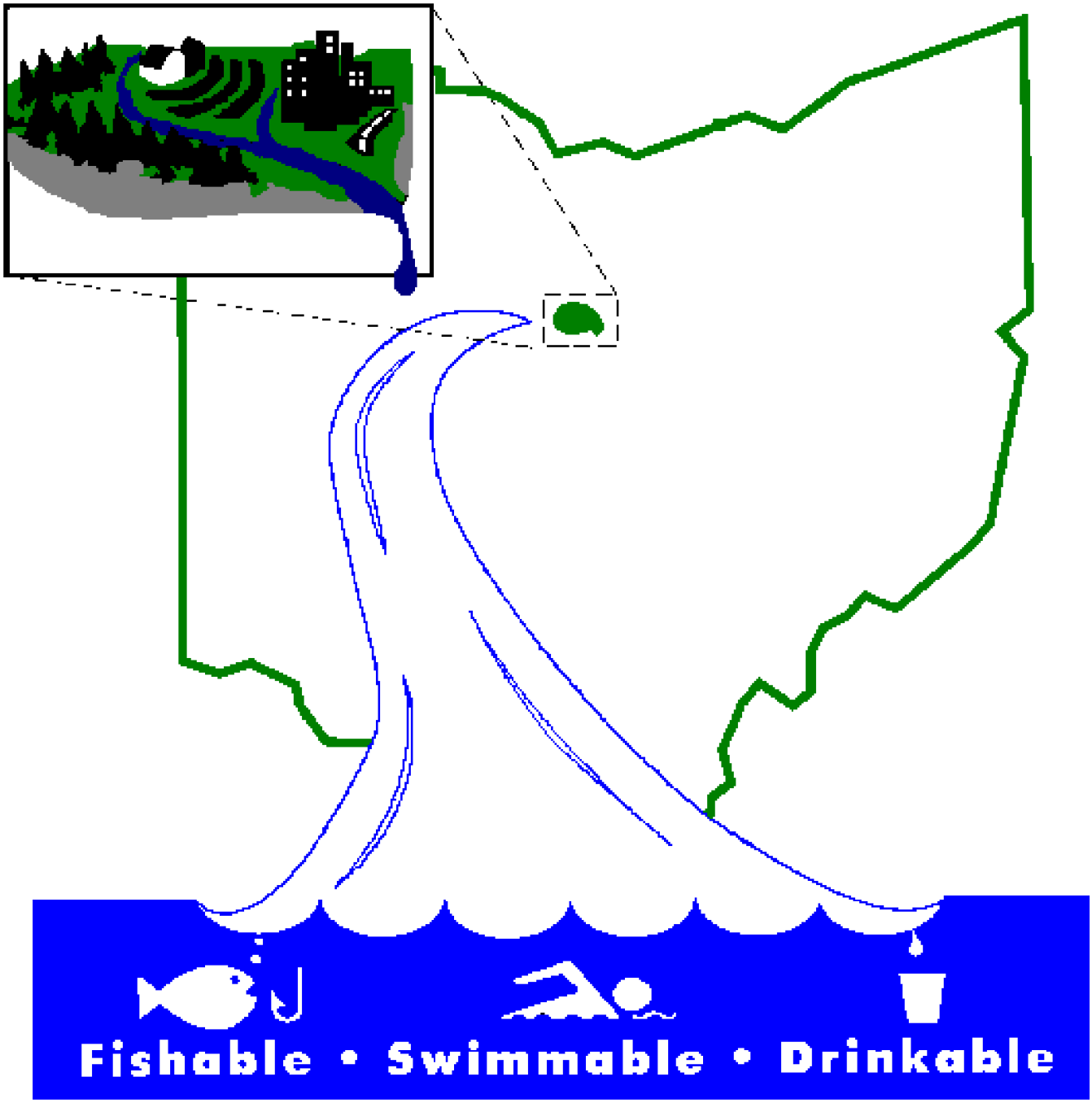
Ohio EPA
State of Ohio Environmental Protection Agency
Division of Surface Water

in cooperation with

U.S.D.A. Natural Resources
Conservation Service
Ohio Department of Natural Resources
Ohio State University Extension
Maumee Valley Resource Conservation
and Development, Inc.
Miami Valley Regional Planning
Commision

A Guide to Developing Local Watershed Action Plans in Ohio



George V. Voinovich, Governor ● Nancy P. Hollister, Lt. Governor ● Donald R. Schregardus, Director

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Introduction

What is the watershed approach?

The watershed approach refers to a comprehensive effort to address multiple causes of water quality and habitat degradation in a watershed. It is a *process* that emphasizes prioritizing problem areas and developing comprehensive, integrated solutions by involving stakeholders from both inside and outside of government.

The purpose of this guide is to (1) describe how to do a community watershed action plan in Ohio; and (2) identify sources of necessary information and resources. Anyone--including citizens, citizen groups, businesses and local governmental agencies--interested in initiating a local watershed project can use this guide.

The focus of the watershed approach described in this guide is the *quality of the water resource*. This approach uses benchmarks of water resource quality to identify problems and environmental indicators to measure progress. The term "water resource" refers to the physical, chemical and biological characteristics of a water body, and the flora, fauna and human uses it supports. Therefore, these measures and indicators of progress are concerned with water quality and ecological integrity in the watershed.

How was it developed?

Watershed-based planning and implementation is not new to Ohio. In the past, various government agencies have developed and implemented watershed projects. However, these projects focused on the objectives of the sponsoring agency, such as forest management, erosion or flood control.

As early as the 1890s the U.S. Inland Waterways Commission reported to Congress that rivers must be treated as integrated systems. But despite this recognition, resource managers still focused on efficient use of water rather than on water quality. Water was valued for such purposes as energy production, navigation, flood control, irrigation and drinking water.[1]

However, by 1948 the focus began to shift to water quality with the passage of the Federal Water Pollution Control Act. The act authorized the U.S. Surgeon General to assist states in developing pollution controls based on a model of water quality standards, and it provided limited funding for the construction of public sewage treatment works.

During the 1950s and '60s, public interest in improving the quality of life and health shifted emphasis toward **ambient** water quality while also protecting the nation's drinking water. The Federal Water Pollution Control Act of 1956 provided funding for **publicly owned treatment works** and the Water Quality Act of 1965 required states to develop water quality standards for waterbodies that crossed state boundaries.

The Federal Water Pollution Control Act (Clean Water Act) of 1972 established a national goal to restore and maintain the integrity of the nation's waters. It also established the **National Pollutant Discharge Elimination System** (NPDES), a permitting system to control point source pollution. Just two years later the Safe Drinking Water Act combined several programs to protect public health and called for a comprehensive watershed protection approach.

Success in implementing programs to control point sources of pollution has revealed that nonpoint sources and habitat degradation account for most of the nation's remaining water quality problems. This national trend is also reflected in Ohio; recent water quality monitoring studies indicate that nonpoint sources of pollution and habitat degradation account for most of Ohio's remaining water quality problems (Ohio EPA, 1996). The proportional increase in nonpoint sources as a major source of impairment is due largely to the emergence of pre-existing problems that were masked by the historically more severe point source impairments.

But it wasn't until 1987 that amendments to the Clean Water Act (CWA) added water quality standards for toxics and required states to expand programs to address **nonpoint sources of pollution** and wetlands. The 1972 CWA established conventional water quality standards. These amendments did not provide a government body with the authority to enforce compliance with the programs. Rather, they directed states to establish nonpoint source programs that provided limited funds for voluntary projects.

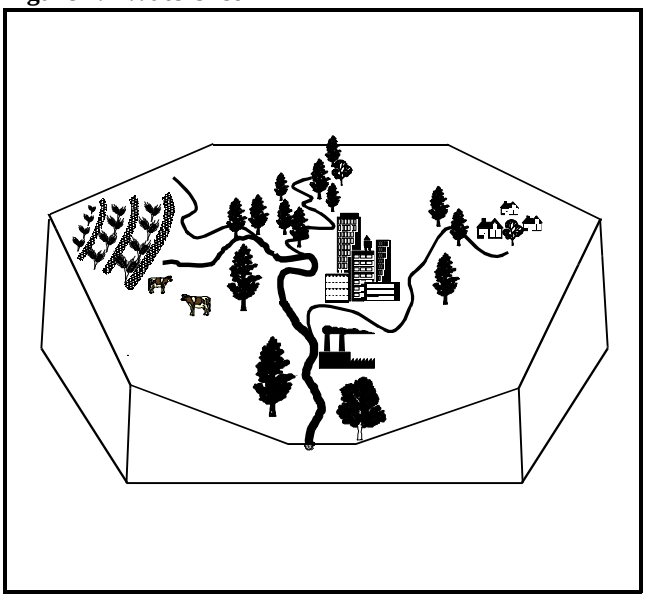
The Safe Drinking Water Act Amendments of 1996 added a new section to the law concerning **source water protection.** Under the section, all areas that contribute water to a public water supply must be mapped and potential pollution sources within that area must be identified. For **surface water** systems, the area contributing water to the public water supply is the watershed. Since the goal of both source water protection and watershed action plans is to improve and protect water quality, watershed action groups should include source water protection in their efforts.

Remedial action plans (RAPs) were also initiated

in the 1980s. Aimed at restoring impaired tributaries of the Great Lakes, the designated **areas of concern** or RAPs exemplify a community-driven watershed approach to multi-media sources of pollution. The RAPs built upon nonpoint source programs and represented a shift from government regulation to community-driven volunteerism.

The watershed approach, an outgrowth of water quality monitoring findings and the RAPs, expands stakeholder volunteerism beyond areas of concern to all watersheds within the state. While RAPs continue in Ohio, their existence does not address other streams and rivers that are not located in areas of concern. Thus, local initiative and action is needed to improve and protect Ohio's watersheds.

Figure 2.1 Watershed



What is a watershed?

A watershed is an area of land from which surface water drains into a common outlet, such as a river, lake or wetland. Depending on its size and location, a watershed can contain one or many of the following features: streams, ditches, ponds, lakes, and/or wetlands. "Drainage basin" and "hydrologic unit" are synonyms for "watershed" (Figure 1.1).

Ohio EPA, with cooperation from natural resource agencies, has divided the state into watersheds for nonpoint source planning and implementation purposes (Figure 1.2). These watersheds have a surface drainage area in the range of 60,000 to 100,000 acres. Watershed projects of more than 100,000 acres (approximately 150 square miles) can be difficult to manage because of the involvement of larger groups of people, reconciliation of their varied interests, the multitude of political jurisdictions, and the inherent need for greater funding.

What is a watershed action plan?

A watershed action plan is an itemization of the problems, priorities and activities the local watershed group would like to address. It does not necessarily need to be completed before activities can begin; rather, it serves as a guide for the watershed group by mapping a strategy for improving or protecting the watershed (Figure 1.3). Often, the process of gathering information and learning about your watershed with other watershed residents is one of the most productive outcomes of developing an action plan. The process fosters a comprehensive understanding and appreciation of your water resources and an ability to work cooperatively with others who may have different interests.

While this manual describes a sequence of steps that can help you develop a watershed action plan, more than one step may be underway at any given time. Also, some steps may be more important in some watersheds than in others. Developing a written plan for a watershed may take less than a year to develop for some groups, or several years for others; however, activities can be initiated long before they are memorialized in a written plan.

Why should we develop a watershed plan?

A watershed action plan will help you to accurately identify pollutants and pollution sources so that appropriate and effective solutions can be formulated. The quality of the water resource at any point in a stream is the product of all natural and human activities in the drainage area above that point. To positively affect water quality, all the sources of potential pollutants need to be identified and evaluated based on their relative pollution contribution.

Why does the plan need to be locally based?

Each watershed is unique and requires its own unique action plan. Watersheds have specific characteristics and problems determined by such factors as population density, economics, geography and existing water quality. Local organizations are best equipped to identify major issues of concern in the community and agree upon technical controls to improve water quality

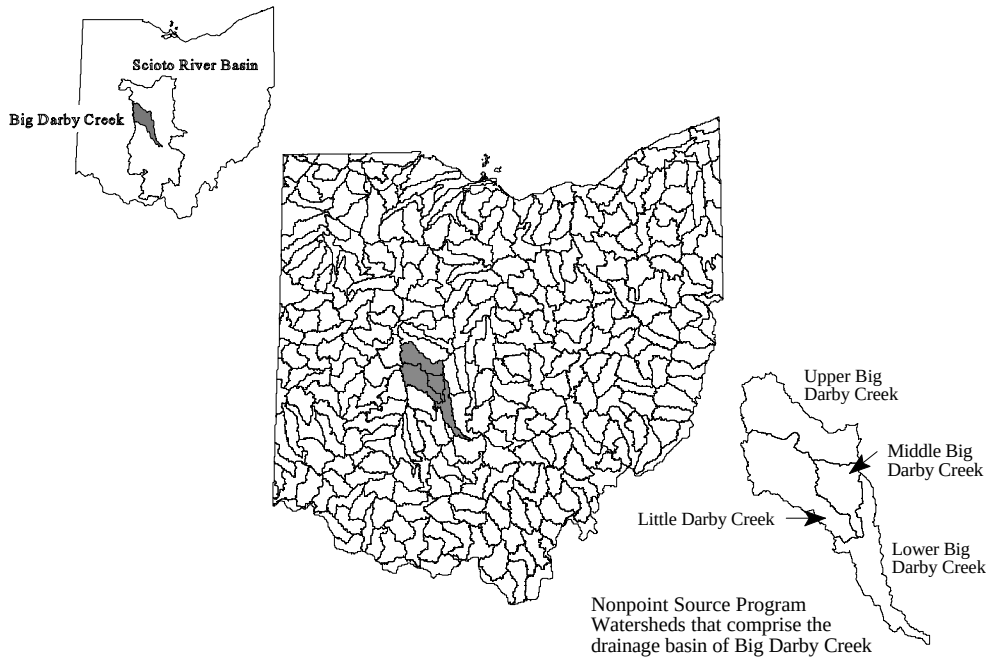
and watershed health. In addition, you will build local support as you develop your plan. Involving stakeholders- individuals or groups that have an interest in thewatershed--in the planning process from the beginning will prevent you from running into obstaclesor opposition when you begin to implement the plan.

Historically, local watershed action planning has occurred only when local governments have requested federal assistance for planning and implementing programs to address specific problems such as flooding. In the 1970s, state agencies developed comprehensive water quality action plans for some regions of the state. Although technically sound, this approach did not nurture a sense of ownership by local citizens most affected by the plan nor did it necessarily incorporate local concerns and goals.

While section **208** (see 208 plan in glossary) of the Clean Water Act places responsibility for water quality action planning on the state and on designated **areawide regional planning agencies,** plans created out of this process have traditionally focused on wastewater treatment capacity and planning. Moreover, federal funding to support this type of water quality action planning has diminished over the years.

Developing and implementing a local watershed action plan not only provides a framework for addressing all water-resource related issues, it provides an opportunity for local participation and empowerment. Regulatory controls are only one of many tools available to protect and improve water quality. In addition, the

Figure 1.2 Nonpoint Source Program Watersheds



The Ohio EPA , in cooperation with other natural resource agencies, divided the state into watersheds ranging in size from approximately 90-150 square miles for nonpoint source program planning and implementation purposes (center figure). The shaded area on the maps represents the drainage basin of Big Darby Creek, a tributary of the Scioto River (figure in the upper left corner). The Big Darby Creek drainage basin encompasess approximately 556 square miles. The figure in the lower right shows the Big Darby drainage basin divided into four nonpoint source program watersheds. Figure 2.1 shows the drainage area of the Big Darby Creek in relation to county and city boundaries.

regulatory authority of government agencies is limited to the specifics outlined in legislation, whereas many other areas of jurisdiction fall under the authority of local governments. Thus, a collaborative effort between local governments, various agencies, private organizations and citizens is the most effective method to comprehensively address water resource quality.

Who should participate in watershed planning?

Watershed planning and implementation needs to be led by a local group with a broad base of representation from the community. This ensures local ownership and support. Participants in the planning process should include individual citizens and organizations who use the resources in the watershed and have an interest in identifying and solving water resource problems. These groups of potential participants are also known as stakeholders. Stakeholders in a typical watershed project may include individual citizens, local officials, state and federal resource agencies, water suppliers, industries, developers and many others. Chapter 1 of this guide identifies a list of who to get involved in the process.

When should a watershed plan be prepared?

A watershed plan should be prepared when there is a perceived or documented concern about a water resource. A local group or individuals should be willing to initiate, develop and implement a watershed action plan.

What are the limitations to this approach to watershed planning?

The watershed plan is based on collected or existing data, including water resource quality information. All of the information you need to evaluate your watershed may not be readily available; and, it may not be practical or feasible to collect during the planning stages. In these cases, you should make the best evaluation based on the information available.

What does the remainder of this guide include?

The remainder of this guide describes some guidelines to help you start the planning process to successfully plan and implement a water resource-based action plan.

Chapter 1, Building Public Support, describes who should be targeted for participation, what it takes to get the group focused on its mission and tasks, and how to get the word out. Tips about how to work with groups and build consensus are highlighted.

Chapter 2, Water Resources and Water Resource Quality gives you the information needed to complete an inventory of your watershed. It explains water quality standards; how to interpret monitoring data; and describes the characteristics of the water resource, and how land and natural features of the watershed interact with human uses to influence water quality.

Chapter 3, Defining the Problem, explains how to interpret water quality information and discern between major and minor pollution sources in your watershed. Several tools that can be used to quantify water quality problems and their effects are also explained.

Chapter 4, Developing Solutions and Setting Goals, will show you how to decide upon which problems to address. Suggestions on how to identify and evaluate solutions will assist your watershed group in making these decisions.

Chapter 5, Implementing the Action Plan to Work, outlines how to prepare a watershed action plan. It also discusses key aspects of implementation such as time lines, funding, public education and information, and parameters for measuring success.

An appendix and references provide a variety of information to support the development of your local watershed plan. In addition, below is a list of references that you may find useful in understanding a watershed approach.

Watershed Approach Resources

Clean Water in Your Watershed: A Citizens Guide to Watershed Protection. Terrene Institute. 1993.

Know Your Watershed. Conservation Technology Information Center. 1995.

National Planning Procedures Handbook. U.S.D.A. Soil Conservation Service. 1993.

Natural Resource Planning Guidebook. Virginia Department of Conservation and Recreation. 1993.

Watershed Protection: A Project Focus. U.S. EPA Office of Water. WH-553. 1995.
The Watershed Protection Approach: An Overview. U.S. EPA Region IV. October 1991.

The Lake and Reservoir Restoration Guidance Manual.

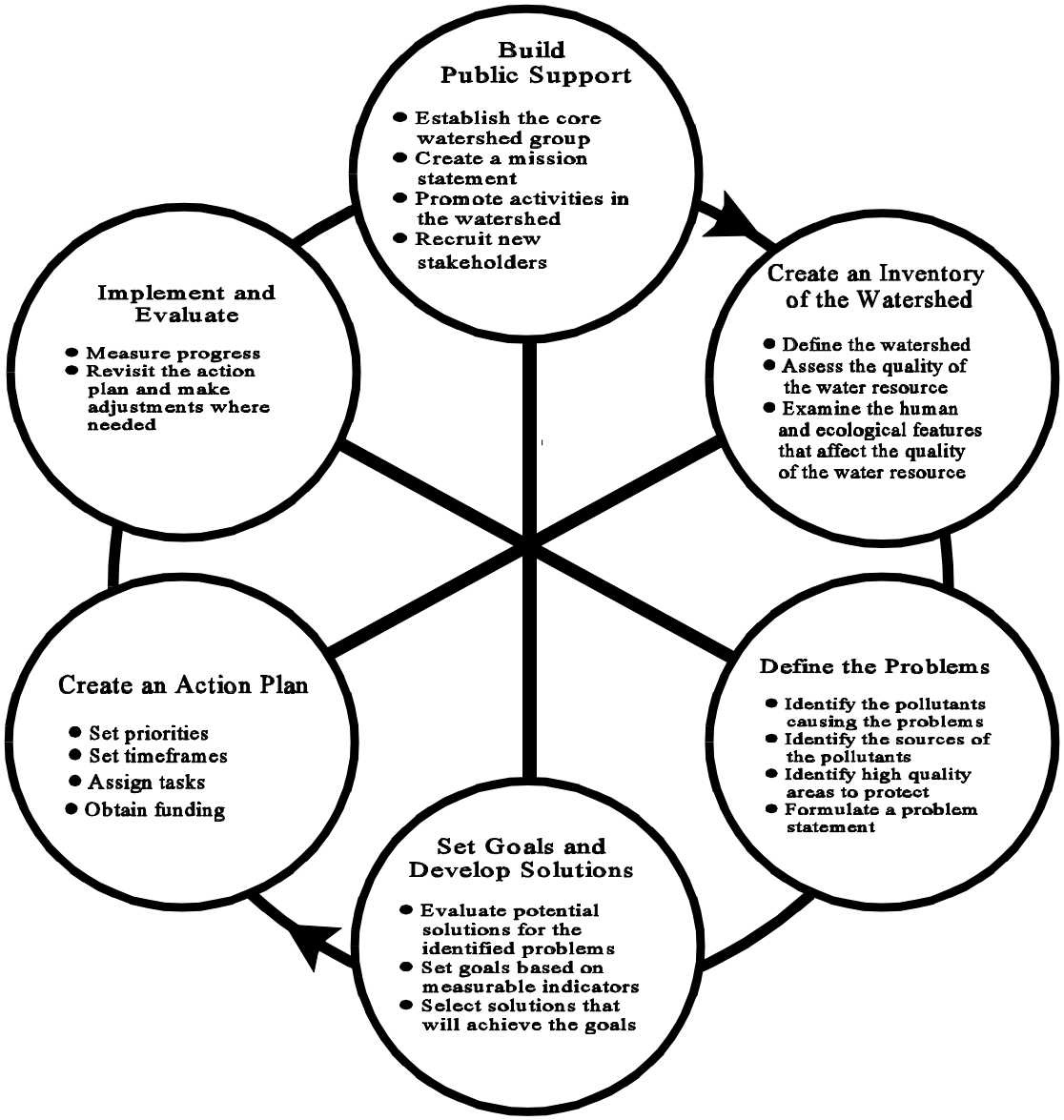
References

U.S. EPA Office of Water. WH-553. 1990.

Watershed Planning Handbook for the Control of Nonpoint Source Pollution. NYS Dept. of Environmental Conservation and NYS Soil and Water Conservation Committee. November 1994.

[1]Watershed Protection: A Statewide Approach U.S.EPA Office of Water. August 1995.

Figure 1.3 Implementing the Watershed Approach



Watershed groups often start at the top of the wheel by building public support and then move clockwise. A group is likely to travel around the wheel several times, with each cycle building upon the information and experience gained previously. The "spokes " connecting each step to the center illustrate that the process does not always proceed in one direction, and that the steps are interrelated. Information gained at one step may lead the group to move to another step in the process. For example, information gained during the inventory step ma y lead the group back to seeking new stakeholders.

Chapter 1

Building Public Support

Watershed management for water resource improvement or protection is a long-term commitment that is only successful with strong local participation. The *process* of planning is especially important because it empowers watershed residents to make educated choices about their future. To ensure strong local support and commitment, stakeholders must be sought out and included in all stages of watershed activity planning.

Achieving local support is a process that may require a publicity and education campaign to solicit participation and involvement. This chapter will provide you with suggestions about starting your local watershed planning group.

10 Steps to Building Public Support

1. Develop a common understanding of problems or concerns.
2. Make a list of stakeholders.
3. Evaluate the group's interest.
4. Form a permanent watershed committee to set organizational structure and coordinate development of the watershed action plan.
5. Elect someone to chair meetings, secure the meeting room, announce meetings and be responsible for the meeting records.
6. Form subcommittees or an advisory council for specific activities or projects.
7. Create a mission statement for the watershed committee.
8. Outline an action plan for watershed subcommittees or the advisory council.
9. Develop a funding plan.
10. Inform the general public.

Mobilizing Community Support

Getting your community mobilized and ready to participate in the watershed effort involves advertising the value of your water resource to the community and personalizing its value to potential stakeholders. Make your issue everyone's issue. For example, if the community relies on any of the streams or rivers within their watershed for drinking water, the watershed group can use this as a selling point for watershed protection.

Be careful not to limit your constituency to those who obviously support the cause. This may exclude needed supporters who would otherwise give your cause a broad base of support.

Once you have informed your community, you will need to establish a watershed action planning group. Below is a step-by-step approach to help you do this. Please keep in mind that although these steps are presented in sequential order, several of them may be in action at any given time.

1. Develop a common understanding of problems or concerns. The local organization or individual who initiates the watershed planning process needs to invite a core group of individuals who are interested in putting together and implementing a plan (see #2).

The goal of this initial meeting is to develop a common understanding about the need to initiate the watershed planning effort and to assess the community interest in it. During the initial meeting, if a decision is made to move ahead with the planning effort, a temporary watershed committee needs to be appointed. This committee will carry out initial tasks such as targeting stakeholders to notify them of future meetings and securing a meeting place.

2. Make a list of stakeholders. At your first few meetings you will need to identify potential stakeholders as you become aware of watershed problems, issues and threats. When identifying stakeholders, remember to look for both those who may be in favor of the effort and those who may oppose it. By including both in the planning process, you are more likely to create a plan that everyone can live with rather than one that only meets the objectives of a few. This will make implementing the plan much easier when the time comes.

Remember that bringing needed people to the table takes more than a simple announcement in the local paper or by the local radio station. Organizers need to personally contact key individuals on the telephone or with a visit and explain how the effort will benefit the

individual or the organization. Potential stakeholders could include:

• health departments;
• local industries;
• NPDES dischargers;
• individual citizens;
• natural resources users (farmers, loggers, etc.);
• citizen organizations;
• municipal and county governments;
• county commissioners;
• water suppliers;
• county extension offices;
• local soil and water conservation districts;
• colleges and universities;
• environmental groups;
• professional associations;
• county NRCS agents; and
• local/regional planning commissions.

3. Evaluate the group's interest. One way to do this is to establish committees or advisory councils (see #6). If stakeholders are unwilling to commit to these, you may not have enough interest to support your watershed effort. You may need to go back to the initial step of publicizing the value of your water resources to the community and rebuild community interest and support.

4. Form a permanent watershed committee to set organizational structure and coordinate development of the watershed action plan. You need an organization to represent your project. Many times, there is already one in place. For example, a regional, city, or county government or organization may already exist. An organization with a broad goal can be the vehicle for a wide variety of projects, as long as the mission statement does not set limitations on scope. Keep in mind that if you will be seeking government sources of funding for watershed projects, the establishment of 501c(3) status is not always necessary; however, it is almost always needed to be eligible for foundation funding. The creation of a formal organizational structure with bylaws (Appendix 1)--and perhaps, tax-exempt status--can be helpful and may be necessary for certain sources of funding. In any case, it is important that the group sets a clear direction, defines committee members' roles and determines ground and house keeping rules.

5. Elect someone to chair meetings, secure the meeting room, announce meetings and be responsible for the meeting records. Ask for a volunteer to act as a temporary secretary or coordinator for the group. Or, if there are several individuals interested, take a vote to elect a designee. Be sure that you clearly identify this person to the group. At the first meeting, you may also want to create a distribution list by asking all in attendance for their name, address and phone number.

6. Form subcommittees or an advisory council for specific activities or products. Advisory councils and subcommittees are made up of the people who get the job done. Watershed organizations often have subcommittees or an advisory council to perform specific tasks. A subcommittee can have a single purpose but numerous members to accomplish the purpose, whereas an advisory council might have more than one purpose, with several members working on several different tasks. In either case, the subcommittees or advisory council should include members of the community such as printers, media professionals, bank representatives, professional experts on the issue, federal and local regulatory and non-regulatory agency representatives, etc. Their professional experience and expertise will expedite related activities. If you don't have these people involved, find a way to get them involved. (see above, **Mobilizing Community Suppport**, **Make a list of stakeholders,** and below, **10. Inform the general public**). Some activities your advisory council or subcommittees may wish to pursue:

- publicity and education;
- funding;
- plan development;
- membership; and
- technical issues, e.g. soil, geology and riparian inventories.

If you will be submitting proposals for grants, it may also work to your advantage to create a board of directors. Your board of directors will set policy for your project program and should consist of no more than 12 members who meet monthly. They will also be responsible for hiring contractors or coordinators associated with your project.

7. Create a mission statement for the watershed committee. The mission statement sets the direction for the group. It answers the questions "Why are we here?" and "What do we want for our watershed?" Be aware that your mission statement will affect your funding options, especially those from foundations. A mission statement that is too specific can sometimes eliminate funding options. For example, if you say that you will improve the watershed by educating the public, you eliminate the option for activities such as tree planting in

riparian corridors, because it is not an education activity. A better mission statement might say something like, to protect and restore the water quality of the Little Creek watershed by reducing pollution." This mission statement is broader and less limiting, but it still creates a vision for the watershed.

8. Outline an action plan for watershed subcommittees or the advisory council. The watershed committee needs to develop a plan of action that describes the tasks to be undertaken and the responsible person, subcommittee or agency. The action plan should include goals and objectives and should be based on watershed data needs, concerns, problems and opportunities. The responsible committee or member should also be identified in the action plan.

9. Develop a funding plan. When initial watershed interest is building, the watershed committee must assess funding needs for developing the watershed activity plan and secure funds immediately. This can be done through fund-raising activities, grant establishment of friends of the watershed groups and other means. Be sure to include costs for collecting data, evaluating and administering watershed planning. Whenever possible, utilize volunteer time and "in-kind" (donated) services (photocopying, meeting space, phone use) of individuals, local organizations, businesses and agencies. Once the watershed committee has established goals and objectives, the finance committee should use these to identify sources of funding for implementation. Done properly, a watershed plan can be your proposal for grant funding. Appendix 2 provides a list and description of programs that provide funds for watershed projects in Ohio.

10. Inform the general public. Get the message out about your issue. The watershed residents need to be informed about the watershed project through a multi-media approach. You should already have contacts with the media through the members on your board, subcommittees or advisory council. Tell the media how your project is unique and how it fills a gap in current programs and services. Let them know that the community supports the project. Get articles in the paper even if you must write them yourself. (You will want to include copies of these articles later with grant proposals). Some activities to get media representatives acquainted with your effort may include: canoe trips, media kits, open houses, exhibits and brochures on the watershed effort.

Some important points to make known to the media:

- purpose of the watershed effort;
- formation of watershed committee;
- list of problems, concerns and opportunities as perceived by the committee;
- request to the general population to further clarify the list;
- invitation to the public to participate in the planning/implementation process; and
- notices of upcoming meetings.

You can reduce your expenses and increase your coverage by asking local reporters, radio announcers, news stations, print shops and advertisers to sit on your public relations or publicity subcommittee. Be creative. Find a hook to interest them in the watershed.

Give the communities in the watershed ownership of the issue. Get mandates or resolutions from city councils identifying and supporting your cause, and solicit the same from neighboring communities.

Helpful Hints for Working with Groups

Now that you have formed a group, here are seven tips to help your organization run smoothly.

1. Communicate effectively. Announcing scheduled meetings, recording meeting minutes and other information is one way to accomplish this. A written agenda mailed out or passed out prior to meetings can help keep your meeting focused and on schedule.

2. Work by consensus. Consensus is agreement where all members of the group can "live" with a choice. They are comfortable and carry out the activities because they have helped make the decisions. The key to decision by consensus is to establish clear roles and rules for the group to follow. (See the reference list at the end of this chapter for more information on group decision-making).

3. Delegate or select a facilitator to help ensure productive use of time in meetings, manage conflicts and get consensus. The role of the facilitator is to create trust and assist the group in decision-making. Appendix 3 outlines a process for making difficult decisions. Ideally, a facilitator would have experience in group dynamics, conflict resolution and running effective meetings.

4. Avoid shortcuts. Most worthwhile goals require work, and attempting short cuts may only impede the process. Projects have a greater chance of success if

local interest and support develop before plans are written or implemented. Government agencies use the phrase readiness to proceed to describe an optimal time for moving forward with each succeeding step. Solid support for decisions and goals is a sign of readiness to proceed. Remember that the process may take longer than initially anticipated; new organizations usually go through a stage in the second year when people drop out.

5. Allow input from all participants. Stakeholders must feel they have input into the process to ensure their acceptance of the final plan. Even though no one may agree with every detail in the final plan, by obtaining everyone's input and trying to understand and accommodating all interests and perspectives, you can develop a plan that will be acceptable to all. One way to do this is by having the facilitator place a poster-size sheet of paper on the wall entitled, Parking Lot. The parking lot is the place where stakeholders can put their personal concerns or issues that they feel are a road block to achieving consensus. These issues may be emotionally, factually or historically based. Try passing out paper to participants and asking them to write their concerns on a sheet and then have the facilitator place them on the parking lot. The facilitator must then either proceed by clearing some of the items on the parking lot, or by asking that they be shelved until the task at hand is concluded. (See Appendix 3, Working with Groups.)

6. Start and end on time. Always schedule a start and end time to your meetings. People often hesitate to commit to a meeting if they don't know exactly when their commitment ends. Set meeting start and end times and stick to them.

Listed below are references that may help you understand group dynamics and how to build consensus within your group.

Coalition and Consensus Building Resources

"Building Coalitions," The Ohio Center for Action on Coalitions for Families and High Risk Youth, The Ohio State University. 1992. Series of fact sheets: (Available from Ohio Center for Action on Coalition Development, Ohio State University Extension, 203 Agricultural Administration Building, 2120 Fyffe Road, Columbus, OH 43210; 614-292-0202.)

Consensus Building and Group Facilitation Resources

Breaking the Impasse: Consensual Approaches to Resolving Public Disputes by Lawrence Suskind and Jeffrey Cruikshank, Basic Books, 1987.

Collaborating: Finding Common Ground For Multiparty Problems by Barbara Gary, Jossey-Bass Publishers, 1989.

Getting to Yes by Roger Fisher and William Ury of the Harvard Negotiation Project, Penguin Books, 1983.

Group Power: A Manager's Guide to Using Meetings by William R. Daniels, University Associates, Inc., 1986.

How to Make Meetings Work: The New Interaction Method by Michael Doyle and David Straus, Berkley Publishing Group, 1976.

Managing Public Disputes: A Practical Guide to Handling Conflict and Reaching Agreements by Susan L. Carpenter and W. J. D. Kennedy, Jossey-Bass Publishers, 1988.

Mining Group Gold: How to Cash In on the Collaborative Brain Power of a Group by Thomas A. Kayser, Serif Publishing, 1990.

Pulling Together: A Land Use and Development Consensus Building Manual by David R. Godschalk, David W. Parham, Douglas R. Porter, William R. Potapchuk, and Steven W. Skulkraft (Washington, D.C.: Program for Community Problem Solving), 1994.

Chapter 2

Water Resources and Water Resource Quality

The focus of the watershed approach to planning is the *quality of the water resource*. Under this approach, measures of water resource quality are used to describe existing conditions, identify problems, set goals and measure progress. A key indicator of water resource quality is whether the water body is attaining its aquatic life use designation, as established in Ohio's water quality standards. Ohio's water quality standards and the methods used to monitor attainment of these standards are described in this chapter.

Also required under the watershed approach is an inventory of the characteristics of the water body and the features of the surrounding landscape that affect the quality of the water resource. These features and characteristics include hydrologic factors such as precipitation and stream flow; natural landscape features such as geology, soils, and riparian habitat; and human influences such as land and water use. The inventory of these features can be used to evaluate potential sources of degradation and to identify actions needed to address impacted areas.

Since each watershed is unique, not all of the elements described in this chapter may be relevant to every watershed. The process of gathering information about the watershed may reveal key issues that otherwise would not be considered.

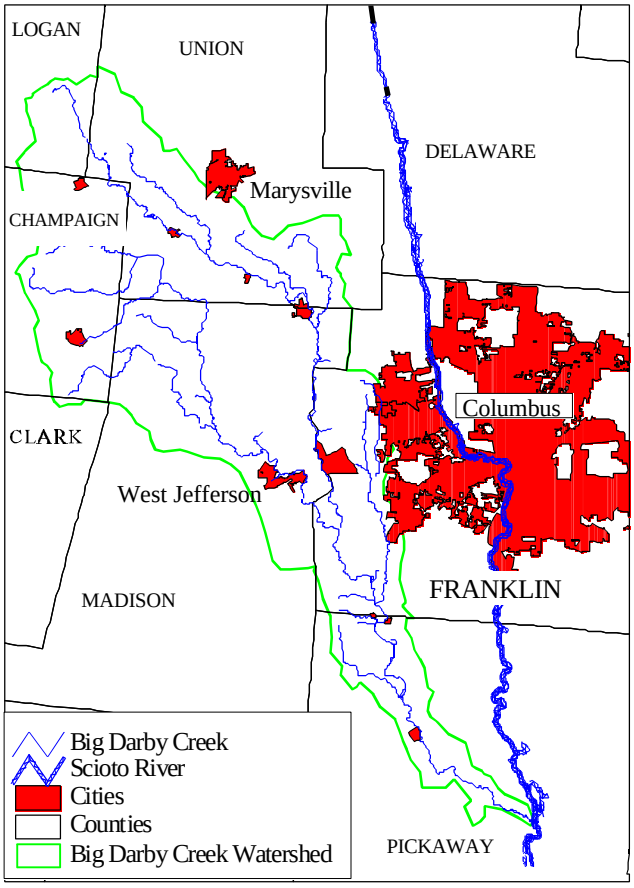
A good way to start the inventory is to look for existing publications and reports; some background information should already be available (see Table 2.1, Sources of Water Resource Quality Data). Find out if any watershed plans or studies already exist for your watershed or for another watershed in your general area (check with the county soil and water conservation districts, Natural Resources Conservation Service, regional planning agency or Ohio EPA district office).

A tour of the watershed (by foot, car or canoe) can help the group learn about its watershed. A tour can also help educate key individuals and can be used as a media event to attract and involve more people. It may even help to identify critical areas or sources of pollution that otherwise might remain unknown. An organized stream survey using preprinted checkoff forms is also a good way to build interest. Appendix 4 contains information on voluntary stream monitoring and survey programs.

Defining the Watershed

Watersheds are drainage basins that are determined by the topography of the land. A watershed can be as small as a single stream, or it can be as large as several rivers, their tributaries and unnamed tributaries. A smaller watershed can be nested within a larger watershed. Thus, the size of the watershed your group

Figure 2.1 The Big Darby Creek Watershed



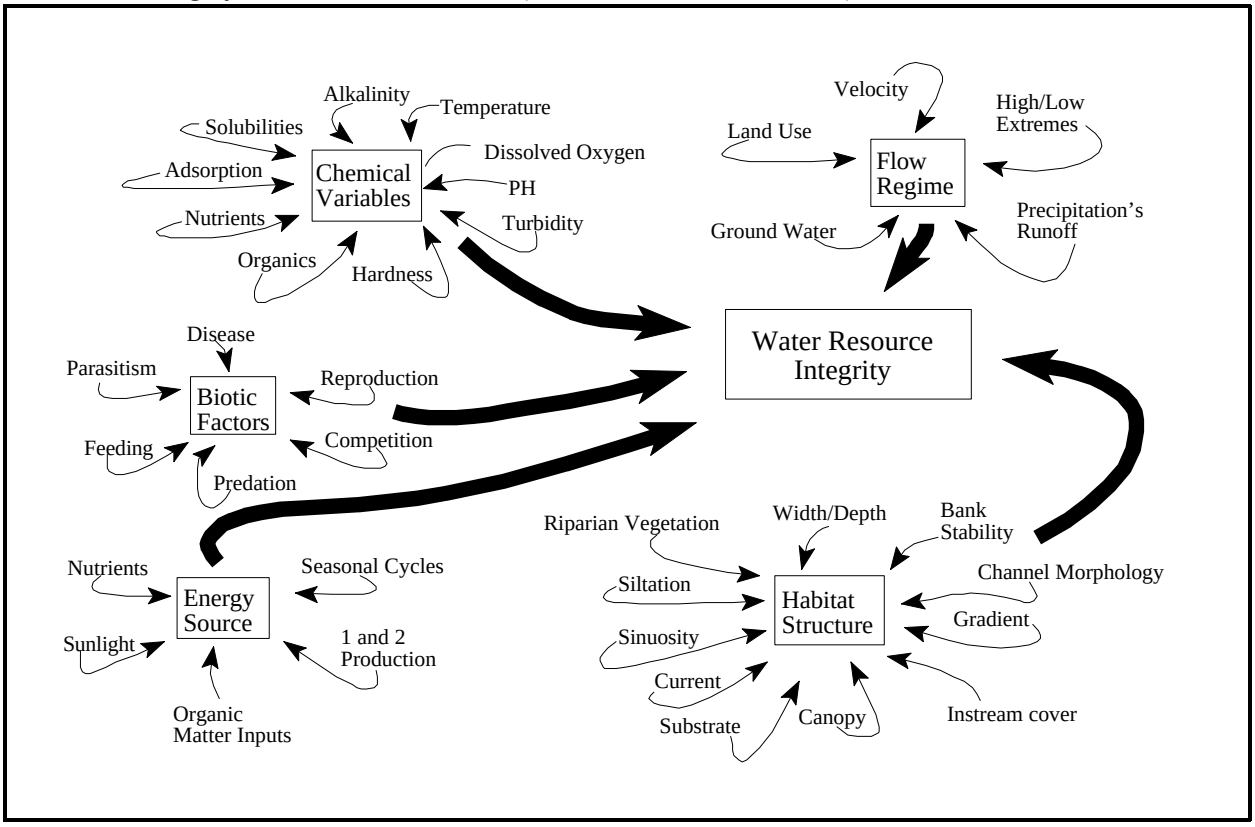
targets is somewhat flexible, depending on the scope of your concerns; however, its boundaries are determined by the highest elevations that divide the flow of water over the land, sending it to different rivers and streams. Defining the size or scale of the watershed may also be influenced by considerations such as political boundaries, (Figure 2.1) the nature and extent of the water quality problems identified, interests of the stakeholders willing to participate and other factors.

Indicators of Water Resource Quality

The quality of your watershed's water resources is determined by the chemical make up of the water column and the health of the biological community in the water channel. Environmental factors, such as stream flow and habitat structure, also influence water quality and the ability of a water body to support a healthy, self-sustaining, biological community (Figure 2.2). Understanding how these environmental factors are associated with water quality and knowing how to interpret measures of water quality will assist your watershed team in identifying streams that may already be impaired or threatened. Once these areas have been located, the sources and causes of impairment need to be identified. To do this, you will need to examine and interpret multiple lines of evidence from water chemistry data, sediment data, habitat data, effluent data, biomonitoring results, drinking water quality data and land use data. Often, after this is done, your conclusions may only be an educated best guess.

In the past, chemical water quality monitoring has largely been relied upon to determine the health of streams and rivers. But as our understanding of ecology has evolved, it has become apparent that chemical monitoring is only part of the water resource quality picture; it does not account for non-chemical pollutants such as siltation and habitat destruction, nor does it adequately reflect the long-term chemical make up of the water body. While a serious chemical water quality standard violation is a good indicator of impairment, the absence of such a violation does not confirm biological integrity. Some examples of chemicals that can be

Figure 2.2 Environmental Factors
The five principal factors, with some of their important chemical, physical and biological components that influence and determine the integrity of surface water resources (modified from Karr et al. 1986).



monitored in the water column are ammonia, phosphorous and dissolved oxygen.

Biological indices, on the other hand, measure the populations, hardiness and diversity of aquatic life. These indices naturally reflect the long-term integrity of the water body by assessing the capability of an aquatic ecosystem to support a biological community. Therefore, they provide a more holistic picture of a stream or river's health.

The following section will explain Ohio's water quality standards and biological criteria.

Water Quality Standards

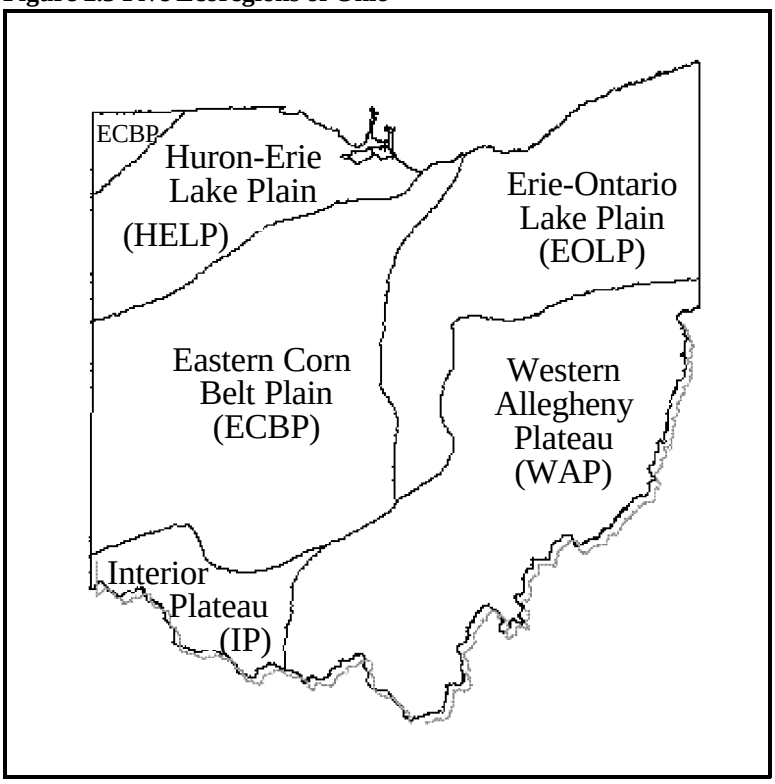
Under the Clean Water Act, every state is required to establish water quality standards. Some states use only chemical criteria, while others use biological criteria to determine the quality of their streams and rivers. Ohio is one of only a few states using numeric biological criteria in its water quality standards, although a number of states are in the process of developing these.

Ohio's water quality standards contain two elements: (1) numeric criteria; and (2) **beneficial use designations**. The numeric criteria are made up of biological indices and chemical parameters. Each beneficial use designation has an individual set of chemical and biological criteria associated with it, which are necessary to sustain the use. For example, to sustain the beneficial use designation, *Exceptional Warmwater Habitat*, the criteria are more stringent than those necessary to sustain the use designation of *Warmwater Habitat*. The beneficial use designations reflect how the water is used by humans and how well it supports the biological community.

The biological criteria also vary according to stream drainage basin area and the expectations for biological communities in each of the state's five ecoregions and stream types (Figure 2.3). The expectations for biological communities are based on background data collected on least-impacted sites in each of the five ecoregions. Examples of biological indices include the index of biological integrity (IBI), the invertebrate community index (ICI), and the modified index of well being (MIwb). A more detailed explanation of how the ecoregion criteria for these indices are set is explained in Ohio EPA's Water Quality Resource Inventory, also called the **305(b) report**.

Ohio EPA has assigned use designations to most major streams and rivers throughout the state. Many streams are divided into segments, each of which may have its own unique use designation. There are four major use designations: aquatic life use, recreational use, water supply, and state resource water. Every designated stream, at a minimum, has an aquatic life use designation; it may or may not also be: a public water supply; used for recreational purposes; a state resource water (water that flows through a state park or preserve). Some of the use designations are subdivided into more specific uses. For example, a water supply can be an agricultural water supply, an industrial water supply or a public (drinking) water supply. Similarly, aquatic life uses can be classified as exceptional warmwater habitat, warmwater habitat, coldwater habitat, seasonal salmonid habitat, modified warmwater habitat, limited warmwater habitat, and limited resource water (see sidebar 2.1).

Figure 2.3 Five Ecoregions of Ohio



Use designations are important in watershed planning and management because they provide a standard for the stream or river's water resource quality. Thus, the watershed action plan needs to identify all assigned use designations and use attainment status to discern which areas are impaired or threatened. This information can be found in the Water Quality Resource Inventory [305(b) report]. This report summarizes the results of Ohio EPA's water quality monitoring efforts and reports whether the monitored streams or lakes are supporting their use designations.

To determine the use designation of the streams and rivers in your watershed, you can refer to Ohio Water Quality Standards, Chapter 3745-1 of the Ohio

Sidebar 2.1
Aquatic Life Use Designations

Exceptional Warmwater Habitat is the most biologically productive environment. These waters support unusual and exceptional assemblages of aquatic organisms, which are characterized by a high diversity of species, particularly those that are highly intolerant and/or rare, threatened, endangered or special status. This use represents a protection goal for water resource management efforts dealing with Ohio's best water resources. The standards for ammonia and dissolved oxygen are more stringent than in the other use designations.

Warmwater Habitat defines the typical warmwater assemblage of aquatic organisms for Ohio rivers and streams. It is the principal restoration target for the majority of water resource management efforts in Ohio. Criteria vary by ecoregion and site type.

Modified Warmwater Habitat applies to streams with extensive and irretrievable physical habitat modifications. The biological criteria for warmwater habitat are not attainable. The activities contributing to the modified warmwater habitat designation have been sanctioned and permitted by state or federal law. The representative aquatic assemblages are generally composed of species that are tolerant to low dissolved oxygen, silt, nutrient enrichment and poor habitat quality. The ammonia and dissolved oxygen standards are less stringent than warmwater habitat. There are three subcategories:

Modified Warmwater Habitat - A for those streams affected by acidic mine runoff;
Modified Warmwater Habitat - C for those streams heavily channelized; and
Modified Warmwater Habitat - I for those streams extensively impounded.

The biocriteria are set separately for each subcategory.

Limited Resource Water applies to streams that have drainage areas of less than three square miles and either may lack water on a recurring annual basis, or have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; no formal biological criteria are established for this designation.

Limited Warmwater Habitat was adopted in 1978 as a temporary variance mechanism for individual segments that had point source discharge problems and as a result could not meet Clean Water Act goals. This designation is being phased out.

Seasonal Salmonid Habitats are Lake Erie tributaries that support periodic runs of salmonids during the spring, summer, and/or fall.

Coldwater Habitat describes waters that support assemblages of coldwater organisms and/or thosethat are stocked with salmonids with the intent of providing a fishery on a year round basis; it should not be confused with the Seasonal Salmonid.

Administrative Code, and *Ohio Water Quality Standards* and *Citizen's Guide to Water Quality Standards*, which are available from Ohio EPA. *Ohio Water Quality Standards* itemizes streams and rivers by segment and identifies their use designation; it also itemizes the chemical criteria for each use designation. (Sidebar 2.1).

Biological Criteria

There are three indices that Ohio EPA uses to assess the health of the biological community and determine **aquatic life use designations**. These are the index of biological integrity (IBI), the modified index of well being, (MIwb) and the invertebrate community index (ICI). These may be referenced in other sections of the 305(b) or in various monitoring or technical support documents.

IBI - Index of Biological Integrity

The index of biological integrity is a measure of fish species diversity and species populations. The criteria used to establish the index for each of the five ecoregions reflects the biological performance exhibited by natural or least impacted habitats of each region based on specific reference sites. The index is a number that reflects total native species composition, indicator species composition, pollutant intolerant and tolerant species composition, and fish condition. Combined, the higher the calculation, the healthier the aquatic ecosystem; conversely, the lower the index, the poorer the health of the aquatic ecosystem. The highest score is 60.

ICI - Invertebrate Community Index

The invertebrate community index is based on measurements of the macroinvertebrate communities living in a stream or river. It is particularly useful in evaluating stream health because: (1) there are a wide variety of macroinvertebrate taxa, which are known to be pollutant intolerant; and (2) there are a number of macroinvertebrate taxa, which are known to be pollutant tolerant. Like the IBI, the ICI scale is 0 to 60 with higher scores representing healthier macroinvertebrate communities and therefore more biologically diverse communities.

MIwb - Modified Index of Well Being

The modified index of well being factors out 13 pollutant tolerant species of fish and includes fish mass in the final analysis. Thus, if the IBI and the MIwb are examined together, an even clearer picture of the health of the biological community emerges. For example, if a high IBI is coupled with a low MIwb, it could tell us that while there is a variety of species and a good number of individuals of each species (high IBI) individual members of these species are smaller than what is expected. This might indicate that while fish are numerous, they are not maturing fully. In turn, this information could be useful in determining which pollution source is impacting the biological community more than others. For example, thermal increases caused by effluent from wastewater treatment plants could contribute to poor maturation of fish fry.

Sources of Water Resource Quality Data

There are a number of sources of information on water quality, such as state and county agencies, public institutions and private organizations (Table 2.1). One or more of these organizations may have water quality information compiled for water bodies in your watershed. Much of the water quality monitoring conducted by Ohio EPA is summarized by water body or stream segments in reports such as the *Water Resource Inventory* [305b report] and in technical support documents.

Despite the number of potential sources, you may find there is no existing water quality monitoring information on the streams your group is targeting. Under these circumstances, the group may want to conduct some basic stream monitoring. Several private organizations and public agencies have created resources and guides on how to conduct volunteer water quality monitoring (Appendix 4). These guides often focus on measures of the biological community and the quality of the aquatic and riparian habitats.

Ohio EPA Reports

Ohio EPA conducts regular stream water quality monitoring on a five-year schedule, which complements the NPDES river basin permit renewal cycle for dischargers (e.g. wastewater treatment plants, industries and other NPDES permit holders). The 305 (b) report, the State of Ohio Nonpoint Source Assessment, technical support documents and other reports provide various monitoring data, assessment of water resources meeting water quality standard and information about sources and causes of impairment.

Nonpoint Source Assessment

The first State of Ohio Nonpoint Source Assessment was done in 1988 in response under the **nonpoint source**

Table 2.1 Sources of Water Resource Quality Data*

Document	Type of Information	Source
Scenic Rivers	Volunteer-collected biological data for state and national scenic rivers.	ODNR, Division of Natural Areas and Preserves
County Water Resource Fact Sheets	Information about surface water resources, such as identification of major drainage basins, general water quality information, and precipitation.	Ohio State University Extension
Voluntary and miscellaneous monitoring data	A variety of special projects are conducted by a host of organizations throughout the state.	•local colleges and universities •US Geological Survey •public water suppliers •sewer districts •Ohio Lake Management Society •local and regional planning agencies
Water Resource Inventory / 305 (b)	Assesses Ohio's streams, rivers, and lakes and whether they meet water quality standards. Information is extracted from TSDs.	Ohio EPA, Division of Surface Water
State of Ohio Nonpoint Source Assessment	Descriptive information about areas identified in the 305(b) as nonpoint sources impaired.	
Technical Support Documents (TSDs)	Monitoring information for selected water bodies, which includes biological index scores and information about causes and sources.	

*Addresses for sources can be found in Appendix 11.

pollution control program set up by the 1987 Clean Water Act amendments. The NPS Assessment identified possible causes and sources of nonpoint source pollution for areas identified as being nonpoint source impaired. It is an extensive survey of existing and collected information of over 200 local, county, state and federal agencies in Ohio.

Technical Support Documents (TSDs)

Technical support documents are reports that summarize monitoring information for specific watersheds or streams. The information compiled in the 305(b) is summarized from TSDs. TSDs can be helpful in understanding your watershed because they may include more detailed information than the 305(b) report, including more specific information about causes and sources of impairment. The 305(b) also includes a reference page that identifies recently conducted TSDs and their availability.

Ohio Water Resource Inventory / 305(b) Report

Once you have identified the use designation of your watershed's streams in *Ohio Water Quality Standards*, you should examine the state's 305(b) *Water Resource*

Sidebar 2.2
What's in the 305(b)?

(Year) Ohio Water Resource Inventory: Summary, Conclusions, and Recommendations

This section gives an overview of the trends in the monitoring data with recommendations on how to address problems. It also gives a perspective of how Ohio fits into the national water quality picture.

Volume 1: Summary, Status, and Trends

This is a narrative summary and analysis of the data in the Appendices to Volume 1, 2, 3, and 4. It includes a detailed explanation of methodologies used in data collection and analysis as well as explanation of overall trends in Ohio's streams and rivers.

Appendices to Volume 1

Tables and charts of data for Ohio's streams and rivers.

Volume 2: Ohio Fish Tissue Contaminant Monitoring Program

This volume explains the current methodologies and rationale for fish tissue contaminant monitoring in Ohio, provides consumption advisories, historical information and a summary of existing data on specific criteria such as metals, PCBs and pesticides.

Volume 3: Ohio's Public Lakes, Ponds, & Reservoirs

This is a series of charts and tables that identify Ohio's publicly owned lakes, ponds and reservoirs larger than five acres; their uses (water supply, recreation or flood control); trophic classification; and summarizes the total acreage of lakes affected by various point and nonpoint sources of pollution.

Volume 4: Ohio's Ground Water

Identifies: the major aquifer systems and types in Ohio; number of aquifers with contamination and their contamination source; ambient ground water monitoring wells; public water supplies; and summarizes exceedances of maximum contaminant levels.

Inventory Report. The 305(b) report is a biennial use attainment assessment of Ohio's designated streams and rivers. The report evaluates Ohio's water resources based on aquatic life use designations, which, in most cases, are the most stringent of the water quality standards. It identifies which streams are meeting their use designation. Since there are a number of parameters associated with each level of aquatic life use designation, the 305(b) report also describes the *degree* to which a stream or river is meeting its use attainment. A stream that does not meet any of its biological criteria is in non-attainment; a stream that is not meeting one of its biological criteria is in partial attainment; and a stream that meets all of the biological criteria is in full attainment.

Also identified in the *Water Resource Inventory* are areas threatened due to existing or potential sources of degradation. Threatened waters are those that are fully attaining their aquatic life use designation but are imminently threatened or already have some portion impaired or partially impaired. They are commonly exceptional warmwater habitats or coldwater habitats because these habitats are extremely sensitive to siltation and habitat destruction. For example, the Upper Big Darby Creek is currently attaining the exceptional warmwater habitat aquatic life use criteria in many areas but is *threatened* by rapid suburban development of tributary watersheds. Construction sediment is already reaching some streams.

Navigating the 305 (b) Report

Trying to interpret the Water Resource Inventory can be a difficult, if not intimidating task. This section will give you the basics to navigate your way through the 305(b) report; however, to fully utilize the report and better understand the ecology of your watershed, you may wish to thoroughly read *Volume 1: Summary, Status and Trends*. The following section will give you a quick lesson on how to use the 305(b) report using examples from the 1996 report.

Figure 2.4 Sample Entry from the 305(b) Report: Big Darby Creek

WB ID #: OH 39 2 River Code: 02-200 USEPA
REACH: 05060001-038

Ecoregion:
Eastern Corn Belt Plain

WB Name: ***BIG DARBY CREEK (HELLBRANCH RUN TO LIZZARD CREEK)***

County:
Logan, Union, Franklin

Aquatic Life Use(s): **EWH** *Segment Length:* 12.77

Assessment Cycle: 96 Assessment Date: 9511 Sampling Years: 92 to 93 Type of Monitoring: Biological

Aquatic Life Use Attainment				
Full	Full, But Threatened	Partial	Not Attaining	Not Assessed
0.00	12.77	0.00	0.00	0.00

Comments: There are multiple threats to this segment. Hellbranch Run is at the upstream end of this segment. This is the most rapidly developing portion of the whole watershed. Problems with failing onsite systems and poorly operated package wastewater treatment plants already cause localized problems, which may translate into downstream problem in BOD as density increases. Discharges in the vicinity of the Pickaway correctional institute are currently causing peaks of phosphorous that may eventually translate into biological impacts.

The 305(b) is divided into several volumes (Sidebar 2.2). Ohio EPA is in the process of making this information available on its web site (http://www.chagrin.epa.ohio.gov/) in PDF format using Adobe Acrobat Reader. Below is a description of what type of information you will find in each of the volumes.

In most cases, you will want to focus your attention on the Appendices to Volume 1. Once you have located the stream of interest, you can glean from the 305(b) some baseline information, such as:

- the degree to which the stream is meeting or not meeting its aquatic life and recreational use designations;
- the type of monitoring information available and the date it was last collected; and
- the major sources of impairment and threats.

Below is an example using the Big Darby Creek that may help you to become familiar with using the 305(b) report.

1. To what degree is the stream meeting its aquatic life use designation?

First, you will need to find out the watershed group identification number of your area (refer to Figure 1.2, Boundaries of Ohio Watersheds). This will help you identify streams and rivers in your watershed in the 305(b) report, which sequentially lists rivers and stream by water body group number. Then, by looking at the *Ohio Water Quality Standards*, the use designations can be identified. For example, the use designations for the Big Darby Creek are as follows:

Big Darby Creek - confluence with Flat Branch to the mouth: state resource water, exceptional warm water habitat, agricultural water supply, industrial water supply and primary contact recreation.
Big Darby Creek - all other segments: warmwater habitat, agricultural water supply, industrial water supply and secondary contact recreation.

Notice that from the confluence with Flat Branch to the mouth, the creek is an exceptional warmwater habitat. This is the majority of the creek, or anything downstream of Flat Branch. In this particular creek, “all other segments” refers only to a small section of the headwaters of the Big Darby north of Flat Branch. Keep this in mind as you review the 305(b).

Next, look at Appendix A in the Appendices to

Figure 2.5 Sample Entry from the 305(b) Report: Tributary to Big Darby Creek

WB ID #: OH 39 6 River Code: 02-204 USEPA

Ecoregion: Eastern Corn Belt Plain

REACH: 05060001-039

WB Name: ***HELLBRANCH RUN***

County: Franklin

Aquatic Life Use(s): **WWH** *Segment Length:* 11.18

Assessment Cycle: 96 Assessment Date: 9512 Sampling Years: 92-93 Type of Monitoring:Biological

Aquatic Life Use Attainment:				
Full	Full, But Threatened	Partial	Not Attaining	Not Assessed
0.00	3.80	3.70	5.30	0.00

Comments:

Causes of Impairment:
Nutrients - H
Siltation - M
Organic enrichment / DO - H
Other habitat alterations - H
Pathogens - H
Siltation - T
Other habitat alterations - T

Sources of Impairment:
Package plants (small flows) - H
Nonirrigated crop production - M
Land development / suburbanization - M
Onsite wastewater systems (septic tanks) - M
Other urban runoff - H
Land development/suburbanization - T

H indicates a major sources of impairment; M indicates a moderate source of impairment; T indicates threatened; and S indicates a slight or unverified potential impact.

Volume 1 of the 1996 305(b). You will see stream information presented in a manner similar to Figures 2.4 and 2.5.

In the first example, the WB ID# is watershed “39" (hydrologic group) (Figure 2-4 in Volume I of the 305(b) is a key to these watersheds). The “2" after OH39 represents the stream segment. Ohio EPA catalogues stream segments, numbering sequentially within a watershed, working up from the mouth of the river to the headwaters. Notice that the next entry in the table is out of sequence. It reads, “OH39 6". This means that segments 3, 4, and 5 were not monitored for the 1994 305(b) report (recall that only 50% of the designated sites are sampled); nor have they been previously monitored. Had they been monitored in 1990, 1991, 1992, ..., data for those years would have been retained in the 1996 report. Note that both of these *segments* (OH 39 2 and OH 39 6) are downstream of Flat Branch; OH39 6 is actually a tributary to Big Darby designated as warmwater habitat. While Hellbranch Run shares the same watershed group number with Big Darby, it has its own river code. Under the field Waterbody Name for Big Darby, you will see [02-200]. The Darby Creek is located in the Scioto River Basin (code 02) and the entire Darby Creek is identified by the code 200. Hellbranch Run, a tributary of Big Darby, is identified by the code 204.

Reading across the table you will see that all of the miles in the first segment (OH39 2) are currently meeting their aquatic life use designation (exceptional warmwater habitat); however, they are threatened.

Now look at the second entry, Hellbranch Run. The total length of the segment is 12.8 miles (sum of miles); 3.8 miles are threatened; 3.7 are partially attaining; and 5.3 are not supporting the aquatic life use designation, warmwater habitat.

2. When was the last monitoring information collected and for which parameters?

While a chemical evaluation of water quality is sufficient to meet federal guidelines for conducting use attainment, Ohio EPA takes an ecologically robust approach to monitoring by also assessing, whenever possible, chemical and biological criteria. Thus, in

certain instances where chemical monitoring information alone is sufficient to estimate the health of the biological community, use assessment is determined by chemical parameters alone. Where this is the case, it is noted in the field, Type of Monitoring. However, in the example with Big Darby and Hellbranch Run, biological monitoring data was collected at both survey sites. This tells us that the assessment was based on at least one biological index.

3. What are the major sources of impairment and threats?

Now look at the section named "comments." This gives a descriptive assessment of the causes and sources of impairment or threatened impairment.

In the second segment (OH39 6), Hellbranch Run, there are a number of causes of impairment. In this example, a major cause of impairment is habitat alteration due to channelization. A stream is considered channelized when it has been moved or diverted from its original course. Sometimes sinuosity or bends in the stream are straightened out to facilitate land construction and development. One of the impacts of channelization is a reduction in stream development and therefore, reduction in the variety of aquatic habitat. The banks of streams that have been channelized are sometimes covered by rip rap, which removes riparian habitat and can speed up stream flow. Increased water velocity, in turn can lead to increased erosion and siltation, which can result in shallower, warmer streams. Warmer, less developed streams (fewer riffles and pools) provide poorer habitat for aquatic life.

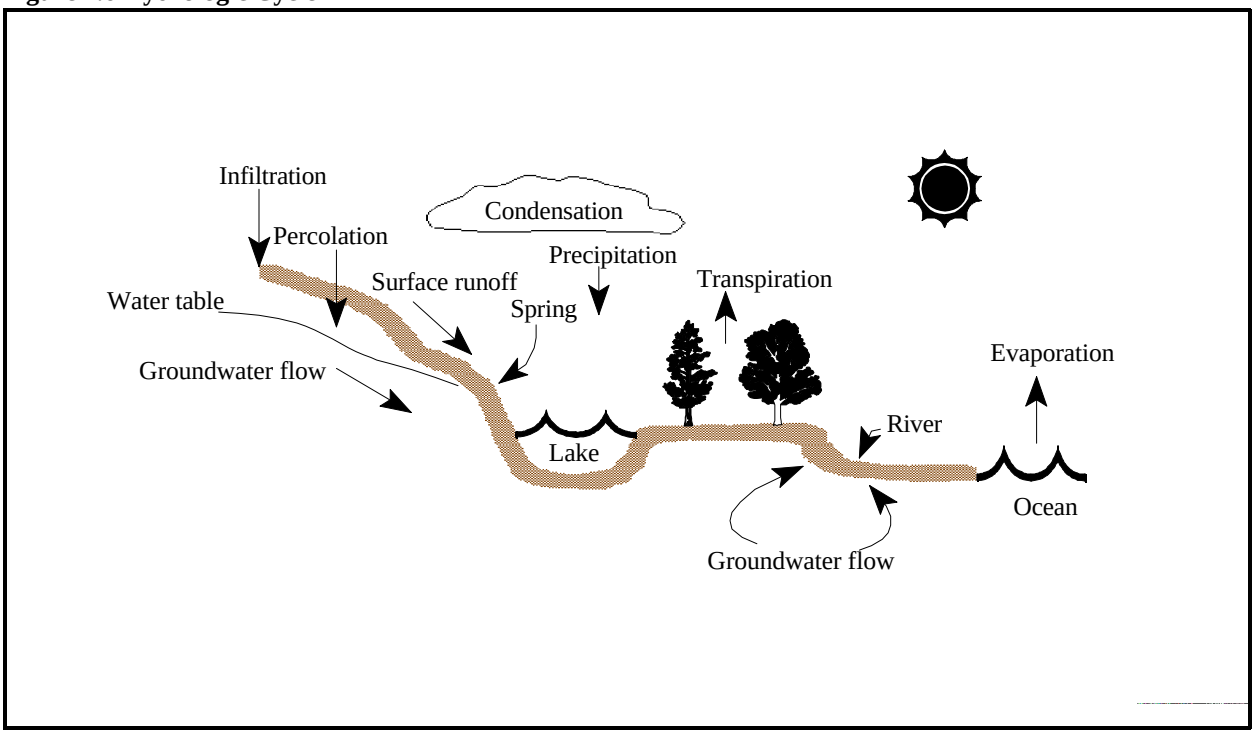
Another equally contributing cause of impairment is organic enrichment. Wastewater effluent and fertilizer runoff from croplands are sources of this pollutant. Siltation and flow alteration, which are produced by channelization as well as agricultural runoff, also affect habitat modification as previously explained.

As you can see from this example, the causes and sources of impairment are interrelated. This can sometimes make it difficult to identify which sources to target in watershed activities. Similarly, activities targeted at one source may actually influence several causes and make other sources more apparent.

Summary of the 305(b)

Other information is also included in the 305(b): attainment of recreation uses; sediment contamination; fish abnormalities; fish tissue samples; fish and primary contact advisories; and fecal coliform data. Attainment of recreational uses identifies when streams are meeting use designations such as primary (e.g., swimming) or secondary contact (e.g., canoeing), as determined by fecal coliform levels. Sediment contamination information may help you identify old waste storage sites or it might

Figure 2.6 Hydrologic Cycle



explain scores on the IBI. Fish tissue samples give information about what types of pesticides, insecticides, herbicides, PCBs and other industrial pollutants are in the stream, which are either ingested or absorbed by fish and show up in their fatty tissue. If your stream or river did not test positive for sediment contamination or advisories were not issued, it will not be itemized in these sections of the 305(b); however, if it is listed, an examination of TSDs, the Master Sites List and point source information may be useful in determining the sources of specific pollutants.

Now that you know how to assess water quality, you need to look at some other factors that influence it such as: (1) the characteristics of the water resource, or the behavior of water; (2) the natural features of your watershed; and (3) human activities that affect water quality.

Characteristics of the Water Resource

The following section will explain some characteristics of water resources that influence water quality. These include hydrology, flooding, ground-surface water interactions and water supplies.

Hydrology

Elements of the hydrologic cycle (Figure 2.6) vary from region to region and from day to day. Changes in one element usually result in changes in another. For example, a heavy rainfall would result in greater stream flow levels, which in turn could result in higher reservoir levels. Hydrology deals with the distribution of water as it flows through the landscape to a larger body of water. In developing an action plan, you may wish to evaluate the following characteristics of the watershed hydrology:

- stream (or drainage) network;
- stream flow, lakes, ponds, reservoirs and wetlands; and
- precipitation.

Stream flow data is useful in determining periods of maximum and minimum pollutant dilution, which can help you analyze pollutant loads (see Chapter 3, **Total Maximum Daily Loads**). Factors influencing stream flow include precipitation, stream length and slope, ground water recharge areas and reservoirs (Table 2.2).

Ground - Surface Water Interactions

In most of Ohio, ground water discharges to surface water. Any contaminants in ground water may add to stream or lake pollution. This typically occurs in unsewered areas where on-site wastewater treatment systems either do not exist or function poorly due to age, neglect or installation in unsuitable soils. Old

Table 2.2 Sources of Hydrologic Information*

Document	Type of Information	Source
County Water Resources Fact Sheets	Precipitation, hydrologic cycle	OSU Extension County Water Resources
Historical and current data from permanent stream gauging stations across Ohio and a variety of reports	Stream flows	•ODNR, Division of Water •US Geological Survey •Ohio EPA, Division of Surface Water
Hydrologic Atlas of Ohio WIR No. 28, 1991	Precipitation, average stream flow, temperature, water loss for 1931-1980	ODNR, Division of Water
Monthly Water Inventory Report for Ohio	Reservoir levels, ground water	ODNR, Division of Water
Gazetteer of Ohio Streams Report No. 12 Ohio Water Plan Inventory	Stream lengths and gradients	ODNR, Division of Water

*Addresses for sources of information can be found in Appendix 11.

landfills and industrial facilities, abandoned underground storage tanks and drainage wells impact ground water directly and surface water indirectly (Table 2.3). In areas with certain types of underlying limestone or in streams with sandy bottoms, surface water can drain directly to ground water and contaminate it. Ground water can also become contaminated by surface water if a water supply well is located adjacent to a stream, river or lake. Wells located next to a water body may actually draw water downward from the surface water body into the well. If the water is contaminated and the water treatment facility is not made aware of it, it may end up in the drinking water supply.

Flooding

Flooding is an overflow of water into normally dry areas. Destruction of riparian vegetation, impervious surfaces and channelization are just a few things that contribute to flooding. Flooding can result in habitat alteration and streambank instability, and damage to homes, businesses, farmland, bridges, water treatment plants and roads.

Table 2.3 Sources of Ground Water Information*

Document	Type of Information	Source
Well logs	Well construction information, such as well depth, water table level and geologic structure	ODNR, Division of Oil and Gas
State of Ohio Nonpoint Source Assessment	Qualitative information about areas impaired by nonpoint sources of pollution as identified in the TSDs	Ohio EPA, Division of Surface Water
County Ground Water Fact Sheets	Information about public water suppliers, drinking water treatment facilities, well yields, aquifers, ground water levels and ground water quality and ground water availability map	Ohio State University Extension
County Soil Surveys	Highly erodible lands, hydric soils (indicative of wetlands)	•Natural Resources Conservation Service •County SWCDs
Master Sites List	Statewide list of old landfills and list of abandoned hazardous waste sites, which are potential sources of ground water contamination	Ohio EPA, Division of Emergency and Remedial Response
A variety of reports and raw data	Public water supply information	•County Health Departments •Ohio Department of Health
A variety of reports and raw data	Wellhead protection plans, statistical summaries of selected monitoring wells and ambient ground water quality data	Ohio EPA, Division of Drinking and Ground Water
Miscellaneous monitoring data	Private well studies for potential contamination by nitrate and agricultural pesticide	Heidelberg College Water Quality Laboratory
Various maps and reports	County ground water availability maps, county ground water pollution potential maps, county ground water resource potential reports for localized construction of wetlands for wastewater treatment, aquifer vulnerability maps	ODNR, Division of Water

*Addresses for sources of information can be found in Appendix 11.

Your watershed planning committee should contact the local floodplain administrator to determine if there are any floodplain management initiatives in place. The committee needs to find out if there are any flood-prone areas in the watershed. Recommendations in the watershed plan should reflect existing plans to reduce flooding and damages.

The regulation of development in federally identified flood hazard areas is administered by local governments with technical assistance from state and federal agencies. Almost 90 percent of the 718 communities in Ohio with identified flood hazard areas participate in the National Flood Insurance Program (NFIP). A federally identified flood hazard area includes those areas subject to inundation by flood having a one percent chance of being equaled or exceeded in any given year. Each NFIP participating community has identified a local floodplain administrator. This person oversees the implementation and enforcement of local flood damage reduction standards.

The Division of Water at ODNR is the primary agency providing information to reduce flood damage in the state. It provides planning information and engineering data to local government and state agencies and distributes flood maps and flood altitude data.

Water Supply

This element of the watershed description calls for a list of all water users in the watershed. Some potential users include: public water suppliers; industries; mines; thermoelectrical power plants; farms; and others.

Water users in the watershed could be a source of financial or technical support for the watershed plan development and implementation. They also may share your interest in improving water quality.

Municipalities may have already developed a plan to protect their water supply. This is especially true when the main source of drinking water is ground water. These communities may have developed a **wellhead protection plan** to prevent surface pollution from reaching their ground waters. Your watershed plan should accommodate any existing wellhead or ground water protection plans and mobilize activities in areas where there is no protection of water supplies.

Public water systems that rely on surface water as their source of drinking water will also begin developing protection plans as required by the 1996 Amendments to the Safe Drinking Water Act. The Ohio EPA Division of Drinking and Ground Waters will be establishing guidelines for conducting source water assessments after federal guidelines are established in August, 1997.

Water use is commonly described by category and by volume. Actual water use volumes are normally available only for facilities that use large quantities of water. Limited information on large capacity water users, including golf courses, farm irrigation systems, public water systems and self-supplied industrial facilities is available from the Ohio Department of Natural Resources, Division of Water. Information on public water supplies is available from either the entity itself or Ohio EPA, Division of Drinking and Ground Waters. Volume 4 of the 305(b) also identifies public water supplies.

Natural Features of Your Watershed

The following section describes the types of information you may wish to include in the watershed description section of your watershed action plan. An inventory of the natural features in your watershed will help you to identify sensitive areas. It will also help you to determine the causes, sources and impacts of pollutants.

Geology

Geologic information can be presented in a narrative format or on a map of the watershed. Soil surveys (published for each county and available from the local soil and water conservation district) describe basic geology of the respective counties. Detailed information on local geology may be available from the Ohio Department of Natural Resources, Division of Geological Survey, or the county engineer.

The geology of a watershed influences the characteristics of the water resource through:

- land form and slope;
- stream shape, form, gradient and flow;
- ground water quantity, quality and flow;
- soils;
- animal and plant life; and
- cultural features.

For example, if the topography (land form and slope) is steep, rivers will run faster and potentially be more susceptible to erosion. This, in turn, could affect stream flow, which would also be further influenced by precipitation and dam releases. The underlying rock formations will determine how susceptible a stream is to erosion and will also affect ground water recharge. The more porous the rock, the quicker the recharge. Soils that make up the stream banks and bed will also determine ground water recharge, flooding and erosion.

Soils

Soils will affect vegetation cover, farming practices, rainfall infiltration, pollution runoff rates, erosion and sedimentation. These, in turn, influence the quality of surface water and/or ground water. Your watershed action plan may include tasks for which soil characteristics should be considered. These include but are not limited to erosion control, nutrient management, septic systems, and construction of wetlands for wastewater treatment.

Soil characteristics allow the determination of volume of runoff and suspended sediment loads to the receiving stream (see Chapter 3, **AGNPS**). In some cases, the type of soil may not be conducive to certain types of waste water treatment such as home sewage systems. For example, clay-rich soils provide little absorption for leachate fields used to treat wastewater from home septic systems. If soil considerations are important, you may wish to contact the local soil and water conservation district of the Natural Resources Conservation Service to obtain the following information:

- county soil surveys;
- highly erodible lands (HEL);
- hydric soils (indicative of wetlands); and
- prime farmland.

Riparian Ecosystem

The riparian ecosystem is the natural vegetation that grows adjacent to flowing water. Trees and shrubs in the riparian ecosystem function as filters that trap sediments and absorb nutrients carried by water draining over the land (runoff). In addition, riparian vegetation provides shade, maintaining water temperatures at levels necessary for certain species of plants and animals. It also regulates the exchange of nutrients and woody residue between land and water. Removal of the riparian vegetation combined with the intense draining and tiling of Ohio's soil have caused our rivers and streams to run wider and shallower. Thus, flash flooding is more frequent, caused by quickly moving runoff from farmed lands and impervious surfaces. Smaller stream channels clogged by sediment also contribute to more frequent flooding and result in downstream damage.

The riparian ecosystem also provides:

- habitat for wildlife and fish;
- a travel path for migratory birds;
- food, shelter and migration corridor for game;
- a critical link in the food web;
- streambank stability; and
- recreational opportunities for many outdoor activities, such as hunting, fishing, camping, boating and swimming.

The watershed committee should direct its efforts to identify, evaluate, quantify and produce a map of all remaining parcels of trees and riparian forest in the watershed. A stream survey (Appendix 4) can be used to accomplish this. Also, some regional planning commissions may have riparian corridor information for selected streams and rivers.

Fauna

The animals that live in the area defined by your watershed are referred to as fauna (Table 2.4). The presence of officially designated rare, threatened or endangered species can help increase awareness of the importance of a watershed. It can also help guide decisions about management activities. For example, if a particular endangered species requires forested land to survive, you may want to factor this into prioritizing riparian corridor restoration. At the same time, you may also discover that a particular stream mollusk is threatened due to high sediment levels. Under these circumstances, both of these species could potentially benefit by riparian corridor restoration.

Human Activities Affecting Water Resource Quality

There are a variety of human activities that influence water quality, which manifest themselves in point source and nonpoint source pollutants.

Point Sources of Pollution

Point sources of pollution are those that have a known discharge point, such as a pipe. In most cases, point sources are required to operate under a National Pollutant Discharge Elimination System (NPDES) permit. Examples of point source discharges include industrial and wastewater treatment plants that discharge directly to a stream, and certain livestock facilities.

The watershed action plan needs to identify, list and locate on a watershed map all known point source dischargers in the watershed. It is also important to determine the pollutants and the amounts being discharged to quantify total pollutant loads.

Point sources of pollution are regulated by Ohio EPA's Division of Surface Water, which maintains records on permits and related water quality monitoring.

Industrial Dischargers

The water that is discharged from industrial facilities to a stream or river is referred to as effluent. Some facilities discharge directly to a stream or river, whereas others discharge to a pipe that goes to a wastewater treatment plant. Facilities directly discharging to surface waters are required to obtain an NPDES permit from Ohio EPA. The permit, if granted, specifically itemizes limits for each chemical effluent; and the facility must conduct regular monitoring to demonstrate compliance with these limits. When a facility discharges to a city or municipality's wastewater system, the city or municipality may require the industry to fulfill certain pretreatment steps to ensure that the industrial effluent does not cause the wastewater treatment plant to exceed its NPDES permit limits.

Locating point source discharges on your watershed map may help you identify causes and sources of water quality problems. These locations may already be known locally or can be identified by examining Ohio EPA NPDES permit files.

Storm Water Dischargers

Storm drains in parking lots and on roadways either discharge directly to streams and rivers, or, as in combined sewer systems (CSSs), combine with sanitary sewage and are transported to a treatment facility. Runoff from impervious surfaces can carry dirt particles, oil, grease and any other substance lying on the paved surface. Household cleaning products, automotive, gardening, painting and other chemical supplies often make their way into storm drains from unwitting residents who pour or wash these chemicals into storm drains for disposal. Under Ohio law, certain industrial facilities are required to obtain NPDES permits for storm drains in parking lots and other paved areas where chemicals and other substances may be stored and exposed to precipitation.

To locate storm water drains and discharge points in your watershed, you will need to contact the municipalities and counties in which the systems are located. Some regional planning agencies may also have this information.

One of the difficulties in correlating water quality information with discharges from CSSs and storm water drains is that the discharges are sporadic; they mostly occur during rain events or snowmelts. If monitoring is not done immediately following a heavy rainfall or snowmelt, water quality data may not accurately reflect pollution surges. Similarly, if monitoring is done after a *series* of heavy precipitations, results may not indicate the

Table 2.4 Sources of Information about Local Flora and Fauna*

Type of Information	Source
Official lists and geographic information on federal- and state- listed rare and endangered plant and animal species. Data is also available on aquatic macroinvertebrates for state-designated scenic rivers.	ODNR, Division of Natural Areas and Preserves
Detailed data on fish and aquatic invertebrate diversity from routine stream monitoring	Ohio EPA, Division of Surface Water
Federal endangered species list	U.S. Fish and Wildlife Service
Miscellaneous and various types of information Check local sources.	Audubon Society Biology teachers University / college biology departments Park districts The Ohio State University Museum of Biological Diversity Lake Management Society The Nature Conservancy

*Addresses for sources of information can be found in Appendix 11.

intensity of the initial pulse of pollutants discharged to a stream or river. Spot checking and monitoring by volunteers in identified areas of concern can help your group determine the degree to which storm water drains are impacting water quality.

Combined Sewer Systems and Overflows

A number of cities and municipalities throughout the state have combined sewer systems (CSSs). These systems carry both storm water and wastewater in one pipe to a treatment facility; thus, the name *combined* sewer systems. More modern systems transport these two wastes separately. When rainfall or snowmelt is heavy, the flow in combined sewer systems can exceed pipe capacity, resulting in discharges to combined sewer overflows (CSOs). Combined sewer overflows are direct outlets to ditches, lakes, rivers, streams and creeks, which prevent backups in the CSSs.

Because the wastes in CSSs are untreated, discharges from CSOs can contain a variety of pollutants, such as pathogens, oxygen-demanding pollutants, suspended solids, nutrients, toxics, and floatable solids. As a result, they can impact streams and rivers suddenly after heavy rainfall or quick snow melts.

As a part of inventorying your watershed, your group should identify communities serviced by combined sewer systems and map the location of CSO discharge points. The best sources for this type of information are municipalities, cities and county water departments or public works divisions. Identifying the location of the CSOs on a map will help you to correlate water quality information and accurately determine sources of pollution.

The task of addressing CSO discharge is complex. Most of the major cities in Ohio are serviced by CSSs, yet the cost of replacing these with separate municipal wastewater and storm water systems is prohibitive. Moreover, while CSOs may discharge directly to surface waters, the materials contained within them consist of a collection of both nonpoint source runoff and point source wastewater. For example, an overflow could contain storm water--oil and sediment from roads and other land surface runoff--as well as sanitary wastes. As such, reducing the pollutants in the CSO would involve a multi-faceted approach, perhaps including an education campaign implemented in conjunction with various control methods.

To help resolve some of the issues surrounding CSOs, U.S. EPA has established a National Combined Sewer Overflow Control Policy. The policy states that CSOs are subject to the National Pollutant Discharge Elimination System (NPDES) permit requirements. It also provides guidance to states in permitting CSOs and enforcing permits, while also requiring the elimination of dry weather overflows. Ultimately, through a staggered schedule, all CSOs will be permitted. The permits require CSO structures to be sound and in compliance with Clean Water Act technology and water quality requirements. They also require that impacts of CSOs on water quality, aquatic biota and human health are to be minimized using a set of prescribed controls.

Wastewater Discharge

Wastewater discharge comes from wastewater treatment plants that treat residential, commercial and industrial waste. Wastewater treatment plants are required to be permitted under the National Pollutant Discharge Elimination System. The effluent from wastewater treatment plants often contains nutrient levels that are higher than those of the stream or river. When examining water quality monitoring data, however, be aware that high nutrient levels observed in a stream may also be the result of runoff from agricultural fields. Often, it can be difficult to discern which is the greater source of nutrient loads. In these cases, innovative approaches to reducing or maintaining total nutrient loads to the stream or river may be required.

Nonpoint Sources of Pollution

The term **nonpoint source pollution** (NPS) refers to water pollution that results from a variety of human land uses such as farming, development, logging, resource extraction, land disposal and hydromodification (Appendix 5). Nonpoint source pollution occurs when rain or snow melt drains over the land. The type of land use determines the type of pollutants that runs off with the precipitant and eventually finds its way back to a stream, river or ground water table. As a product of weather patterns, nonpoint source discharges are naturally intermittent and occur more sporadically than point source discharges. Most are diffuse and difficult to quantify. Your watershed plan should identify all known or suspected sources of nonpoint source pollutants. One way to do this is to delineate land uses on a map.

Land Use

Land use data may be available in computerized

Table 2.5 Sources of Land Use Information*

Type of Information	Source
Miscellaneous	Local and regional planning commissions
OCAP - Ohio Capability Analysis Program -- land use information for most Ohio counties; and aerial photos of stream networks	ODNR, Division of Real Estate Land Management
County statistic of agriculture land uses	Ohio Department of Agriculture Annual Report
Aerial photos	Consolidated Farm Services Agency (formerly the Agricultural Stabilization and Conservation Service)
Copies of old surface mining permit maps	Ohio Historical Society
Agricultural land uses, tillage transect surveys	NRCS

*Addresses for sources of information can be found in Appendix 11.

geographic information systems (GIS) (Table 2.5). Aerial photographs show land features, such as riparian corridor coverage, and they can also give watershed residents a bird's eye view of their watershed. The presence of natural areas, nature preserves, scenic rivers, or historical or archaeological sites should also be noted on the map as these assets can increase community appreciation of the watershed.

When developing your watershed plan, be especially aware of changes in land use; for example, annexations or sewer and water line extensions usually precede new development. New developments can be used as a predictor of future water quality problems. Other activities that warrant special attention:

- new or planned residential or commercial development, which may increase heavy metal and nutrient loads, and erosion;
- industrial areas, which may increase peak volume runoff, nutrient and heavy metal loads;
- smokestack industries, potential sources of air pollution, may either precipitate with rain and snow or run off with contaminated surface water;
- cropland, pastures and feedlots, which contribute runoff and/or sediment carrying herbicide, pesticide, insecticide and fertilizer residues;
- logging, which contributes to erosion and sedimentation; and
- wastewater treatment facilities and home septic systems, which may contribute nutrients and bacteria to surface or ground waters.

Impervious Surfaces

Impervious cover can be defined as any land cover that prevents the infiltration of water into the soil. Examples are roads, parking lots, sidewalks, rooftops and other impermeable surfaces in urbanized areas. Imperviousness is a useful indicator to measure the effect of land development on water resource quality.

Research consistently yields similar conclusions regarding the effect of imperviousness on stream degradation. Stream degradation occurs at levels of imperviousness as low as 10 percent (Figure 2.7). If a watershed is greater than 30 percent impervious cover, stream health is not only impacted, but degraded. Land use also can be used to predict the percentage of impervious cover. A study by the USDA Soil Conservation Service (now the USDA Natural Resources Conservation Service) (1975) indicated that a one acre residential development may only be 20 percent impervious cover; whereas an industrial or commercial development of the same size may be up to 70 percent impervious cover.

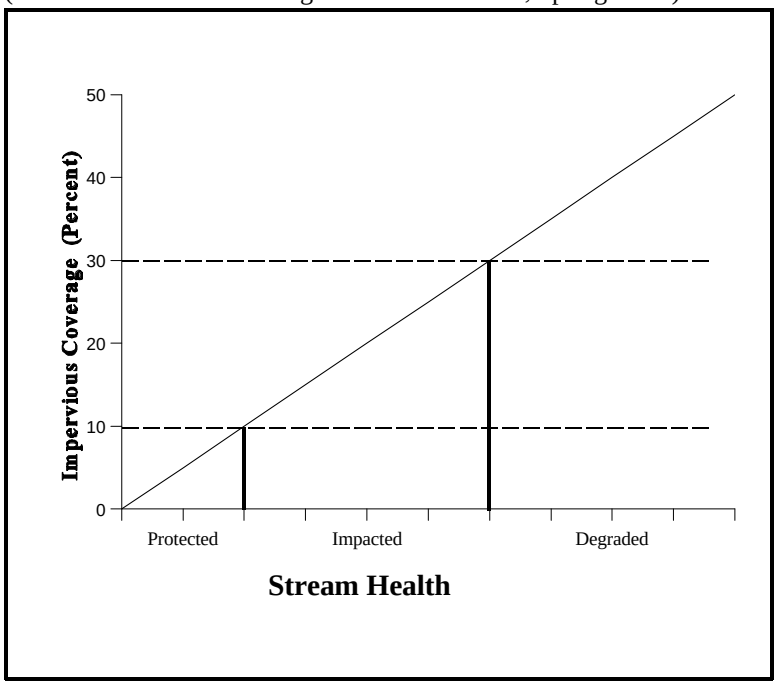
Impervious surfaces affect water resources by:

- increasing the amount of runoff, peak of discharge, velocity and time of concentration;
- reducing infiltration, ground water recharge and dry weather discharge;
- increasing stream cross-sectional area to accommodate higher flow. This in turn produces streambank erosion and habitat degradation;
- increasing temperature of runoff reaching streams and thereby increasing stream temperatures; and

- reducing populations of sensitive **macroinvertebrates** and reducing **biodiversity** in general.

Your watershed action plan needs to consider impervious surfaces for planned developments and how to minimize their impacts once they are built.

Figure 2.7 Relationship of Imperviousness to Stream Health
(Source: Amnerican Planning Association Journal, Spring 1996.)



Unsewered Areas

Another source of nonpoint source pollution is unsewered areas. Typically, these are usually rural areas or newly developing areas on the urban fringe. In both instances, sewer lines have not been built either because housing density is very low, such as in rural areas, making it cost prohibitive; or, as in urban fringe areas, new sewer lines have not yet been constructed.

Septic systems offer the minimum treatment, or primary treatment, of domestic waste. Essentially, wastewater is stored in an underground tank where solids are removed and stored. The remaining gray water is then filtered through a leachate bed and thereby returned to ground or surface water. As such, septic systems require somewhat porous soils, which allow the wastewater to percolate through the ground layers. Every few years septic tanks need to be pumped to remove stored sewage solids. With this type of sewage system, discharge will be diffuse. Each home in a residential development may be outfitted with its own septic system, all of which may eventually recharge to a single stream or ground water source.

Aeration systems are similar to septic systems except sewage is oxygenated with an aerator, which allows for wastes to break down aerobically. Like the septic systems, aeration systems must also be pumped every few years to remove the stored sewage solids. But unlike septic systems, numerous aeration systems in a single housing development often share a common drainage tile, which usually discharges directly to a stream or river.

If home sewage systems are installed in impermeable soils or in areas with high water tables, water quality problems can arise. In addition, if either of these systems are not well maintained and pumped according to schedule, high fecal coliform and nutrient levels can result in nearby streams, rivers and underground water supplies. Therefore, your watershed group should identify the areas of high growth that are unsewered and determine whether soils are suitable for this type of system. In unsuitable areas, zoning may be used to prevent such problems. To identify existing areas serviced by home aeration systems, contact your local health departments. They may be able to tell you when systems were built and what types of education residents have or have not received about proper maintenance of them.

Social Issues

The watershed committee needs to determine what social issues, if any, make the watershed unique. Recreational attractions or historically significant cultural attractions can make the watershed effort important not only to environmentalists but to other groups.

Social trends can provide insights into a watershed's current situation as well as methods to design strategies to achieve strong local participation. For example, a stream in an urban area might be impaired because residents are unaware of the quality of the stream or, they may not realize how their behaviors impact it. Or point source dischargers may actually be a source of nonpoint runoff from impervious surfaces, like large parking lots or outdoor cement storage pads. To better understand the social issues affecting your watershed, try examining trends on the following issues (see Sidebar 2.3 for sources of information):

- population (age, size of family, composition, etc);

- average household income;
- education levels;
- housing (ownership, rental, vacancy rates, etc.);
- property tax values;
- unemployment rate;
- farming trends (part-time/full time, owner operated/rental, etc.);
- limited resource landowners;
- major employers, location of facilities; and
- watershed and regional economic trends.

Plans for watersheds in rural areas with little or no population change will be distinct from those for watersheds on the urban fringe and those experiencing rapid population growth and new construction.

Sidebar 2.3*
Sources of Socioeconomic Information:

- local and regional planning commissions; and
- Ohio Department of Development, Office of Strategic Research ("1990 Census and 1992 Estimates of Ohio's Population: State, Counties, Cities, and Villages" or current version).

*Addresses for sources of information can be found in Appendix 11.

Map Preparation Tips

Maps are an important resource for describing a watershed. A map, or set of maps that overlay, can clearly illustrate how a variety of features interrelate. A detailed map of the watershed may illustrate features such as: administrative boundaries; road network; the principal stream and its tributaries; lakes, ponds, and reservoirs; locations of major wastewater dischargers and other potential pollutant sources; storm drainage networks; land use; and natural features. In preparing maps for the watershed action plan, the standard USGS 7.5 minute topographic maps can serve as an excellent base map. These may be available from the local soil and water conservation district, regional and local planning commissions or by contacting USGS directly. Planning commissions also may have other types of base maps, including specific watershed maps.

Computer mapping systems should also be investigated. In geographic information systems (GIS), various types of data can be formed into map layers, which can then be compiled in a variety of combinations enabling evaluation of different issues. GIS may also be available to a watershed group through a local or regional planning commission.

Some points to consider when preparing maps:

- Black and white maps copy most easily (full color graphics may be impressive, but do not necessarily show more useful information; they are usually more costly and difficult to reproduce).

- If possible, fit the map to an 8.5" x 11"sheet of paper for easy inclusion in the plan and for use as a handout. Alternately, 11" x 17" maps can be folded for inclusion in the report.

- Use color for overheads and presentations. Make larger maps for display in meetings, giving consideration to visibility from a distance. Display maps are commonly produced at a minimum size of 3' x 5'.

References

Karr, J. R., K.D. Fausch, P. L. Angermeier. P. R. Yant, and I. J. Schlosser. 1986. Assessing biological integrity in running waters: A method and its rationale. Illinois Natural History Survey Special Publication No. 5, 28 pp. Champaign, Illinois.

Chapter 3

Defining Problems

This chapter discusses identifying and diagnosing problems and threats to the water resource. A clearly defined water resource problem is one where the cause and source are known, and the impact is quantified (where feasible). A full understanding of the nature and extent of the problem assists in developing solutions, prioritizing action, and identifying indicators to evaluate the progress of the watershed project.

Identifying Problems

Some water quality problems may be identified easily with casual observation--a fish kill or a stream choked with silt or algae is obvious. But others may involve small to moderate increases in pollutant concentrations that are harmful to humans or aquatic life over time. These less obvious situations require a comprehensive assessment of water quality using special sampling, analysis and comparison of this data with safe pollutant levels established by the state's water quality standards. (See Chapter 2, **Water Quality Standards**).

The water quality standards of Ohio provide an important benchmark for determining problems and directing your goals. If a stream fails to meet the water quality standards for its designated use(s), it is said to be "not attaining use" and thus, has a water quality problem. However, even though a stream is meeting its water quality standards doesn't mean it can't be improved. Ohio's water quality standards measure a set number of parameters; however, your watershed group may wish to improve water quality beyond these.

Suggestions to help you identify water resource quality problems:

- compare perceived problems with existing water quality data or document with new data;
- relate problems with data from resource inventory;
- identify sources (point and nonpoint) of water quality problems;
- identify the sources of the pollutant;
- quantify water quality problems to the extent possible; and
- clearly define water quality problems.

A wide variety of problems and concerns will be identified during the process of building public support and inventorying the existing conditions and features of the watershed. The group should try to identify general problems and concerns first. These general problems can then be broken into very specific, narrowly defined problems, that are more manageable. When identifying problems, be aware that: (1) symptoms may masquerade as problems; and (2) perceptions of problems may change as knowledge increases (thus, the importance of education).

Diagnosing Problems

In diagnosing a problem, the goal is to better define its nature and extent. The two key aspects of problem diagnosis involve linking the cause of the water quality problem to its source(s), and quantifying (where feasible) the pollutant load.

Identifying Sources

Linking a cause of a water quality problem to its source may be as simple as linking a single pollutant to a single source, or as complicated as linking multiple sources to each of several pollutants. For example, the cause of a stream segment not meeting its use designation may be excessive sedimentation. The source of the sediment may be cropland, stream bank erosion, urban runoff, construction activities, or all of the above. Source identification needs to be done for all identified water resource problems. Keep in mind that both point sources and nonpoint sources of pollution need to be identified to fully address water quality. Table 3.1 itemizes some common pollutants and stressors. It then links them to potential sources and briefly describes the impact the pollutant may have on the water resource.

Placing important pollution sources on a watershed map, linked with water quality data and land uses can help you target areas in the watershed for activities. If a GIS computer system is not available, mylar overlay maps of resource features can be used as a simple analysis tool.

Table 3.1 Causes and Sources of Water Resource Degradation

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
Sediment/Siltation (sand, silt, clay)	Cropland Forestry activities Pasture Stream banks Construction Roads Mining operations Gullies Livestock operations Other land-disturbing activities	Sediment may destroy fish habitat by: (1) blanketing spawning and feeding areas; (2) eliminating certain food organisms; (3) causing gill abrasion and fin rot; and (4) reducing sunlight penetration, thereby impairing photosynthesis. Suspended sediment decreases recreational values, reduces fishery habitat, adds to mechanical wear of water supply pumps and distribution systems, and adds treatment costs for water supplies. Nutrients and toxic substances attached to sediment particles may enter aquatic food chains, cause fish toxicity problems, impair recreational uses or degrade the water as a drinking water source.
Nutrients (phosphorus, nitrogen)	Erosion and runoff from fertilized fields Urban runoff Wastewater treatment plants Industrial discharges Septic systems Animal production operations Cropland or pasture where manure is spread	Nutrient enrichment may cause excessive algae and aquatic plant growth, which may choke open waters and consume oxygen (primarily from decomposition of dead plants and algae). These conditions will adversely affect fish and aquatic organisms, fishing and boating, and the taste and odor of finished drinking water. Nitrogen contaminants in drinking water significantly above the drinking water standard may cause methoglobinemia (blood disease) in infants, and have forced the closure of many water supplies.
Pathogens (bacteria and viruses)	Human and animal excreta Animal operations Cropland or pasture where manure is spread Wastewater treatment plants Septic systems Urban runoff Wildlife	Waterborne diseases may be transmitted to humans through drinking or contact with pathogen-laden water. Eating shellfish taken from or uncooked crops irrigated with pathogen-laden waters may also transmit waterborne diseases. The principal concern in both surface and ground waters is the potential degradation of public water supply sources. Pathogens reaching a lake or other surface water body may limit primary contact recreation, such as swimming.

Table 3.1 Causes and Sources of Water Resource Degradation

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
Pesticides	All land where pesticides are used (forest, pastures, urban/suburban areas, golf courses, waste disposal sites) Sites of historical usage (chlorinated pesticides) Urban runoff Irrigation return flows	Pesticides may enter surface waters either dissolved in runoff or attached to sediment or organic materials, and may enter ground water through soil infiltration. The principal concerns in surface water are their entry into the food chain, bioaccumulation, toxic effects on fish, wildlife and microorganisms, habitat degradation and potential degradation of public water supply sources. Ground water impacts are primarily related to water supply sources.
Toxic Substances (heavy metals, oil and petroleum products)	Urban runoff Wastewater treatment plants Industrial discharges	Toxic substances may enter surface waters either dissolved in runoff or attached to sediment or organic materials and may enter ground waters through soil infiltration. Principal concerns in surface water include entry into the food chain, bioaccumulation, toxic effects on aquatic organisms, other wildlife and microorganisms, habitat degradation and degradation of water supplies. Ground water impacts are primarily related to degradation of water supply sources.
Organic Enrichment (depletion of dissolved oxygen)	Human and animal excreta Decaying plant/animal matter Discarded litter and food waste	Organic materials (natural or synthetic) may enter surface waters dissolved or suspended in runoff. Natural decomposition of these materials may deplete oxygen supplies in surface waters. Dissolved oxygen may be reduced to below the threshold necessary to maintain aquatic life.
Thermal Stress/ Sunlight	Riparian corridor destruction Bank destruction Urban runoff Hydromodifications Industrial dischargers	Direct exposure of sunlight to streams may elevate stream temperatures, which can exceed fish tolerance limits, reduce dissolved oxygen and promote the growth of nuisance algae. The lack of trees along a stream bank contributes to thermal stress and excessive sunlight. Thermal stress may also be the result of storm water runoff, which is heated as it flows over urban streets. Hydromodifications that create wider, shallower channels create more surface area and allow for quicker temperature changes. Modifications that create pools and increase the storage time of water may also contribute to thermal stress by increasing surface area and not allowing the warmed water to wash out of the watershed. Coldwater fish may be eliminated or only marginally supported in streams affected by thermal stress.

Table 3.1 Causes and Sources of Water Resource Degradation

Causes (Pollutant or Stressor)	Possible Sources	Potential Adverse Impacts
pH (acidic and alkaline waters)	Mine drainage Mine tailings runoff Atmospheric deposition Industrial point source discharges	Acidic or alkaline waters will adversely affect many biological processes. Low pH or acidic conditions adversely affect the reproduction and development of fish and amphibians, and can decrease microbial activity important to nutrient cycling. An extremely low pH will kill all aquatic life. Acidic conditions can also cause the release of toxic metals that were adsorbed to sediments into the water column. High pH, or alkaline conditions, can cause ammonia toxicity in aquatic organisms.
Salinity (dissolved solids)	Brine from oil extraction Road deicing	High levels of dissolved solids will affect the taste of drinking water. High concentrations of sodium sulfate or magnesium sulfate in drinking water can cause laxative effects, and excess sodium may affect persons restricted to low sodium diets. High concentrations of salts can inhibit aquatic plant growth and have an adverse effect on aquatic life. Lakes receiving runoff with high salt concentrations may form a saline layer near the bottom that will resist mixing, thereby reducing dissolved oxygen in the saline layer.
Flow Alterations (hydrologic modifications)	Channelization Dams Dredging Streambank modifications	Hydrologic modifications alter the flow of water through the stream. Structures or activities in the water body that alter stream flow may in turn be the source of stressors, such as habitat modifications, or exacerbate others, such as thermal stress. Dams may also act as a barrier to the upstream migration of aquatic organisms. Stream flow alterations may result from a stressor such as sedimentation, which may change a stream bed from narrow with deep pools to broad and shallow.
Habitat Modifications	Channelization Construction Changing land uses in the watershed Stream burial Dredging Removal of riparian vegetation Streambank modifications	Habitat modifications include activities in the landscape or in the water body that alter the physical structure of the aquatic and riparian ecosystem. Some examples include: removal of stream side vegetation that stabilizes the stream bank and provides shade; excavation in the stream and removal of cobbles from the stream bed that provide nesting habitat for fish; stream burial; and development that alters the natural drainage pattern by increasing the intensity, magnitude and energy of runoff waters.
Refuse, Litter and Other Debris	Litter Illegal dumping of solid wastes	Refuse and litter in a stream can clog fish spawning areas; stress aquatic organisms; reduce water clarity; impede water treatment plant operations; and impair recreational uses of the water body, such as swimming, fishing and boating.

Estimating Pollutant Loadings

After the problems have been identified and documented, causes and sources must be quantified. This is done by estimating the amounts of current pollutants being transported to the stream and determining how much reduction in pollutants is needed to return the stream to its designated use. The level of reduction is determined by comparing the current amount of pollutants being transported in the stream to the water quality standard.

Estimating a target amount of pollutant load reduction can be an integral part of developing a watershed management plan. There are many acceptable procedures and tools for developing such estimates. The complexity of the watershed and land uses involved also determine the methodology to be used. Below are three methods used by Ohio EPA and other agencies to quantify pollutant delivery loads.

1. Total Maximum Daily Load (TMDL)

A total maximum daily load is the maximum amount of a pollutant, such as nitrate, that a stream segment can assimilate without exceeding its use designation. The equation used to determine the TMDL factors in point source and nonpoint source pollutants as well as the background level for each parameter identified in Ohio's water quality standards. Examples of metrics are phosphorous and nitrate. A background level is the estimated level naturally occurring in the stream. Background levels have been estimated for waters in each of Ohio's five **ecoregions** (Figure 2.3, Chapter 2) based on available data from sites unimpacted by point sources and significant nonpoint sources. For example, the estimated background level for total phosphorous in the Eastern Cornbelt Plains region is .3433 milligrams per liter (mg/l); whereas the background level for phosphorous in the Western Allegheny Plateau is .1576 mg/l. Ohio EPA is in the process of developing Total Maximum Daily Load (TMDL) for those stream segments not meeting water quality standards. When these are completed, the TMDL may provide useful information for a watershed group because they link the development and implementation of point and nonpoint controls to the attainment of water quality standards. The TMDL process attributes portions of the water body's **assimilative capacity** to various pollution sources — including natural background sources and **a margin of safety**--so that the water body achieves established water quality standards. Section 303 of the Clean Water Act requires the states to implement TMDLs in all waters in which water quality standards are not attained or not expected to be attained. This includes violations of water standards because of point sources, nonpoint sources or a combination of both. The process Ohio EPA uses in developing TMDLs includes:

- selection of the pollutant to consider, e.g. phosphorus, nitrogen, etc.;
- estimation of the water body capacity to assimilate selected pollutant;
- estimation of the pollutant from all sources to the water body;
- predictive analysis of pollutant in the water body and determination of total allowable pollutant load; and
- allocation (with margin of safety) of the allowable pollutant among the different pollution sources in a manner that water quality standards are achieved.

2. Sediment Delivery

Sediment delivery to a stream can be calculated by estimating the amount of gross upland erosion and comparing it with sedimentation at the water channel's mouth. Potential gross erosion is the amount of soils and solids entering the stream and can be derived from National Resources Inventory (NRI) data from NRCS or computer programs and models. Data for sedimentation or suspended solids can be obtained from monitoring stations or sediment surveys.

Goals for sediment reduction should be at a level sufficient to obtain measurable improvements in overall water quality, and should be reached by consensus. More information can be found on the planning process and general inventory methods in the NRCS National Planning Procedures Handbook (Part 600.6), or by contacting your nearest NRCS office.

3. Agricultural Nonpoint Source Pollution Model (AGNPS)

This GIS model is designed to simulate runoff, sediment and nutrients from watershed areas during a single or continuous rain event. While AGNPS can analyze pollutants from point sources, such as feedlots and wastewater treatment plants, as well as streambanks and gully erosion, it is not up-to-date for all areas of the state and can be costly to obtain. The model analyzes and provides estimates of sediment runoff from agricultural watersheds as large as 50,000 acres. Information about AGNPS can be obtained from ODNR-Office of Real Estate and Land Management or at http: //www.bae/ncsu.edu/bae/programs/ extension/wqg.

Defining a Problem Statement

At this stage of the process, the group needs to develop a detailed statement of the water quality problems in the

watershed. The group's problem statement may take any number of forms, but a simple outline that compiles the various causes and sources of water resource impairment is sometimes easiest. For example, the problem for your watershed might be:

- excessive sedimentation;
- high nutrient loads; or
- reduced fish harvests.

The problem statement should include information about the location of threatened or existing impaired areas, and the pollutants/stressors causing the impairment and their sources. It can also include other issues and concerns, such as economic impacts resulting from the water quality problems. Thus, the problem statements for the above problems might be:

- excessive sedimentation in the west fork of the Water River due to increased construction and development;
- high nutrient loads in the mainstem of the Water River due to unmaintained septic systems;
- high nutrient loads in the headwaters of Water River, due to wastewater treatment plants operating at levels exceeding maximum capacity;
- high nutrient loads in three segments of Clean Creek due to agriculture fertilization practices; and
- reduced fish harvests in the main stem of Water River possibly due to high nutrient loads and sedimentation.

Another important aspect of the problem statement is that its content is agreed to by all of the stakeholders. In a sense, the problem statement(s) may also be a method for prioritizing the most obvious problems the group is interested in addressing. As such, identifying and diagnosing problems in a watershed is a process that may not always lead to simple conclusions. Locating sources of pollution and estimating a single source's contribution to the overall pollutant load can be difficult. *U.S. EPA's Watershed Protection: A Project Focus* suggests the following guidelines for completing this process:

1) Technical experts believe that all significant problems in the watershed are known--problems in physical/chemical water quality, biological communities, instream and riparian habitat and other factors required to meet designated uses.

2) If these problems were solved, ecological integrity of aquatic systems in the watershed could be achieved.

3) The nature of these problems is understood well enough that environmental indicators can be chosen to track progress in cleaning them up.

4) Sources of the problems are known or can be readily determined.

Chapter 4

Setting Goals and Developing Solutions

This chapter addresses how to develop the goals and objectives for the action plan. Goals define what the group wants to achieve and objectives describe how the group will achieve it. The process of developing this action plan includes: (1) identifying and evaluating solutions to each of the water resource problems listed in the problem statement; (2) identifying appropriate indicators of success; (3) setting goals based on measurable indicators; and (4) setting objectives by selecting the controls and actions required to meet each goal.

Before setting goals, your group will need to familiarize itself with potential solutions for addressing each identified problem. Once this is done, the group must find appropriate indicators or ways of measuring the effectiveness of solutions. Thus, when watershed goals are established, they will be achievable and measurable.

Identify Potential Solutions

The group should try to identify multiple potential solutions to each water quality impairment. At this stage, it is important to avoid becoming too focused on a specific structural control or management practice. Try to develop fresh and uncommon ideas without evaluating them (this step will come later) so that no options are excluded.

Examining a wide range of options is also important because in most cases, achieving a comprehensive solution to water resource problems requires a *combination* of various pollution controls, public education, economic incentives, land use zoning and habitat restoration. A number of agencies and organizations that can provide specific information about potential solutions can be found in Appendix 5.

Evaluating Point and Nonpoint Source Pollution Controls

"Controls" are a kind of mitigating solution. But the controls for point sources and nonpoint sources of pollution differ in that point source controls are frequently installed to fulfill a permit requirement. Reducing pollutant loads below existing permit requirements might require legislative changes or regulatory action by an authorized agency. A more innovative approach, however, such as voluntary action by an industry or facility to reduce its own pollutant discharge, should not be overlooked. Incentives, such as recognition awards, cost savings, improved public image, and increased property values can be effective in stimulating these voluntary actions.

Unlike point source controls, nonpoint source controls are almost always implemented voluntarily. They must be tailored to the unique characteristics of the watershed and its land uses. Education, training in new technologies and practices, and zoning are just a few examples of nonpoint source pollution controls. Best management practices (BMPs) are a type of control that encompasses an array of practices, each one aimed at a particular pollutant and set of circumstances. Since some readers may not be familiar with these, a brief explanation of BMPs is provided below.

Best Management Practices

Activities, or management procedures and structures that prevent or reduce water pollution, are collectively known as best management practices (BMPs). BMPs have been developed for a wide variety of land uses such as agriculture, mining, forestry, construction and many others.

A BMP may either be structural or non-structural. A structural BMP could be a livestock exclusion fence, which prevents livestock from wading into streams, eroding streambanks and contributing to fecal coliform levels. A non-structural BMP, on the other hand, could be a new method of tilling a field. Rather than tilling the entire field, only segments of the field might be tilled, leaving fewer acres of tilled land exposed to wind and rain erosion. Thus, the selection of BMPs depends on the land use and the pollutant of concern. Non-structural BMPs are generally more cost-effective than structural solutions in the long-term.

When choosing BMPs, the watershed group should seek technical assistance to make sure proposed solutions are likely to be effective and not cause additional problems. Technical assistance for nonpoint source solutions is available from Area Assistance Teams and Ohio EPA district offices (Appendix 6). These teams are comprised of representatives from various state and local resource agencies. The teams assist local agencies and organizations in developing watershed plans and grant applications for nonpoint source pollution abatement projects.

Information on BMPs is also available from local soil

and water conservation districts, county extension offices or the North Carolina Extension web site at http://www.bae/ncsu.edu/bae/programs/extension/wqg/, which gives detailed descriptions of numerous BMPs. The Natural Resources Conservation Service and The Ohio State University Extension have developed tables relating BMP effectiveness to a variety of applications. See Appendix 7, which identifies a variety of BMPs grouped by land use, to help your group brainstorm options.

While BMPs provide solutions to many nonpoint source pollution problems, not all the problems identified in a watershed can be addressed through them. Issues such as protecting critical riparian habitats and maintaining good water quality in the face of growth and development may need to be addressed through zoning and other means. Regardless of which solutions you choose, you will need to find a way of measuring the effectiveness of any watershed activities. Indicators, as discussed in the following section, can help you do this.

Indicators

Indicators can illustrate the existing condition of a watershed and serve as benchmarks to gauge the progress of watershed activities. Indicators may be administrative or programmatic measures, such as the number of BMPs implemented or the number of communities enacting storm water ordinances. They may also be direct measures of the health of the water resource such as the index of biological integrity (IBI). Setting goals and objectives will require using both programmatic and administrative indicators. Table 4.1 (adapted from U.S. EPA, *Watershed Protection, A Project Focus* 1994) shows examples of environmental and programmatic indicators. Ohio EPA is currently developing a set of environmental indicators for Ohio rivers, stream and lakes.

Setting Goals for the Watershed

A goal is the desired change or outcome you wish to achieve and is driven by the problem statement. Setting goals in a watershed effort involves getting the stakeholders to define desired changes as measurable and attainable end points.

The watershed group should develop a set of goals that defines the desired change for each identified problem statement, helps guide the group's restoration and protection efforts, and reflects the group's mission statement.

The goals for a watershed effort may be general, specific, long-term or short-term. The list of sample goals below progresses from more general to more specific.

- All streams in the watershed are in attainment of the aquatic life use designation within 10 years.
- Protect or restore the riparian corridor in targeted high quality streams.
- Reduce nitrate loads to within water quality standards.
- Reduce stream embeddedness by decreasing sedimentation in headwaters.

Setting Objectives

In the goal setting process, the group defines the results it wants to achieve. In setting objectives, the group describes how it will do this.

Each objective should identify specific controls or management strategies and include the following four components:

- the changes that need to occur;
- who will make the changes or acquire new technology;
- the incentives/means that will be provided to facilitate changes; and
- the means to evaluate the outcomes.

Sidebar 4.1 contains sample objectives comprised of the four components. The change that needs to occur is stated in each of the objectives: either increase, protect, or restore riparian habitat. The changes for increasing riparian habitat will potentially be made by homeowners and local governments. The incentive or means that will facilitate this is solicitation of homeowners to donate conservation easements. One of the non-profit organizations that is a stakeholder in the watershed might be responsible for initiating this action and responsibility should be designated during this phase. Purchasing the greenway might also require partnering with a land trust organization, which may not be a stakeholder resident in your watershed, or it may require identifying funding sources, such as the Ohio Department of Natural Resources Natureworks Grant, which is specifically designed for the purpose of purchasing lands. Note that the indicators of successfully meeting these objectives are programmatic (see Table 4.1, Document the extent to which programmatic and regulatory actions have been taken).

Now look at Sidebar 4.2. In this case, the objective is to reduce pollutants by improving homeowner septic system maintenance through education. While

Table 4.1 Examples of Environmental Indicators

Description of Indicator Type	Examples of Indicators
Document the extent to which programmatic and regulatory actions have been taken.	Number of permits reissued with new limits Number of point sources in substantial noncompliance Elapsed time from identification of serious discharge violations until correction Number of targeted facilities/properties that have implemented BMPs Amount of fertilizer sold or used Number of estuary acres monitored Number of communities enacting zoning or stormwater management ordinances Number of public water systems with source water protection Number of public outreach activities and citizens reached
Quantify the extent to which actions have led to reduction in threats to surface or ground water quality.	Reduction in **nutrient loadings** from each type of point and nonpoint source Reduction in pollutant loadings to ground water from underground injection wells Stability and condition of riparian vegetation Percent imperviousness upstream General erosion rate upstream Amount of toxics discharged in excess of permitted levels Amount of toxics discharged by spills Number of businesses and households that have altered behaviors or processes to reduce pollutants
Measure the extent to which ambient water quality has changed.	Pollutant concentrations in water column, sediments and ground water Frequency, extent and duration of restriction on water uses - bathing drinking, fishing, shellfishing Percent of stream miles or lake or estuary acres that support each designated use Percent with impaired or threatened uses Percent of citizens who rate major water bodies as usable for various recreational activities
Measure direct effects on the health of humans, fish, other wildlife, habitat, riparian vegetation and the economy of the region.	Aquatic community metrics Reduction in waterborne disease in humans Size of wetlands or riparian habitat lost or protected Size of commercial and recreational fish harvest Increased jobs and income due to recreation

Source: Watershed Protection: A Project Focus, U.S.EPA Office of Water, EPA 841-R-95-003.

See Appendix 7 for a list of BMPs.

Sidebar 4.1 Sample Goals and Objectives with Programmatic Indicators

Goal: Protect or restore the riparian corridor in targeted high quality streams.		
Objective(s)	**Action(s)**	**Indicator(s)**
Increase riparian corridor	(1) Local land trust solicits the donation of conservation easements from property owners along targeted streams.	Number of acres donated.
	(2) City and county park districts purchase land for a seven-mile greenway along east side of Water River.	Miles purchased, donated, or deeded.
Protect riparian corridor	(1) Watershed communities pass township or municipal ordinances requiring 150 ft. easements for any new construction in floodplain of targeted streams.	Number of resolution(s) or ordinance(s) passed.
Restore riparian corridor in targeted areas	(1) Resource agencies work with stream-side landowners to install five willow post revetments at high erosion points.	Number or willow post projects completed.
	(2) Install grass filter strips in 100 acres of critical headwaters farms.	Number of acres grassed.

programmatic measures are utilized to measure education activities, successful attainment of the overall objective, reducing nitrates, is dependent upon monitoring nitrate levels, an environmental indicator (see Table 4.1, measure the extent to which ambient water quality has changed).

Both of these examples only include a few of the objectives that might result from a typical watershed action planning process. There are many other activities and objectives that can be used to meet the respective goals. Also, as you learn more about documenting your plan in Chapter 5, you'll see that including a time line and assigning each of the activities to a designee is an invaluable tool in keeping your action plan focused and on schedule.

In setting goals and defining objectives, the group creates the core of its action plan. Agreeing to the goals and deciding upon specific actions are not simple or easy tasks. The group will have to address many complex issues and resolve disagreements. Some of the questions and considerations that may be encountered in developing goals and objectives and setting priorities for implementation are identified in the publications, Clean Water in Your Watershed, Terrene Institute (1993) and Watershed Protection: A Project Focus, U.S.EPA (1995). These considerations include:

1. **Deciding whether the group deals with one source of pollution at a time or multiple sources at the same time.**

Addressing several sources of a pollutant is generally more successful than addressing one source at a time. Treating all sources rather than singling out one or a group of similar sources may enhance participation by all of the responsible sources--especially if all the parties can agree that they are partly responsible for a portion of the problem.

Addressing one pollutant source at a time may appear to be the simplest approach. Most agencies and groups specialize in one land management activity; therefore, concentrating on one segment of the population makes

documenting progress in installing controls or changing behavior easier. The one-source-at-a-time approach rarely results in clean water. What often happens is that one problem is "cleaned up," while others become more evident. The public perceives that its money has been wasted, and support for the project fades.

2. Choosing whether to place greater emphasis on: (a) problems that are easier and less expensive to fix; (b) problems that are more pervasive throughout the watershed; or (3) problems that are higher risk to the human and ecological health of the watershed.

Some areas in the watershed may be contributing higher loads or more concentrated pollutant loads than other areas. Some pollutants pose greater human and ecological risks than others. The group may be able to identify the pollutants that pose the greatest risk by using the list it has compiled of pollutants, sources and estimates of pollutant loads. It may then choose to prioritize its actions based upon the pollutants posing the greatest risks. However, watershed projects have also been successful by focusing on one highly visible but relatively simple or inexpensive problem at the beginning of the project to build momentum, then tackling the higher risk or more pervasive problems later. Nevertheless, the group should be careful not to neglect the more serious problems.

3. Selecting the type of BMPs or pollution controls to use.

Many watershed projects will rely on voluntary implementation of BMPs. Selection of BMPs in a voluntary program may be based on: effectiveness of addressing the water quality problem; acceptability to targeted population (e.g., farmers); and cost-effectiveness.

Cost-effectiveness in improving water quality ("bang for the buck"), and the economic impact solutions will have on the population required to make the change are important considerations because they will affect the acceptability of the project by the target population. Pollution controls for point sources and nonpoint sources benefit the water resource and society, but often do not provide an economic benefit to the individual, group or

Sidebar 4.2 Samples Goals and Objectives with Programmatic and Environmental Indicators

Goal: Reduce pollution levels to meet state water quality standards.			
Objective(s)	**Action(s)**	**Programmatic Indicator(s)**	**Environmental Indicator(s)**
Reduce septic system pollutants reaching Water River North of S.R 100.	(1) County Health Department produces and distributes "How Your Septic System Could be Making You Sick: How to Properly Maintain a Home Septic or Aeration System" to targeted homeowners.	•Distribution of 5,000 pamphlets to septic or aeration system owners in Water River Watershed.	•Nitrate levels after one year / two years of education efforts. •Fecal coliform levels after one / two years of education efforts. •Reduction in primary contact advisories.
	(2) Cooperatively hold (with county and city health departments and governments) six open house seminars for the public on "How Your Septic System Could be Making You Sick."	•Completed six workshops (conduct one every two months.)	
	(3) Pass ordinances in municipalities north of S.R. 100 requiring homeowners to certify septic system functioning.	•Number of ordinance(s) or resolution(s) passed.	

industry that installs or implements them. This situation may lead to disagreement between those favoring the least cost-effective method versus those favoring the most effective pollution control, regardless of cost.

In voluntary programs, incentives are critical for promoting installation or implementation of a BMP. Incentives can include cost share and direct payment programs, tax advantages, education and technical assistance (see Appendix 2, NPS Funding in Ohio).

Economic benefits that result from improving the quality of the water resource are another consideration. Identifying benefits depends in part on the use category of the water and the number of users. For example, recreational use has a high public value, and therefore, it may be easier to do more costly projects; however, it may be more difficult to find support for equally costly projects aimed at waters designated as agricultural water supplies. Improvements to this water resource might not be perceived as directly benefiting watershed residents.

4. Targeting critical areas.

Some resources in a watershed may be of such importance as to warrant special attention. Such resources may include public water supplies or valuable ecosystems. These areas should be prioritized if they are threatened. They may require other measures to address local land use, such as the protection of riparian buffers and flood plains or the purchase of conservation easements in order to prevent future degradation.

5. Defining success.

The following decisions are critical to developing objectives and ensuring that the goals will be achieved:

a) Put actions in priority order.

For example, achieving the environmental goal may require implementation of several actions or activities, yet the resources may only exist to do two or three. The two or three actions that will be the most productive should be the first priority, leaving the others for implementation in subsequent years.

b) Determine how the successful completion of each action will be measured.

For example, the first critical action of the project is to zone 50 acres bordering a river that runs through town as parkland. However, the zoning board and city council approve only 30 acres. Has this action been adequately completed? Has enough land been set aside to meet the BMP or environmental goal? When coupled with other actions and BMPs, is the environmental goal achievable?

c) Determine the method of measurement.

For each BMP and activity to be implemented, the group should agree on the method used to measure its achievement and who will be responsible. Also note that some goals will be much more difficult to measure than others. In the example above, for instance, the number of acres obtained as conservation easements is relatively easy to measure; however, goals that rely on environmental measures, such as nitrate or bacteria levels, may be more difficult to accurately measure, and they may require a longer time frame to assess.

Now that your group has set goals and developed solutions, it will need to chart and track the implementation of its projects. The next chapter gives some tips on writing an action plan, along with a funding schedule.

Chapter 5

Implementing the Action Plan

Implementation requires money, personnel, planning, scheduling and sometimes permission. Smooth implementation depends on careful scheduling. Not only do critical activities need to be properly timed, but they also need to be timed with the natural cycle of the resource they are trying to protect.

Therefore, the next logical step is the development of a written action plan. It should contain the goals and objectives, and time lines for pollution controls, nonpoint source management projects, public information and education efforts. It should also contain funding strategies for each activity.

The purpose of the written plan is to clarify and justify how the objectives will be achieved; describe the steps to get the desired results; and describe who does what, by when, for whom, and for how much money. The written plan is also useful in that it documents the decision-making process for both participants and non-participants. However, the absence of a written action plan should not prevent the group from initiating activities. Beginning activities during the planning process can actually increase community interest and participation.

In the process of creating this manual, a lot of people requested an outline of a watershed action plan. A sample outline of what to include in a plan is given in Appendix 8, with a few example outlines of existing watershed action plans.

Components of the Action Plan

Your action plan should include an activity time line, a publicity campaign, a funding schedule and some type of measurement or evaluation of progress toward watershed goals.

Activity Time Line

An activity time line helps you to identify which objectives have been met and which you are still working toward. It also sets expectations and benchmarks for progress. A simple way to develop a detailed activity time line is to list each activity, its indicator or measurement, the person or committee responsible for it, and the time frame for its completion. (See Table 5.1).

Creating the time line is a critical point in the watershed action planning process, as it involves stakeholders assuming responsibility for tasks. When creating a time line, consider building in some flexibility by setting a *time frame* for completion of certain activities, rather than a specific date. For example, an activity like conducting stream surveys will most likely need to be completed before cold weather sets in. The time line in this case may be to complete the activity by late summer. Delays are also likely to occur, therefore put some contingencies into your time line so that the group does not become discouraged by missed completion dates. If the group will be seeking grant funding, it may also be useful to outline the project time line on a quarter-by-quarter basis since most grants require quarterly reporting.

Funding

Fund raising is a time consuming activity. Each type and source of funding has its own application criteria, procedures and deadlines. Early in the watershed planning stages it may be helpful to establish a schedule for obtaining funds and in-kind support for the entire watershed effort. Once the watershed plan has been developed, securing funds to implement it becomes the next major step. Few watershed projects, if any, secure sufficient funding from federal, state and local sources for all phases of the project. Most activities will require funding from multiple sources.

One way to organize the search for funds is to divide activities in the implementation plan by categories--e.g. education, plan development, various implementation categories, monitoring, evaluation and enforcement--then seek the type of funding agencies, groups, and foundations that fund each category. Keep in mind that not all the activities require cash funding; in many instances, technical assistance and data collection are free services of cooperating state and local agencies.

The schedule should document:

- possible funding sources;
- application dates;
- date funds are needed; and
- work to be done to obtain funds.

While developing a funding plan is crucial to meeting long-term goals for the watershed, you needn't wait to complete the funding strategy before you begin activities. For example, you might organize a one-day stream sweep litter clean up as a means of informing the

community of watershed issues. Donated time and equipment can make such projects feasible even when other sources of funding, such as grants, have not yet been secured. Starting activities with whatever resources you have available will only make it easier when you solicit additional funding. Completed or ongoing activities demonstrate to funders that your watershed group is capable of implementing activities and has obtained results. Examples of watershed projects that have followed this strategy include the Stillwater project in Darke and Miami counties, and the phosphorus reduction effort in Lake Erie. See Appendix 2 for a list of public funding sources available in Ohio for watershed-related projects. Ohio EPA also disburses a limited number of federal funds, allocated under Section 319 of the Clean Water Act, for nonpoint source pollution control grant projects (Appendix 9).

Public Information and Education

A public education campaign designed to build awareness and participation needs to be integrated into each phase of the watershed effort. Education is the cornerstone of a voluntary program. Through mass media and public education programs, watershed residents will learn about their relationship to the water resource problems and the watershed efforts underway to mitigate them. Start an information and education campaign early to establish a baseline of community involvement. As your watershed management plan evolves, information and education must concur with those stages to help maintain community participation. Use your public relations subcommittee to keep your information and education campaign alive and interesting (See Chapter 2, **Inform the General Public**).

During the planning process, citizens may need help in understanding what watershed planning is all about and how they can contribute to the process. Special emphasis needs to be placed on landowners, operators and resource users. This first phase of the campaign needs to focus on helping local people or committees identify water problems and establish general goals and objectives.

During implementation of the plan, however, design the information and education campaign so that it will attract a high level of resource-user participation. While citizens may be aware of a problem, many times they may not know of any organized efforts to address it.

Throughout the watershed effort, establish ongoing contact between those responsible for administering various activities and resource users. Build and maintain a relationship with local reporters. Another option is to make informal presentations to schools and suggest cooperative hands-on science opportunities that will simultaneously meet watershed objectives and increase awareness of local water issues. In addition, school groups and local service organizations can help with information and education activities.

A good campaign plan runs for the duration of the watershed effort. It introduces the different activities to the public; tells the story of the effort from the start, who started it, and why; reports on community acceptance; reports on community reactions; trumpets successes; reports on trends; and tells of similar successes elsewhere. Use the publicity campaign wisely. Consider the audience, the message and methods to spread the message.

Measuring Success and Making Adjustments

Progress in achieving your watershed goals and objectives needs to be documented, and in most cases where grant funding has been provided it must also be reported to the funding organization. Evaluation of goals and objectives can be used as interim measurements of success. Another way to measure your success is through volunteer monitoring. If you evaluate as you implement activities, you will continue to learn about your watershed and the effectiveness of your efforts. Ultimately, you will want to obtain the greatest results from the littlest effort. If your evaluation indicates that your activities are not addressing the targeted problem, you may want to re-evaluate your action plan and modify it (see Figure 1.3). To be sure that you are evaluating your work, you may wish to build periodic evaluations into your action plan at the halfway point and or at one year intervals. Evaluation helps keep a plan on track, determine plan successes and highlight activities to repeat or to avoid in the future.

In contrast, unplanned or insufficient evaluation wastes time, energy and funds. Poor evaluation can show an ineffective project as successful and hide beneficial results of effective activities. Try to avoid both of these situations. Better evaluation occurs when evaluation is seen as a useful part of the entire implementation plan and not considered a separate task. Appendix 10 provides information on evaluating your activities.

For watershed projects, evaluation deals with two questions:

1. Are we doing things right? and
2. Are we doing the right things?

Funders may require an evaluation plan, but merely fulfilling the requirements of the funders may not provide the information your watershed committee needs to determine success. You can identify your evaluation

needs early in the planning process by answering the following questions:

- Are implementation results to be evaluated?
- Is interim progress to be reported?
- What specific information must be known? (water quality changes, relative effectiveness of different practices or procedures, etc.)
- Is process effectiveness to be evaluated?
- How will evaluation results be used?

Putting the action plan to work is the most important product of the watershed effort. Well- meaning, organized plans alone do not improve the quality of the water resource. Implementing them does. Remember, too, that actions and projects can be implemented throughout the planning process and can actually be elements of planning. For example, a canoe float used as part of your publicity campaign can also be used to remove litter from the stream or to inventory various features or uses of the stream. Putting a plan together and putting it to work isn't easy. Try not to get discouraged; acknowledge successes even if they are small. Over time, these will amount to larger, measurable gains that will result in a cleaner, healthier watershed.

Table 5.1 Lower Great Miami Basin Council Action Plan
Goal 2.0 Develop and Achieve Community-Based Water Quality Goals
Original Date: March 1996 Revision Date: December 1996

	Objectives	Education	Print/Publishing	Speakers		Action Items	Measurements	Date Assessed	Champions	Status	Comments
2.1	Establish water quality goals that are broadly acceptable to the public				2.1.1	Establish mechanism for using stakeholders to develop goals.	Mechanism is established (refer to Steering Committee)	96-11	Leader needed - (Possibilities - MetroParks, Butler County Parks, Recreation Departments, Water Purveyors Group)	Completed 1996	
2.1	Establish water quality goals that are broadly acceptable to the public				2.1.2	Develop community - based water quality goals	Consensus goals established	97-03		* Deferred long term	
2.1	Establish water quality goals that are broadly acceptable to the public				2.1.3	Develop measures for achieving community-based goals	Defer until goals are established	97-03		* Deferred long term	
2.1	Establish water quality goals that are broadly acceptable to the public				2.1.4	Identify/develop funding mechanisms	Defer until goals are established	97-03		* Deferred long term	
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.1	Conduct sampling to characterize bacterial concentrations	Number of bacterial samples taken and results reported, "are we swimmable"	97-03	Leader - Rick Westerfield (496-7049) Montgomery County David Dawson (887-3686) Butler County, Jim Rozelle (439-5183)	on-going	Consolidate databases from POTWs
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.2	Conduct sampling to identify sources of discharges leading to non-attainment	Number of samples taken and results reported	97-9 +	Leader - Jay Richie (285-6030) EPA, Dayton ; Dusty Hall (443-3725) City of Dayton	on-going	
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.3	Implement control measures				* Deferred	Defer until sources of non-attainment are identified.

Table 5.1 Lower Great Miami Basin Council Action Plan
Goal 2.0 Develop and Achieve Community-Based Water Quality Goals
Original Date: March 1996 Revision Date: December 1996

	Objectives	Education	Print/Publishing	Speakers		Action Items	Measurements	Date Assessed	Champions	Status	Comments
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.4	Develop "Adopt a River Segment," program and develop volunteer sampling crews "Adopt an Outfall"	Number of river segments sampled and number of samples collected Program developed	97-03 +	Leader - Linda Rogers (257-5535) WPAFB; Amy Lamborg (320-3601) Terran Corp.: Dave Trout (435-1983) MetroParks: Bob Jurick (878-6060)B-W Greenway: Jackie McCartel (278-8231) MetroParks (Ask Project Green and Natural History Museum to volunteer)		Scheduled(Combined with 5.1.9) Two planning meetings have been held. Formal plan is expected in 1997.
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.5	Create user friendly terminology for use designations and enhance availability of data to quantify improvements	Date completed	97-03 +	Leader - Diana Zimmerman (285-6440) EPA, Dayton John Eastman (259-5051) LJB Engineers: C.J. Vehorn (257-3397) WPAFB: Norbert Klopsch (298-0600) City of Oakwood: Holey Hanes (455-4455) GM: Scott Arentsen (259-7810) DP&L: Dick Swisshelm (614-469-5553) USGS		
2.2	Attain and maintain uses (relative to regulatory "use" designations)				2.2.6	Research ownership of policy regarding water contact to understand who controls the policy	Statement of current policy(nearly complete) Health Department	96-06 +	Leader - Pete Lane (224-9654) OSU Extension (County Recreation Departments, MetroParks)	Completed 1996	No swimming in the Great Miami River!

Glossary

208 plan - Section 208 of the Clean Water Act (CWA) of 1972 requires that states annually certify Water Quality Management (WQM) plans. While Ohio EPA is the lead agency in administering the CWA, six areawide water quality planning agencies are designated by the state to develop WQM plans for their regions. The focus of the WQM is to plan for the needs of future water quality.

305(b) report - A biennial water quality report is required of each state by the CWA. The report, which is also referred to as the *Water Resource Inventory*, evaluates the water quality of all navigable waters of the state, inventories all point sources of discharge pollutants and identifies which water bodies are meeting use attainments as defined by the state's water quality standards. The 305(b) report is a summary of monitoring information collected from **technical support documents** and other monitoring information.

319 Nonpoint Source Pollution (NPS) Control Program - The CWA requires each state to submit a Nonpoint Source Assessment (see definition below); develop a nonpoint source state management program, which includes identification of best management practices; and provide technical assistance to the public and other agencies. A limited amount of federal funding is available for nonpoint source pollution control projects. Applications are first reviewed by Ohio EPA and then forwarded to U.S. EPA for final review and approval.

ambient water quality - The chemical and physical characteristics of water in a stream, creek, river, lake or other water body (as opposed to the water quality of an effluent).

aquatic life use designation -The type and grade of the biological community that a stream supports.

areas of concern - Areas(identified by the International Joint Committee) with such significant pollution that they are aa potential or existing threat to the Great Lakes (see RAP).

areawide regional planning agencies - Set up to provide planning services in such fields as land use, transportation and water quality. Areawide planning agencies provide this service to member counties--thus the term regional. Typically, major metropolitan areas such as Cleveland, Akron, Toledo, Dayton and Cincinnati are represented in regional planning agencies. In Ohio, six areawide planning agencies are designated by the governor to develop water resource planning: Miami Valley Regional Planning Commission (MVRPC); Eastgate Development and Transportation Agency (EDATA); Ohio Kentucky and Indiana Regional Planning Commission (OKI); Toledo Metropolitan Areawide Council of Governments (TMACOG); Northeast Areawide Coordinating Agency (NOACA); and Northeast Ohio Four County Regional Planning & Development Organization (NEFCO).

assimilative capacity / carrying capacity - Capacity of a natural body of water to receive: (1) waste waters, without deleterious effects; (2) toxic materials, without damage to aquatic life or humans consuming the water; and (3) biological oxygen demand, within prescribed dissolved oxygen limits.

beneficial use designations - Ohio EPA assigns beneficial use designations to water bodies in the state. Designations take into consideration the use and value of water for public water supplies, protection and propagation of aquatic life, recreation in and on the water, agricultural, industrial and other purposes including navigation. There may be more than one use designation per water body. Examples of beneficial uses include: public water supply; agricultural water supply, primary contact recreation; and aquatic life use designations.

best management practices - Management practices (such as nutrient management) or structural practices (such as terraces) designed to reduce the quantities of pollutants, such as sediment, nitrogen, phosphorous, and animal wastes washed by rain and snow melt from land into nearby receiving waters, such as lakes, creeks, streams, rivers, estuaries and ground water.

biodiversity - The variety of flora and fauna in a particular niche or ecotome. Generally, greater variety indicates a healthier environment.

ecoregion - Ecoregions are land-surface areas that are grouped based on similarities in land use, potential natural vegetation, land surface form and soils. These underlying factors determine the character of watersheds and have a profound influence on background water quality and the type and composition of the biological communities in a stream or river and the manner in which

human impacts are exhibited.

macroinvertebrates - An environmental indicator of stream health, macroinvertebrates are crustaceans, insects (without a backbone) and worms, which assemble in semi-permanent populations. Numerous taxa of macroinvertebrates exist that are either pollutant-tolerant or pollutant-sensitive; thus they are a good indicator of water quality.

margin of safety -The difference between a wasteload allocation and the assimilative capacity of a stream or river.

National Pollutant Discharge Elimination System - Established by the Clean Water Act of 1972, the program imposes effluent limitations and monitoring requirements on point source dischargers, which may include municipal, private and industrial sources. The NPDES permits may contain compliance schedules to ensure construction of facilities needed to achieve the required effluent limitations.

Nonpoint Source Assessment - According to the CWA, a nonpoint source pollution assessment report identifies waters that are unlikely to comply with water quality standards without additional controls on nonpoint sources of pollution. It must also identify the nonpoint sources causing the problems. The assessment directs monitoring schedules and implementation of nonpoint source pollution control activities.

nonpoint source pollution - Water pollution that results from a variety of human land use practices, such as agriculture, surface mines, forestry, home wastewater treatment systems, construction sites, and urban yards and roadways. As a result, nonpoint source pollution is controllable by implementing land management practices that protect water quality and economic, social and political interests. These practices are often referred to as best management practices.

NRCS - Natural Resources Conservation Service, formerly the Soil Conservation Service, a part of the U.S. Department of Agriculture.

nutrient runoff - Phosphorous and nitrate bind to soils and are thereby transported with eroding soils. Synthetic fertilizers or manures applied to undeveloped cropland can wash off into streams and rivers, particularly when applied just prior to a large rain event.

publicly owned treatment works (POTWs) - Public water suppliers or wastewater treatment facilities.

remedial action plans (RAPs) - Established by the Great Lakes Critical Programs Act of 1990 with the goal of addressing coordinated cleanup and control of phosphorous and eutrophication of the Great Lakes. The International Joint Commission, a binational organization of the U. S. and Canada, identified 43 areas of concern in the Great Lakes Basin. These areas were targeted for grassroots community cleanup projects. In Ohio, there are ongoing RAPs on the Ashtabula, Cuyahoga, Black and Maumee rivers. These projects have been extremely successful and are sustained by local involvement.

source water protection - A program to prevent contamination of public drinking water. This program was introduced in the Safe Drinking Water Act Amendments of 1996 to expand wellhead protection to include surface water supplies of drinking water.

stream flow - The volume of water in a stream or riverbed varies according to the amount of rain or snowfall; it is usually greatest in the spring and lowest in the fall. Release of water from impoundments may also influence stream flow. The volume of flow affects the water body's carrying capacity. Thus, at low flows a stream would be more impacted by discharge and runoff than at high flow.

surface water - Water bodies which are visible at the surface of the earth (as opposed to underground aquifers).

SWCDs - County soil and water conservation districts.

technical support documents -Written reports of water quality monitoring studies conducted by Ohio EPA's Ecological Assessment Unit.

total maximum daily loads (TMDLs) - Consist of wasteload allocations and load allocations. Wasteload allocations determine the amount of pollutants that can be discharged from point sources without violating water quality standards. Load allocations consider nonpoint sources of pollution. Historically, TMDLs have focused on reducing loads of pollutants from point sources.

water quality standards - The rules set forth in Chapter 3745-1 of the Ohio Administrative Code establish stream use designations and water quality criteria (scientifically derived ambient concentrations developed by the state) that are protective of the surface waters of the state.

water resource - Includes the physical, chemical and biological features of water and its stream channel, riparian corridor and environs.

wellhead protection - A program to prevent contamination of the ground water used for public drinking water. A wellhead protection plan consists of three steps: (1) determining the area contributing water to a public well or wellfield; (2) inventorying the potential pollution sources in the wellhead protection area; and (3) developing a management strategy to prevent, detect, and remediate ground water contamination.

Appendices

1 Model Bylaws
2 NPS Funding in Ohio
3 Working with Groups
4 Stream Surveys
5 Sources of Information for Watershed Action Planning
6 Area Assistance Teams and Ohio EPA District Offices
7 Best Management Practices Used in Ohio
8 Outline of a Watershed Action Plan
9 Ohio EPA's 319 Program: What You Should Know
10 Project Evaluation
11 Contacts

Appendix 1 - Model Bylaws

The following model bylaws were adopted from the Rocky Fork Creek Watershed Protection Task Force Bylaws. This model is provided as an example of bylaws created by a local watershed group.

BYLAWS

_____ WATERSHED TASK FORCE

1.0 PURPOSE

The purpose of the _____ Watershed Task Force (Task Force) is to develop, promote, guide, and implement a coordinated, comprehensive, and effective watershed protection plan for the _____ Watershed.

2.0 MEMBERSHIP

2.1 Membership is open to any individual, family, business, or organization that subscribes to the purposes of the Task Force.

2.2 Voting membership shall consist of (number) representatives from each of the following:

- One member from each of the (number) jurisdictional units of local government in the watershed;

- (Number) members from the educational, recreational, and commercial (*or other applicable categories, such as agriculture*) sectors active in the watershed; and

- (Number) members who are residents of the watershed.

2.3 Each participating state or federal agency may be represented by one (1) ex-officio, non-voting member.

2.4 Voting membership shall be selected as follows:

- Each of the (number) jurisdictional units of local government in the watershed is allowed one designated representative to serve on the Task Force.

- A list of candidates from an open invitation for nominations to represent the educational, recreational, and commercial sectors shall be maintained; an election by written, secret ballot of all members present shall be conducted to elect the (number) voting members.

- A list of candidates from an open invitation for nominations to represent the residents of the watershed shall be maintained; an election by written, secret ballot of all members present shall be conducted to elect the (number) voting members.

2.5 Voting member vacancies shall be filled following the process in Section 2.4, except in the case of the Chair, which vacancy shall be filled pursuant to Section 3.3.

3.0 ORGANIZATION AND OFFICERS

3.1 The officers of the Task Force are the Chair, Vice-Chair, Secretary, and Treasurer. The Chair shall be one of the

(number) voting watershed residents.

3.2 The duties of the Chair include, but are not be limited to:

- Developing meeting agendas;
- Presiding over all meetings of the Task Force; and
- Serving as Chair of the Steering Committee and as an ad hoc member of other committees.

3.3 The Vice-Chair may be any member of the Task Force. The Vice-Chair shall assume the duties of the Chair for the remainder of that term should that office become vacant, and shall preside at meetings of the Task Force and Steering Committee when the Chair is unable to attend.

3.4 The Secretary may be any member of the Task Force. The duties of the Secretary include, but are not limited to:

- Maintaining the official records of the Task Force;
- Recording and distributing the minutes of the Task Force meetings;
- Maintaining a current record of the names and addresses of Task Force members; and
- Sending out notices of meetings and any supporting meeting materials at least two (2) weeks prior to scheduled meetings.

3.5 Election of the Chair, Vice-Chair, and Secretary shall be by written, secret ballot. For the initial election, nominations shall be made by the Organizational Committee; in subsequent elections, nominations shall be made by the Steering Committee. Additional nominations may be made by any Task Force member from the floor or in writing to any member of the Organizational Committee (Steering Committee after the first election). It is incumbent upon the nominator to determine willingness of the nominee to serve.

3.6 The Chair shall be elected for a two-year term. The initial Vice-Chair shall be elected for a one-year term; thereafter, the Vice-Chair shall be elected for a two-year term. The Secretary shall be elected for a two-year term. Re-election to these offices is permitted.

3.7 The Steering Committee shall appoint the Treasurer. If it becomes legally necessary for the Treasurer to be elected, the election procedures in Section 3.5 shall be followed.

4.0 COMMITTEES

4.1 Standing Committees:

The following standing committees shall be established by the Steering Committee to address concerns of the Task Force:

- Sediment Control and Land Development
- Habitat, Wetlands, Riparian Zone Protection
- Stream Watch
- Ground Water Protection
- Public Relations and Public Involvement
- Funding

4.2 Organizational Committee

The Organizational Committee is established. When the bylaws are adopted by the Task Force, the Officers elected, and the Steering Committee selected, the Organizational Committee shall cease to exist.

4.3 Other Committees

The Steering Committee may appoint such other Standing or Ad-Hoc Committees as deemed necessary to support the efforts of the Task Force.

4.4 Steering Committee

The Steering Committee shall be composed of the Chair and Vice-Chair of the Task Force and the Chairs of the established Committees.

The duties of the Steering Committee shall include, but not be limited to:
- Directing the business activities of the Task Force;
- Nominating members for elected positions;
- Creating or disbanding Standing or Ad Hoc Committees;
- Calling emergency meetings without two weeks' notice; and
- Recommending projects to Committees.

4.5 Each Committee shall elect a Committee Chair by the end of its second meeting. At the pleasure of its committee, the Committee Chair shall serve as a member of the Steering Committee.

5.0 MEETINGS

5.1 The Task Force shall meet as determined by the Steering Committee.

5.2 Notice shall be mailed to all members at least two (2) weeks in advance of all Task Force meetings. Notice shall include an agenda and business materials that may be considered or acted upon, whether or not set forth in the agenda.

6.0 DECISION MAKING

6.1 The Task Force shall strive to operate by consensus. Group decisions shall be made by consensus of all members present at any meeting.

6.2 Any member may call for a vote on any issue during the course of any meeting.

6.3 Decisions made by vote shall require a two-thirds majority of the voting members present for passage.

6.4 Voting members may be represented by designated alternates. Alternates shall be designated by letter or telephone call to the Chair in advance of the meeting. The alternate shall have all the rights and duties of a voting member during the meeting(s) for which they are a designated alternate.

7.0 MISCELLANEOUS PROVISIONS

8.0 ADOPTION AND AMENDMENTS

8.1 These bylaws and any amendments shall be adopted by a simple majority vote of the Task Force. Amendments to the bylaws shall be summarized in the notice of the Task Force meeting at which the proposed amendments are to be voted on.

Appendix 2 - NPS Funding in Ohio

Funding programs listed below provide funds to implement watershed management projects, local unit of government nonpoint source and conservation project, and cost-share to individuals to implement best action plans.

Environmental Quality Incentives Program (EQIP)

Type: direct cost-share payments
Source: federal funds
Administration: USDA, Farm Service Agency (FSA) or Natural Resources Conservation Service (NRCS)*
Eligibility: agricultural landowners who bear part of the cost of an approved practice
Availability: statewide with 50% of funds to targeted areas and livestock enterprises
Allowable uses: installation of approved best management practices (water quality improvement is a special emphasis)
Requires: contact FSA or NRCS *
Description: Financial assistance to control erosion and sedimentation, and promote nutrient management through voluntary activity, using technical assistance from the Natural Resources Conservation Service.
* Undetermined at the time of printing

Conservation Reserve Program (CRP)

Type: 10- to 15-year contracts
Source: federal funds
Administration: USDA, Farm Service Agency (FSA)
Eligibility: highly environmental sensitive areas, such as riparian corridors
Availability: statewide, funds based upon appropriations
Allowable uses: create grassy or woody cover to protect sensitive areas
Requires: 10- to 15-year easement with right of access for inspection activities
Description: CRP is a voluntary program that offers landowners annual payments and cost-share assistance for protecting lands of high environmental value. NRCS provides technical assistance to landowners for installation of required practices. Landowners are offered annual payments based upon criteria of environmental factors and effects.

State Cost Share Program (House Bill 88)

Type: grants to individual farmers for erosion and animal waste BMPs
Source: state funds
Administration: ODNR, Division of Soil and Water Conservation, E-2 Fountain Square Ct., Columbus, OH 43224, (614) 265-6610
Eligibility: any landowner with an approved conservation plan from SWCD
Availability: ongoing
Allowable uses: cost sharing on specific BMPs to control pollution from animal wastes or erosion
Requires: application by SWCD to ODNR-DSWC
Description: Cost share limited to 75% of project cost, not to exceed $15,000 per landowner per year.

Great Lakes Protection Fund

Type: grants
Source: multi-state (Great Lakes states)
Administration: Great Lakes Protection Fund
Eligibility: non-profit agencies' proposals addressing funds, mission and goals
Availability: annual cycle
Allowable uses: activities supporting funds, mission and goals
Requires: preproposals
Description: The fund encourages a range of strategies to meet the following goals: prevent toxic pollution; support effective cleanup approaches in Areas of Concern; support natural resources stewardship; and clarify effects of toxic pollution on humans and wildlife.

Lake Erie Protection Fund

Type: grants
Source: State of Ohio
Administration: Ohio Lake Erie Office
Eligibility: government agencies, education institutions, nonprofit organizations
Availability: annual cycle
Allowable uses: priorities are set with each funding cycle
Requires: matching funds (minimum 10%)
Description: funded activities will help the State of Ohio protect and enhance Lake Erie. Activities may include research, monitoring, demonstration and education concerning Lake Erie, its shoreline and watershed.

Natureworks (State Bond Issue 1)

Type: grant
Source: state funds
Administration: ODNR, Division of Soil and Water Conservation, E-2 Fountain Square Ct., Columbus, OH 43224, (614) 265-6610
Eligibility: funds passed through county soil and water conservation districts
Availability: funds allocated through 2001 from initial bond issue
Allowable uses: NPS practice demonstrations and watershed management, stream banking, livestock exclusion, precision farming, manure brokerages
Requires: matching funds
Description: $8.5 million is dedicated for three categories of NPS activity between 1995 and 2000.

Nonpoint Source Education Grant

Type: grant
Source: state and federal funds
Administration: ODNR, Division of Soil and Water Conservation, E-2 Fountain Square Ct., Columbus, OH 43224, (614) 265-6610
Eligibility: nonprofit or tax-exempt organizations, educational institutions in collaboration with soil and water conservation districts
Availability: annual cycle
Allowable uses: nonpoint source education
Requires: (contact the Division of Soil and Water Conservation)
Description: The Ohio Soil and Water Conservation Commission has appropriated approximately $120,000 per year for education projects since 1991.

Nonpoint Source Watershed Grants Program (319 Grants)

Type: small grants to SWCDs
Source: state funds
Administration: ODNR, Division of Soil and Water Conservation, E-2 Fountain Square Ct., Columbus, OH 43224, (614) 265-6610
Eligibility: SWCDs and their local partners
Availability: ongoing
Allowable uses: cost sharing on BMPs, site inspections for erosion control, activities that result in direct implementation of NPS controls
Requires: application by SWCD to Ohio EPA Division of Surface Water
Description: Small (less than $20,000), one-time grants for innovative NPS controls that are ineligible for other types of state funding.

Ohio Environmental Education Fund

Type: grant
Source: state funds
Administration: Ohio EPA, Ohio Environmental Education Fund, P.O. Box 1049, Columbus, OH 43216-1049, (614) 644-2873
Eligibility: nonprofit or tax-exempt organizations, educational institutions, government
Availability: semi-annual funding cycle
Allowable uses: environmental education for Ohio residents
Requires: (contact the Ohio Environmental Education Fund)
Description: Through 1993, the Ohio Environmental Education Fund provided $225,000 for 21 NPS-related projects.

Ohio Water Pollution Control Loan Fund (WPCLF)

Type: low-interest loan
Source: state funds
Administration: Ohio EPA, Division of Environmental and Financial Assistance, P.O. Box 1049, Columbus, OH 43216-1049, (614) 644-2798
Eligibility: municipalities or others having publicly-owned water or wastewater systems
Availability: Contact the Division of Environmental and Financial Assistance
Allowable uses: landfill closure, wellhead protection, upgrading on-site wastewater treatment systems, etc.
Requires: (contact the Division of Environmental and Financial Assistance)
Description: A portion of the WPCLF, originally established with federal money as financial assistance for constructing or upgrading public wastewater treatment plants and now self-maintaining, is directed toward nonpoint source pollution control. These funds are administered by Ohio EPA and the Ohio Water Development Authority.

Ohio Water Pollution Control Loan Fund (WPCLF) Linked Deposit Program

Type: low-interest loan
Source: state funds
Administration: Ohio EPA, Division of Environmental and Financial Assistance, P.O. Box 1049, Columbus, OH 43216-1049, (614) 644-2798
Eligibility: individuals and private organizations in participating watersheds
Availability: based on credit-worthiness, as determined by participating banks
Allowable uses: agricultural BMPs, other projects on private land
Requires: conformance with watershed action plan
Description: A portion of the WPCLF, originally established with federal money as financial assistance for constructing or upgrading public wastewater treatment plants and now self-maintaining, is directed toward nonpoint source pollution control. Five watershed projects (Black River, Indian Lake, Stillwater River, Big Darby Creek, and Killbuck Creek) have been supported by this program. These funds are administered by Ohio EPA and the Ohio Water Development Authority.

PL - 566 Small Watershed Program

Type: project grants/direct cost-share payment and technical assistance
Source: federal funds
Administration: Natural Resources Conservation Service, 200 North High Street, Columbus, OH 43215-2478, (614) 469-6962
Eligibility: state agencies, and local governments
Availability: based on appropriation
Allowable uses: planning and carrying out works of improvement and to protect, develop, and utilize the land and water resources in small watersheds (<250,000 acres).
Requires: Demonstration of meeting statutory requirements; necessary authority by local sponsors; and favorable cost-benefit ratio. Local sponsors are responsible for obtaining all land rights. Individual land users in watershed protection projects are responsible for 35% of the cost for BMPs.
Description: **NRCS** works with local sponsors to plan and implement watershed protection-and flood prevention-based projects in small watersheds.

Research and Development Grant

Type: grant
Source: state funds
Administration: Ohio Water Development Authority, 50 West Broad Street, Suite 1425, Columbus, OH 43215, (614) 466-5822
Eligibility: (contact the Authority)
Availability: continuous
Allowable uses: development of projects and concepts that otherwise might not be possible due to limited resources
Requires: (contact the Authority)
Description: The Research and Development Grant program funded manure brokerage projects in Darke ($53,000) and Holmes ($70,000) counties.

Section 314 (Clean Lakes)

Type: grant
Source: federal (Water Quality Act of 1987; the "Clean Water Act")
Administration: Ohio EPA, Division of Surface Water, P.O. Box 1049, Columbus, OH 43216-1049, (614) 644-2001
Eligibility: Ohio EPA determines current phase of project, and applies for funding on behalf of the project
Availability: annual cycle
Allowable uses: Lake Water Quality Assessment (LWQA) funding for sampling; Phase I funding for diagnostic and feasibility studies (maximum $100,000); Phase II funding for implementation (no maximum dollars or number of years eligible); Phase III funding for post-implementation monitoring (maximum $125,000)
Requires: 50% match for LWQA, Phase I, Phase II; 30% match for Phase III
Description: Section 314 ("Clean Lakes") funds for watershed projects focused on lake water quality have been used for five projects in Ohio.

Section 319 Nonpoint Source

Type: grant
Source: federal (Water Quality Act of 1987; the "Clean Water Act")
Administration: Ohio EPA, Division of Surface Water, P.O. Box 1049, Columbus, OH 43216-1049, (614) 644-2001
Eligibility: non-profit organization or agency
Availability: annual cycle based on federal fiscal year
Allowable uses: watershed-wide nonpoint source implementation projects
Requires: 40% local match
Description: Through federal fiscal year 1994, Ohio received $ 8,800,000 from Section 319 and supported 78 projects.

Stewardship Incentives Program

Type: grant
Source: federal funds
Administration: jointly by Ohio Department of Natural Resources, Division of Forestry, Fountain Square, Bldg. B-3, Columbus, OH 43224, (614) 265-6694 and the Consolidated Farm Service Agency (CFSA, formerly ASCS) (county office)
Eligibility: land owners with riparian property or at least five acres of woodland
Availability: continuous
Allowable uses: tree planting for windbreaks, soil erosion control, riparian corridors and wildlife habitat
Requires: forest action plan (prepared by Division of Forestry service forester or consulting forester); 25% cost share by land owner
Description: Approximately $450,000 available annually in Ohio.

Wetland Reserve Program (WRP)

Type: direct payments/cost-share
Source: federal funds
Administration: NRCS
Eligibility: restorable or previously restored wetland areas, including riparian areas
Availability: based on appropriations
Allowable uses: hunting/fishing, non-intensive recreation, and some timber harvesting.
Requires: permanent or 30 year easement with right of access for inspection activities.
Description: WRP is a voluntary program that offers landowners payments for restoring and protecting wetlands. It obtains conservation easements from landowners and cost-share payments for wetland restoration.

Appendix 3 - Working with Groups

Outlined in this appendix are four aspects of working with groups: coalition building; collaborating; setting ground rules; and generating and ranking ideas.

I. Coalitions

(Based on "Building Coalitions" a series of fact sheets developed by The Ohio Center For Action on Coalitions for Families and High Risk Youth, Richard Clark, Ph.D., Director. The Ohio State University. 1992.)

A coalition:
- Involves all key players
- Chooses a realistic strategy
- Establishes a shared vision
- Agrees to disagree on process
- Makes promises that can be kept
- Builds ownership at all levels
- Institutionalizes change
- Publicizes successes

Support can come from:
- Obtaining agreement on plans
- Developing awareness of agencies
- Involving officials in problem-solving
- Seeking advice and evaluation
- Sharing planning and implementation support
- Endorsement of plans by officials

Coalitions are weakened by:

- Failure to keep members informed of policies and actions
- Loss of key leaders
- Irreconcilable splits
- Change in conditions
- Delay

Elements for success:
- Common goals
- Communication
- Importance of each member
- Participation
- Sense of ownership
- Delegation of responsibility
- Effective meetings
- Shared leadership

The problem-solving method:
- Define the problem
- Determine the cause(s)
- Develop alternative approaches
- Assess the consequences

Select a solution

Implement the chosen solution

Evaluate
- select issues for analysis
- determine feasibility of analysis
- determine measures
  - importance
  - validity
  - uniqueness
  - accuracy
  - timeliness
  - privacy and confidentiality
  - costs of data collection
  - completeness

II. Collaboration

(adapted from Ohio Commission on Dispute Resolution and Conflict Management)

Collaboration:

- a process of joint decision-making among groups, individuals, and organizations that have an interest in the problem; and
- a process through which parties involved in different aspects of a problem constructively explore their differences and search for solutions that go beyond the limits of their individual or agency roles or responsibilities.

Features of collaboration:

1. The involved or affected participants, or stakeholders, are interdependent--they need each other to solve the problem. Collaboration involves building a common understanding of the problem that forms the basis for choosing a collective course of action. Collaboration

can turn an adversarial situation into a mutual search for information and solutions that allows all those participating to ensure that their interests are represented.

2. Solutions emerge from recognizing and dealing constructively with differences. Because participants' interests vary, as do their resources and skills, they solve a problem by looking for trade-offs and mutually beneficial solutions.

3. Participants share direct responsibility for the agreements they make. Joint ownership means implementation is more likely to happen.

4. Collaboration is a forum or process in which organizations and groups can evolve through a variety of ways of interacting.

Phases of a consensus-building (collaborative) process (adapted from Collaborating by Barbara Gray, Jossey-Bass Publishers, 1989):

Phase 1 — Plan the process

- frame the problem
- identify stakeholders
- commit stakeholders to the collaborative process
- identify resources

Phase 2 — Conduct the process

- establish ground rules
- agree on common definition of the problem
- set agenda
- organize subgroups
- gather information
- generate options
- communicate with constituencies
- build external support
- reach agreement

Phase 3 — Implement the agreement

- create a monitoring system
- monitor compliance
- modify activities if necessary

III. Ground Rules

(adapted from Ohio Commission on Dispute Resolution and Conflict Management, 1991, and The Conflict Clinic, Inc., 1989)

Ground rules are agreements individuals in a group make to improve their ability to work together effectively. Ground rules:

- establish a general process (and set expectations);
- provide a code of conduct for behavior of participants (including leaders and facilitators);
- create a framework for cooperation;
- help make open communication safe; and
- reduce potential for later disputes.

Agreeing on ground rules at the beginning of every meeting sets a framework to ensure that all business deemed important gets addressed (some items may be deferred or otherwise managed, but everything gets aired to the group's satisfaction). When a group meets regularly, the ground rules may become familiar and need not be revisited at each meeting. It may be useful to periodically review the ground rules, however, to be sure that they still meet the group's needs.

IV. Generating and Ranking Ideas

(adapted from Ohio Commission on Dispute Resolution and Conflict Management)

Nominal Group Technique: a group process for identifying problems, generating possible solutions, and setting priorities. It assumes that ground rules provide an environment where all participants are respected and can speak freely, and a manageable group size (less than 50).

The leader or facilitator explains the steps in the process (see below), then presents the problem statement or question to the group. As the group gets to each step, the leader should explain it in detail.

Step 1 (silent generation of ideas in writing) - The leader reads the question aloud; it is written on a flip chart or on paper passed out to the group. Members list their responses or ideas in phrases or brief sentences, working silently or independently for a set time.

Step 2 (presenting and recording the ideas) - The

leader asks each member for one idea at a time, and records it on a flip chart. As each sheet is filled, it is taped to the wall to remain visible. Adding to ideas is encouraged. No discussion, elaboration, or criticism is allowed (these occur in Step 3). The leader continues asking around the group until all ideas are presented. (Alternatively, pass out index cards to record ideas, then collect the cards and write the responses on the flip chart. Another alternative is "brainstorming," where people randomly shout out their ideas while one or more "recorders" or "scribes" writes them on a flip chart. This is potentially dangerous unless the group has a high level of trust and respect, and everyone feels free to participate; otherwise, some people might not speak up, and their ideas may not be considered.)

Step 3 (discussion of ideas) - Clarification of ideas takes place at this stage. The leader reads each item aloud, and asks for comments. Similar ideas can be lumped together, and some may be removed from consideration if they are not applicable. Once all ideas have been discussed to the group's satisfaction, this stage ends.

Step 4 (ranking the ideas) - This is like voting. Each person selects five (or seven, if the number is large; decision by leader) ideas considered most important and ranks them in order, number 1 being most important. Index cards can be used, or sheets of paper. The rankings are collected, tallied, and recorded on the flip chart. Alternatively, distribute colored sticky dots to each person voting (number of dots equals number of votes); voting occurs on the flip charts according to the placement of the dots. A voter can place more than one dot on a preferred idea, or give one vote to each of several ideas.

Step 5 (discussion and agreement)- Discuss the voting results and significance. Discuss the ranked items and their relative order. If the ideas and order seem acceptable, the leader asks if anyone has reservations about the list. Accept the list as the basis for further activity if there are no objections. If there are reservations or the group is clearly not in agreement, the leader starts a second round of priority setting, using the small list from the first vote. Each person gets three votes or stickers, and votes. Discuss the results and seek agreement.

Survey Results: Uses results of a questionnaire survey designed to get ideas or to rank ideas. Tabulation of survey data can be done by one person or a small working group. Ranking is based on tabulation results. This process may be used in a meeting, but is likely to take more time than would Nominal Group Technique. If carried out by mail or other means of questionnaire distribution, it allows more people to participate.

Appendix 4 - Stream Surveys

Familiarity with the watershed is a major benefit of a local watershed committee. A driving or walking tour of the watershed can show critical areas or sources of pollution that otherwise may remain unidentified, and help motivate involvement in the effort by more people. An organized stream survey by committee volunteers, using preprinted checkoff forms, is a popular and fun way to gather information. Stream surveys can provide land use and pollutant source information not otherwise available. They are labor intensive, however, and can waste time and money if poorly done.

"Streamwalk" is a stream survey program developed by U.S. EPA. The forms are simple and designed for use by the general public with little training. Watershed committees have designed forms for their own use, based on knowledge of their watersheds. Some state agencies also use their own forms, often more technical than those for public use. "Streamwalk" forms and information are available from:

Streamwalk, WD-139
Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

A Guide to Volunteer Stream Quality Monitoring, has been developed by the Ohio Department of Natural Resources. The guide is comprised of a stream quality assessment form based on macroinvertebrates and a watershed assessment form. Assistance using this guide may be available from Area Assistance Teams (Appendix 6) or staff of ODNR and Soil and Water Conservation Districts.

Please keep two things in mind when planning a stream survey program:

1. Avoid trespassing. Most streams run through private property. Be sure that your program includes getting permission from property owners to use their land.

2. Keep safety the priority. No data are worth risking a life. Do not enter a stream swollen by runoff or in otherwise dangerous condition.

Appendix 5

Sources of Information for Watershed Action Planning

Addresses and contact phone numbers for information sources can be found in Appendix 11.

Concerns	Sources of Information	Ohio EPA - Div. of Surface Water	Ohio EPA - Other Divisions	Ohio Dept. of Natural Resources	Ohio Dept. of Agriculture	Ohio State University Extension	Ohio Dept. of Health	Local Health Departments	County Soil & Water Cons. Dist.	Heidelburg College Water Qual. Lab	Local Government (city, county, etc.)	Ohio Comm. on Dispute Resolution	Ohio Lake Management Society	Ohio Alliance for the Environment	Conservation Tech. Info. Center	Public Library	Regional Planning Commissions	Ohio Water Development Authority	U.S. Fish and Wildlife Service	Consolidated Farm Service Agency	State Fire Marshal (BUSTR)	U.S. Geological Survey	Ohio Department of Development	Resource Conser. & Dev. Council	Citizen Lake Improvement Program	Natural Resources Conser. Service	
Livestock pasture/feedlots	✔		✔	✔	✔			✔						✔					✔				✔		✔	Agriculture
Crop Production			✔	✔	✔			✔						✔					✔				✔		✔	
Residue management	✔		✔	✔	✔			✔						✔					✔				✔		✔	Silviculture
Forest management			✔		✔			✔																	✔	
Storm sewers	✔					✔	✔			✔						✔										Urbanization
Sanitary sewers	✔					✔	✔			✔						✔										
Combined sewers	✔					✔	✔			✔						✔										
Construction sites	✔		✔				✔	✔		✔						✔									✔	
NPDES dischargers	✔																									
Mining and quarrying	✔		✔																							Resource Extraction
Oil Field Brine			✔																							
Oil and Gas Production			✔																							
Bridge Construction	✔									✔							✔				✔	✔				Hydromodification
Channelization	✔		✔					✔		✔							✔				✔				✔	
Dam Construction	✔		✔					✔									✔				✔				✔	
Dredging	✔		✔					✔									✔				✔				✔	
Streambank modification	✔		✔					✔									✔								✔	

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Concerns	Sources of Information	Ohio EPA - Div. of Surface Water	Ohio EPA - Other Divisions	Ohio Dept. of Natural Resources	Ohio Dept. of Agriculture	Ohio State University Extension	Ohio Dept. of Health	Local Health Departments	County Soil & Water Cons. Dist.	Heidelburg College Water Qual. Lab	Local Government (city, county, etc.)	Ohio Comm. on Dispute Resolution	Ohio Lake Management Society	Ohio Alliance for the Environment	Conservation Tech. Info. Center	Public Library	Regional Planning Commissions	Ohio Water Development Authority	U.S. Fish and Wildlife Service	Consolidated Farm Service Agency	State Fire Marshal (BUSTR)	U.S. Geological Survey	Ohio Department of Development	Resource Conser. & Dev. Council	Citizen Lake Improvement Program	Natural Resources Conser. Service	
Landfills	✔	✔					✔			✔																	**Land Disposal**
Sludge	✔	✔	✔		✔		✔	✔		✔																✔	
Sediment (contaminated)	✔	✔																								✔	
Underground Storage Tanks		✔																									
Industrial Land Treatment		✔					✔																				
On-site wastewater septic systems	✔				✔	✔	✔			✔							✔										
Beach Closings	✔					✔	✔			✔																	**Human Health**
Contact Advisories	✔					✔	✔			✔																	
Fish Consumption Advisories	✔			✔		✔	✔			✔																	
Biological Monitoring	✔		✔					✔	✔																	✔	**Water Quality**
Chemical Monitoring	✔								✔			✔															
Volunteer Monitoring	✔		✔					✔																		✔	
Floodplain Management			✔					✔		✔																✔	
Flora and Fauna			✔															✔								✔	
Ground Water		✔	✔		✔				✔	✔																	
Hydrology	✔		✔		✔				✔												✔					✔	

Addresses and contact phone numbers for information sources can be found in Appendix 11.

Concerns	Sources of Information	Sources of Information	Ohio EPA Info. Dir. of Surface Water	Ohio EPA Dir. of Surface Water	Ohio Dept. of Other Natural Resources	Ohio Dept. of Natural Resources Division	Ohio Dept. of Agriculture	Ohio State University Extension	Ohio Dept. of Health	Local Health Departments	Conservancy Dist.	Heidelberg College Water Quality Lab	Local Soil & Water Conservation Dists.	Ohio Community Water Quality Lab	Ohio Lake Management Society	Ohio Alliance for the Environment	Conservation Tech. Info. Center	Regional Planning Commissions	Public Library	Regional Planning Commission Authority	Ohio Water Development Authority	U.S. Fish and Wildlife Service	Consolidated Farm Service Agency	State Fire Marshal (BUSTR)	U.S. Geological Survey	Ohio Department of Development	Resource Conser. & Dev. Council	Citizen Lake Improvement Program	Natural Resources Conser. Service	
Pollutant Loads	✔																													

Concerns																													
Soil Erosin			✔	✔	✔			✔													✔		✔		✔	**Water Quality**
Spills (historic info.		✔	✔				✔			✔															✔	
Water Quality	✔	✔	✔					✔	✔			✔									✔				✔	
Water Use		✔	✔		✔		✔			✔							✔								✔	
Wellhead Protection		✔								✔															✔	
Wetlands	✔		✔					✔										✔							✔	
BMPs	✔		✔	✔	✔		✔	✔				✔		✔											✔	**Watershed Action Planning**
Communications					✔		✔	✔		✔	✔				✔										✔	
Decision Making								✔		✔																
Education			✔		✔			✔		✔															✔	
Group Dynamics					✔						✔				✔											
Grants/funding	✔		✔					✔		✔					✔											
Socioeconomic infor.					✔					✔					✔							✔			✔	

Appendix 6 - Area Assistance Teams and Ohio EPA District Offices

Area Assistance Teams encourage comprehensive watershed planning and management by cooperatively providing technical assistance, information exchange, and educational services at the local level. The informal teams are composed of one Ohio EPA staff person assigned to nonpoint source pollution issues in each of Ohio EPA's five district offices, the two Ohio Department of Natural Resources, Division of Soil and Water Conservation program specialists in each of ODNR's five area offices, and the respective Natural Resources Conservation Service staff. Representatives of The Ohio State University Extension and other agencies may join projects as ad-hoc team members.

Area Assistance Teams are available to help local agencies and organizations develop watershed action plans, grant applications for various NPS grant sources, coordinate activity across political subdivisions and agency responsibilities, and tap into technical resources otherwise little used in watershed management.

To use the services of your Area Assistance Team, contact any of the following offices corresponding to your watershed or county **(see map on reverse).**

Div. of Soil and Water Conservation, Area 1
952 Lima Ave., Box D
Findlay, OH 45840
(419) 424-5006 FAX (419) 424-5009

Div. of Soil and Water Conservation, Area 2
804 U.S. Route 250 E
Ashland, OH 44805
(419) 281-2891

Div. of Soil and Water Conservation, Area 3
225 Underwood St., Ste. 500
Zanesville, OH 43701
(614) 453-2932

Div. of Soil and Water Conservation, Area 4
4690 N. Union Rd.
Trotwood, OH 45426
(513) 854-1772

Div. of Soil and Water Conservation, Area 5
503 Nicholas Ct.
Circleville, OH 43113
(614) 474-7013

Ohio EPA, Southwest District Office
Division of Surface Water
401 E. Fifth St.
Dayton, OH 45402-2911
(937) 285-6007 FAX (937) 285-6249

Ohio EPA, Central District Office
Division of Surface Water
3232 Alum Creek Dr.
Columbus, OH 43201-3417
(614) 728-3837 FAX (614) 728-3898

Ohio EPA, Northwest District Office
Division of Surface Water
347 N. Dunbridge Rd.
Bowling Green, OH 43402
(419) 352-8461 FAX (419) 352-8468

Ohio EPA, Northeast District Office
Division of Surface Water
2110 E. Aurora Rd.
Twinsburg, OH 44807
(216) 963-1161 FAX (216) 487-0769

Ohio EPA, Southeast District Office
Division of Surface Water
2195 Front St.
Logan, OH 43138
(614) 385-8501 FAX (614) 385-6490

Ohio EPA District Boundaries
NORTHWEST
NORTHEAST
CENTRAL
SOUTHWEST
SOUTHEAST
WILLIAMS
FULTON
LUCAS
OTTAWA
DEFIANCE
HENRY
WOOD
SANDUSKY
ERIE
LORAIN
CUYAHOGA
LAKE
GEAUGA
ASHTABULA
TRUMBULL
HURON
PAULDING
PUTNAM
HANCOCK
SENECA
MEDINA
SUMMIT
PORTAGE
MAHONING
VAN WERT
ALLEN
WYANDOT
CRAWFORD
ASHLAND
WAYNE
STARK
COLUMBIANA
RICHLAND
HARDIN
MERCER
AUGLAIZE
MARION
MORROW
HOLMES
TUSCARAWAS
CARROLL
JEFFERSON
SHELBY
LOGAN
UNION
DELAWARE
KNOX
COSHOCTON
HARRISON
DARKE
MIAMI
CHAMPAIGN
FRANKLIN
LICKING
GUERNSEY
BELMONT
MUSKINGUM
CLARK
MADISON
PREBLE
MONTGOMERY
GREENE
FAIRFIELD
PERRY
NOBLE
MONROE
FAYETTE
PICKAWAY
HOCKING
MORGAN
BUTLER
WARREN
CLINTON
ROSS
WASHINGTON
VINTON
ATHENS
HAMILTON
HIGHLAND
MEIGS
CLERMONT
PIKE
JACKSON
BROWN
ADAMS
SCIOTO
GALLIA
LAWRENCE

Appendix 7 - Best Management Practices (BMPs) Used in Ohio

Consult with the local soil and water conservation district or Natural Resources Conservation Service before deciding on BMPs. This list of BMPs is taken from the Ohio Nonpoint Source Management Program, Revised Edition, 1993.

Agriculture
- conservation tillage
- conservation cropping sequence
- contour farming
- contour strip cropping
- cover and green manure crops
- diversions
- field windbreaks
- field strip cropping
- field borders
- filter strips
- grade stabilization structures
- grassed waterways
- grasses and legumes in rotation
- tree planting
- riparian management
- nutrient management
- pasture and hayland management
- pest management
- regulating water in drainage systems
- runoff management systems
- streambank and shoreline protection
- terraces
- waste management systems
- water and sediment control basins
- water control structures
- water table control
- wetland development or restoration

Waste Disposal
- analysis of sludge
- application management
- composting
- design standards
- flow and waste load reduction
- household chemical disposal alternatives
- monitoring
- operation and maintenance standards
- public education
- septage disposal

Waste Disposal (continued)
- site suitability determination
- storage planning

Industrial Storm Water
- preventative measure:
    - debris removal
    - education
    - exposure reduction
    - minimization of pollutants
    - parking lot and street cleaning
    - runoff diversion
    - secondary containment
- control measures
    - dry detention basins
    - infiltration devices
    - floating aquatic plant systems
    - oil and grease trap devices
    - sand filters
    - vegetative controls
        - *filter strips
        - *grassed swales
    - constructed and restored wetlands
    - wet retention ponds

Mining (BMPs for acid mine drainage)
- armoring
- in-situ treatment
- inundation
- remining
- wetlands
- anoxic limestone drains
- chemical treatment
- covering
- reclamation
- runoff diversion
- constructed and restored wetlands
- active mining measures
    - surface stabilization
    - runoff control and conveyance measures
    - outlet protection
    - sediment traps and barriers

•stream protection

Forestry
• determining not to log sensitive areas
• eliminating grazing in forest lands
• establishing or retaining riparian forests
• expanding forests
• proper road construction, drainage and management
• proper planning and development of harvest sites

Habitat Degradation
• wetlands protection and restoration
• riparian protection and restoration
• streambank and streambed stabilization

Urban Runoff/Construction Sites
• community green space requirements
• first flush treatment requirements
• floodplain development restrictions
• infiltration systems with pretreatment
• limit time and area of construction disturbances
• regional storm water action planning
• require vegetative stabilization of denuded surfaces
• sediment control basins
• sediment traps and barriers
• site planning requirements
• stream buffer protection and stabilization
• tree cover preservation requirements
• waterway disturbance limitations
• wetland protection

Appendix 8 - Outline of a Watershed Action Plan

The text of Appendix 8 has been replaced by a February 2003 update. See http://www.epa.state.oh.us/dsw/nps/.

Appendix 9 - Ohio EPA's 319 Program: What You Should Know

Background

Each year since 1990, Section 319 of the Clean Water Act has made federal funds available to states to implement a nonpoint source (NPS) water quality program. As Ohio's designated water quality management agency, Ohio EPA has been charged with administering this federal funding source, commonly referred to as the 319 Program.

The intent of the 319 Program is to protect or improve water quality. As a result, Ohio EPA has used a significant portion of its 319 funding to support state and local nonpoint source water quality projects throughout Ohio. The projects emphasize a voluntary (as opposed to regulatory) approach to controlling nonpoint source pollution. They range from narrowly focused information and education programs to highly technical applications of nonpoint source control technology. A majority of the projects address agricultural sources of pollution; other sources include urban activities, forestry, mining and on-site septic systems.

General Information

Ohio EPA's 319 Grant Program has brought focus and federal funding to state and local nonpoint source pollution control efforts. Any public or private non-profit organization may apply for a 319 grant from Ohio EPA.

319 projects tend to fall into three categories: surface water, ground water and statewide. Surface water projects must be implemented along natural watershed boundaries, not geopolitical boundaries. Local ground water projects usually differ from watershed projects in the type of activities undertaken. For example, where NPS pollution is suspected to be affecting ground water, but no data exists to demonstrate this, ground water projects may implement assessment, monitoring and characterization activities. Statewide projects tend to address an identified need of the Ohio NPS program, typically undertaken by state agencies and cooperating partners.

The following are important factors to consider when developing a 319 project:

• Does the project target identified causes of water quality problems in one of Ohio's nonpoint source priority watersheds?

• Do the BMPs solve the identified water quality problem(s) and are they cost-effective?

• Is the project well supported by local government officials, citizens and affected groups?

• Does the project represent a team approach to the problem?

• Is the project plan transferable to other watersheds or aquifers with similar problems?

• Does the project include appropriate and effective measures of success for meeting the project objectives?

Requirements of the 319 Program

Each 319 project is required to obtain non-federal (local and state) matching funds that equal 40 percent of the total project cost. Local and state match contributions can be in-kind services or cash. The 319 share of the project is limited to $300,000 and project duration is limited to three years.

In addition, Ohio 319 projects must meet the following cost-share requirements:

• Cost-share funds must be used to demonstrate new or innovative BMPs to implement proven BMPs (e.g. new ways to deliver a proven practice).

• Cost-share funds can be used to supplement but not duplicate traditional cost-share programs (e.g. NRCS-PL 566, FSA-EQIP, state funding, etc.). The total federal cost-share to any individual cannot exceed 75 percent of the total cost of the practice.

• Cost-share programs must include elements of public participation and technology transfer. A plan to involve, educate, and transfer information and technology to affected groups must be developed and implemented. Activities that might be included in such a plan are field days, tours, newsletters, etc.

• Project applicants must identify how cooperators will

be selected to receive cost-share, specific cost-share rates, and how BMPs will be designed, operated and maintained.

• Project representatives are not permitted to distribute cost-share payments beyond the life of the project.

Application Process

The 319 project application process consists of two steps. The first step involves project applicants working closely with the district Ohio EPA member of their Area Assistance Team (AAT) to develop project proposals including quarterly work plans. Ohio EPA sets the deadline for submittal of proposals in the spring (May - June) of each year. The proposals are evaluated locally by the AAT which is made up of one district representative each from Ohio EPA, OSU Extension, Natural Resources Conservation Service, Ohio Department of Natural Resources, and Resource and Conservation Districts. The proposals are then evaluated by the Ohio Nonpoint Source State Selection Committee, which is made up of one representative each from the Ohio EPA, Ohio Department of Natural Resources, Ohio Department of Health, Ohio Department of Agriculture, Natural Resources Conservation Service, and OSU Extension. The selected proposals are then sent by Ohio EPA to U.S. EPA, Region V in Chicago to initiate the grant award process. Once U.S. EPA awards the grant to Ohio EPA, Ohio EPA initiates the second step of the process, which is the signing of a grant agreement with sponsors of the selected proposals.

Summary

319 projects in Ohio have proven to be an effective and successful way to address Ohio's water quality problems caused by nonpoint source pollution. Their presence demonstrates Ohio EPA's commitment to a voluntary approach of controlling nonpoint source pollution and a strong federal, state and local partnership. For more information on 319 Projects, contact Ohio EPA, Division of Surface Water, Nonpoint Source and Clean Lakes Unit, at 614-644-2001.

Appendix 10 - Project Evaluation

Evaluation can either be a useful tool or it can waste time, energy and funds. Useful evaluation can help keep a project on track, determine project success and highlight activities to repeat or avoid in future projects. Without good evaluation, the effectiveness of a well-conceived and executed project may not be known. Similarly, improper evaluation can show an ineffective project as successful. Better evaluation results may be anticipated when evaluation is seen as a useful part of the entire project and not considered as a separate, burdensome task.

This information is merely a starting point for thinking about project evaluation. If additional information is needed, the Area Assistance Teams (Appendix 6) have been trained in evaluation fundamentals, and can help prepare evaluation plans.

Some reasons to evaluate
(adapted from Contant, Cheryl, The University of Iowa, 1994)

- To judge the worth of ongoing programs.
- To estimate the usefulness of attempts to improve programs.
- To assess the utility of innovative programs or initiatives.
- To increase effectiveness of program management and administration.
- To meet accountability requirements.
- To contribute to substantive and/or methodological knowledge of processes and programs.

Some questions around which to devise evaluation
(adapted from Contant, Cheryl, The University of Iowa, 1994)

- What happened to whom at what point in time?
- What was involved in the program and in what manner?
- What changes took place, and why?
- What worked, and why?
- What did not work, and why?
- What were the project's strengths, and why?
- What were the project's limitations, and why?

Types of evaluation
(adapted from Herman, J., Morris, L., Fitz-Gibbon, C., Evaluator's Handbook, Sage Publications, 1987)

Needs Assessment — to determine what needs attention, or what should be accomplished
Formative Evaluation — to determine how to improve the program
Summative Evaluation — to determine if the program is effective
Implementation Study — to determine program status
Outcome Study — to determine if program is meeting its goals

Steps in planning an evaluation
(adapted from Contant, Cheryl, The University of Iowa, 1994)

1. Identify stakeholders
2. Gather background information for evaluation development
3. Become familiar with the area, problem, and stakeholders
4. Assess the program for evaluation possibilities
5. Determine evaluation methods and devise evaluation tools
6. Present evaluation plan to customer for comment
7. Conduct evaluation
8. Prepare preliminary findings and present to customer for comment
9. Adjust evaluation plan
10. Continue evaluation
11. Present results and interpretation

Appendix 11 - Contacts

Areawide Coordinating Agencies

Buckeye Hills-Hocking Valley Regional Development
District (Athens, Hocking, Meigs, Monroe, Morgan, Noble, Perry and Washington counties)
Route 1, P.O. Box 299 D
Marietta, OH 45750
(614) 374-9436

Eastgate Development & Transportation Agency - EDATA
(Mahoning and Trumbull counties)
Ohio One Building, Suite 400, 25 E. Boardman St.
Youngstown, OH 44503
(216) 746-7601

Logan-Union-Champaign Regional Planning Commission
(Champaign, Logan and Union counties)
E. Foundry St., P.O. Box 141
East Liberty, OH 43319
(513) 666-3431

Maumee Valley Planning Organization
(Defiance, Fulton, Henry, Paulding and Williams counties)
197-2B-2 Island Park Ave.
Defiance, OH 43512
(419) 782-4548

Miami Valley Regional Planning Commission - MVRPC
(Darke, Greene, Miami, Montgomery and Preble counties)
400 Miami Valley Tower, 40 W. Fourth St.
Dayton, OH 45402-1827
(937) 223-6323

Mid-Ohio Regional Planning Commission - MORPC
(Delaware and Franklin counties)
285 E. Main St.
Columbus, OH 43215-5272
(614) 228-2663

Midwestern Ohio Joint Planning Council
(Auglaize, Putnam and Van Wert counties)
310 N. Main St.
Delphos, OH 45833
(419) 696-6522

Northeast Ohio Areawide Coordinating Agency - NOACA
(Cuyahoga, Geauga, Lake, Lorain and Medina counties)
668 Euclid Ave., Atrium Office Plaza
Cleveland, OH 44114-3000
(216) 241-2414

Northeast Ohio Four County Regional Planning and Development Organization - NEFCO
(Stark, Summit, Portage and Wayne counties)
969 Copley Rd.
Akron, OH 44320-2992
(216) 836-5731

Ohio-Kentucky-Indiana Regional Council of Governments - OKI
(Butler, Clermont, Hamilton, and Warren counties)
801-B W. 8th. St., Suite 400
Cincinnati, OH 45203-1607
(513) 621-7060

Ohio Mideastern Governments Association - OMEGA
(Carroll, Coshocton, Guernsey, Harrison, Holmes, Muskingum and Tuscarawas counties)
P.O. Box 130
Cambridge, OH 43725
(614) 439-4471

Ohio Valley Regional Development Commission
(Adams, Brown, Gallia, Highland, Jackson, Pike, Ross, Scioto and Vinton counties)
740 Second St.
Portsmouth, OH 45662
(614)354-7795

Toledo Metropolitan Area Council of Governments - TMACOG
(Erie, Lucas, Ottawa, Sandusky and Wood counties)
123 Michigan St.
Toledo, OH 43624-1927
TMACOG (cont'd)
(419) 241-9155
- Administers various economic development and

water quality activities

Conservation Technology Information Center
220 Potter Dr., Room 170
West Lafayette, IN 47906-1383
(317) 494-9555
- "Know Your Watershed" educational program
- Technology transfer, primarily related to agricultural conservation practices

Heidelberg College
Water Quality Lab
Heidelberg College
Tiffin, Ohio 44883
(419) 448-2201

Local and County Planning and Zoning Boards
- Regulate land use and zoning

Resource Conservation and Development Councils
- Facilitate resource conservation planning at a regional level

Local Health Departments
- Administer septic tank and private water supply regulations
- Maintain advisories on fish consumption and human contact with water

Ohio Alliance for the Environment
445 King Avenue
Columbus, Ohio 43201
(614) 420-7819

Ohio Commission on Dispute Resolution and Conflict Management
77 South High St.
Columbus, Ohio 43266
(614) 752-9595

Ohio Department of Agriculture
8995 E. Main St.
Reynoldsburg, OH 43068
(614) 866-6361
- Regulates pesticide registration and use
- Administers marketing programs
- Regulates bulk fertilizer facilities
- Publishes annual report of agricultural statistics

Ohio Department of Commerce, Division of State Fire Marshal, Bureau of Underground Storage Tank Regulation, 8895 E. Main St.
Reynoldsburg, OH 43068
(614) 752-7938
- Regulates underground storage tanks
- Coordinates cleanup oversight of leakingunderground storage tanks

Ohio Department of Health, Division of Environmental Health
246 N. High St., P.O. Box 118
Columbus, OH 43215
(614) 644-6811; or general info. at 466-3543
- Regulates septic tanks and private wells
- Provides technical assistance to local governments
- Coordinates fish consumption advisories

Ohio Department of Natural Resources (ODNR)
Division
Fountain Square Bldg.
Columbus, Ohio 43224

Ohio Department of Natural Resources (ODNR), Division of Forestry
Bldg. B-3
(614) 265-6694
- Administers Forestry Stewardship Incentive Program (SIP)
- Promotes BMPs for logging operations

ODNR, Division of Natural Areas and Preserves,
Bldg. F-1,
(614) 265-6453
- Administers state nature preserves and state scenic rivers
- Administers the Natural Heritage Data Base

ODNR, Division of Oil and Gas
Bldg. A
(614) 265-6922

ODNR, Division of Real Estate and Land Management
Bldg. C-4
(614) 265-6395
- Administers the Ohio Coastal Management Program, including oversight of coastal nonpoint source program
- Administers the Ohio Capability Analysis Program

ODNR, Division of Soil and Water Conservation
Bldg. E-2
(614) 265-6610
- Administers statewide soil and water conservation programs

- Maintains the State of Ohio Nonpoint Source Management Program document
- Administers "NatureWorks" program providing state funds for specific watershed projects

ODNR, Division of Water
Bldg. E-3
(614) 265-6717
- Administers the National Flood Insurance Program
- Maintains data on ground water availability and hydrogeology
- Maintains data on statewide water use

ODNR, Division of Wildlife
Bldg. G
(614) 265-6300
- Administers the fish and wildlife laws of Ohio
- Provides wetland and wildlife habitat assistance to land owners
- Enforces the stream litter law and investigates fish kills due to spills or dumping

Ohio Department of Transportation
Environmental Services
25 S. Front St.
Columbus, OH 43215
(614) 466-7100
- Administers use of National Highway System (NHS) and Surface Transportation Program (STP) funds for wetland mitigation and runoff water quality monitoring

Ohio EPA
Mailing address:
P.O. Box 1049
Columbus, Ohio 43216-1049
Location:
1800 WaterMark Dr.

Ohio EPA, Division of Drinking and Ground Waters
(614) 644-2752
- Regulates public drinking water supplies and quality standards
- Administers the Sole Source Aquifer program and wellhead protection program
- Maintains ambient ground water quality monitoring network

Ohio EPA, Division of Environmental and Financial Assistance
(614) 644-2798
- Provides low-interest loans and planning assistance for nonpoint source control projects

Ohio EPA, Division of Emergency and Remedial Response
(614) 644-2924
- Coordinates remediation oversight for abandoned hazardous waste sites
- Coordinates cleanup oversight for spills of hazardous materials
- Maintains data base of current and historic spills information

Ohio EPA, Division of Hazardous Waste Management
(614) 644-2917
- Monitors hazardous waste from its creation to its final disposal.

Ohio EPA, Division of Surface Water
(614) 644-2856
- Administers nonpoint source pollution controlsupport programs (watershed prioritization,statewide assessment, Section 319 grant management)
- Administers federally-funded Clean Lakes program (Section 314 grant management for enhancement and restoration of public lakes)
- Administers Section 401 Water Quality Certification program for proposed fills in waters of the United States)
- Develops and promulgates numeric and narrative water quality standards (chemical standards and biological criteria and standards)
- Administers point source pollution control programs (NPDES permits and enforcement operations)
- Coordinates development of Remedial Action Plans for Ohio's four designated Areas of Concern
- Monitors ambient surface water quality statewide
- Publishes Ohio Water Resource Inventory (305(b) report, summarizing water quality in Ohio)

Ohio Lake Management Society
P.O. Box 463
Kent, Ohio 44240
(216) 672-5475

Ohio State University Extension (formerly cooperative extension service)

2120 Fyffe Road
Columbus, Ohio 43210
(614) 282-4077
(contact county office)
- Provides training and technical assistance for nonpoint source control

Ohio Water Development Authority
50 W. Broad St.
Suite 1425
Columbus, Ohio 43215
(614) 466-5822

Soil and Water Conservation Districts
(contact county office)
- Provide technical assistance and coordination for soil and water conservation and related programs
- Maintain information on county soils and tillage surveys

State Fire Marshall
Bureau of Underground Storage Tank Regulation
8895 E. Main St.
Reynoldsburg, Ohio 43068
(614) 752-7938

U.S. Army Corps of Engineers
Buffalo District:
1776 Niagara St.
Buffalo, NY 14207-3199
(716) 879-4330
(District offices covering Ohio in Buffalo, NY; Pittsburgh, PA; Huntington, WV; Louisville, KY)
- Oversees construction and operation of large flood control and public water supply reservoirs
- Cooperatively administers the wetlands dredge and fill permit program with U.S. EPA and USFWS

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)
(contact local SWCD office). State office:
200 N. High St., Rm. 522
Columbus, Ohio 43215-2478
(614) 469-6962
Provides technical assistance for planning, design, installation, and management of soil conservation, animal waste, and water quality systems:
- Conservation Reserve Program (CRP), to conserve and protect highly erodible cropland (in conjunction with Farm Services Agency)
- Wetlands Reserve Program (WRP), program to return drained wetlands to wetland status
- Conservation compliance ("sodbuster" and "swampbuster"); authorized by the Food Security Act of 1985 and Food, Agriculture, Conservation, and Trade Act of 1990, and managed jointly with the Consolidated Farm Services Agency, these programs deny subsidy payments to farmers who plow highly erodible land or drain wetlands
- Environmental Quality Incentive Program (EQIP) provide financial assistance to control erosion and sedimentation, promote nutrient management through voluntary activity.
- Small Watershed Program (PL-566), evaluation and treatment of small agricultural watersheds
- Resource Conservation and Development (RC&D) Program, to promote economic development and to intensify resource protection in priority areas
- Natural Resource Assessment programs, to map and assess the condition of natural resources
- Rural Abandoned Mine Program (RAMP), to provide cost-share for reclamation, conservation, and development of rural abandoned coal mine lands and waters
- Hydrologic Unit Area (HUA) coordination
- General watershed action planning assistance
- Forestry Incentives Program, provides cost sharing to revegetate and improve timber stands on private lands
- Conservation Operations Program, which provides conservation planning and BMP implementation assistance
- Cooperative River Basin Planning Program, which provides assistance and guidance in developing planning and inventory and evaluation on larger watersheds and basins including floodplain,management studies

USDA, Consolidated Farm Services Agency
(formerly Agricultural Stabilization and Conservation Service and Farmers Home Administration)
200 N. High St.
Columbus, Ohio 43215
(614) 469-6735
(contact county office)
USDA, Consolidated Farm Services Agency (cont'd)
Provides administrative oversight and cost sharing for approved conservation practices; provides loans and loan guarantees to eligible producers for operating expenses, land purchase, and conservation measures, including:
- Agricultural Conservation Program, provides cost sharing on an annual basis for a number of

conservation and water quality practices
- Emergency Conservation Program, provides cost sharing on an annual basis to replace conservation treatments destroyed by natural disasters
- Watershed Protection and Flood Prevention Loans, to provide financial assistance for works of improvement, specifically to install or improve municipal water supply reservoirs

USDA, Forest Service
359 Main Road
Delaware, Ohio 43015
(614) 368-0140
Manages national forests for sustained production and multiple use, including:
- Forest Stewardship Initiative, providing technical assistance and cost share to private inholdings or lands adjacent to National Forest lands for installing BMPs

U.S. Department of Commerce, National Oceanic and Atmospheric Administration
Main Commerce Building
1350 E. West Highway, Rm. 9619
Silver Spring, MD 20910
(301) 713-3338
- Oversees coastal management programs (see also ODNR)

U.S. Department of the Interior (USDI), Office of Surface Mining
Columbus Field Office
2242 S. Hamilton Rd.
Columbus, OH 43232
(614) 866-0578
- Provides regulatory oversight of surface mining for coal and subsequent reclamation

USDI, U.S. Geological Survey (USGS)
Water Resources Division
975 W. Third Ave.
Columbus, OH 4321
(614) 469-5553
- Administers programs for long-term baseline monitoring of water resources, hydrologic and geologic investigations and data, and special studies

USDI, U.S. Fish and Wildlife Service (USFWS)
Ohio Field Office
6950 Americana Pkwy.
Reynoldsburg, OH 43068
(614) 469-6923
- Provides oversight and regulation of wildlife resources
- Manages National Wildlife Refuges
- Cooperatively administers national wetlands program with Corps of Engineers and U.S. EPA
- Cooperatively manages wildlife management projects and research
- Administers Coastal Wetlands Planning, Protection and Restoration program, providing funds for acquisition of coastal lands or waters, and for restoration, enhancement, or management of coastal wetland ecosystems

U.S. EPA, Region V
77 W. Jackson St.
Chicago, IL 60604
(312) 886-3000
- Provides regulatory oversight, education, planning, technical assistance, grants