runoff retention pond • Wetland development	• Cover crop • Strip cropping • Riparian Buffer Zone • Change crop or grass species to one that is more nutrient demanding	• Recycle or reuse irrigation return flow and runoff water • Nutrient management, Irrigation water management
	Contain animal waste, process and land apply or export to a different watershed (dissolved form control—animal waste)	• Diversion, Pit/Pond/Lagoon • Compost facility	see 2a.	• Lagoon pump out • Proper irrigation management
	Minimize soil erosion and sediment delivery (adsorbed form control)	• Terraces • Diversions • Streambank protection and stabilization • Sediment pond • Critical area treatment	• Conservation tillage • Filter strips • Riparian buffer zones • Cover crops	Nutrient management
	Intercept, treat runoff before it reaches the water (suspended form control)	See 1 - 3. Water treatment (filtration or flocculation) for high value crops.	Riparian buffer zone	See 1-3.
Pathogens (Bacteria, Viruses or Other Disease-Causing Organisms)	Minimize source	Fences		Animal waste management—especially proper application rate and timing
	Minimize movement so that bacteria dies	• Animal waste storage • Detention ponds	• Filter strips • Riparian Buffer Zones	• Proper site selection for animal feeding facility • Proper application rate of waste
	Treat water	Waste treatment lagoon	Artificial wetland/rock reed microbial filter	

Table 2.—Selecting BMPs by Pollutant: Rules of Thumb (continued)

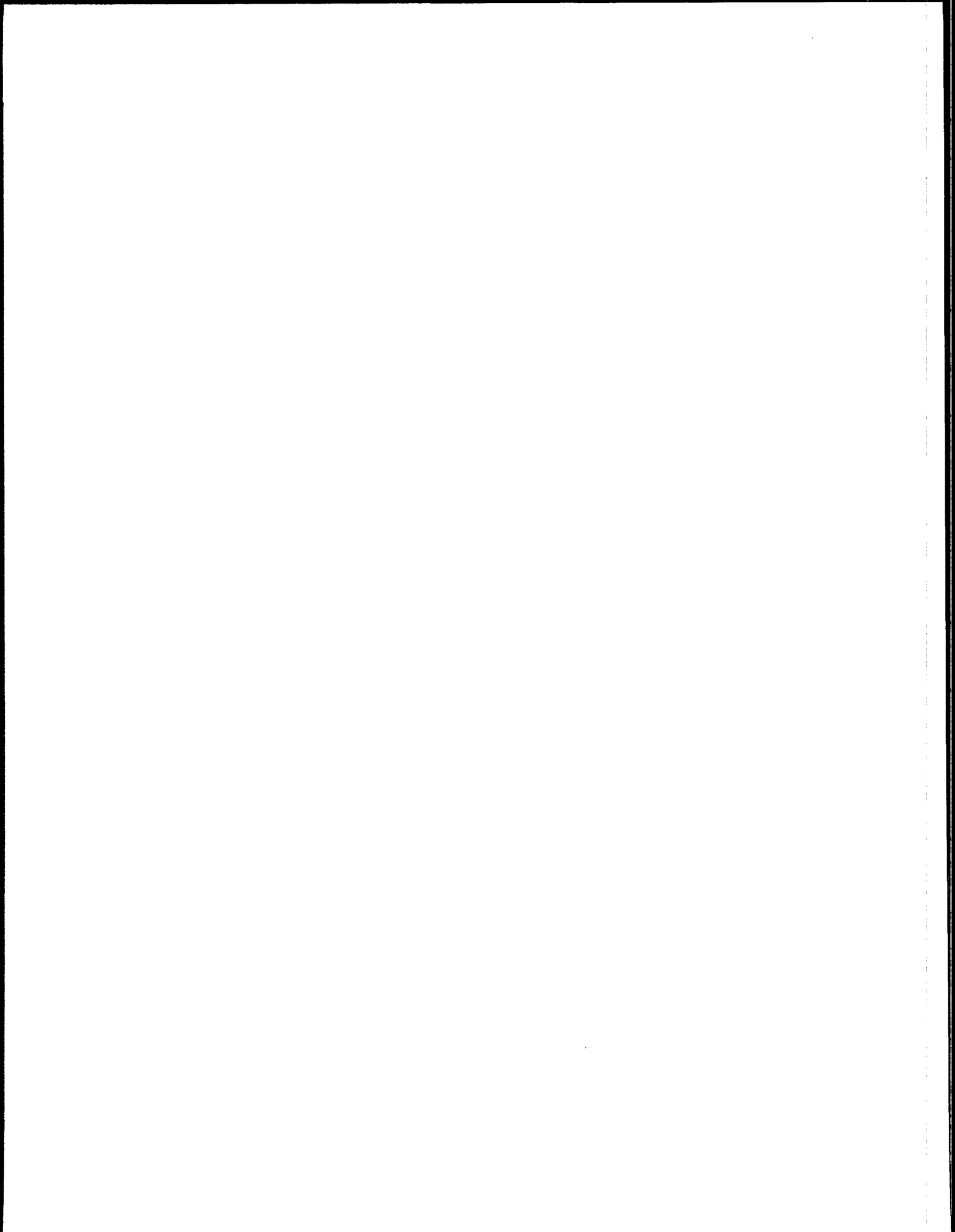| POLLUTANT	METHODS OF CONTROL	STRUCTURAL	VEGETATIVE	MANAGEMENT (O&M AND BMP)
Metals	Control soil sources		Crop/plant selection	Avoid adding materials containing trace metals
	Control added sources	• Tailwater pit • Reuse or recycle	Crop selection	• Irrigation water management • Integrated pest control
	Treat water	Filtration	Artificial wetland/rock reed microbial filter system	
Salts/Salinity	Limit availability			Drip irrigation
	Control loss	• Evaporation basins • Tailwater recovery pits • Ditch lining • Replace ditches with pipe	• Crop selection • Saline wetland buffer • Land use conversion	Irrigation water management
Pesticides and Other Toxins Minimize Sources	Minimize sources		Plant variety/crop selection	• Integrated pest management • Change planting dates • Proper container disposal
	Minimize movement and discharge	• Terraces • Sediment control basins • Retention ponds with water • Reuse/recycle system	• Buffer zones • Conservation tillage • Filter strips (adsorbed control only) • Wetland enhancement	• Irrigation water management • Integrated pest management
	Treat discharge water	Carbon filter system (high value crops)	Rock—reed microbial filter system/artificial wetland	
Physical Habitat Alteration	Minimize disturbance within 100 feet of water	• Road and turnrow realignment • Fencing/livestock water crossing facility	• Buffer strips • Riparian buffer zones	Proper grazing management including limiting livestock access
	Control erosion on land	See sediment BMPs		
	Maintain or restore natural riparian area vegetation and hydrology	• Streambank stabilization • Channel integrity repair	Wetland enhancement	• Proper grazing use and range management • Limit livestock access

Watershed Project Timetable Tips

Estimating the time needed to complete each phase of a project is difficult. So many site specific variables combine with unforseen circumstances to make any estimate more of a guess. Based upon well organized and well funded projects—some average timeframes you might expect include:

Table 3.—Watershed Project Average Timetable

PROJECT	ESTIMATED TIME
Preproject Monitoring and Evaluation	2-4 years
Watershed Plan Development	2-5 years
BMP and Pollution Control Implementation	3-6 years
Intensive Management	5 years
Continued Monitoring (after project)	2-5 years
Routine Maintenance	20+ years
Spot Check Type Monitoring	20+ years

Where to Get Help

Selected Watershed Projects

Anacostia Watershed Restoration Project—A unique multi-agency project in one of the most highly urbanized watersheds in the United States—the Anacostia River watershed outside of Washington, DC. Especially good status reports and action plan including information on setting and reporting progress toward goals. Progress reports and watershed plan available. Contact the Anacostia Restoration Team, Metropolitan Washington Council of Governments, 777 North Capitol Street, N.E, Suite 300, Washington DC 20002-4201; (202) 962-3343.

Chesapeake Bay Program—A huge multimillion dollar effort by the states of Virginia and Maryland, and the District of Columbia as well as numerous federal agencies to control pollution in the bay. Extensive databases were developed and complex mathematical models were used to set project goals. Many lessons were learned during the multistep negotiation phases of the project. Information available from the Chesapeake Bay Program Office, 410 Severn Ave., Suite 109, Annapolis, MD 21403; (410) 267-0061.

Puget Sound Basin—In 1987, the 12 counties surrounding Puget Sound in the state of Washington were directed to identify and rank their watersheds in priority order for nonpoint source pollution control and develop management plans to control this pollution. Each plan was somewhat different, reflecting the diversity of issues facing the various communities. An excellent planning handbook *Managing Nonpoint Source Pollution—An Action Plan for Puget Sound Watersheds* contains the program, technical, and legal information that guided these efforts. Many useful products resulted from various projects—the public involvement and education model projects as well as some of the technical fact sheets were especially informative. Copies of some of the actual small watershed plans may be available. Contact the Puget Sound Water Quality Authority, 217 Pine Street, Suite 1100, Seattle, WA 98101; (206) 464-7320.

Minnesota River Watershed—A cooperative project between the Minnesota Pollution Control Agency and local citizens with especially strong and effective citizen involvement through a grass-roots organization called Clean Up the River Environment (CURE). Minnesota also has a statewide watershed planning program. Contact the Minnesota Pollution Control Agency, 520 Lafayette, Rd., St. Paul, MN 55155; (612) 296-7323.

Nisqually River Council—Assists in the implementation of the Nisqually River Management Plan through a variety of on the ground projects, workshops, newsletters, and a new education and interpretive center. A strong citizens committee helps guide the policies of the cooperating council agencies. For additional information, contact the Nisqually River Council, P.O. Box 1076, Yelm, WA 98598; (206) 459-6780.

Coordinated Tribal Water Quality Program—Although most of the watershed activities of the 22 native American tribes involved in this program are in the planning stage, the program is unique in bringing together so many different tribes into a collective watershed protection process that recognizes that the tribes' cultural, economic, and spiritual health depends on clean water. For more information, contact the Northwest Indian Fisheries Commission, 6730 Martin Way E., Olympia, WA 98506; (206) 438-1180.

Public Participation Training and Citizen Involvement Materials

Many private and nonprofit organizations train and educate citizens about a variety of environmental and public participation subjects. The following is not a complete list or an endorsement; however, it can provide a starting point.

The Conservation Directory—A sourcebook published annually by the National Wildlife Federation. This directory is one of the most comprehensive listings of the names, addresses, and phone numbers of government agencies, international, national and regional organizations, state and territorial agencies, and citizens groups. It also contains information about the publications of most of the entities listed. Available from the National Wildlife Federation, 1400 Sixteenth St., N.W., Washington, DC 20036-2266; (800) 432-6564.

Institute for Participatory Management and Planning—Trains public officials and other professionals serving the public in consensus building and decisionmaking. Contact IPMP, 969 Pacific, St., Suite 10, Monterey, CA 93940; (408) 373-4292.

Highlander Center—Trains citizens from the South and Appalachia in participatory activism. 1959 Highlander Way, New Market, TN 37820; (615) 933-3443.

Ozark Society—Promotes and protects the scenic natural resources of the Ozark and Ouachita mountains region. P.O. Box 2914, Little Rock, AR 72203.

Terrene Institute—Engages in research, education, and public outreach for the environmental community. See especially, *Organizing Lake Users: A Practical Guide,* prepared by the Terrene Institute in cooperation with the Tennessee Valley Authority. Contact Terrene, 1717 K Street, N.W., Suite 801, Washington, DC 20006; (202) 833-8317.

Written Materials

Numerous databases, information clearinghouses, electronic bulletin boards, and bibliographies exist—listing hundreds of publications. Trying to access all of this information from so many different sources can be frustrating. Consult the following list for a good place to begin.

NPS News Notes—A free bulletin dealing with the water environment and watershed restoration. Includes national legislative news and state and locally submitted project stories. Available from the Terrene Institute, 1717 K St. N.W., Suite 801, Washington, DC, 20006; (202) 833-8317.

Runoff Report—Watershed Information Network News. A publication of the National Nonpoint Source Federation (NNPSF), a membership organization that unites corporate, environmental, governmental, and grass roots interests. Created as a watershed information network, the NNPSF is establishing a central, comprehensive, accurate information base for nonpoint source pollution and watershed issues. For more information or to join, contact NNPSF at P.O. Box 30103, Kansas City, MO 64112; (800) 795-3634.

Rural Clean Water Program—lessons learned from a voluntary nonpoint source control experiment. A brief overview of the program and selected watershed projects. Available from U.S. Environmental Protection Agency, Nonpoint Source Control Branch, 401 M. St., S.W., Washington, DC 20460.

Summary Report—Evaluation of the Experimental Rural Clean Water Program—published September 1992 by the National Water Quality Evaluation Project. Reports prepared by the participants in one of the largest sets of watershed projects ever attempted. Contact NCSU Water Quality Group, Biologic and Agricultural Engineering Department, NC Cooperative Extension Service, North Carolina State University, Raleigh, NC 27695-7637.

The Water Quality Catalog—A Source Book of Public Information Materials—Developed by the Water Pollution Control Federation (now called the Water Environment Federation) 601 Wythe St., Alexandria, VA 22314-1994; (703) 684-2400.

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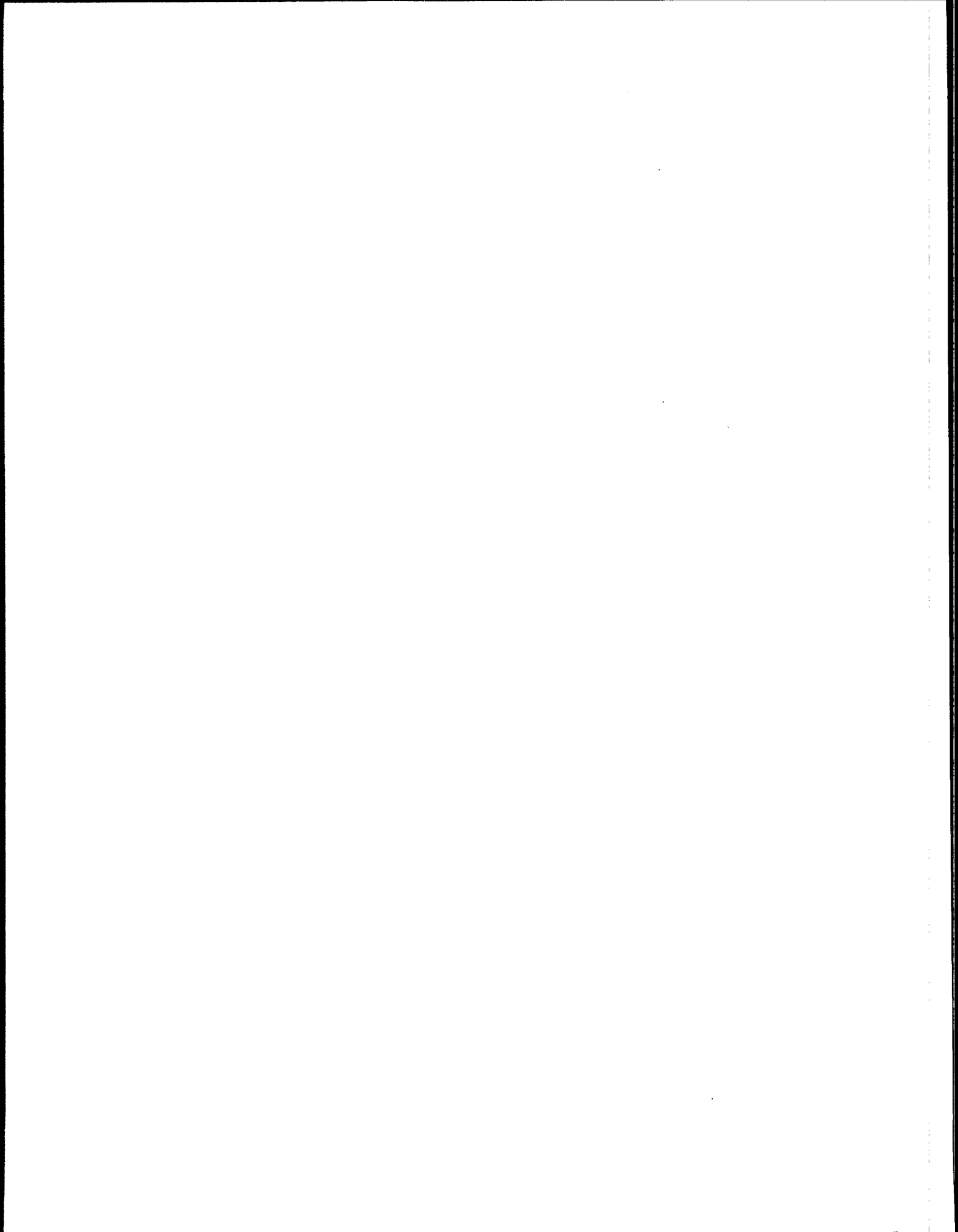
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The First Lake Maintenance Handbook—
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This how-to manual contains field tested, easy and affordable projects to help you clean up, improve and maintain the lakes and ponds in your community. A user's guide for people who live, work or play at the water's edge, it is recommended reading for lake managers, homeowner associations, fishers, individuals and families who live on or near the water.

Lake Smarts: The First Lake Maintenance Handbook shows you where to begin lake-saving projects, how to save time and money by using equipment designed for other purposes, where to get the equipment (addresses and phone numbers), and how much it costs.

The author's commonsensical approach and wry humor are contagious—and cover all lake problems, including algae and aquatic weeds, muddy waters, sediments, waste disposal, undesirable fish and greedy waterfowl.

Imagination, not money, is the key to successful lake management, and this book has it in spades—and rakes, and bedsprings.

Using the tips and illustrations in this book, you and your friends can improve the appearance and functioning of lakes and nearshore areas accustomed to years of benign neglect.

Keep it around, you'll want it next season, too.

Steve McComas, founder and manager of Blue Water Science in St. Paul, Minnesota, is a research and engineering specialist in lake and watershed management. He has thoroughly field-tested these projects over a decade of work in Minnesota and Wisconsin. Developed in cooperation with U.S. EPA's Clean Lakes Program.

Lake Smarts: The First Lake Maintenance Handbook was developed in cooperation with U.S. EPA's Clean Lakes Program.

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