DOCUMENT RESUME

ED 382 485 SE 056 355

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TITLE Controlling Nonpoint-Source Water Pollution: A Citizen's Handbook.
INSTITUTION Conservation Foundation, Washington, D.C.; National Audubon Society, New York, N.Y.
REPORT NO ISBN-0-89164-105-X
PUB DATE 88
NOTE 174p.
AVAILABLE FROM The Conservation Foundation, 1250 Twenty-Fourth St., N.W., Washington, DC 20037.
PUB TYPE Books (010) -- Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Activism; Adult Education; *Citizen Participation; Community Education; Environmental Education; Environmental Standards; *Federal Legislation; Planning; Program Development; Program Implementation; *State Regulation; *Water Pollution; *Water Quality
IDENTIFIERS *Nonpoint Source Pollution

ABSTRACT

Citizens can play an important role in helping their states develop pollution control programs and spurring effective efforts to deal with nonpoint-source pollution. This guide takes the reader step-by-step through the process that states must follow to comply with water quality legislation relevant to nonpoint-source pollution. Part I provides background on nonpoint-source pollution. Parts II, III, and IV describe in detail the nonpoint-planning process. Chapter titles are: (1) "Introduction: An Opportunity for Citizen Action"; (2) "A Different Kind of Pollution"; (3) "Identifying Water-Quality Problems"; (4) "Identifying Sources of Nonpoint Pollution"; (5) "Selecting Best Management Practices"; (6) "Establishing Institutional Mechanisms"; (7) "Drawing Up an Implementation Schedule"; and (7) "Monitoring Implementation and Enforcement." References are provided at the end of each chapter. Appendices contain: (1) a listing of offices of the Environmental Protection Agency and states within each EPA region; (2) state water pollution control agencies; (3) nonpoint-source provisions in the Water Quality Act of 1987; (4) report of the Conference Committee, U.S. House of Representatives pertaining to management of nonpoint sources of pollution; (5) state water resources research institutes; (6) major nonpoint-source pollution categories and subcategories; and (7) agricultural chemicals for which EPA has recommended water quality criteria. (LZ)

Controlling Nonpoint-Source Water Pollution

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Controlling Nonpoint-Source Water Pollution

The Conservation Foundation is a nonprofit research and communications organization dedicated to encouraging human conduct to sustain and enrich life on earth. Since its founding in 1948, it has attempted to provide intellectual leadership in the cause of wise management of the earth's resources. The Conservation Foundation is affiliated with World Wildlife Fund.

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Controlling Nonpoint-Source Water Pollution:
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Cover design by Pamela S. Cubberly
Printed by Wickersham Printing Company, Inc., Lancaster, Pennsylvania

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Our thanks to the Virginia Environmental Endowment for making the publication of this handbook possible.

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Foreword

Storm water runoff from city streets, suburban lawns, farmers' fields, and other such nonpoint sources is increasingly recognized as a major source of pollution of both surface and ground water in the United States. In response to this problem, Congress passed amendments to the federal Clean Water Act in February 1987, requiring states to initiate nonpoint-source pollution control programs.

Citizens can play an important role in helping their states develop these programs and spurring effective efforts to deal with nonpoint-source pollution. The purpose of this handbook is to assist citizens in this effort. The information the handbook includes, however, should also benefit the agencies responsible for developing these programs, as well as the landowners likely to be affected by program requirements.

Controlling Nonpoint-Source Water Pollution: A Citizen's Handbook is a collaborative effort between The Conservation Foundation and National Audubon Society. These two organizations also worked together in helping Congress to formulate the nonpoint-source program that was finally enacted.

Both to ensure this book's accuracy and to guarantee that it can be an effective tool for citizens in their efforts, *Controlling Nonpoint-Source Water Pollution* has been extensively reviewed by government officials and individual citizens active on water pollution issues around the country.

The authors have paid particular attention to the suggestions made in these reviews as they have fine-tuned the manuscript.

The Conservation Foundation, National Audubon Society, and the authors would like to thank a number of people, in addition to the numerous reviewers, for the contributions they made to this document. Pam Cubberly of The Conservation Foundation put substantial work into rewriting this handbook to make it more useful for the intended audience. Without her help, it would be much less intelligible and useful than it is. Connie Mahan of National Audubon Society lent her expertise on working with the "grass roots" in reviewing the portions of the handbook providing "tips" on how to be effective. Roger Wynne, an Audubon intern, provided valuable assistance in the early development of the handbook. And Marsha White of The Conservation Foundation worked her usual magic to produce clear manuscripts from often inscrutable originals, with the Foundation's Fannie Mae Keller and Jeanie Kim also providing valuable assistance.

Finally, thanks are due to the Virginia Environmental Endowment and the Ford Foundation for their generous support of this project.

William K. Reilly	Peter A. A. Berle
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Introduction

An Opportunity for Citizen Action

JUST AN ORDINARY RAIN STORM

The sky darkens. The wind whips up. On the streets of the city, umbrellas pop open and steps quicken. Construction workers, welcoming a break, duck under sheltered parts of their half-built structures, while suburban stay-at-homes race to shut their windows. Outside the city, in fields half-plowed, farmers don slickers and simply ignore the turn in weather.

It's just an ordinary storm, with barely enough rain to give vegetable gardens a good soaking. But with the rain can come serious pollution to our lakes, bays, rivers, streams, and aquifers. Where stormwater cannot soak into the earth, it runs off, filling street gutters and washing off exposed land. The onrush of water sweeps accumulated dust, dirt, debris—and often organic matter and toxic pollutants—from roads, construction sites, lawns, and other areas into city sewer lines and sometimes directly into surface waters. Farm gullies may channel water muddy with sediment, fertilizer and pesticide residues, salts, and animal wastes into streams and from there to larger bodies of water. Despite our nation's serious efforts to clean up pollution from factories and sewage systems, these less obvious sources of pollution are keeping our water dirty.

Nonpoint-source pollution—contaminants that enter our nation's waterways when water washes across the surface of the land—is a nationwide problem. It is responsible for an estimated 99 percent of sediment, 88 percent of nitrates, and 84 percent of phosphates entering America's lakes and streams.[1] Decomposition of organic wastes put into the water by human activities uses up oxygen vital to life. Nonpoint sources are responsible for 73 percent of this biological oxygen demand (BOD) in our waterways.

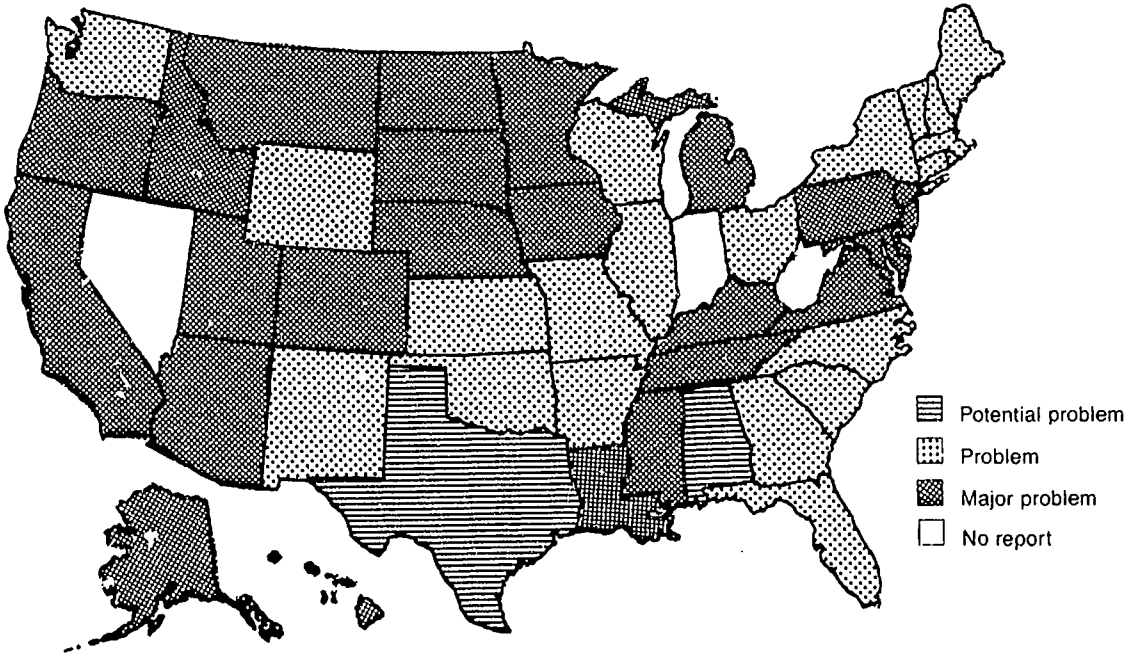
The cost of this dirty water is significant. A 1984 study by The Conservation Foundation[2] estimated the yearly costs imposed by sediment and associated contaminants resulting from erosion *alone* as being anywhere from $3.2 to $13 billion. And these estimates do not include many very significant impacts on biological systems for which an economic value is difficult to assign. Nor do they account for the costs of nonpoint-source pollutants—such as nitrates and many pesticides—that dissolve in water.

AN OPPORTUNITY FOR CITIZEN ACTION

If you are concerned about the quality of your state's water bodies, you have the opportunity to do something about it.

Early in 1987, the U.S. Congress passed The Water Quality Act (hereafter referred to as the 1987 amendments), which amended the Federal Clean Water Act. Among other actions, Congress directed the states to develop programs to begin to reduce nonpoint-source pollution. Prior to these amendments, Congress had concentrated on the cleanup of pollution from *point* sources, primarily municipal sewers and industrial discharges. As pollution from these sources has abated in the last 15 years, the role of nonpoint sources, largely uncontrolled, has become increasingly obvious. The U.S. Environmental Protection Agency (EPA) recently reported[3] that 24 states ranked nonpoint-source pollution as a "major problem," while an additional 21 states identified it as a "problem," impairing surface-water quality. (See figure 1.)

Figure 1
Level of Nonpoint-Source Contribution



Source: U S. Enviromental Protection Agency, *National Water Quality Inventory, 1984 Report to Congress*, EPA 440/4-85-029, Office of Water Regulations and Standards, Washington, DC, August 1985, p. 17.

The 1987 amendment on nonpoint-source pollution[4] requires each state to develop and implement an effective program to control this pollution. First, the states must identify and, to the extent possible, quantify the problem within their borders in an "assessment report." Then, they must figure out solutions to the problem by developing a "management program." Both these documents must be submitted to EPA by August 4, 1988, 18 months after the amendments became law. States must implement their management programs within four years of their submission to EPA. No penalty is imposed if states do not carry out these steps.* If your state's commitment to the task is not strong, people like yourself can play an important role in spurring the cleanup of these remaining sources of pollution.

HOW CAN YOU HELP?

While preparation of a nonpoint-source control program is ultimately the responsibility of your state's water-pollution-control agency, citizens can influence the content of that program in a variety of ways. Since states face no penalty for not participating in the nonpoint program (other than the fact that they will not be eligible for grant money to administer the program), you may need to pressure your state even to get started. This may involve raising the awareness of both state officials and the public about nonpoint-source pollution. Once the state begins to assess its nonpoint problem, you can help by reviewing—and perhaps adding to—the state's list of water quality problems and the nonpoint sources that cause them.

During the development stage of the management program, you can review proposed control techniques (called best management practices or BMPs), the enforcement or assistance programs selected to get BMPs used, and the timeline for implementation of the entire management

*If a state does not complete an assessment report, the law requires EPA to do it. However, the law does not require EPA to develop the state's management program.

program. Remember, a weak program may be as bad as no program at all. Finally, you can monitor the progress of the management program once it is implemented to make sure the job gets done. Helping to make sure that those responsible for nonpoint-source pollution carry out the recommended BMPs and that their actions actually result in cleaner water is probably the most important and most difficult task for citizen advocates.

Citizens can make a useful contribution at any stage and to any aspect of the nonpoint-planning process. You may wish, for example, to focus your efforts on problems in a particular water body, type of water body, type of nonpoint source, or type of BMP. Or, you may decide to focus on one particular agency, following and encouraging its work during the course of the nonpoint-planning process.

If you are not already part of an existing network of citizens concerned with water pollution in part or all of your state, you may want to join one. Networks of citizens can coordinate to monitor the nonpoint-planning process for their community, an entire watershed, region, or state. In this way, you may participate in a broader, more comprehensive effort to develop public support for nonpoint-source pollution control, identify a comprehensive list of problem water bodies and nonpoint sources, and/or monitor how well the management program gets implemented. Remember that you do not have to be an expert to contribute to the nonpoint-planning process. Citizen activists can play an important role just by asking good questions about what they notice in their lakes, streams, and other water bodies; and let the state take on the burden of finding the answers. For example, why does a local stream turn brown with silt or smell bad after a heavy rainstorm? Is it a good practice to plow right up to the edges of streams? Why is dirt from construction sites allowed to wash into street gutters?

The 1987 nonpoint-source pollution control program encourages your participation. The law requires that the state provide "notice and opportunity for public comment" before

it submits the assessment report and management program to EPA. EPA must also allow for public comment after it has received these documents from a state. Other opportunities for citizen input will probably arise. This handbook is designed to give you the tools you need to make effective use of these opportunities and to find other ways to influence the nonpoint-planning process in your state.

HOW TO USE THIS HANDBOOK

Controlling Nonpoint-Source Water Pollution: A Citizen's Handbook, produced jointly by The Conservation Foundation and National Audubon Society, takes you step-by-step through the process that your state must follow to comply with the 1987 amendments relevant to nonpoint-source pollution. The *Handbook* is designed to help you no matter what stages of the process, geographic area, or aspects of nonpoint control you decide to take on. Part I provides background on nonpoint-source pollution and references for more information. Parts II, III, and IV describe in detail the nonpoint-planning process. Tips on how you can get involved in the process are included both within the text and in special "tip" boxes, and references concerning more information on specific topics appear at the end of most of the chapters. The appendixes provide useful addresses and phone numbers, the text of relevant portions of the 1987 amendments and conference report, and other helpful information.

AN OVERVIEW

Before proceeding into the first chapter, however, you should become acquainted with the overall process set up by Congress. As mentioned earlier, the 1987 amendments direct states to prepare a nonpoint-source control program consisting of an assessment report (part II of this handbook) and a management program (part III). The states must then implement the management program (part IV).

The Assessment Report

The assessment report must identify those water bodies within a state's boundaries that cannot meet state water-quality standards because of nonpoint-source pollution (chapter 2) and the specific activities causing those water bodies to not be in compliance with either the standards or the "goals and requirements" of the Clean Water Act (chapter 3). Congress requires this assessment of the magnitude of a state's nonpoint pollution problem so the state can focus cleanup efforts on the most serious problems and allow EPA to evaluate the effectiveness of proposed management programs. These reports also provide a national data base of nonpoint sources and pollution problems in every state.

The Management Program

Once a state has identified bodies of water significantly polluted by nonpoint sources and what those sources are, it must design and submit to EPA a management program to solve the problem. Among other things, the management program must: (1) identify BMPs for controlling specific nonpoint sources (chapter 4); (2) identify existing, and propose new, programs to encourage or require the use of BMPs (chapter 5); and (3) set up a tight time schedule for the implementation of the management program (chapter 6).

Implementation

Once EPA approves a management program, the state concerned has four years to implement it. Part III of this handbook discusses how you can monitor the implementation of a management program once it has gone into effect.

The goal of the 1987 nonpoint-source pollution amendment is to finish the job of cleaning up the nation's waters that was started in 1972 by implementing effective management programs in every state. We welcome your comments

and suggestions on the usefulness of *Controlling Nonpoint-Source Water Pollution: A Citizen's Handbook* as you proceed with this vital task.

FURTHER READING

Other citizen guides that may be helpful include *Toward Clean Water: A Guide to Citizen Action* (Washington, D.C.: The Conservation Foundation, 1976) and *Groundwater: A Community Action Guide* (Washington, D.C.: Concern, Inc., 1984).

Tips

Developing Support for Nonpoint-Source Pollution Control

By raising the awareness of the public and of state officials about nonpoint-source pollution (where nonpoint problems occur, what they are costing the state, and the lack of existing effective programs), you can build political will within the state to tackle the problem and develop solutions.

First on your agenda should be to join or form a group and plan a strategy to influence the nonpoint-planning process. If no group already exists, arrange a meeting of people concerned about water pollution and interested in doing something about it. Try to select people who bring a wide range of skills—for example, writing, public speaking, technical expertise, etc.—and who will be willing to work hard. Additional members may be recruited as you begin to publicize your efforts through the media and by contacting other groups. At your first meeting, have your group brainstorm what you need to do. Write everything down on an easel or a large pad of paper—otherwise good ideas might get away. At this meeting, you should:

Identify Your Goals

Assess your strengths and weaknesses so that you can select realistic goals. Citizen groups can monitor all or just a part of the nonpoint-planning process in their state. If you belong to a statewide network of citizens concerned about water quality, you may want to follow progress on the development of the entire state management program. Smaller groups with more limited resources and expertise may want to focus their efforts on some smaller slice of the pie. Goals can be as varied and creative as your resources for achieving them, but make them as specific as possible. Set deadlines as a yardstick for measuring the success of your efforts.

Identify Your Natural Allies

Identify interest groups that can help you achieve your goals. Think broadly. Some likely

natural allies could be: (1) environmental organizations in your state; (2) other organizations that for economic or other reasons are sympathetic to your goals—for example, recreational and commercial fishing interests, outdoor outfitters, etc.; (3) businesses, organizations, or governmental bodies that use water and would benefit from it being clean—for example, municipal water-supply facilities, industrial dischargers that must remove nonpoint pollutants to comply with discharge limitations on their permits, etc.; (4) local and state officials. By including nonenvironmental groups—for example, groups that will economically benefit from improved water quality—you will be able to present important economic arguments to counter opponents' concerns about the costs of pollution control.

Form a Coalition

The people and organizations you have identified as potential allies can help at various stages by signing letters, providing resources, or giving testimony. You might also consider asking them to join you in a formal coalition. A unified body of varied groups may bring wider recognition and support as well as greater resources to the effort of a single group.

Plan a Fundraiser

Don't forget that your activities will cost money—to pay for stationery, the telephone, copying, travel, experts, lab fees, etc. On your agenda should be plans for raising money. Schedule a party, concert, bake sale, garage sale, raffle, or other event. The occasion will also advertise your organization's efforts. Many established environmental and other nonprofit organizations will have useful advice on how to plan a successful fund-raising event. Consult the National Wildlife Federation's *The 1987 Conservation Directory*[1] for names and phone numbers of local or national organizations.

Plan Some Special Events

Special events can publicize your activities and bring members of the general public into the fold. For example, a workshop, to which experts and political figures are invited, will not only attract a large audience who will learn about your work, but will also allow you to educate people about the problem and perhaps motivate them to action. Workshops are most effective when carefully planned and when focused on a specific topic. Organize your workshop well enough in advance to publicize it widely.

Be Creative

Find creative ways to broaden your support. Invite the public, press, and important political officials to visit a body of water that has been damaged by nonpoint-source pollution. Piggyback your issue onto other events: Distribute materials at conferences on related topics organized by other groups or at a booth at a county fair. Adopt a slogan that captures in a few short words some public sentiment about clean water. Slogans, like "Save the Bay," convey a message. The more people you get to display that message, the wider support you will appear to have.

Know Your Opponents

Be aware of special interest groups or individuals who oppose nonpoint-source pollution control. Establish contacts with these people or organizations, and discuss your differences openly. Try to find some common ground—if only to identify where your disagreements are.

Taking Advantage of Formal and Informal Opportunities for Participation

During the development of the assessment report and management program, many formal opportunities will arise to get your opinions before decision makers. You can also create informal opportunities. Use any of these occasions to press for the best program possible.

Formal Opportunities

Public meetings and other opportunities for public input are likely to occur throughout the nonpoint planning process. Be sure to anticipate these actions and use them to introduce your views formally to the press and to state agencies. Submitting written comments and testifying at public hearings are two of the most effective means of influencing the original formulation of a state's nonpoint-source control program. Here's how:

Look for notices soliciting public comment. In accordance with state and/or federal law, agencies involved in nonpoint planning will provide public notice of actions such as a public hearing or the release of a draft management program. Such announcements will appear in the local newspaper and at certain public places, such as libraries and government offices. A good way to be sure not to miss these

notices is to get on the agency's mailing list. The notices will describe the specific action being taken by the agency as well as information to aid public participation. Thus, a notice may indicate the date, time, and type of public meeting to be held or the availability of any documents for public review such as an environmental impact statement or a draft program. In addition, a notice may specify certain procedures that must be followed to submit comments for public record. For example, it may provide a date by which comments must be received, indicate the number of written copies that must be submitted, or specify a time limit for oral comments at a public meeting.

The notice should be posted in time to provide adequate time for meaningful public review. Use the time to prepare your response carefully. Before testifying at a hearing or submitting written comments, talk to relevant parties, establish good relations with agency personnel, and formulate a well-reasoned and accurate response. It may be necessary to use the help of experts (see "Free and Paid Expertise," chapter 2). Experts may also be willing to testify publicly, although their comments should not be substituted for citizen input.

Testifying at a Hearing

Come to a public hearing armed with a written statement to back up your oral summary of major points, since time may not permit the reading of a complete testimony. Be brief, concise, and to the point. Not only must you be able to present your critique, but you must have good evidence for your claims. Be sure to attach any supporting documentation such as monitoring data, maps, studies, photographs, or surveys to your written testimony. Be polite, but firm with your views. Dress neatly, as appearances are important.

Follow up on the agency's response. Government agencies are generally required to respond to comments received from the public. The degree of formality of the required response will vary from state to state. For example, public comments may be included in the draft plan with an explanation on behalf of the planning agency as to how they were considered. It is important to make sure that your comments were received and taken into account. If they were not, find out why. In some cases, lack of response to the public's comments may be grounds for a lawsuit.

Informal Opportunities

In addition to these formal opportunities for input, you may have or be able to create infor-

mal opportunities to influence the nonpoint-planning process. Stay in close contact with planners as the program is being developed. Use the telephone, send correspondence, or schedule meetings in order to present your views and the results of any independent research you have conducted.

Working with the Media

Effective use of the media can spur statewide involvement in nonpoint planning. Working with the media at various stages in the process can help educate public officials about water-quality issues as well as heighten public awareness on nonpoint-source pollution, the state's planning process, and its preliminary results. Contact the media to publicize public hearings, meetings, and events that you've planned. Take advantage of some of the following ways to get coverage from the media:

Work with Specific Reporters

Try to develop rapport with reporters who work specifically on environmental issues. If none exist, contact outdoor or sports writers: they may serve the same function. Give these reporters accurate and succinct information on the most pressing nonpoint issues in the area. Provide, but don't overwhelm, them with useful background information. Be available to answer their questions. Notify them about any newsworthy events or "human interest stories" on nonpoint pollution. You may want to work with a member of the editorial staff if the nonpoint program becomes a hot political issue.

Send Letters to the Editor

A well-written letter to the editor of newspapers with local or statewide coverage is an effective means of educating the public on your issue. Your letter should be timely: Submit it three to five days after a relevant article or event. State your view precisely and clearly in 200 to 300 words; type the letter, if possible, and sign it.

Submit an Op-ed Piece

Most newspapers periodically run op-ed (opinion editorial) pieces, which allow readers to present their views in essay fom on important issues. A well-timed op-ed can educate the public on nonpoint pollution in general or on a particular local issue. Make sure your facts are accurate and relevant.

Write a Press Release

A press release draws the media's attention to a newsworthy event, such as a hearing or issuance of state's draft management program. On your group's standard letterhead (if you don't have one, you might consider creating one), set out the major details of the event or topic in short, readable sentences. Create a catchy headline. Keep the release short: only one to two pages. Type it double-spaced with side margins and end each page with a complete paragraph. Place "For Immediate Release" or a date for future release in the upper right-hand corner near the headline. Include a contact name, address, and phone number in the upper left-hand corner.

Plan a News Conference

News conferences brief representatives of the press, TV, and radio in person on a topic or newsworthy event. Notify reporters well in advance. Choose a slow news day, if possible. Have packets containing fact sheets, pictures, and relevant background articles available. Feature an articulate speaker who is brief and to the point. Don't forget to have coffee and doughnuts!

Part I

Understanding the Problem

Chapter 1

A Different Kind of Pollution

Nonpoint-source pollution is caused primarily by stormwater and snowmelt runoff from land surfaces, for example, farmland, forests undergoing logging, and urban areas, although wind may also carry dust and dirt into surface waters. Other sources exist. Mines, septic systems, hazardous waste sites, and landfills all may leak a variety of pollutants into ground and surface waters.

Nonpoint-source pollution creates many of the same problems as point-source pollution. Heavy metals, pesticides, and other toxic chemicals washed off streets, farms, and lawns can poison fish and other aquatic wildlife; decomposition removes dissolved oxygen necessary for the survival of valuable fish species; and nitrates and other nutrients can cause extensive algae blooms or the rapid eutrophication* of lakes and estuaries.

But the vast amounts of sediment released from nonpoint sources can cause a host of other problems—covering spawning beds for anadromous fish, exacerbating flood damage, and filling in reservoirs, drainage ditches, and irrigation canals. (See figure 2 for a list of the types of adverse impacts of nonpoint-source pollution.)

*A process by which lakes age.

Figure 2
Adverse Impacts and Costs of Nonpoint-Source Pollution

In-Stream Costs/Effects

Biological:
- Loss of species
- Destruction of species habitat
- Alteration of food web
- Interruption of ecosystem functions

Recreational:
- Loss of recreational fishing—fresh water and marine
- Loss of boating and swimming opportunities
- Swimming and boating accidents
- Loss of waterfowl hunting opportunities

Water-storage facilities:
- Need to construct larger sediment pools
- Need to dredge and excavate sediments
- Early replacement of storage capacity
- Additional water-quality treatment required

Navigation:
- Delays and accidents in shipping/boating
- Damage to marine engines
- Need for dredging and disposal of spoils

Other:
- Loss of fishery
- Reduced property values and aesthetics

Off-Stream Costs/Effects

Flood damages:
- Deposition of sediment on cropland, roads, and other private property
- Loss of productivity resulting from sediment deposition
- Loss of human life

Water-conveyance facilities:
- Deposition and removal of sediment in drainage ditches, irrigation canals
- Increased pumping requirements

Water-treatment facilities and water-users:
- Additional treatment required
- Increased maintenance of equipment
- Loss of productivity

Drinking-water supplies:
- Increased health risks and illnesses from contaminated surface water and groundwater
- Supplemental drinking water required

Adapted from Edwin H. Clark II, Jennifer A. Haverkamp, and William Chapman, *Eroding Soils: The Off-Farm Impacts* (Washington, D.C.: The Conservation Foundation, 1985).

In contrast to point sources, nonpoint-source pollution is generated from areas of land. Its control, therefore, is hampered by its diffusiveness. The impact of nonpoint pollution usually depends on how close sources are to water bodies, the type of soil, and the slope of the land, although contaminants from distant sources may reach water bodies after several storms.

Nonpoint-source pollution can also cause serious groundwater contamination problems. Nitrates and some pesticides can seep into groundwater from cropland and suburban lawns. Leakage from septic tanks and seepage from chemical spills, landfills, and a host of other sources can contaminate shallow groundwater supplies. Many other of the same sources that affect surface water can affect groundwater as well, particularly if the contaminants dissolve in water. Finally, many of the measures that can be taken to lessen surface water pollution may result in making groundwater contamination more serious.

WHAT ARE THE MOST COMMON SOURCES OF NONPOINT POLLUTION?

In general, most sources of nonpoint pollution can be grouped into one of the following categories:

Agriculture

Two-thirds of the nation's rivers are adversely affected by agricultural nonpoint-source pollution, which stems from crop production and animal husbandry. The pollutants most commonly associated with agriculture include sediment, nutrients, salts, organic matter, pesticides, and pathogens.

How and when the soil is tilled and agricultural chemicals, such as pesticides, fertilizers, and manure, are applied can determine how much pollution is generated.

In more arid regions, irrigation return flows may carry off various salts found naturally on the land. These salts are detrimental to aquatic wildlife and downstream water

users, and, at least in one case—California's Kesterson Reservoir—have forced the closure of a wildlife refuge.

Animal husbandry is another source of pollution. Although large feedlots are treated as point sources, any operation having less than 100 animals is considered a nonpoint source. Runoff from the lot itself or from manure storage areas and stream banks can cause serious pollution.

Silviculture

At least 38 states experience nonpoint-source pollution from the cultivation, production, and harvesting of timber. Silvicultural operations can produce sediment, pesticides, and other organic materials. Although the total amount of pollution may not be large, its impact may be quite significant: Forested watersheds produce high quality water suitable for municipal drinking supplies, cold-water fisheries, and other valuable recreational uses. Even limited amounts of pollutants can interfere with these uses.

Many different aspects of silvicultural practice may generate nonpoint-source pollution, including harvesting, logging, road building, burning, aerial pesticide application, and storage of logs in water.

Mining

Both operating and abandoned mines cause pollution problems throughout the country.* The pollutants of major concern include sediment, acids, heavy metals, radioactive

*Under both the Surface Mining Reclamation Control Act (which regulates surface coal mines and the surface effects of underground coal mining) and the Clean Water Act, active mines are considered point sources of pollution and regulated as such. Mine operators are required to collect runoff in a sedimentation basin or pond. The discharge from these basins or ponds is then regulated as a point source. However, nonpoint problems can occur from active mines, if existing regulations are not enforced, and from orphaned or abandoned mines of any type. If inactive mines are later reopened for additional mining activities, they are considered new mines subject to regulation under the point-source program.

materials, and salts. Nonpoint-source pollution at mining sites results primarily from drainage and leaching, the erosion of spoil piles and mine tailings, and runoff from haulage roads.

Water pollution from mining can be quite harmful. Although sediment is the most pervasive pollutant, acid mine drainage has killed the fish and plant life in entire streams in vast areas of Appalachia. While the pollution often affects a small area, heavy metals and radioactive materials in mine runoff can pose serious threats to surrounding ecosystems, as well as nearby human populations.

Runoff from old uranium, metal, and coal mines poses nonpoint problems in the West, while in the mid-Atlantic and Appalachian regions, drainage from abandoned and inactive coal mines degrades more than one-half the stream miles in Pennsylvania, West Virginia, Virginia, Maryland, and Delaware.

Construction/Urban Runoff

Runoff from construction—for example, of housing developments, highways and bridges, sewage treatment facilities, and industrial and commercial developments—make relatively minor contributions to total nationwide nonpoint loadings, but the local impacts on water quality can be severe. The main pollutant from construction sites is sediment. Erosion rates from construction sites can be 10 to 20 twenty times those of agricultural lands, although much smaller areas are involved. Other pollutants generated at construction sites include chemical fertilizers, pesticides, petroleum products, miscellaneous wastes dumped on the site, construction chemicals, and debris.

Construction sites are not the only potential nonpoint sources in urban areas. Each time it rains, pollutants may be washed off residential and urban streets, roofs, lawns, and other areas into lakes, rivers, or aquifers. A wide variety of potential contaminants are carried in stormwater runoff—including asphalt, tar, oil, gasoline, fertilizers, lit-

ter, road salt and sand, pet wastes, and toxic materials including lead, cadmium, mercury, organic pesticides, ammonia, and oils.*

Other Sources

On-site Septic Systems

If septic systems are overloaded, inadequately sited or constructed, or not maintained properly, untreated wastes may overflow and be washed off the surface—or seep directly through the ground—into the groundwater or adjacent surface water. The most common pollutants are bacteria, other pathogens, and biological oxygen demand (BOD), although nutrients and other chemicals dumped into household drains are also problematic. Whereas most nonpoint sources cause the most pollution as a result of rainfall or snow melt, failing septic tanks can cause the biggest problems during low-flow periods.

Landfills and Hazardous Waste Sites

Almost any chemicals dumped into a landfill can leak out. This includes the full range of oils, toxic solvents, and even solid materials that decompose or dissolve. These contaminants may be washed off the surface by stormwater runoff or flood flows or seep directly through the ground into the groundwater or adjacent surface waters. In many cases the pollution may not appear until years after the waste was placed in the landfill and even for years after the landfill is closed.

*The 1987 amendments to the Clean Water Act include an enhanced program for regulating stormwater collected in storm sewers. There are several other provisions of the Clean Water Act relevant to the regulation or nonregulation of stormwater from certain activities. See Section 402(l)(2) (stormwater runoff from oil, gas, and mining operations), Section 402(p) (municipal and industrial stormwater discharges), and Section 502(14) (agricultural stormwater).

Air Pollution

Air pollution can cause nonpoint problems wherever stormwater runs off the land into streams and lakes. For instance, acid precipitation (commonly called acid rain) builds up in snow and ice over the winter. The first spring thaw is likely to result in a heavy dose of acidic water being flushed into streams throughout a region.

FURTHER READING

The U.S. Environmental Protection Agency has produced several useful reports on nonpoint-source pollution including *Report to Congress: Nonpoint Source Pollution in the U.S.* (Washington, D.C.: Water Planning Division, U.S. Environmental Protection Agency, January, 1984) and *Nonpoint Source Runoff: Information Transfer System* (Washington, D.C.: Office of Water, U.S. Environmental Protection Agency, 1983).

The Conservation Foundation report by Edwin H. Clark II, Jennifer A. Haverkamp, and William Chapman, *Eroding Soils: The Off-Farm Impacts* (Washington, D.C.: The Conservation Foundation, 1985), contains an extensive analysis of the types of impacts associated with certain forms of nonpoint-source pollution and their economic costs. Also see *Groundwater Protection* (Washington, D.C.: The Conservation Foundation, 1987).

Another useful general resource on nonpoint pollution is Vladimir Novotny's and Gordon Chesters' *Handbook on Nonpoint Source Pollution: Sources and Management* (New York: Van Nostrand Reinhold Company, 1981).

Part II

Preparing the Assessment Report

Each state must complete an assessment report by August 4, 1988, 18 months after the 1987 amendments were enacted. The report must identify:

- bodies of water that do not meet water quality standards or "the goals and requirements" of the Clean Water Act because of nonpoint-source pollution (chapter 2), and
- the most significant types of nonpoint sources of pollution for each problem waterway (chapter 3).

In addition, states must: (1) describe the process (including intergovernmental coordination and public participation) for identifying best management practices (BMPs)*

*The choice of BMPs is the stage of the nonpoint-planning process that most affects persons responsible for generating nonpoint-source pollution. Therefore, the 1987 nonpoint amendment requires the assessment report to include a description of how a state will allow timely and effective input from both experts and the public at this stage. The state must also ensure that all the right agencies at the state and local level are involved and are coordinating with each other.

and (2) list existing state and local programs for controlling pollution from nonpoint sources. The list of existing programs will later help identify what additional programs are needed to clean up the pollution, and will be discussed in chapter 5.

Chapter 2

Identifying Water-Quality Problems

The 1987 nonpoint-source pollution amendment reads that states must identify "those navigable waters within the State, which without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of the [Clean Water] Act." Once these waters are identified, the remainder of the program focuses on getting them cleaned up. You can help by informing state officials of the location of any problem areas you find through your own efforts and by carefully reviewing the state's list to ensure it is complete.

Identifying water bodies that fit within the requirements of the law can be thought of as a three-step process. The first is to determine which waters are polluted. The second is to determine which of these waters are polluted by nonpoint sources. The third and final step is to determine whether the pollution levels are serious enough to exceed state water quality standards or to not meet the "goals and requirements" of the Clean Water Act. Of course, your research may uncover answers to any of these questions at any time. But to be thorough, try to answer each question in turn.

One of the major challenges in implementing the 1987 nonpoint-source pollution amendment will be to develop ef-

Steps In Identifying Water-Quality Problems

Step one: Which water bodies are polluted?
Step two: Which of these water bodies are polluted by nonpoint sources?
Step three: Are the pollution levels serious enough to exceed state water-quality standards or to not meet the goals and requirements of the Clean Water Act?

fective management programs in the face of insufficient data and/or vague and incomplete water quality standards, more often the case than not. You can help in this process by building a case based on information gathered from many sources and by presenting it in such a way that makes the state take a closer look at its waters.

STEP ONE: WHICH WATER BODIES ARE POLLUTED?

You can tap a variety of information sources to identify polluted water bodies. Through fieldwork, you can even try to generate information yourself. The following list of sources and approaches is organized in order of their usefulness. Start at the beginning of the list, using the later ideas to fill any gaps.

State Reports on Water Quality

Some of the best sources of information for identifying polluted water bodies are official state summaries of water-quality conditions (see examples below). In these reports, which may have been prepared for a variety of purposes, the state should have identified waters failing to achieve water-quality standards. If your state has set up effective standards, has taken thorough water-quality measurements and, even better, has analyzed the resulting data to provide a clear up-to-date summary of water-quality conditions for a number of different pollutants, it has already carried out

Remember...

Water bodies in your state must not only meet state water quality standards, they must also be clean enough to meet the legislated goal of the Clean Water Act, that is, "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

steps one and three of the identification process for you. If you are lucky, the state may have also identified which water bodies are polluted from nonpoint sources (step two).

A. 305(b) of the Clean Water Act. Biennial summaries of water quality in a state are required under Section 305(b) of the Clean Water Act. These reports are prepared by a state's water-pollution-control agency and then submitted to the Environmental Protection Agency (EPA). Although the format varies from state-to-state, each report generally identifies areas where water-quality standards are not being met and provides other information on point and nonpoint pollution. Request copies of these reports from your state's water-pollution-control agency (See appendix B.)

B. Other State Reports. State agencies may have prepared similar reports or summaries for the state legislature, citizens, or the agency's own purposes. The state's water-pollution-control agency or the legislature's environment committees are the places to inquire.

C. ASIWPCA Water Quality Reports. Most states also prepared water quality summaries in 1982 and 1984 for the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA). While limited in detail, the ASIWPCA reports provide a quick picture of possible problem areas. The most recent report, entitled *America's Clean Water: The State's Nonpoint Source Assessment, 1985* can be obtained by writing ASIWPCA, 444 N. Capitol Street, NW, Suite 330, Washington, D.C. 20001.

The state probably had to develop the above water-quality reports using very limited data, so the reports may not be useful in identifying all polluted waters. In many

cases, the state may have made little more than "judgment calls." Some waters that should have been included may not have been.

This is particularly true for pollution problems caused by nonpoint sources, since existing monitoring programs are often ineffective in identifying these types of problems. Most monitoring focuses on the types of pollutants discharged by industries and municipal sewage systems, not necessarily those likely to be associated with nonpoint sources. In addition, most nonpoint-source pollution problems are intermittent, occurring during or just after a storm when measurements are not likely to be taken. In fact, the people responsible for going out and taking measurements are quite likely to conclude that this is the best time to catch up on all that paperwork piling up in the office. Monitoring data, if available at all, probably cover only a few pollutants, were gathered at infrequent intervals, perhaps once a month, and were analyzed only after a long delay, if at all.

It is important to remember that, since states tend to measure the water quality of flowing waters, they may have little information about the quality of water in ponds, lakes, reservoirs, bays, and estuaries. These areas can be seriously affected by nonpoint-source pollution, because they tend to be sinks, collecting runoff and accumulating pollution. Information on lake and reservoir water quality may be available from special monitoring programs, such as the National Eutrophication Survey, the U.S. Army Corps of Engineers reservoir study, as well as the state's efforts under the Section 314 Clean Lakes Program. Another good source of information is the North American Lake Management Society, its membership list and conference proceedings.

Given the possible limitations of these reports, you can use several approaches to finding polluted water bodies that were missed. The first is to go out and look for them yourself. The second is to turn to special studies. After you have exhausted these sources, you might see what you can get from specialized governmental agencies, universities, and environmental or other groups. Finally, as a last resort, you

might try to look at unprocessed monitoring data, aerial photos, or even satellite photos to identify rivers receiving large inflows of sediment.

Fieldwork

Drive around in the vicinity of a lake, stream, or other water body especially after a storm, and note signs of water-

Figure 3
Windshield Surveys of Water-Quality Impacts from Nonpoint-Source Pollution

Drive around near lakes, streams, and other water bodies. If a water body exhibits any of the characteristics listed in the left-hand column, the nonpoint activity listed in the right-hand column may be the cause.

What You See	Possible Nonpoint Source
Muddy waters	Sediment from agriculture, silviculture, urban runoff, or construction sites
Build-up of sand or mud	Sediment from agriculture, silviculture, urban runoff, or construction sites
Excess algae or plant growth	Nutrients from agriculture or urban runoff or septic tank seepage
Dead fish	Pesticides from agriculture or silviculture; runoff from mining
Odd smell	Pesticides from agriculture or silviculture
Foul odor	Runoff of animal wastes; urban runoff
Debris in water	Runoff from silviculture, construction sites, or urban areas
Black water	Coal or waste materials from mining
Oddly colored water, sediment, or soil	Mine drainage; runoff from industrial sites
Oily water	Urban runoff
Damaged stream channels	Animal grazing

quality problems. At this stage, you might as well narrow your search to problems probably caused by nonpoint sources. (See figure 3 for a list of signs of nonpoint-source pollution.) For example, a stream's water may be very silty, indicating runoff from city streets, a construction site, or farm fields. You may also want to take the opposite approach by looking for a likely nonpoint source—for example, a construction site—and tracing runoff to the nearest water body.

Supplement your fieldwork by surveying local residents door-to-door or sending them a questionnaire. They may know of an old swimming hole that has silted up, a stream that has become thickened with algae, or a sewer that overflows during heavy rainfalls. *Obtaining Citizen Feedback* by Webb and Hatry[1] can help you design your questionnaire.

Special Studies

At this stage, you may also be able to fill gaps by learning what you can from special studies:

1) *Section 208 of the Clean Water Act.* This section required preparation of areawide water-quality management plans, including an analysis of nonpoint-pollution problems. Although funding for 208 plans was eliminated in 1981, most states analyzed water-quality problems associated with the various nonpoint-pollution sources. As of 1982, over two hundred 208 water-quality plans had been approved. The plans provide useful historical background on water-quality issues in each area, many of which are still likely to be relevant. Agencies to contact about 208 plans include state water-pollution-control agencies*, regional councils of government, regional EPA offices, and regional planning commissions.

2) *Studies Focused on Particular Geographic Locations.* Some areas with highly visible nonpoint problems, such as the Chesapeake Bay, Great Lakes Basin, or Colorado River, have provoked special studies and management activities on

*See appendix B for addresses and phone numbers of state water pollution control agencies.

a regional or local level. State or substate (regional) agencies, for instance, may have conducted special problem assessments and watershed-management plans designed to identify and reduce inputs from nonpoint pollutants. A state- or regional-level water-quality management agency may know about the existence of any special studies, watershed plans, and monitoring efforts.

3) *Other Special Studies.* Sometimes teachers or students at local colleges and secondary schools will take water-quality measurements as part of an on-going or special research project. Check with faculty in departments of environmental studies, biology, engineering, and water resources.

Other Sources of Information

Agencies that specialize in agriculture, public health, mining, or other topics may also have site-specific information about water-quality problems. Because of their longstanding work with farmers on soil erosion, the U.S. Soil Conservation Service and locally based, soil and water conservation and irrigation districts may have information on water-quality trouble spots. County health agencies, because of their interest in safe drinking water, may be aware of water-quality problems that affect human health. County public works departments may have information on stormwater runoff.

Local branches of national environmental or other organizations—for example, the National Audubon Society, the Izaak Walton League, the Sierra Club, Trout Unlimited, the National Wildlife Federation, and the League of Women Voters—may also prove useful. Contact local or state-wide recreational clubs, such as fishing, hunting, or garden clubs, for help in identifying problem waters, particularly those with impaired fishing and wildlife habitat. Local organizations already formed in response to problems should be particularly helpful. The *1987 Conservation Directory*[2]

published by the National Wildlife Federation can direct you to various environmental organizations in your state.

Unprocessed Water-Quality Measurement Data

As a last resort or to fill any gaps left, you may want to sort through unprocessed monitoring data collected by any of the agencies or organizations mentioned above. Check first with your state water pollution control agency (see appendix B) to find out if they or anyone else have been taking measurements not yet analyzed as part of official state reports. Under the best of circumstances, the state will have installed monitoring stations that take continuous water-quality measurements upstream and downstream from all major municipal and industrial dischargers.

If, as is more likely, your state's water-quality data are incomplete, you might contact the local office of the U.S. Geological Survey (USGS).* USGS maintains a system of over 500 monitoring stations across the country called the National Ambient Stream Quality Accounting Network (NASQAN), providing useful data on water quality trends. It may, however, be of limited use in isolating problems due to the location of the stations, the types of measurements taken, and the infrequent tabulation and analysis of the results.

STEP TWO: ARE NONPOINT SOURCES THE CULPRIT?

By now, you have identified polluted waters in your state, region, or community. Some, you may already suspect, are caused by nonpoint-source pollution. The second step in the identification process is to determine which of these waters are actually polluted by nonpoint sources.

*Your local library may carry a listing of local USGS Water Resource Offices called *Water Resources Division Information Guide*, or call the USGS Public Inquiry Office at (703) 648-6892.

One hint is the type of pollution problem that occurs. Some types of pollution are more commonly caused by point sources. Others frequently result from nonpoint sources. Again, refer to figure 3 for a list of water-quality problems often caused by nonpoint sources.

Another clue is when pollution problems occur. In contrast to point sources, most nonpoint-source problems occur as a result of stormwater or snowmelt runoff. Thus, if water-quality problems occur during or after a storm, especially in the case of rivers and streams, nonpoint sources are quite probably involved. If the worst water-quality problems occur during the stream's low-flow periods, point sources such as municipal sewers or industrial discharges are the more likely culprits, although you should still be on the lookout for leaking septic tanks and landfills.*

How do you find out if pollution occurs after storms? Compare measurements of the amount of water flowing in the stream with measurements of water quality, looking for elevated pollution levels during periods of high water flow (i.e., during or after a storm). State and federal geological surveys as well as other water-resource planning and management agencies (for instance, the Tennessee Valley Authority, Bureau of Reclamation, the U.S. Army Corps of Engineers, the U.S. Geological Survey, and state or local water-supply agencies) often collect flow data. They can probably also provide some insight about when storms have occurred and what stream-flow levels are likely to result. If rivers are not actually "gauged" like this, weather bureau records can generally indicate when major storms have occurred. Remember that maximum stream flows are likely to occur somewhat later than the maximum rainfall. The amount of lag time—from a few minutes up to a day or more—depends primarily on how far the water has to travel before reaching the area where the water-quality problem occurs.

*Some nonpoint-source pollutants, however, tend to have long-term impacts that might not be seen immediately after a storm. For example, lakes and estuaries may become eutrophic because of nonpoint-source nutrients contributed over the course of many storms.

How do I find out what my state's water quality standards are?

Just call your state water pollution control agency (see appendix B) or the EPA regional office that includes your state (see appendix A).

One serious type of water-quality problem often caused by storms is officially considered a point-source problem. Cities, primarily in the Northeast, typically have sewer systems which carry both sewage and storm water. These systems will often overflow during storms, spilling raw or partially treated sewage into receiving waters.

Nonpoint sources can cause water quality problems during low-flow periods as well. Pollutants leaching from septic tanks and landfills, for example, may be most noticeable during low flow periods, because there is less water in the stream to dilute them.

Lakes, reservoirs, ponds, and estuaries may also demonstrate the most serious water-quality problems during low-flow periods, even though the pollutants enter them during high flows. Many of the pollutants carried into streams during storms accumulate downstream in ponds, lakes, reservoirs, or estuaries. There, the nutrients washed off fields may stimulate algae and weed growth and other problems associated with eutrophication.* Pesticides and other toxic substances may harm fish and other aquatic life.

And sediment may cause shoaling† or block out the light needed by bottom-dwelling vegetation and other aquatic life. However, if any large uncontrolled point sources—for example, municipal sewage plants and industrial charges—are located upstream of the water body, they may well be the major cause of the problems observed. You can then

*A process by which lakes age.

†Shoaling occurs when sand or mud collects in a water body, for example, in sandbars.

only guess at the relative importance of nonpoint sources on the basis of your "windshield survey" evidence.

A final hint on whether nonpoint sources are a problem is which pollutants are giving the most problem. High levels of sediment, pesticides, oil, grease, and trash generally indicate nonpoint sources. Nitrates (from, for example, fertilizers and animal wastes) and phosphates (from, for example, fertilizers and sewage treatment effluent) can be discharged by either point or nonpoint sources. Sophisticated chemical analyses may be able to determine from which kind of source they come. Experts previously used the relative amounts of different types of bacteria as one guide to source contributions, but this is no longer considered a reliable indicator.

STEP THREE: IS THE NONPOINT POLLUTION SERIOUS ENOUGH TO EXCEED WATER-QUALITY STANDARDS OR TO NOT MEET THE GOALS AND REQUIREMENTS OF THE CLEAN WATER ACT?

The third and final step in the identification process (if not already adequately completed by the state or other agencies or organizations) is to determine whether the pollution problems you have identified are really serious. The first statutory test is whether the pollution levels are so high that they exceed the state's water-quality standards. The second statutory test is whether the goals and requirements of the Clean Water Act are met.

What is a Water-Quality Standard?

The Clean Water Act requires that states establish water quality standards for all their water bodies. A water-quality standard consists of two parts: (1) a designation of the use to be made of a water body or stream segment and (2) the water-quality criteria necessary to protect that use from a particular pollutant. Both parts of a standard must be attained. If a water body is not clean enough to support its

designated use even though the water quality criteria set up have been met, the water body is still not "in attainment." Some states also have provisions in their standards that do not allow any degradation of water quality that is detrimental to beneficial or designated uses.

States have primary responsibility for setting water quality standards. First, they decide on the desired uses of the water bodies within the state—for example, public drinking water supply, protection and propagation of fish and wildlife, primary contact recreation (for example, swimming), agricultural and industrial water supply, and navigation. Since different uses require different levels of purity, states are then supposed to establish water-quality criteria that specify the quality of water required to support a particular use. Criteria to achieve these standards act as upper limits to the allowable concentrations of given pollutants. EPA has recommended water quality criteria for various uses of water bodies that are to be used as guides by the states in setting their standards.

The stringency and inclusiveness of state standards will vary from state-to-state. For example, they may not address pollutants such as agricultural chemicals which are of particular importance in nonpoint-source pollution.* If there is not a state water quality standard for a particular pollutant commonly found in runoff, then those standards will be of no help in identifying waters impaired by that pollutant. Therefore, you need to review your state's water quality standards to determine how helpful they are going to be in identifying waterways degraded by nonpoint sources.

Comparing Monitoring Data With Water-Quality Standards

If your state has established numerical criteria in its water quality standards and you have adequate data on actual pollution levels, comparing one with the other will indicate

*A list of those agricultural chemicals for which EPA has issued water-quality criteria can be found in appendix G.

whether the standard is being exceeded. If it is exceeded, the water body is not "in attainment."

Even if no numerical criteria are exceeded, the uses desired for that water body may still not be attained. This may be true because criteria have not been established for all nonpoint-source pollutants. It may also be that the state has not monitored the water body frequently enough. Find out if the state's criteria are higher than the water-quality criteria recommended by EPA or if monitoring data are scanty.

In some cases, the state will have adopted narrative rather than quantitative criteria. A narrative criterion might say that a state's water should be free from:

- substances that will cause the formation of putrescent or otherwise objectionable bottom deposits;
- oil, scum, and floating debris in amounts that are unsightly or deleterious;
- materials that cause odor, color, or other conditions to such a degree as to cause a nuisance; or
- substances in concentrations or combinations harmful or toxic to humans or aquatic life.

In these cases, no precise measure is given of whether the standard is being met or not. One way to get around this is to see whether the pollutant concentrations are below those selected by EPA in its water-quality criteria documents for the particular use designated.[3] A second approach is to see if the water is actually being used for its designated use. For example, if a stream has been designated recreational and no one is using it for that purpose, the chances are that a water-quality problem exists.

A third approach is to see if the water has so much pollution that it will not support sensitive aquatic organisms. For instance, "Save Our Streams," a program of the Izaak Walton League, has developed a quick and easy field test for water quality that requires just a pail, a sieve, and a page of instructions. The test is based on three species of insects

that generally inhabit healthy waters: stoneflies, caddisflies, and mayflies. If all three can be found, the stream is likely to be healthy. If the first two are missing, the water is neither drinkable nor swimmable. The Stream Quality Sampling Kit can be obtained by sending $5.00 to: Save Our Streams, 258 Manor Drive, Glen Burnie, MD, 21061.

This, in fact, is similar to the approach taken in a third type of water-quality criterion, a "toxicity-based criterion." This type of measure generally states that concentrations of pollutants shall not exceed levels that exhibit a certain degree of toxicity, i.e., what it takes for a given pollutant to kill 50 percent of the organisms exposed to it (the lethal concentration) for a specific period of time (usually 24, 48, or 96 hours). This value is known as the LC_{50}. The state may not accept as definitive the results of any tests you undertake using this criterion unless you have access to a recognized water quality analytical laboratory to confirm your results. Nonetheless, your results should certainly get the state to look more closely at the problem you have identified.

IN CONCLUSION

Simply stated, assessing the importance of nonpoint sources to a particular water-quality problem is an inexact art. The pollution-control agency may make use of sophisticated, although not necessarily more exact, computer models to help in this effort. The individual citizen can help by marshalling enough evidence on the apparent importance of nonpoint sources to force the state to evaluate their likely contributions to a pollution problem more carefully.

The citizen can also ask hard questions about what may happen in the future. A water body may be meeting water-quality standards now, but will it continue to do so? Are land use changes occurring that will increase nonpoint-source pollutant loadings? And could these increases be significant enough to keep a water body from maintaining water-quality standards? If so, these water bodies should also be included in the program.

FURTHER READING

Chapters 1 and 2 in *Report to Congress: Nonpoint Source Pollution in the U.S.* (Washington, D.C.: U.S. Environmental Protection Agency, January, 1984) provide additional information on the nature and extent of water-quality problems caused by nonpoint-source pollution.

Tips

Start with a Single Phone Call

Most citizen activists who get involved in nonpoint-source pollution control must first learn a great deal. Initial stages involve gathering background information on the nature of the problem, the decision-making process within the state on water-quality matters, and the major players in that process. Along the way, you will gain expertise in the subject and learn where to find professional help. Don't be overwhelmed—helpful information and people abound, and things will quickly begin to make sense.

The best way to start the process of becoming an expert is with a single telephone call to your state water-pollution-control agency (see appendix B). Ask to speak with an expert on nonpoint-source pollution or water quality. Or, call a local or regional environmental group that has been active on clean water issues. These initial calls will snowball into a number of additional information sources to be tapped later in the process. If you are working in a group, divide up the fact-finding tasks. Depending on the goals of your group, you could assign responsibilities for identifying problems according to different areas of the state, types of water bodies (lakes, streams, groundwater, etc.), or some other logical way.

Be creative in your fact-finding efforts. Don't just rely on government reports or what people tell you. Conduct your own fieldwork to verify identified problem areas or to discover new ones. Some outdoor fieldwork will offer a welcome break for volunteers who have been spending time on the telephone or reading government reports.

It is a good idea to set up files for documents, news clippings, journal articles, references to books that provide information on specific topics, and names and phone numbers of useful contacts.

Free and Paid Expertise

Gaining expertise gives citizens credibility with decision-making agencies, the general public, and the media. Expertise comes in a variety of forms—some free, some for hire. On some subjects, a citizen can quickly become an expert; others will require assistance from professionals in the field.

Free Expertise

(1) *The local library.* This should be a good source of general reference materials and texts on topics relating to nonpoint-source pollution.

(2) *Newspapers.* News and feature articles provide good summaries of current events relating to nonpoint-source pollution. Newspapers also have "morgues" of past articles, which can be used for background on an issue.

(3) *Friends and colleagues.* Friends and coworkers can often give useful professional advice. Areas of expertise that may be particularly helpful include landscape architecture, engineering, hydrology, and planning.

(4) *Universities.* Faculty and graduate students are often valuable resources. Departments that may be particularly helpful include natural resources, environmental studies, silviculture, agriculture, zoology and other natural sciences, civil engineering, and water-resources research institutes (see appendix E for a list of water-resources research institutes).

(5) *Government agencies.* Government information is in the public domain. The best information will be obtained by specific requests and persistent follow-up. Directories for government agencies are available in many libraries to help callers reach the right people.

Expertise for Hire

(1) *Referrals.* This is probably the best way to find a qualified, reliable, and reasonably priced professional. Ask local, regional, or national environmental organizations for ideas.

(2) *Professional associations.* The American Planning Association, Association of Professional Geologists, National Association of Environmental Professionals, the American Society of Civil Engineers, etc., are good places to look for short-term consultants. These national associations are likely to have local members who may be willing to get involved in nonpoint issues.

(3) *Universities.* While often a source of free information, many university professors consult on the side. They are good candidates for testifying at public hearings because of their academic credentials.

(4) *Interest groups.* Staff of environmental or recreational groups may also be hired for professional services or may be willing to donate their time. Individuals with many years of experience can often provide valuable expert testimony or background on a particular topic.

(5) *The Yellow Pages.* This last resort for expertise is a hit-or-miss proposition. Potential hires should be carefully interviewed, and terms of payment should be established in advance.

How to Call Government Agencies

Citizen involvement in nonpoint planning means frequent telephone contact with agency personnel. Some calls may be to request information, others to influence some aspect of the planning process. Regardless of the purpose of the call, the following tips will help:

Plan your presentation. Make some notes or prepare a list of quesions beforehand. Give a brief and well-organized reason for the call. Take notes on the conversation and what you learn, and write down the contact person's name and number for future reference.

Be as specific as possible. When requesting information or documents, try to cite specific references, names, or titles.

Be persistent. Get a commitment from the listener to take some specific action. Call back to follow-up if necessary.

Be patient. Remember that what you have to say is worth saying to the right person. Ask for referrals until you are directed to the appropriate contact.

Be courteous. A polite and friendly approach will get the best results.

Be sensitive. Be aware of the amount of time people can spare.

For gaining more detailed background on an issue, it is usually most helpful to meet with the person instead of talking on the telephone.

(Tips on calling government agencies were adapted from: *Clean Streams Handbook, A Citizen's Manual for Building a Clean Water Community* (Seattle: U.S. EPA, Office of External Affairs, 1981), p. 26)

Chapter 3

Identifying Sources of Nonpoint Pollution

Once the state has identified bodies of water that are polluted by nonpoint sources, the next step is to identify the kinds of activities, and, in some cases, specific sources that cause this pollution. The law requires the state to identify those categories and subcategories of sources that add "significant pollution" to the water bodies identified through the processes described in chapter 2. It also gives the state substantial flexibility in how it defines these categories.

In general, categories are defined by the type of activity—for example, mining, construction, or agriculture. Depending on the state, all agricultural activities might be lumped together in one category or split up into separate categories, such as, cropland or animal husbandry. Subcategories, on the other hand, may focus on particular variables, for example, type of crop, degree of slope, or distance from a water body.

The law allows the state substantial freedom in using topographic, economic, land ownership, and other characteristics to define subcategories, to allow the state to focus its control efforts on the specific types of sources causing most of the problem. For instance, the state may have designated cropland as a category, but wants to focus its control efforts on specific types of cropland. One subcategory might be cropland planted with soybeans, having a

slope greater than 5 percent (i.e., sloping downward more than 5 feet for every 100 feet of length), and located within a mile of a stream. Cropland planted with corn and having the same topographical characteristics might be another subcategory. Specific strategies to control these subcategories of nonpoint-source pollution can then be designed and included in the management program.

The effectiveness of nonpoint-source pollution control may rest on how well the state sets up these subcategories. If they are defined too narrowly, the state may miss important sources of pollution. If they are defined too broadly, the state's efforts could be spread too thinly and may generate political opposition by imposing controls on a large number of relatively unimportant sources. It may also not be able to impose the controls necessary to deal with the more serious contributors, because it will want to treat everyone in a subcategory equally.

The state will probably define subcategories of sources by considering: (1) what specific kinds of situations create the most pollution, (2) the availability and cost of different measures (BMPs) to control it (see chapter 4), and (3) what assistance or regulatory programs exist (or could be developed) to handle that source (see chapter 5). If your state water-pollution-control agency is doing its job, it will usually make these decisions using extensive and complicated informational and analytical techniques. For example, it may review topographical and land-use maps to determine which types of sources are most prevalent, which are closest to streams and lakes, or, using erosion estimation techniques, which fields experiencing the highest rates of erosion are likely to discharge pollutants into receiving waters. It may also use computer models to connect specific kinds of sources with particular water-quality problems. By combining the results of these analyses, the state should have a fairly accurate idea of the kinds of sources causing most of the problem.

There are several ways in which citizens can contribute at this stage. First, by linking nonpoint sources with iden-

tified polluted water bodies in chapter 2, you may identify types of sources that the state has not found. Second, the knowledge you gain in this process may help the state define the most appropriate subcategories. Finally, your research should give you some idea of the adequacy of the state effort. By presenting evidence to the state that other sources exist, you may even spur it to be more thorough.

You are likely to be most effective if you establish a good working relationship with state planning personnel. Most state personnel welcome citizen help, particularly if they have only been hearing from landowners and developers. Ask a member of the state planning team to keep you apprised of their analysis of sources and make sure that the process makes sense to you.

In addition, try to learn about the perceptions of those whose activities result in pollution. You may discover one group, for example, that greatly resists being categorized as a nonpoint source. You and state planners should be aware of these perceptions, since they may need to be counteracted by additional education or research.

HOW CAN YOU DETERMINE WHAT KINDS OF NONPOINT ACTIVITIES ARE CAUSING THE PROBLEM?

As stated in chapter 2, the nature of a water-quality problem may indicate specific types of nonpoint sources. Figure 3 listed some of the water pollution problems associated with different types of nonpoint sources. For example, excessive algae growth may indicate nutrient inputs from surrounding farmlands. Dead fish or oddly colored water may indicate pesticide runoff from lawns or fields, or toxic metals from industrial sites.

Once you have made som educated guesses on possible sources, go out into the field to look for them. Just as you spotted water-quality problems by carrying out windshield surveys, you may also be able to spot potential pollution sources, or evidence of them, by driving around during or

immediately after a storm. Look for some of the telltale signs of nonpoint sources indicated in figure 4. Or look for ditches, pipes, or tributaries that are discharging large volumes of muddy water. By following these water channels to their beginnings, you may be able to locate specific fields or activities that are causing the pollution. Nearby residents may also be able to point out possible sources. Moveover, you may be able to uncover nonpoint sources that lead you to additional polluted water bodies for your state's list.

When you discover possible nonpoint sources, take photographs and note carefully the location, date, and description of what you see. Try to gather evidence that links the source with a pollution problem. For example, a series of photographs linking the erosion of a field with a muddy river or a photo showing a dirt trail leading from a construction site. You may need this evidence later on, if you want to argue for strengthened control strategies for a given source.

Make sure that all "problem" bodies of water are linked to a source or sources. If you uncover any sources that are not being considered by the planners, develop a strategy to support your contention that such a source should be in the management program. Present your evidence to agency personnel either in person or over the telephone. If the source is still ignored, be prepared to present your claim at public hearings and to the media.

HOW ARE WORKABLE SUBCATEGORIES DEFINED?

As mentioned earlier, the law focuses its attention on the most important categories and subcategories of sources. Including every possible nonpoint source might so diffuse control efforts that the management program would end up being ineffective. While the definition of categories is relatively straightforward—a typical list might include agricul-

Figure 4
Windshield Surveys for Nonpoint Sources

If in driving around you observe a situation listed in the left-hand column, it may indicate a nonpoint source listed in the right-hand column.

What You See	Possible Nonpoint Source
Eroded gullies in fields	Agriculture, mining, construction sites, silviculture
Eroded streambanks	Agriculture
No grass or trees along streambank	Agriculture
No buffer zone of grass or trees between plowed fields (or other cleared land) and stream	Agriculture, mining, construction sites, silviculture
Animals in stream or grazing along banks or in forests	Agriculture
Mud and debris slides	Silviculture
Eroded gullies along roads	Silviculture
Obvious discharge from mine operations	Mining
Areas where streams intercept mines	Mining
Equipment or coal refuse piles in or near a stream	Mining
Oddly colored water, sediment, or soil	Mine drainage; industrial sites
Black water	Coal dust from mining
Storm sewers discharging after storms	Urban runoff
Places with large areas of impervious surface	Urban runoff
Clogged storm drains	Urban runoff
Flooding	Urban runoff
Oil slicks	Urban runoff
Obvious tracts of exposed soil	Construction sites
Eroded gullies or trail of dirt from construction site	Construction sites
Absence of erosion control techniques such as grass cover, hay bales, or fencing	Construction sites

ture, mining, urban runoff, construction sites, silviculture, and septic tanks—the problem of defining subcategories requires more thought, since subcategories allow planners to focus on the *types* of nonpoint sources causing most of the pollution.

Certain characteristics of the land or of the activity concerned determine how much pollution is created. For example, the closer the source to the water body, the more likely that runoff from the source will cause pollution. (Distant sources may add to the problem when pollutants washed off by one storm and deposited in an intermediate area are swept by later storms into water bodies far from the original source.) The steeper the land, the more pollution is likely to be carried off the surface. For instance, a steep mine tailings pile is likely to erode faster than one with gentle slopes. In addition, the greater the amount of contamination on the ground surface, the greater the amount likely to be washed off into waterways. For example, an old industrial site may have a far more serious accumulation of toxic substances on its ground surface than a modern, recently built industrial park. Finally, the more easily water flows over or drains from the land the greater the amount of pollution carried with it. For example, soybean fields, which have a fair amount of exposed soil, are more likely to erode than wheat fields, in which the denser vegetation slows the flow of water.

Thinking through the breakdown of sources into subcategories allows the design of the most specific control strategies possible. A superficial analysis of sources may gloss over this important step. Make sure that the planners

Some of the Factors That Contribute to the Seriousness of a Nonpoint Source:

- How close is the source to water bodies?
- How exposed is the soil to the elements?
- How frequent and severe are storms?
- How steep is the land, and how long are the slopes?

have identified subcategories within each given source category. You may need to find specialists who can help you understand what conditions and types and combinations of activities contribute the most nonpoint pollution (see *Free and Paid Expertise*, chapter 2).

Agriculture

Pollution from agricultural activities such as crop production and grazing may depend on irrigation practices, tillage methods, animal waste management practices, pesticide use, fertilizer use, use of buffer zones, and streambank management. Some irrigation practices allow large amounts of water that carry soil, fertilizers, pesticides, and other contaminants to flow off fields and back into streams. Sprinkler irrigation usually results in less runoff and therefore less surface-water pollution. Tillage systems that clear the land of all vegetation are likely to allow more runoff and pollution than conservation tillage approaches that leave large amounts of crop residue on the soil surface.* Animal feed lots and manure storage areas that are located uphill of a stream and lack adequate runoff catchment areas may be serious pollution sources. Heavy fertilizer and pesticide applications, particularly just before storms, will often result in heavy chemical pollution discharges. In addition, plowing fields right up to a streambank (leaving no buffer) or allowing cattle to graze freely on streambanks can impair water quality. Agriculture assistance agencies such as the Soil Conservation Service, state agriculture departments, county extension agents, and offices for irrigation or conservation districts may be able to help identify which combination of characteristics contribute to the worst pollution problems.

*Conservation tillage may result in more contaminants reaching the groundwater, however, in part because it usually requires higher pesticide application rates.

Mining

Mining subcategories may be defined by the type of mine (for example, coal, metal, or rock and gravel), by whether it is a surface or underground mine, by the procedures used in storing overburden and other mine wastes, by various topographical characteristics, by its size, or by other factors. Coal mines, metal mines, and gravel mines will all use different processes for handling mineral resources, resulting in different water quality impacts. The practices used to handle mine tailings, spoil, and leachate will also affect pollution potential. Personnel at state or federal, geological survey or mining agencies may be able to offer some insight on which of these characteristics are likely to be most relevant.

Silviculture

Silviculture may be separated into categories according to types of related activity—for example, road building, reforestation, pesticide use, type of harvesting practice, and residue management. Here again, the slope of the land and proximity to water are important considerations. Other important considerations include: how intensively the forest is managed (Heavy aerial pesticide applications can drift or run off into adjacent waters.); what kind of harvesting is practiced (Clear cutting is likely to result in more runoff than selective cutting.); whether buffer strips are maintained along streams during harvesting; what is done with the slash; and whether the area is reseeded. State forestry departments may be able to offer some insight into the most important considerations, particularly in those states that already have forest practice acts.

Construction and Urban Nonpoint Sources

Construction activities and urban nonpoint sources might be divided into subcategories on the basis of the type of development or the percentage of impervious surface. Sub-

urban lawns and golf courses can be important sources of fertilizers and pesticides while contributing relatively little sediment. Runoff from industrial sites and streets can carry a wide range of contaminants that have been spilled or deposited on the ground. Or construction sites within a specific distance from a stream or water body may be a major problem. Local government planning and public works or engineering departments, as well as agencies concerned with water quality, may be able to offer some additional insight on these types of problems.

FURTHER READING

The various categories and subcategories of nonpoint-source pollution are described in chapter 2 in *Report to Congress: Nonpoint Source Pollution* (Washington, D.C.: U.S. Environmental Protection Agency, January, 1984) and *Handbook of Nonpoint Pollution: Sources and Management* by V. Novotny and G. Chesters (New York: Van Nostrand Reinhold, 1981).

Another useful resource is *Selection of Critical Areas for NPS Pollution Control* (Raleigh, N.C.: North Carolina State University Extension Service, Water Quality Group, 615 Oberlin Road, Suite 100, Raleigh, N.C. 27605).

Part III

Developing a Management Program

The assessment report provides the information base necessary for building an effective nonpoint-source pollution management program. This program must:

- identify "best management practices" (BMPs) that can control pollution from each category, subcategory, or specific nonpoint source of pollution identified in the assessment report (chapter 4);
- list all existing, and propose new, regulatory and nonregulatory programs that can induce the adoption of these BMPs and prevent future developments that are likely to cause nonpoint-source pollution problems (chapter 5); and
- provide a clear time schedule for implementation of these programs and for adoption of BMPs to solve nonpoint-source water-quality problems expeditiously (chapter 6).

The law also requires that the management program include: (1) certification that the state has the legal authority to implement the program it proposes, (2) a description of assistance programs that are available to get the manage-

ment program started, and (3) a review of federal programs that may be contributing to nonpoint-source pollution.

The goal of the management program is not to punish those responsible for particular types of sources nor to identify a series of activities that would be effective if only someone had the legal authority or courage to implement them. Nor is the goal to design a program that will offend no one. Rather, the program should, given the environmental, hydrological, economic, social, legal, and political realities, be designed to get the job done.

Chapter 4

Selecting Best Management Practices

Any particular nonpoint problem may be controlled by a variety of different best management practices (BMPs) varying widely in cost and effectiveness. Most BMPs control pollutants where they originate—for instance, farmers' fields. A few operate by collecting and reducing pollutants away from where they were generated but before they cause any water-quality damage. Some BMPs involve the construction of a control mechanism, such as an agricultural terrace to slow runoff and control erosion or a concrete basin to capture urban stormwater runoff; others may only require improved operating practices such as cover cropping to reduce erosion or the use of "integrated pest management" to reduce pesticide applications. (Specific examples of BMPs for different activities are described later in this chapter). The management program must identify BMPs that can control pollution from each category, subcategory, or specific nonpoint source identified in the assessment report.

GOOD QUESTIONS TO ASK

Citizens can help at this stage by reviewing the state's selection of BMPs and by suggesting alternatives where appropriate. In reviewing the state's selection, keep several questions in mind:

Are the Proposed BMPs Effective Enough?

Some BMPs reduce contaminant runoff only slightly. Others can reduce it substantially. In part, a BMP's effectiveness depends on the type of contaminant involved. Dissolved contaminants such as nitrates and salts are very difficult to control except by stopping runoff. Other pollutants, such as sediment, can be controlled much more easily by temporarily slowing the runoff or filtering it through vegetation, increasing percolation to the groundwater.

A BMP's effectiveness will also depend on such physical conditions as soil characteristics and the slope of the land. Some will work well in sandy soils, which soak up water rapidly, but much less effectively in clays. Some, such as contour plowing, may work well on flat slopes but much less effectively on steep ones.

Finally, a BMP's effectiveness will depend on climatic conditions. Some (for example, catchment basins) work well with light rains but lose much of their effectiveness during heavy storms. Similarly, in northern regions significant nonpoint- source pollution can occur in the spring or summer when melting snow carries manure off fields or accumulated debris off streets. Obviously, BMPs that depend on warm weather will be of little effectiveness under these conditions.

Unfortunately, relatively little is known about how well many BMPs work, particularly in reducing pollutant discharges other than sediment. But citizens should make sure that the state has considered the various factors that influence the efficiency of BMPs and has stated with supporting documentation its assumptions about how effective the BMPs will be and under what conditions.

How Much Are the Responsible Parties Likely to Resist Adopting the Recommended BMPs?

The law is clear that the state must be ready to "assist, encourage, or require" the adoption of BMPs by those respon-

sible for the subcategories of sources the state has defined. But some BMPs are quite expensive to adopt. Others may reduce the landowner's ability to produce income from the land. Some may disrupt normal operating procedures and be considered a nuisance. Others may require that operators be specially trained to implement them properly. All of these factors can cause landowners to resist adopting the proposed practices.

The problem of ensuring adoption and maintenance is a major focus of the institutional mechanisms discussed in chapter 5. However, you should also keep this question in mind when reviewing the suitability of the BMPs themselves.

How Likely is the BMP to be Properly Maintained Once it is Adopted?

Some structural BMPs continue to do their job after they are installed with only occasional maintenance. Others require continued maintenance or soon become ineffective, and many are really changes in operating procedures and must be readopted annually. Proper continued maintenance of BMPs can cost money and take time and effort. While the problem of continued maintenance should be addressed by the programs discussed in chapter 5, it should also be considered at the time that BMPs are selected.

How easy is it to determine whether a BMP is being maintained properly? In some cases, this is relatively easy: A field planted with a cover crop such as hay can easily be distinguished from a field of corn. But in some cases it is very difficult—for instance, determining the amount of care a farmer takes in applying fertilizers or pesticides. If a BMP appears unlikely to be maintained, you might suggest that the state look at alternatives that can be easily inspected.

What Other Environmental Costs or Benefits May Result from the Adoption of a BMP?

Many BMPs operate by causing rainfall to seep into the ground rather than running off the surface. Their adoption may result in a different kind of pollution problem, for example, dissolved substances such as fertilizers, pesticides, and salts may be transferred to the groundwater.

On the other hand, many BMPs produce benefits in addition to reducing water pollution. They may create additional wildlife habitat, reduce flooding, conserve water, or increase groundwater supplies. And in urban areas, some BMPs can increase the cleanliness of streets and the attractiveness of developments. Such associated benefits and costs can be important considerations in the selection process.

EXAMPLES OF BMPs

Agriculture

The agricultural sector uses an extensive system of BMPs, many developed over decades of attempts to control soil erosion. Five of the most common agricultural categories of BMPs are tillage practices, cropping patterns, structural measures to control erosion, cropland conversion to less intensive uses, and improved management of agricultural chemicals.

Tillage—the way in which a farmer prepares a field for planting and weed control—can greatly influence the amount of soil and associated contaminants carried off a field by water and wind erosion. A popular practice is "conservation tillage" in which old crop residues are not plowed under the soil but left on the surface as mulch.* Contour

*Conservation tillage has, however, raised concern about potential groundwater contamination because this technique may rely on increased use of pesticides while increasing the infiltration of water. Some scientists are concerned about the leaching of these chemicals into groundwater.

plowing, that is, plowing, planting, and harvesting along the contour of hills rather than straight up and down their slopes, also helps reduce erosion. The furrows catch and hold water, allowing it to seep into the ground and thereby reducing runoff.

The type of crop grown on the land also affects the rate of erosion. Row crops, such as corn and soybeans, typically leave a large proportion of the land uncovered and allow water to flow easily down the rows and off the field. Field crops such as wheat or alfalfa provide a better canopy and retard runoff.

Other anti-erosion cropping techniques are: crop rotations that include soil-conserving crops in the sequence of crops grown; cover cropping, i.e., planting close-growing grasses or legumes where the land would otherwise be left fallow; and strip cropping, i.e., planting strips of close-growing crops such as alfalfa and meadow grasses as buffers between strips of row crops such as corn. In some cases (for example, on steep slopes with highly erodible soils), the most effective approach is simply to take the field out of crop production entirely.

If structural measures are properly maintained, they can be used to retain or redirect runoff for many years. Such structures include terraces, diversion channels, sediment basins, and grassed waterways. Terraces and diversion channels reduce on-field erosion, while sediment basins and grassed waterways reduce the amount of sediment delivered to receiving waters.

Methods for improved agricultural chemical management include integrated pest management and the more judicious use of pesticides and fertilizers. Both techniques require careful attention to the frequency, timing, and amount of chemical use. Reducing chemical use offers one of the most effective ways to reduce chemical pollution from nonpoint sources.

A variety of techniques, including concrete manure pits, controlled grazing rates, shifting (rotating) pastures, and fencing of stream banks, help control nonpoint pollutants

from livestock. Special techniques, such as management of the quantity and timing of irrigation water, are used to control salt buildup in runoff from irrigated fields in arid areas.

Agricultural BMPs vary widely in cost, relative effectiveness, and degree of benefit to farmers. Practices such as conservation tillage, integrated pest management, careful irrigation management, and attention to cropping practices can provide direct economic benefits, in terms of reduced production costs or increased yields, to the farmers who adopt them. Conservation tillage can reduce the use of labor and energy; integrated pest management can reduce the use of pesticides; irrigation management can reduce the use of water; and changed cropping patterns can reduce the use of all inputs. All of these techniques can also, in certain circumstances, increase crop yields as well. Some control measures, however, may be beyond the economic self-interest of a farmer—for example, terracing to control severe erosion or fencing of stream banks to keep animals out.

Silviculture

A variety of practices are used to reduce negative environmental effects of silviculture: erosion from roads, stream crossings, and construction sites; soil disturbance from log removal; and control of chemical runoff. BMPs frequently used to curb the release of sediment include better preharvest planning, better planned and constructed roads, revegetation and closing of roads after use, and establishment of buffer zones along streams. Soil disturbance from log removal can be reduced by the use of special logging techniques, such as directional felling, as well as special techniques for harvesting, storage, and hauling. Finally, more careful application of fertilizers and pesticides, including avoidance of stream areas, helps reduce chemical pollution.

BMPs in silviculture vary widely in cost and need to be carefully adapted to specific problems. Careful planning of the roads and equipment used at the harvest site costs little

and promises a high payoff in controlling sedimentation from preharvest activities. Other control techniques may require a much greater investment, such as the construction of bridges to protect stream crossings. Individual site characteristics are important considerations when choosing silvicultural BMPs. Slope, aspect, hydrology, elevation, and climate will all affect the suitability of a given control practice.

Mining

BMPs for abandoned mines are designed to prevent erosion of exposed earth, control mine runoff and acid drainage from underground mines, and control leaching of acids and metals from tailings and spoil piles. Erosion of exposed surface mines is controlled by revegetation and reclamation. This requires regrading the mine site and replacing the topsoil. Correction of drainage problems from deep mines involves sealing abandoned mines to minimize oxygen contact and reduce acid formation. Achieving a complete, long-lasting seal can be both technically difficult and costly. Leaching from coal and metal tailings and spoil can be controlled by a variety of techniques, including mixing of materials to help stabilize or neutralize mill tailings, removing waste materials from streams and gulches to higher ground, and containing leached materials in ditches, dikes, and impoundments.

Significant technical and cost considerations are associated with mining BMPs. Although BMPs are available for controlling nonpoint-source pollution from inactive mines, they are often expensive, of limited effectiveness, and difficult to enforce. Therefore, the most effective control of nonpoint-source pollution from mines is prevention by proper site planning when operations begin.

Construction and Urban Sources

Urban BMPs often operate by removing loose dirt, litter, chemicals, and other debris from construction sites, highways, and city streets. Others focus on protecting disturbed areas from rainfall and flowing runoff, slowing the rate of the runoff, trapping sediment that is being transported, and keeping chemical pollutants and debris out of the runoff.

These controls are accomplished by a combination of structural and nonstructural BMPs. The less costly ones include careful planning and use of vegetative controls. Careful planning takes into consideration site factors such as natural drainage, as well as scheduling construction to minimize soil exposure. Soil stabilization practices, such as mulching, seeding, and applying ground cover, are also effective in reducing runoff volumes and sediment load.

More costly structural approaches include the construction of sediment basins, diversion ditches, and filter structures out of stone and gravel or sandbags. These collect or redirect runoff to reduce negative impacts on receiving waters.

Structural and nonstructural practices are also used to control the volume of, and pollutant loadings in, urban runoff. The principal structural techniques are retention basins, in-line storage, and in-line screens. These methods retain water and solids, that would otherwise flow directly to streams, within basins and conveyance systems or allow water to slowly percolate into the ground. Nonstructural BMPs include land-use planning, use of natural wetlands for stormwater storage, and good housekeeping practices such as control of litter and pet waste.

The choice of BMPs in an urban area may depend on whether an area is already built-up or just beginning to be developed. In established urban areas, structural controls, such as porous pavement, are expensive to implement, and nonstructural controls are limited in their effectiveness. The greatest potential for using structural and nonstructural controls is in developing urban areas, where the

prevention of future pollution can be realized at the least cost by building these features into the urban design.

FURTHER READING

Many texts and manuals are available that describe the technology, cost, and effectiveness of BMPs for specific sources. Government agencies traditionally involved with the various sectors are also good sources of information. Summary information on BMPs for the major sources of nonpoint pollution can be found in the following written materials.

General

U.S. Environmental Protection Agency, *Nonpoint Source Runoff: Information Transfer System* (Washington, D.C.: U.S. Environmental Protection Agency, 1983).

U.S. Environmental Protection Agency, *Report to Congress: Nonpoint Source Pollution in the U.S.* (Washington, D.C.: U.S. EPA, January 1984).

New York State Department of Environmental Conservation, *Stream Corridor Management—A Basic Reference Manual* (Albany, N.Y.: Dept. Env. Cons, January 1986).

Agriculture

Contact state agriculture departments, U.S. Soil Conservation Service, local conservation districts, and agriculture extension agents. Written sources include:

P.D. Robillard, M.F. Walter, and L.M. Bruckner, *Planning Guide for Evaluating Agricultural Nonpoint Source Water Quality Controls*, Report No. EPA-600/3-82-021 (Athens, Georgia: U.S. Environmental Protection Agency, September, 1982).

North Carolina State University Extension Service, *Best Management Practices for Agricultural Nonpoint Source*

Pollution Control, I. Animal Waste, II. Commercial Fertilizer, III. Sediment, IV. Pesticide, prepared for the U.S. Environmental Protection Agency and U.S. Department of Agriculture (Washington, D.C.: U.S. Environmental Protection Agency and U.S. Department of Agriculture). Available from: N.C. State University Extension Service, Water Quality Group, 615 Oberlin Road, Suite 100, Raleigh, N.C. 27605. Telephone: (919) 737-3723.

U.S. Department of Agriculture, Soil Conservation Service, *Water Quality Field Guide*, Report No. SCS-TP-160 (Washington, D.C.: U.S. Department of Agriculture, September, 1983).

Douglas A. Haith and Raymond C. Loehr, eds., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, prepared for U.S. Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory (Washington, D.C.: U.S. Government Printing Office, 1979).

Raymond C. Loehr et al., eds., *Best Management Practices for Agriculture and Silviculture* (Proceedings of the 1978 Cornell Agricultural Waste Management Conference) (Ann Arbor, Mich.: Ann Arbor Science Publishers, 1979).

U.S. Department of Agriculture, Agricultural Research Service, and U.S. Environmental Protection Agency, Office of Research and Development, *Control of Water Pollution from Cropland, Vol. 1, A Manual for Guideline Development* (Washington, D.C.: U.S. Government Printing Office, 1975).

Silviculture

Contact state forestry agencies and the U.S. Forest Service. Refer to guidelines instate forest practices acts. Written sources include:

Raymond C. Loehr et al., eds., *Best Management Practices for Agriculture and Silviculture* (Proceedings of the 1978

Cornell Agricultural Waste Management Conference) (Ann Arbor, Mich.: Ann Arbor Science Publishers, 1979).

National Council of the Paper Industry for Air and Stream Improvement (NCASI), *Forest Management Practices and Natural Events—Their Relation to Landslides and Water Quality Protection*, Technical Bulletin No. 401 (National Council of the Paper Industry for Air and Stream Improvement, June, 1983).

U.S. Forest Service and U.S. Environmental Protection Agency, *An Approach to Water Resources Evaluation of Nonpoint Silvicultural Sources (WRENNS)* (Athens, Georgia: U.S. Forest Service and U.S. Environmental Protection Agency, August, 1980).

U.S. Forest Service, U.S. Environmental Protection Agency, "Forest Management for Water Quality," (Workbook to accompany the National Forestry Water Quality Training Program) (Washington, D.C.: U.S. Forest Service/EPA, August 1981).

National Council of the Paper Industry for Air and Stream Improvement, *A Review of Current Knowledge and Research on the Impact of Alternative Forest Management Practices on Receiving Water*, Technical Bulletin No. 322, May 1979.

Mining

At the state level, contact mining divisions of natural resource departments and local planning agencies. Sources at the federal level include the Bureau of Mines, Office of Surface Mining, and Bureau of Land Management, all in the U.S. Department of the Interior. See also:

Tennessee Valley Authority, Office of Natural Resources, Division of Water Resources, Regional Water Quality Management Program, *Coal Mining and Water Quality*, (Chattanooga, TE: September, 1980).

U.S. Environmental Protection Agency, Office of Air and Water Programs, Water Quality and Nonpoint Source

Control Division. *Processes, Procedures and Methods to Control Pollution from Mining Activities* (Washington, D.C.: U.S. EPA, October 1973).

Construction/Urban Runoff

Contact the U.S. EPA, state water pollution control agencies, and local planning agencies. Written sources include:

U.S. Environmental Protection Agency, Office of Water Planning and Standards, *Nonpoint Source Control Guidance Construction Activities* (Washington, D.C.: U.S. EPA, 1976).

U.S. Environmental Protection Agency, Water Planning Division, *Final Report of the Nationwide Urban Runoff Program, Final Draft, Vol. 1* (Washington, D.C., U.S. EPA, December 1983).

William G. Lynard et al., *Urban Stormwater Management and Technology—Case Histories* (Washington, D.C.: U.S. EPA, Office of Research and Development, August 1980).

U.S. Environmental Protection Agency, Office of Research and Development, *Urban Stormwater Management and Technologies: Update and Users' Guide* (Washington, D.C.: U.S. EPA, September 1977).

Tip

Push for Effective Control Strategies

As in identifying water-quality problems, the selection of BMPs requires some technical "know-how." However, it is relatively easy to learn about BMPs by talking to people with experience and by doing some extra reading. Be sure to use the contacts you have already established to learn about BMPs (see "Free and Paid Expertise," Tips, chapter 2).

Although it is possible to gain a general understanding of the range of BMPs fairly quickly, it may not be as easy to identify the most appropriate ones for controlling the nonpoint-source pollution problems in your state. Agency personnel with experience in implementing BMPs may be particularly helpful. For example, a county soil conservation expert having firsthand experience implementing a variety of BMPs for a range of purposes may provide a useful perspective on what may or may not work in controlling agricultural runoff in a particular area. It may also be useful to talk to individuals such as farmers or foresters who have implemented BMPs.

Also remember that BMPs that work for one type of source may also work for another. For example, BMPs that control erosion at a mine may be equally useful for controlling construction runoff. Leaving buffer strips along streams to prevent soil from a farm washing into a river may also work effectively in silviculture. Be creative in identifying BMPs.

You will quickly discover that selection of BMPs is not necessarily an objective process. More likely than not, the relative effectiveness or appropriateness of certain BMPs will be in dispute, and strong opposition to any costs associated with their implementation will exist. As a citizen activist, it is important for you to be aware of these conflicts and concerns, and to push for the control strategies that seem most effective based on your research. You may also need to develop arguments that demonstrate the cost-effectiveness or cost-savings of implementing certain BMPs to counter these fears.

Remember, if the program is going to succeed politically, it must be perceived as fair as well as effective. Therefore, resist attempts by certain interests to make special deals and receive exemptions from requirements that would otherwise apply. At the same time, resistance to implementation of certain BMPs may realistically indicate the need to establish a more narrow subcategory of sources. (See chapter 3.) Be aware of the problem, and always seek a solution that makes sense from both a water-quality improvement and a political standpoint.

Chapter 5

Establishing Institutional Mechanisms

After the state has identified appropriate best management practices (BMPs), it must identify programs that will be used to ensure that the BMPs are, in fact, adopted. Some of these programs may already exist and be in use. Others will have to be created to ensure that all elements of the management program can be effectively implemented.

The full set of programs is likely to include both nonregulatory and regulatory components. Nonregulatory programs provide technical assistance (for instance, by local soil conservation districts) or financial incentives (for instance, some form of cost sharing or tax break) to encourage voluntary compliance with BMPs. Regulatory programs, which incorporate mandatory controls and sanctions enforceable by law, involve a state or local agency that issues regulations requiring BMPs to be adopted and practiced and then monitors for compliance. Such regulations are often used to control erosion at construction sites and to reclaim surface mines.

The combination of regulatory and nonregulatory controls chosen should be tailored to the types of sources being controlled and the severity and location of the nonpoint problem. BMPs that rely on voluntary compliance may need to be backed up by regulatory action. Similarly, if landowners turn down financial incentives, the manage-

ment program should include an alternative strategy for gaining compliance. For some BMPs and some sources, regulatory enforcement may be the only way to guarantee compliance.

Establishing institutional mechanisms for implementing nonpoint-source BMPs is a four-step process. First, the state should identify all existing relevant programs. Actually, by law this step should already have been completed in the assessment report, which should describe existing state and local programs for controlling nonpoint-source pollution, including those that receive grants or loans under any section of the Clean Water Act.

Second, the state should assess how effectively these programs have controlled or are controlling nonpoint-source pollution. Many of the programs were likely established for other purposes, and any pollution control benefits provided may be incidental. Other programs may look fine on paper but may have accomplished little due to lack of interest, resources, or will. Evaluating existing programs is important but also likely to be difficult. Often the best that can be accomplished is an impressionistic evaluation based on observations of what has or has not happened, reviews of program budgets and reports, and discussions with agency personnel, intended program beneficiaries, and others familiar with the types of issues the programs are supposed to address.

Third, the state should identify opportunities for modifying the programs so that they more effectively address nonpoint problems. Can the activities of the program be more directly focused on controlling nonpoint-source pollution? Would additional information and/or modifying existing guidance help in this focusing? Do mechanisms exist that allow the programs to be developed along watershed boundaries rather than political boundaries? Are additional financial resources necessary? Often clear opportunities exist for modifications, but it is important to distinguish between what could be done and what is likely to be done. Both the staff implementing the programs and the tradi-

tional beneficiaries may resist change. Legal, budgetary, and political constraints may also effectively prevent any modifications to the status quo.

Fourth, the state should identify what new programs are needed both at the state and local level. Here again, a fundamental consideration is what is possible and practical. A comprehensive regulatory program that would give the state pollution-control authority the power to require anyone responsible for a source to adopt designated BMPs may be desirable, but may not be politically feasible. Local agencies may be best able to identify what needs to be done and implement many aspects of the programs, and monitor the the adoption of control measures. With this strategy a major state role would be to offer inducements to local agencies to encourage them to take on these responsibilities. A large financial assistance program to help those responsible for sources to adopt BMPs could reduce the political opposition but may not be budgetarily practical.

The creation of new programs will be a continual pull between the desirable and the possible. Active participation by citizen groups can help ensure that the desirable is given adequate consideration.

EXISTING PROGRAMS

Many programs for nonpoint-source control are already available through federal and state agencies and can be incorporated into a state's management program. Although many of these programs may already be in operation in a state and should be described in the state's assessment report, it is important that they be explicitly included in the state's nonpoint control program to ensure their effective use.

The Clean Water Act and corresponding state water pollution control acts already contain some provisions relevant to nonpoint-source control. For example, some sources that might be thought of as "nonpoint" such as cattle feed lots and certain mining operations are actually treated by law as

point sources. Permits that limit pollution discharges or delineate pollution control measures are required for these activities.

The municipal construction grants program for sewage treatment plants can also be used to handle some sources of nonpoint-source pollution related to sewage disposal. For instance, this program can provide financial support for the installation of sewer systems in housing developments with septic tank failures. Funds may also be used to address problems caused by the overflow of combined sewers. However, none of the funds can be used solely for the purpose of controlling stormwater drainage.

Other relevant programs may include the Clean Lakes Program (Section 314 of the Clean Water Act), the National Estuary Program (Section 320), various groundwater protection activities, and a new stormwater permitting program (Section 402 (l)(2)). The Clean Lakes Program provides funding for efforts to cleanup lakes that are already polluted and to reduce the flow of pollution into them. The National Estuary Program was established by the 1987 amendments to protect and restore the nation's estuaries. Various groundwater protection activities implemented under the Clean Water Act and other legislation (such as the Resource Conservation and Recovery Act) may have an impact on nonpoint-source pollution. Many states have similar programs, and some have already begun efforts to control nonpoint sources under their general pollution control authorities. The 1987 amendments also require that certain industrial and municipal dischargers get permits for stormwater discharges.

The relevance of these programs will depend on the specific circumstances being addressed, legal limitations to the state's authorities, and the availability of resources. The Clean Lakes, National Estuary, and federal groundwater protection programs, for instance, receive relatively little funding compared to the national need. RCRA and Superfund, however, are better funded.

Agriculture

The federal and all state and territorial governments have had active soil conservation programs for years. The programs include research (conducted through the Agricultural Research Service, the Soil Conservation Service, and the state land grant colleges); education (provided by the Agricultural Extension Service, the land grant colleges, and local Conservation Districts); technical assistance to individual farmers (provided by the Soil Conservation Service, Agricultural Extension Agents, and local Conservation Districts); and financial assistance (provided by the U.S. Agricultural Stabilization and Conservation Service and state agencies). These programs can contribute substantially to nonpoint-source pollution control.

The agricultural programs rely almost exclusively on voluntary participation. Until recently the responsible agencies often did not even attempt to focus the programs on areas where erosion or other water quality concerns were most serious. In many cases, the prime concern of the responsible agency has been to increase agricultural production or to maintain farm income, not to protect natural resources. As a result, many of the program's resources were used as much to help the farmers' financial situation as to control real erosion problems. All of these programs will undoubtedly be listed in the state's management program. But, citizens should find out if the programs in question are adequately funded and what will be done to focus them on nonpoint sources of pollution.

The federal 1985 Food Security Act established several additional programs that can be used to control nonpoint-source pollution. Farmers can receive an annual payment by placing highly erodible cropland into a "conservation reserve" after they have adequately planted the land with a cover crop. The language of the act allows the Department of Agriculture to include other lands, such as "buffer strips" on areas where the irrigation return flow is environmentally detrimental, in the conservation reserve as well. Other

clauses in the bill prohibit farmers from receiving benefits if they bring highly erodible land or wetlands into crop production. Again, citizens should find out how these programs will actually be used to reduce nonpoint-source pollution.

Silviculture

The U.S. Forest Service (within the U.S. Department of Agriculture or USDA) and the Bureau of Land Management (within the U.S. Department of the Interior) are responsible for making sure that silvicultural operations on their lands do not cause serious environmental problems. The Forest Service has established guidelines for silvicultural practice, including appropriate BMPs, that it is supposed to follow in its own operations and is to include in all its contracts with private companies that harvest timber from federal lands. The Forestry Incentives Program and the Agricultural Conservation Program also provide some cost sharing to aid in the implementation of BMPs. Citizens should question whether these procedures are currently being adequately implemented and enforced, and, if not, what will be done to make them more effective?

The five western states with large silvicultural industries (California, Oregon, Washington, Idaho, and Alaska) regulate a wide range of silvicultural practices through state forest practices acts. Under these acts, the state can require the adoption of BMPs on both private and public lands. Other states (Hawaii, Maine, Massachusetts, Nevada, New Hampshire, and Pennsylvania) rely on "quasi-regulatory" approaches to forest practices control by employing existing sediment- and erosion-control laws or water-quality regulations. Some states also provide incentive programs for managing silvicultural nonpoint sources, which commonly feature technical assistance and cost sharing. Again questions to ask are: how effective are the current practices; are they being implemented; and, if they are not adequate, what will be done to make them more so?

Mining

The largest federal program governing coal mining nonpoint sources is that administered under the Surface Mining Control and Reclamation Act by the Office of Surface Mining (Department of the Interior).* If the procedures called for by the law have been adopted, nonpoint-source pollution from active surface coal mines should not be a problem. However, many of the states which have been delegated implementation of the law have been very lax in enforcing the law. In addition, eastern states must deal with a large number of small, illegal mines (recently calculated to be in excess of 6,000). The Abandoned Mine Lands Reclamation Program and Rural Abandoned Mine Program, which were established by the Surface Mining Control and Reclamation Act and which focus on correcting water quality problems created by reclaiming abandoned surface mines, are hurt by a lack of adequate funding.

Until the 1987 amendments, no federal laws specifically required the control of nonpoint-source pollution from noncoal mining operations, which include metal, hard rock minerals, sand and gravel, phosphate mining, and peat mining. Some states have laws for controlling unwanted environmental impacts from these types of mining, but few provide any technical requirements for control of runoff (such as the imposition of BMPs) or effective powers of enforcement.

No federal law and limited state interest exist for controlling water pollution from underground noncoal mines or their waste piles. If these are a problem, new initiatives will likely be required.

Construction/Urban Runoff

Few federal programs directly address the nonpoint impacts of construction and urban runoff. The Federal Highway Ad-

*The law regulates both surface mining and the surface impacts of underground coal mining.

ministration has erosion-control standards and requires implementation of control measures during construction of highways. Various soil conservation programs of the USDA may provide technical assistance for site planning and construction of erosion control measures.

State and local governments, however, are likely to have programs that require site planning and the adoption of specific BMPs at construction sites. Sixteen states* had enacted legislation for erosion control at construction sites as of 1983. In addition, many state and local governments have developed engineering guidelines that address nonpoint-source pollution and are incorporated in contracts for construction of public buildings and roads. A state's overall water-quality program may also address nonpoint-source pollution from urban runoff.

States and localities are also directly responsible for some of the facilities that cause nonpoint-source pollution. State highway departments can reduce salt runoff by more careful use of de-icing salts. Municipalities can modify street cleaning programs, their management of parks, other public lands, and solid waste collection activities; and they can construct and manage landfills to reduce pollutant runoff. The program might include requirements that such practices be adopted and monitoring systems installed. Public education on disposal of household wastes can be especially useful.

Land use, subdivisions, and other controls in new developments can include pollution control provisions. For example, local zoning ordinances can prevent development of highly erodible lands and streambanks; site plan reviews can include pollution control elements; and subdivision control ordinances can require certain standards of performance, including holding basins to reduce stormwater runoff. Local or state agencies often control the siting, construction, and maintenance of on-site sewage disposal systems. They may also provide public information on or control the use of pesticides, and some undertake programs to

*Connecticut, Delaware, Georgia, Hawaii, Illinois, Indiana, Maryland, Michigan, Montana, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, South Dakota, and Virginia.

reduce the inappropriate disposal of hazardous substances and used crankcase oil which might otherwise be dumped on the ground.

HOW WILL THESE PROGRAMS BE FUNDED?

Controlling nonpoint-source pollution need not be expensive, but it will not be cheap. Two separate funding questions should be addressed in the management program: (1) funding for the agencies responsible for implementing the programs and (2) financial assistance to those responsible for polluting sources to help them adopt and maintain controls.

The 1987 amendments provide several different sources of funds for the agencies implementing the program. One is a direct authorization of grants under section 319(h) of the Clean Water Act. Congress must appropriate the funds, however, before they are actually available to the states. Another section of the Clean Water Act (205(j)(1)) was amended by the Water Quality Act of 1987 (Section 316(d)) to direct the EPA Administrator to reserve 1 percent (or $100,000, whichever is larger) of a state's annual allocation of funds under the construction grants program for implementing nonpoint-source management programs. The governor of each state can also set aside 20 percent of the money allotted to the state under the construction grants program for nonpoint-source management (Section 316(d) of the Water Quality Act of 1987 amending Section 201(g)(1) of the Clean Water Act). And finally, the newly authorized state revolving funds (Title VI) may be used for loans to public agencies or individuals for adopting nonpoint-source controls (see Section 603(c) of the Water Quality Act of 1987). To the extent the programs are applicable, funds made available for the Clean Lakes, Estuary Protection, and Groundwater Protection programs can also be used to help nonpoint-source control programs. In addition to these funds, state budgets include resources for administering water-pollution-control programs. Other state and federal

agencies can use some of their existing resources for this purpose as well. All-in-all, state agencies should have access to adequate funding if they are willing to use the funding sources available.

Financial assistance to those responsible for nonpoint sources is much more limited. Most of the funding sources mentioned above cannot be used for this purpose. Many state budget allocations are also limited. The major source of such assistance is the Agricultural Stabilization and Conservation Service and similar state programs to help farmers install erosion-control and water conservation measures. But even these funds, at least at the federal level, may be cut back or eliminated entirely at any time.

Thus, one of the major questions in developing the state management program is the extent to which financial assistance will be provided to those responsible for sources to adopt controls.* Much of this funding will probably have to come from state sources. Citizens should find out for which particular sources this assistance will be given and for what types of BMPs. How much assistance will be given (i.e., what percentage of costs would be covered) and in what form—grants or loans? The answer to these questions may depend on how expensive the BMP is, and how much the landowner benefits from its adoption. For instance, relatively little assistance might be appropriate in the case of conservation tillage, which often results in reduced production costs for the farmer, but more might be appropriate when land is to be taken out of production for filter strips and grassed water ways.

PROGRAM ELEMENTS THAT MAY BE MISSING

In addition to adequate funding, state management programs may also need to expand in several ways to be

*Grants made under Section 319 may not be used for direct assistance to persons responsible for nonpoint sources except when related to the cost of demonstration project (see Section 319(h)(7) of the Clean Water Act..

truly coherent and effective. The elements most likely to be missing are the following:

Authority to Implement BMPs

States may not have the legal authority to enforce all of the requirements that may be included in a management program. New laws may be needed in some cases to allow for the control of a previously unrecognized nonpoint source. Even more likely, the authorities of existing agencies will need to be expanded to enable them to issue new or enforce existing regulations. For example, the powers of a state forestry department may need to be extended from providing guidance in the implementation of BMPs to enforcing compliance with them. The statutes relating to nonpoint-source pollution control in each state will need to be carefully reviewed for cases where additional powers need to be granted. Additional legal staff may also be needed by agencies to help with rulemaking, permitting, and enforcement activities.

Missing Programs for Specific Sources

Some nonpoint sources of pollution have often never been uncontrolled. New programs for these sources may need to be developed at the state or local level. Some sources that may require special attention include septic systems, golf courses, and home use of pesticides and fertilizers.

Strengthened Local Programs

Much of the ultimate responsibility for nonpoint pollution control falls on the shoulders of local government, but this responsibility is often unrecognized or ignored. A state's management program may need to strengthen the ability of local government to enforce the implementation of BMPs. Local government may need special assistance in developing ordinances for construction-site control, site-plan review, or

septic-tank regulation to achieve water-quality goals. States may also need to allow for the formation of inter-local agreements to help implement uniform control measures throughout a watershed and monitor for compliance.* In many cases, local government will have legal authority to raise funds or take regulatory action, but may need some extra prodding from the state to use it.

Focus on Prevention

Many of the existing programs for nonpoint control focus on cure, rather than prevention. Public education on preventing nonpoint-source pollution is an important addition to a state's program. An educational campaign could be developed from the resources of federal agencies, educators, the media, and concerned citizens. In some areas, government agencies have contracted private environmental groups to provide public education. Area-wide planning to anticipate problems can also be very valuable.

Monitoring Progress

Progress of the management program can be monitored in several different ways. The simplest is to note how many regulations have been issued and training programs held, how much funding has been provided, etc. A second is to monitor the extent to which BMPs are actually adopted, implemented effectively, and maintained satisfactorily. A third is to determine whether the quality of the water is improving. The time schedule discussed in the next chapter will depend primarily on the first and second of these approaches. But obviously, whether the water is getting cleaner is the more important question. A good manage-

*Under Section 319(e) of the Clean Water Act, if a state fails to submit a management program or EPA does not approve a state's management program, a local public agency or organization that has expertise and authority in controlling nonpoint-source pollution in any area of the state may request the EPA administrator to provide technical assistance and funding in developing a management program for that area.

ment program will include provisions for monitoring water-quality trends as well.

Enforcement

An effective management program will require some enforcement powers to back up any regulatory authorities. These are likely to be very controversial. If they are too weak or too strong they will probably be useless—in the former case because no one will care and in the latter because they will never be used. Designing adequate enforcement tools that will actually be used is often the most difficult task in a regulatory program. Citizens reviewing the management program should be aware of these difficulties, consider whether the proposed enforcement tools are reasonable but effective, and make sure the tools will be used if necessary.

List of Conflicting Federal Programs

The 1987 amendments contain a particularly obscure, but possibly quite significant, provision inviting states to identify federal programs that conflict with nonpoint-source control. The amendments require the federal agencies in charge of those programs to take nonpoint pollution into account as they implement their programs in the states that have identified problems.

Many public programs adopted to achieve a particular goal are, at least in part, thwarted by other public programs working toward unrelated goals. In the case of nonpoint-source pollution, Department of Transportation-funded projects to build more highways, forest harvesting activities to produce more lumber, agricultural programs to increase crop production or stabilize farm incomes, dam construction and irrigation projects, the construction of defense bases by the Department of Defense and other types of facilities by other agencies, the management of federal lands by the Bureau of Land Management, and many other such activities can interfere with control efforts. These conflicts

can, of course, also occur at the state and local level and should be addressed there as well.

The 1987 amendments incorporate an Executive Order[1] signed by President Reagan in 1982. This order lays out a process by which state and local authorities may comment on applications for federal assistance and federal development projects to assure that these federally supported activities are consistent with state objectives. It also requires federal agencies to provide opportunities for elected state and local officials to comment on the impacts of proposed federal projects and allows states to institute their own review processes to be followed by federal agencies involved in development or assistance programs. The executive order requires federal agencies to accommodate state and local concerns or, if the concerns are not accommodated, to explain in a timely manner why.

How helpful this provision may be is quite unclear. The agencies are often reluctant to modify their programs to take account of factors that are of no importance to them, and no clear mechanism exists for enforcing the provision if the agencies do resist. However, it is certainly worth a try. The more directly the agency actions can be linked to actual pollution problems, the greater the chance of succeeding.

FURTHER READING

"Tackling Nonpoint Source Pollution," a special issue of the *EPA Journal* (volume 12, number 4, May, 1986) addresses the question of what level of government should be responsible for the cleanup of nonpoint-source pollution.

Helpful documents released by The Farmland Project of the National Association of State Departments of Agriculture Research Foundations are found in *Cooperation for Clean Water. Case Studies of Agricultural Nonpoint Source Pollution Control in the Great Lakes States*, N. Bushwick, H. Hiemstra, and S. Brichford, editors. Three helpful briefing papers from the same organization are 1."Lessons Learned about Agricultural Nonpoint Source Pollution Control in the

Great Lakes Studies"; 2."Estimating Water Quality Improvements from Management of Agricultural Nonpoint Source Pollution"; and 3."Institutional Issues in Agricultural Nonpoint Source Pollution Control Policy"

For a broad assessment of nonpoint-source issues, see:

Perspectives on Nonpoint Source Pollution, proceedings of a national conference, Kansas City, Missouri, May 19-22, 1985. Report No. EPA-440/5-85-001, Office of Water Regulations and Standards, U.S. Environmental Protection Agency, 1985.

Proceedings of the National Retreat on Goals, Expectations and Future Directions of State Nonpoint Source Management Programs, Association of State and Interstate Water Pollution Control Administrators, November, 1984.

"Nonpoint Water Pollution," special issue of the *Journal of Soil and Water Conservation*, volume 40, number 1, January-February, 1985.

Final Report on the Federal/State/Local Nonpoint Source Task Force and Recommended National Nonpoint Source Policy, prepared for the Nonpoint Source Task Force by the U.S. Environmental Protection Agency, Office of Water, January 1985, provides a helpful overview of various agency strategies for dealing with nonpoint-source pollution.

Chapter 6

Drawing Up an Implementation Schedule

The 1987 nonpoint-source pollution amendment establishes tight deadlines for accomplishing the actions it requires. The assessment report and draft management program must be submitted to the U.S. Environmental Protection Agency (EPA) within 18 months of the law's enactment (August 4, 1988). EPA, then, has three months to approve or disapprove it in whole or in part. If no action occurs within this time frame, the program is assumed approved. If EPA disapproves any section of the program, the state has three months to submit a revision.

The 1987 nonpoint amendment requires the state to submit a detailed time schedule with its management program, setting forth when each of the components of the program will be implemented. This schedule, if properly drawn up, can be one of the most effective tools citizen groups can use to monitor the program's implementation and ensure that the job is actually getting done. Remember that if a state does not meet the milestones it sets up, it will not continue to get annual grants to help implement its management. In awarding each year's nonpoint planning grants, EPA will look at whether the state has complied with its time line.

The schedule must include milestones for each of the four years of the program covering implementation of the best management practices (BMPs) discussed in chapter 4, the

regulatory or assistance programs discussed in chapter 5, as well as general tasks (for example, application for grants, hiring of staff, and spending of budgeted funds). The care and specificity used in defining these milestones will determine how effectively they can be used to monitor the program's implementation. Is the action to be completed clearly defined? Can an observer readily determine whether the action has been taken or not? Milestones such as "public-participation program implemented" or "BMPs adopted by all farms where required," would be difficult to monitor, if the public-participation program is not precisely defined or if the types of farms and/or BMPs are not specified. Pushing the agency to adopt precise, clearly defined, and easily observed milestones will help both the responsible agencies and the public during the program implementation phase.

Milestones for BMPs will usually be stated as the dates by which control strategies must be in place for various categories of sources. These dates will probably vary for different types of sources, since some control strategies may be easier to implement than others. BMP milestones should generally require the installation of controls for a particular category of source across the state by a given date. However, the state may set different time schedules for different watersheds depending on the severity of water-quality problems. The program should also include a date by which sanctions will be applied if specific sources do not comply with BMPs as required.

All the milestones should call for rapid action, but should not be unreasonable. Establishing an impossible schedule may produce little but frustration and backlash. Different BMPs require different time frames to be implemented. Some nonstructural approaches, for example, will require reaching people with education and training. Others may require the phasing out of old equipment and the purchase of new. In some cases, it may be necessary for state or local governments to pass new laws or revise existing ones before the program can go forward. A time schedule that is

developed with the cooperation and advice of those who need to comply with it has a much more realistic chance of being followed. And a schedule that responds to local watershed-specific needs, as opposed to unified statewide deadlines, is more likely to meet with approval and ultimate compliance.

It is, of course, important for all parties to agree on how the success in meeting the milestones is to be measured. Because stormwater runoff patterns can vary substantially from storm to storm and year to year, it would take several years to measure success in terms of reduced pollution loads. Less ambiguous, although indirect, measurements are provided by actions taken, i.e. retention ponds built, acres planted in conservation tillage, regulations issued, funds appropriated, etc. In some cases how success should be measured will be clear in the definition of the milestone. In most cases, however, there may be several possible means of measurement, and the one to be used should be agreed on.

Part IV

Implementing the Management Program

Chapter 7

Monitoring Implementation and Enforcement

After months of hard work to develop a nonpoint program, an even harder task begins: implementation. Citizen activists can make the difference between a management program on paper and one in action by monitoring its implementation at the state level and the field. Two key questions need to be considered:

- Is the program being carried out on schedule, i.e., is the state taking the steps it said it would to implement a nonpoint-source program and are those responsible for sources of nonpoint pollution implementing the required practices?
- Is the program obtaining the desired results, i.e., is water quality improving in targeted water bodies? If not, what modifications of the program need to be made?

Citizens need to stay involved while their state passes the necessary laws, issues the necessary regulations, hires the necessary personnel, and acquires the necessary resources to do the job, and until those responsible for identified

sources of nonpoint pollution adopt the prescribed best management practices. Citizens can also help evaluate the program's effectiveness by helping to determine if water-quality standards are now being met where once they were violated because of nonpoint pollution.

WATCHING THE IMPLEMENTORS

Responsibilities for implementation should be clearly delineated in the program. Responsibility may be divided among many agencies or assigned to a single entity at the state level. Or, it could be delegated to local government or some other sub-state body. In any case, citizens should oversee the overseers to make sure that the program is being carried out on schedule both at the state level and in the field.

Citizens can organize to oversee program implementation the same way they organized to participate in program development, employing many of the same techniques. Subgroups can be formed to monitor key agencies and personnel, pollution sources, or water bodies. Armed with the program and its implementation schedule, it should not be difficult to determine if the program is being followed. Telephone calls to agency personnel and monitoring of agency publications should provide you with information on whether the state is doing what it said it would. Windshield surveys can be used to determine if those responsible for sources are adopting required best management practices.

Citizens who have "adopted" a stream or lake will be especially helpful in noting the implementation of best management practices (BMPs) and progress in improving water quality. Landowners might be polled on their attitudes about the final nonpoint program. This information could be useful to state agencies, providing them with more information on how to encourage compliance with requirements.

The information you gather should be fed to the agency or legislative body responsible for overseeing implementa-

tion. This should be done in writing wherever possible. Follow-up with phone calls and with a letter summarizing your findings. The public can especially assist the implementation process by reporting cases where BMPs are not being used or finding out why certain practices are not being accepted. Even the best intentioned state agency cannot be everywhere all the time. If implementation is going well, media coverage and telephone calls praising the efforts of state agencies and landowners will help reinforce continued compliance.

What if things are just not working out according to plan? Your investigations have uncovered major breakdowns in program implementation. Perhaps the state or those responsible for nonpoint sources are ignoring the program or taking unnecessarily long to comply. Or, perhaps the state is not enforcing prescribed practices in the field even though it has the legal authority and the necessary resources to do the job. What do you do then?

You have at least three recourses: The first is to try to get the state to correct the problem. A telephone call to the agencies responsible for implementation may spur greater accountability and give them the necessary public support to enforce regulations they may otherwise let slide. It may take more than one call, so be prepared to persist.

If that approach does not work, go to the media with the facts. During program implementation, the media can draw attention to cases where the program is not being carried out on schedule. For example, shrewd use of the media by citizens in Maryland made a difference in the implementation of county erosion-control requirements. They surveyed county construction sites for compliance with erosion-control regulations and found that only 26 percent of the sites were in compliance. They took the story to the newspapers, and the state soon found money to hire more inspectors. Six months later, however, the citizens surveyed the sites again and surprisingly found that the rate of compliance had actually decreased to 17 percent. It appeared that the number of inspectors on the county payroll was not the important

factor—the degree of enforcement of erosion-control regulations was. After the story was fed to the press again, the county took its enforcement responsibilities more seriously. A follow-up survey six months later showed that the compliance rate was up to 60 percent. Similar tactics could be used by citizens to force compliance with a state's nonpoint program.

Your third and final recourse is to go to court and try to get a judge to mandate either the state's compliance with the program, if that is where the breakdown has occurred, or adoption of the required practices by those responsible for a nonpoint source. Before you undertake such action, you should consult with a lawyer to determine if you can show the requisite interest in the proceeding to be able to appear in court, whether you have a complaint that a court can hear, whether you should take your case to federal or state court, whether you have a cause of action against the party you are suing, and to what relief you are entitled. Litigation can be time consuming and costly, but frequently it is the only way to achieve enforcement of environmental laws.

IS THE MANAGEMENT PROGRAM DOING ITS JOB?

More difficult than serving as a watchdog over a time schedule and state and source compliance with a program is tracking whether the program is getting its intended results. Your investigation has determined that the program is being implemented by the state as required and those responsible for sources are adopting the necessary practices. But, how do you know if the program is working? Have the BMPs been effective? Is water quality improving? A dedicated citizens group can conduct a variety of activities to answer these questions.

Get back in your car and go to the streams with poor water quality identified during the problem assessment phase. Just as a windshield survey is a useful technique for identifying water-quality problems and determining if the necessary practices are being adopted, it can also be used to

identify and evaluate the effectiveness of BMPs on polluted water bodies. For example, construction sites with BMPs installed can be inspected for signs of sediment flowing to streams. Has fencing off a stream segment from a herd of dairy cows helped with streambank erosion or are additional practices required to stabilize the bank? After a heavy rain, are oil and debris still flowing off city streets into storm sewers or has increasing the frequency of street cleaning abated that problem? These are just some examples where observation of prescribed BMPs may be sufficient to determine if they are working.

In some cases, improvement may be dramatic and readily apparent, even from your car. In others, improvement may be more subtle and require periodic monitoring of water quality over several years. The expertise you developed in assessing water quality during the problem identification phase of program development and your contacts in the scientific and professional communities will help you evaluate whether water quality in degraded stream segments is improving after program implementation.

Agency personnel, landowners, and citizens should all constantly evaluate how well the nonpoint program is working. If BMPs are not being implemented, or if they do not appear to be working, it may be necessary to make major or minor adjustments to the program. Even if the program was sound at the outset, it may need to be modified in response to unforeseen or changing circumstances. For example, more time may be needed than was initially allocated to find financial assistance or to educate landowners on required BMPs.

FURTHER READING

For more information on monitoring implementation and enforcement, see *Increasing the Sensitivity of Nonpoint Source Control Monitoring Programs* (Raleigh, N.C.: North Carolina State University Extension Service, Water Quality Group).

Tip

Being a Watchdog

Perhaps no stage of the nonpoint-planning process requires citizen involvement more than the program implementation phase. Public apathy toward follow-through on a nonpoint-management program will allow the program's importance to slip away gradually and with it any hope for improvement in water quality. Citizens who are knowledgeable about the management program and its goals can help keep the interest level high and hold the appropriate parties accountable for implementation. There are several ways to act as a "watchdog" over implementation:

1. Get a copy of the program as soon as it is released. Make a timetable showing the schedule and its milestones. Distribute the program and timetable widely to other activists. Assign responsibilities for making sure each milestone is being met.

2. Notify the media when the program is released. Hold a news conference. This will draw public attention to nonpoint pollution and may help general support for implementation of the program.

3. Develop brochures and fact sheets on the management program and place them in public libraries, schools, booths at county fairs, and other public gatherings.

4. Bring to the media's attention success stories as well as stories about program breakdowns.

5. Hold the parties responsible for enforcement accountable. Again, divide up the work to make sure that someone keeps an eye on each agency and/or unit of government's upholding of the program.

6. Schedule seminars or workshops on the new program for people who will need to implement BMPs. Explain the program and appropriate BMPs to them in simple terms. You may want to do this in cooperation with state offices.

7. Get involved in implementation. Look around your area to see who is implementing BMPs and who isn't. Find out peoples' attitudes about the nonpoint program. Are they resisting it or

complying voluntarily? Give awards for successful efforts.

8. Look for improvements in water quality. Conduct follow-up windshield surveys or tests for stream water quality. Be sure to report all of your findings back to the party responsible for enforcement.

9. Above all, stay involved in the process. Don't let public support for nonpoint pollution control slip away.

Appendix A

Offices of the Environmental Protection Agency and States within Each EPA Region

EPA HEADQUARTERS
(Office of the Environmental Protection Agency responsible for administering the nonpoint program)

Office of Regulations and Standards
Nonpoint Sources Branch (WH-585)
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460
(Car' F. Myers, Chief)
(202) 382-7100

EPA REGIONAL OFFICES
Each regional office of the Environmental Protection Agency has a nonpoint-source coordinator reporting to the director of the Waste Management Division. The names and phone numbers of these individuals are given under each office.

EPA Region	States within Region
Region 1 Water Management Division John F. Kennedy Office Bldg. Rm. 2203 Boston, MA 02203 (617) 565-3478 Contact: Bart Hague (617) 565-3547	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont
Region 2 Water Management Division 26 Federal Plaza, Rm. 90 New York, NY 10278 (212) 264-2513 Contact: Rick Balla (212) 264-0711	New Jersey New York Puerto Rico Virgin Islands
Region 3 Water Management Division 841 Chestnut St. Philadelphia, PA 19107 (215) 597-9410 Contact: Lynn Shuyler	Delaware District of Columbia Maryland Pennsylvania Virginia West Virginia
Region 4 Water Management Division 345 Courtland St., N.E. Atlanta, GA 30365 (404) 347-4450 Contact: Bo Crum (404) 347-7788	Alabama Florida Georgia Kentucky Mississippi North Carolina South Carolina Tennessee

EPA Region (continued)	States within Region (continued)
Region 5 Water Management Division 230 S. Dearborn St. Chicago, IL 60604 (312) 886-0148 Contact: Tom Davenport (312) 886-0124	Illinois Indiana Michigan Minnesota Ohio Wisconsin
Region 6 Water Management Division 1201 Elm Street Dallas, TX 75270 (214) 655-7100 Contact: Russell Bowen (214) 655-7144	Arkansas Louisiana New Mexico Oklahoma Texas
Region 7 Water Management Division 726 Minnesota Ave. Kansas City, KS 66101 (913) 236-2812 Contact: Bob Steiert (913) 236-2817	Iowa Kansas Missouri Nebraska
Region 8 Water Management Division 999 18th St., Suite 1300 Denver, CO 80202 (303) 293-1542 Contact: Roger Dean Wyoming (303) 293-1571	Colorado Montana North Dakota South Dakota Utah

EPA Region (continued)	States within Region (continued)
Region 9 Water Management Division 215 Fremont St. San Francisco, CA 94105 (415) 974-8115 Contact: Kathryn Kuhlman (415) 974-8285	Arizona California Hawaii Nevada American Samoa Guam
Region 10 Water Division 1200 Sixth Avenue Seattle, WA 98101 (206) 442-1237 Contact: Elbert Moore (206) 442-4181	Alaska Idaho Oregon Washington

Appendix B

State Water Pollution Control Agencies

For each state listed below is an agency with responsibilities for water pollution control. Call the contact provided, or call the main agency number and ask for the name of a staff member who is knowledgeable about nonpoint-pollution control. This one phone call will eventually lead to a useful list of agency contacts.

Alabama
Department of Environmental Management
1751 Federal Drive
Montgomery, Alabama 36130
(205) 271-7700
Contact: Steven Jenkins, Chief
Mining/Agriculture Section
(205) 271-7839

Alaska
Division of Environmental Quality
P.O. Box O
Juneau, Alaska 99811
(907) 465-2610
Contact: Doug Redburn

Arizona
Department of Environmental Quality
1740 W. Adams Street
Phoenix, Arizona 85007
(602) 255-1024
Contact: Ronald L. Miller
Office of Water Quality
(602) 257-2305

Arkansas
Department of Pollution Control and Ecology
8001 National Drive
P.O. Box 9583
Little Rock, Arkansas 72219
(501) 562-7444
Contact: Vince Blubaugh

California
The Resources Agency
Water Resources Control Board
901 P Street
P.O. Box 100
Sacramento, California 95801
(916) 445-3993
Contact: James L. Easton, Executive Director

Colorado
Department of Health
4210 E. 11th Avenue
Denver, Colorado 80220
Contact: Paul Ferraro, Director
Water Quality Control Division
(303) 331-4534

Connecticut
Department of Environmental Protection
Water Compliance Unit
122 Washington Street
Hartford, Connecticut 06106
Contact: Fred Banach
(203) 566-3439

Delaware
Department of Natural Resources
and Environmental Control
89 Kings Highway
P.O. Box 1401
Dover, Delaware 19903
(302) 736-4506
Contact: R. Wayne Ashbee, Director
Division of Water Resources

District of Columbia
Department of Public Works
2000 14th Street, NW
Washington, D.C. 20009
Contact: Wallace White, Administrator
Water and Sewer Utility Administration
(202) 767-7651

Florida
Department of Environmental Regulation
2600 Blairstone Road
Tallahassee, Florida 32301
(904) 488-4805
Contact: Eric H. Livingston
Nonpoint Source Management
(904) 488-0782

Georgia
Environmental Protection Division
148 International Blvd.
Suite 350
Atlanta, Georgia 30303
Contact: Jim Chandler
Water Quality Management Program
(404) 656-4905

Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801
(808) 548-6355
Contact: Dr. John Lewin, Director
(808) 548-4139

Idaho
Department of Water Resources
Statehouse
Boise, Idaho 83720
Contact: Susan Martin
(208) 334-5845

Illinois
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706
(217) 782-3397
Contact: Toby Frevert
Water Pollution Control
(217) 782-3362

Indiana
Department of Natural Resources
608 State Office Bldg.
Indianapolis, Indiana 46204
Contact: John Winters
Division of Water
(317) 663-0808

Iowa
Department of Natural Resources
E. Ninth and Grand Avenue
Wallace Bldg.
Des Moines, Iowa 50319
(515) 281-8666
Contact: Darrell McAllister, Chief,
Surface and Groundwater Protection Bureau
Environmental Protection Division
(515) 281-8869

Kansas
State Department of Health and Environment
Forbes Field, Bldg. 740
Topeka, Kansas 66620
Contact: Karl Mueldener
Bureau of Water Protection
(913) 296-5508

Kentucky
Department for Environmental Management
Fort Boone Plaza
18 Reilly Road
Frankfort, Kentucky 40601
Contact: Maureen Merkler
(502) 564-3410, ext. 475

Louisiana
Water Pollution Control Division
Louisiana Dept. of Environmental Quality
P.O.Box 44091
Capitol Station
Baton Rouge, Louisiana 70804-4091
(504) 342-6363
Contact: Roger Hartzog

Maine
Environmental Evaluation and Lake Studies
Bureau of Water Quality Control
Department of Environmental Protection
State House, Station 17
Augusta, Maine 04333
(207) 289-3901
Contact: Matthew Scott, Director

Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 W. Preston Street
Baltimore, Maryland 21201
(301) 225-5750
Contact: Richard Sellars, Director
Water Management

Massachusetts
Division of Water Pollution Control
Technical Services Branch
Westview Building/Lyman School
Westborough, Massachusetts 01581
(617) 366-9181
Contact: Eben Chesebrough

Michigan
Department of Natural Resources
Box 30028
Lansing, Michigan 48909
(517) 373-1220
Contact: Dennis Swanson
(517) 335-4171

Minnesota
Pollution Control Agency
520 Lafayette Road, North
St. Paul, Minnesota 55155
Contact: Curt Sparks
(612) 297-1831

Mississippi
Department of Natural Resources
Bureau of Pollution Control
P.O. Box 10385
Jackson, Mississippi 39209
(601) 961-5171
Contact: Robert Seyfarth, Coordinator
Water Quality Management
(601) 961-5171

Missouri
Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102
(314) 751-3332 or
toll-free (800) 334-6946
Contact: Charles Stiefermann, Staff Director
Water Pollution Control Program
(314) 751-1300

Montana
State Department of Health and Environmental Sciences
Cogswell Bldg., Capitol Station
Helena, Montana 59620
(406) 444-2544
Contact: Steve Pilcher, Chief
Water Quality Bureau
Division of Environmental Sciences
(406) 444-2406

Nebraska
Department of Environmental Control
State House Station
Box 94877
Lincoln, Nebraska 68509
(402) 471-2186
Contact: Gale Hutton, Chief
Water Quality Division
(402) 471-4220

Nevada
Department of Conservation and Natural Resources
Capitol Complex, Nye Bldg.
201 S. Fall Street
Carson City, Nevada 89710
(702) 885-4360
Contact: Lewis H. Dodgion, Administrator
Division of Environmental Protection
(702) 885-4670

New Hampshire
Water Supply and Pollution Control Commission
Hazen Drive, Box 95
Concord, New Hampshire 03301
(603) 271-2358
Contact: Fred Elkind, Director
Water Quality Management Planning

New Jersey
Department of Environmental Protection, CN 029
Trenton, New Jersey 08625
(609) 984-5855
Contact: George Horzepa, Chief
Bureau of Water Resources Management Planning
Division of Water Resources

New Mexico
Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504
(505) 827-2793
Contact: Kathleen Sisneros
Surface Water Quality Bureau

New York
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001
Contact: Philip DeGaetano, Director
Bureau of Water Quality
Division of Water
(518) 457-6956

North Carolina
Division of Environmental Management
P.O. Box 27687
Raleigh, North Carolina 27611
(919) 733-4984
Contact: Alan Klimek
(919) 733-5083

North Dakota
Department of Health
Bismarck, North Dakota 58505
Contact: Francis Schwindt, Director
Division of Water Supply and Pollution Control
(701) 224-2354

Ohio
Environmental Protection Agency
P.O. Box 1049
361 E. Broad Street
Columbus, Ohio 43216
(614) 466-8565
Contact: Carl Wilhelm
(614) 481-2131

Oklahoma
Conservation Commission
2800 N. Lincoln Blvd., Suite 160
Oklahoma City, Oklahoma 73105
(405) 521-2384
Contact: John Hassell, Director
Water Quality Program

Oregon
Department of Environmental Quality
522 SW Fifth Avenue
P.O. Box 1760
Portland, Oregon 97207
Contact: John Jackson
Water Quality
(503) 229-6035

Pennsylvania
Department of Environmental Resources
Press Office, 9th Floor, Fulton Bldg.
Box 2063
Harrisburg, Pennsylvania 17120
Contact: Dennis Capella, Director
Bureau of Water Quality Management
(717) 787-2666

Rhode Island
Department of Environmental Management
83 Park Street
Providence, Rhode Island 02903
(401) 277-3961
Contact: Chris Deacutis
Division of Water Resources

South Carolina
Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201
Contact: Chester Sansbury, Director
Division of Water Quality
(803) 734--5312

South Dakota
Department of Water and Natural Resources
Joe Foss Office Bldg.
Pierre, South Dakota 57501
(605) 773-3151
Contact: Mark Steichen
(605) 773-4854

Tennessee
Department of Health and Environment
510 9th Avenue N
T.E.R.R.A. Building
Nashville, Tennessee 37219-5404
Contact: Andrew N. Barrass
Division of Construction Grants and Loans
(615) 741-0638

Texas
Texas Water Development Board
Water Commission
P.O. Box 13087
Capitol Station
Austin, Texas 78711-3087
(512) 463-8028
Contact: Dick McVey
(512) 475-4514

Utah
Division of Environmental Health
288 North 1460 West
P.O. Box 16690
Salt Lake City, Utah 84116-0690
Contact: Don Ostler, Director
Bureau of Water Pollution Control
(801) 538-6146

Vermont
Agency of Environmental Conservation
103 South Main Street
Waterbury, Vermont
(802) 244-6916
Contact: Stephen Syz, Chief
Water Resources Planning
(802) 244-6951

Virginia
State Water Control Board
2111 N. Hamilton Street
P.O. Box 11143
Richmond, Virginia 23230
(804) 257-0056
Contact: Richard N. Burton, Executive Director

Washington
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504
(206) 459-6000
Contact: Bob Monn
Water Quality
(206) 459-6070

West Virginia
Department of Natural Resources
1800 Washington Street, East
Charleston, West Virginia 25305
(304) 348-2754
Contact: David W. Robinson, Chief of Water Resources
(328-2107)

Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707
(608) 266-2621
Contact: Mike Llewelyn
(608) 266-9254

Wyoming
Department of Environmental Quality
122 W. 25th Street
Cheyenne, Wyoming 82002
(307) 777-7781
Contact: William L. Garland, Water Quality Division

Appendix C

Nonpoint-Source Provisions in the Water Quality Act of 1987

SUBJECT

Section 319

Creates new Sec. 319 on NPS Management Programs

SEC. 316. MANAGEMENT OF NONPOINT SOURCES OF POLLUTION.

(a) In General—Title III is amended by adding at the end the following new section:

"SEC. 319. NONPOINT SOURCE MANAGEMENT PROGRAMS.

Contents of State Assessment Reports

"(a) State Assessment Reports.—

"(1) CONTENTS.—The Governor of each State shall, after notice and opportunity for public comment, prepare and submit to the Administrator for approval, a report which—

"(A) identifies those navigable waters within the State which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of this Act;

"(B) identifies those categories and subcategories of nonpoint sources or, where appropriate, particular nonpoint sources which add significant pollution to each portion of the navigable waters identified under subparagraph (A) in amounts which contribute to such portion not meeting such water quality standards or such goals and requirements;

"(C) describes the process, including intergovernmental coordination and public participation, for identifying best management practices and measures to control each category and subcategory of nonpoint sources and, where appropriate, particular nonpoint sources identified under subparagraph (B) and to reduce, to the maximum extent practicable, the level of pollution resulting from such category, subcategory, or source; and

"(D) identifies and describes State and local programs for controlling pollution added from nonpoint sources to, and improving the quality of, each such portion of the navigable waters, including but not limited to those programs which are receiving Federal assistance under subsections (h) and (i).

Information used to prepare State Assessment Report

"(2) INFORMATION USED IN PREPARATION.—In developing the report required by this section, the State (A) may rely upon information developed pursuant to sections 208, 303(e), 304(f), 305(b), and 314, and other information as appropriate, and (B) may utilize appropriate elements of the waste treatment management plans developed pursuant to sections 208(b) and 303, to

the extent such elements are consistent with and fulfill the requirements of this section.

Contents of State Management Programs

"(b) STATE MANAGEMENT PROGRAMS.—

"(1) IN GENERAL.—The Governor of each State, for that State or in combination with adjacent States, shall, after notice and opportunity for public comment, prepare and submit to the Administrator for approval a management program which such State proposes to implement in the first four fiscal years beginning after the date of submission of such management program for controlling pollution added from nonpoint sources to the navigable waters within the State and improving the quality of such waters.

"(2) SPECIFIC CONTENTS.—Each management program proposed for implementation under this subsection shall include each of the following:

"(A) An identification of the best management practices and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source designated under paragraph (1)(B), taking into account the impact of the practice on ground water quality.

"(B) An identification of programs (including, as appropriate, nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects) to achieve implementation of the best management practices by the categories, subcategories, and particular nonpoint sources designated under subparagraph (A).

"(C) A schedule containing annual milestones for (i) utilization of the program implementation methods identified in subparagraph (B), and (ii) implementation of the best management practices iden-

tified in subparagraph (A) by the categories, subcategories, or particular nonpoint sources designated under paragraph (1)(B). Such schedule shall provide for utilization of the best management practices at the earliest practicable date.

"(D) A certification of the attorney general of the State or States (or the chief attorney of any State water pollution control agency which has independent legal counsel) that the laws of the State or States, as the case may be, provide adequate authority to implement such management program or, if there is not such adequate authority, a list of such additional authorities as will be necessary to implement such management program. A schedule and commitment by the State or States to seek such additional authorities as expeditiously as practicable.

"(E) Sources of Federal and other assistance and funding (other than assistance provided under subsections (h) and (i)) which will be available in each of such fiscal years for supporting implementation of such practices and measures and the purposes for which such assistance will be used in each of such fiscal years.

"(F) An identification of Federal financial assistance programs and Federal development projects for which the State will review individual assistance applications or development projects for their effect on water quality pursuant to the procedures set forth in Executive Order 12372 as in effect on September 17, 1983, to determine whether such assistance applications or development projects would be consistent with the program prepared under this subsection; for the purposes of this subparagraph, identification shall not be limited to the assistance programs or development projects subject to Executive Order 12372, but may include any programs listed in the most recent Catalog of Federal Domestic Assistance which may have an effect on the purposes and objec-

tives of the State's nonpoint source pollution management program.

Other requirements for State Assessment/Management Programs

Use of local and private experts

"(3) UTILIZATION OF LOCAL AND PRIVATE EXPERTS.—In developing and implementing a management program under this subsection, a State shall, to the maximum extent practicable, involve local public and private agencies and organizations which have expertise in control of nonpoint sources of pollution.

Emphasis on watershed-by-watershed basis

"(4) DEVELOPMENT ON WATERSHED BASIS.—A State shall, to the maximum extent practicable, develop and implement a management program under this subsection on a watershed-by-watershed basis within such State.

Cooperation Requirement

"(c) ADMINISTRATIVE PROVISIONS.—

"(1) COOPERATION REQUIREMENT.—Any report required by subsection (a) and any management program and report required by subsection (b) shall be developed in cooperation with local, substate regional, and interstate entities which are actively planning for the implementation of nonpoint source pollution controls and have either been certified by the Administrator in accordance with section 208, have worked jointly with the state on water quality management planning under section 205(j), or have been designated by the State legislative body or Governor as water quality management planning agencies for their geographic areas.

Time frame for State submittal of Report/Management Program

"(2) TIME PERIOD FOR SUBMISSION OF REPORTS AND MANAGEMENT PROGRAMS.--Each report and management program shall be submitted to the Administrator during the 18-month period beginning on the date of the enactment of this section.

Time frame for EPA approval of State Reports/Management Programs

"(d) APPROVAL OR DISAPPROVAL OF REPORTS AND MANAGEMENT PROGRAMS.—

"(1) DEADLINE.—Subject to paragraph (2), not later than 180 days after the date of submission to the Administrator of any report or management program under this section (other than subsections (h), (i), and (k)), the Administrator shall either approve or disapprove such report or management program, as the case may be. The Administrator may approve a portion of a management program under this subsection. If the Administrator does not disapprove a report, management program, or portion of a management program in such 180-day period, such report, management program, or portion shall be deemed approved for purposes of this section.

Procedure for EPA disapproval and criteria for disapproval

"(2) PROCEDURE FOR DISAPPROVAL.—If, after notice and opportunity for public comment and consultation with appropriate Federal and State agencies and other interested persons, the Administrator determines that—

"(A) the proposed management program or any portion does not meet the requirements of subsection

(b)(2) of this section or is not likely to satisfy, in whole or in part, the goals and requirements of this Act;

"(B) adequate authority does not exist, or adequate resources are not available, to implement such program or portion;

"(C) the schedule for implementing such program or portion is not sufficiently expeditious; or

"(D) the practices and measures proposed in such program or portion are not adequate to reduce the level of pollution in navigable waters in the State resulting from nonpoint sources and to improve the quality of navigable waters in the State;

the Administrator shall within 6 months of the receipt of the proposed program notify the State of any revisions or modifications necessary to obtain approval. The State shall thereupon have an additional 3 months to submit its revised management program and the Administrator shall approve or disapprove such revised program within three months of receipt.

What if State fails to submit an Assessment Report?

"(3) FAILURE OF STATE TO SUBMIT REPORT.—If a Governor of a State does not submit the report required by subsection (a) within the period specified by sub-section (c)(2), the Administrator shall, within 30 months after the date of the enactment of this section, prepare a report for such State which makes the identifications required by paragraphs (1)(A) and (1)(B) of subsection (a). Upon completion of the requirement of the preceding sentence and after notice and opportunity for comment, the Administrator shall report to Congress on his actions pursuant to this section.

What if State fails to submit a Management Program?

"(e) LOCAL MANAGEMENT PROGRAMS; TECHNICAL ASSISTANCE.—If a State fails to submit a management program under subsection (b) or the Administrator does not approve such a management program, a local public agency or organization which has expertise in, and authority to, control water pollution resulting from nonpoint sources in any area of such State which the Administrator determines is of sufficient geographic size may, with approval of such State, request the Administrator to provide, and the Administrator shall provide, technical assistance to such agency or organization in developing for such area a management program which is described in subsection (b) and can be approved pursuant to subsection (d). After development of such management program, such agency or organization shall submit such management program to the Administrator for approval. If the Administrator approves such management program, such agency or organization shall be eligible to receive financial assistance under subsection (h) for implementation of such management program as if such agency or organization were a State for which a report submitted under subsection (a) and a management program submitted under subsection (b) were approved under this section. Such financial assistance shall be subject to the same terms and conditions as assistance provided to a State under subsection (h).

EPA Technical Assistance

"(f) TECHNICAL ASSISTANCE FOR STATES.—Upon request of a State, the Administrator may provide technical assistance to such State in developing a management program approved under subsection (b) for those portions of the navigable waters requested by such State.

Interstate Management Conference

"(g) INTERSTATE MANAGEMENT CONFERENCE.—

"(1) CONVENING OF CONFERENCE; NOTIFICATION; PURPOSE.—If any portion of the navigable waters in any State which is implementing a management program approved under this section is not meeting applicable water quality standards or the goals and requirements of this Act as a result, in whole or in part, of pollution from nonpoint sources in another State, such State may petition the Administrator to convene, and the Administrator shall convene, a management conference of all States which contribute significant pollution resulting from nonpoint sources to such portion. If, on the basis of information available, the Administrator determines that a State is not meeting applicable water quality standards or the goals and requirements of this Act as a result, in whole or in part, of significant pollution from nonpoint sources in another State, the Administrator shall notify such States. The Administrator may convene a management conference under this paragraph not later than 180 days after giving such notification, whether or not the State which is not meeting such standards requests such conference. The purpose of such conference shall be to develop an agreement among such States to reduce the level of pollution in such portion resulting from nonpoint sources and to improve the water quality of such portion. Nothing in such agreement shall supersede or abrogate rights to quantities of water which have been established by interstate water compacts, Supreme Court decrees, or State water laws. This subsection shall not apply to any pollution which is subject to the Colorado River Basin Salinity Control Act. The requirement that the Administrator convene a management conference shall not be subject to the provisions of section 505 of this Act.

"(2) STATE MANAGEMENT PROGRAM REQUIREMENT.—To the extent that the States reach agreement

through such conference, the management programs of the States which are parties to such agreements and which contribute significant pollution to the navigable waters or portions thereof not meeting applicable water quality standards or goals and requirements of this Act will be revised to reflect such agreement. Such management programs shall be consistent with Federal and State law.

Requirements for grants under Sec. 319(h)

Assessment / Management Program must be approved

"(h) GRANT PROGRAM.—

"(1) GRANTS FOR IMPLEMENTATION OF MANAGEMENT PROGRAMS.—Upon application of a State for which a report submitted under subsection (a) and a management program submitted under subsection (b) is approved under this section, the Administrator shall make grants, subject to such terms and conditions as the Administrator considers appropriate, under this subsection to such State for the purpose of assisting the State in implementing such management program. Funds reserved pursuant to section 205(j)(5) of this Act may be used to develop and implement such management program.

"(2) APPLICATIONS.—An application for a grant under this subsection in any fiscal year shall be in such form and shall contain such other information as the Administrator may require, including an identification and description of the best management practices and measures which the State proposes to assist, encourage, or require in such year with the Federal assistance to be provided under the grant.

Federal share not to exceed 60%

"(3) FEDERAL SHARE.—The Federal share of the cost of each management program implemented with Federal assistance under this subsection in any fiscal year shall not exceed 60 percent of the cost incurred by the State in implementing such management program and shall be made on condition that the non-Federal share is provided from non-Federal sources.

No more than 15% of the authorization for this subsection may go to one State

"(4) LIMITATION ON GRANT AMOUNTS.—Notwithstanding any other provision of this subsection, not more than 15 percent of the amount appropriated to carry out this sub-section may be used to make grants to any one State, including any grants to any local public agency or organization with authority to control pollution from nonpoint sources in any area of such State.

Priority considerations for Sec. 319(h) grants

"(5) PRIORITY FOR EFFECTIVE MECHANISMS.—For each fiscal year beginning after September 30, 1987, the Administrator may give priority in making grants under this subsection, and shall give consideration in determining the Federal share of any such grant, to States which have implemented or are proposing to implement management programs which will—

"(A) control particularly difficult or serious nonpoint source pollution problems, including, but not limited to, problems resulting from mining activities;

"(B) implement innovative methods or practices for controlling nonpoint source of pollution, including regulatory programs where the Administrator deems appropriate;

"(C) control interstate nonpoint source pollution problems; or

"(D) carry out ground water quality protection activities which the Administrator determines are part of a comprehensive nonpoint source pollution control program, including research, planning, ground water assessments, demonstration programs, enforcement, technical assistance, education, and training to protect ground water quality from nonpoint sources of pollution.

Availability for obligation

"(6) AVAILABILITY FOR OBLIGATION.—The funds granted to each State pursuant to this subsection in a fiscal year shall remain available for obligation by such State for the fiscal year for which appropriated. The amount of any such funds not obligated by the end of such fiscal year shall be available to the Administrator for granting to other States under this subsection in the next fiscal year.

Financial assistance to individuals only for costs related to demonstration projects

"(7) LIMITATION ON USE OF FUNDS.—States may use funds from grants made pursuant to this section for financial assistance to persons only to the extent that such assistance is related to the costs of demonstration projects.

Satisfactory progress

"(8) SATISFACTORY PROGRESS.—No grant may be made under this subsection in any fiscal year to a State which in the preceding fiscal year received a grant under this subsection unless the Administrator determines that such State made satisfactory progress in

such preceding fiscal year in meeting the schedule specified by such State under subsection (b)(2).

Maintenance of effort

"(9) MAINTENANCE OF EFFORT.—No grant may be made to a State under this subsection in any fiscal year unless such State enters into such agreements with the Administrator as the Administrator may require to ensure that such State will maintain its aggregate expenditures from all other sources for programs for controlling pollution added to the navigable waters in such State from nonpoint sources and improving the quality of such waters at or above the average level of such expenditures in its two fiscal years preceding the date of enactment of this subsection.

Request for information

"(10) REQUEST FOR INFORMATION.—The Administrator may request such information, data, and reports as he considers necessary to make the determination of continuing eligibility for grants under this section.

Annual State reports required

"(11) REPORTING AND OTHER REQUIREMENTS.—Each State shall report to the Administrator on an annual basis concerning (A) its progress in meeting the schedule of milestones submitted pursuant to subsection (b)(2)(C) of this section, and (B) to the extent that appropriate information is available, reductions in nonpoint source pollutant loading and improvements in water quality for those navigable waters or watersheds within the State which were identified pursuant to subsection (a)(1)(A) of this section resulting from implementation of the management program.

Limitation on administrative costs (shall not exceed 10%)

"(12) LIMITATION ON ADMINISTRATIVE COSTS.—For purposes of this subsection, administrative costs in the form of salaries, overhead, or indirect costs for services provided and charged against activities and programs carried out with a grant under this subsection shall not exceed in any fiscal year 10 percent of the amount of the grant in such year, except that costs of implementing enforcement and regulatory activities, education, training, technical assistance, demonstration projects, and technology transfer programs shall not be subject to this limitation.

Requirements for grants under Sec. 319(i) for protecting groundwater quality

Eligible applicants and activities

"(i) GRANTS FOR PROTECTING GROUNDWATER QUALITY.—

"(1) ELIGIBLE APPLICANTS AND ACTIVITIES.—Upon application of a State for which a report submitted under subsection (a) and a plan submitted under subsection (b) is approved under this section, the Administrator shall make grants under this subsection to such State for the purpose of assisting such State in carrying out groundwater quality protection activities which the Administrator determines will advance the State toward implementation of a comprehensive nonpoint source pollution control program. Such activities shall include, but not be limited to, research, planning, groundwater assessments, demonstration programs, enforcement, technical assistance, education and training to protect the quality of groundwater and to prevent contamination of groundwater from nonpoint sources of pollution.

"(2) APPLICATIONS.—An application for a grant under this subsection shall be in such form and shall contain such information as the Administrator may require.

Federal share not to exceed 50%

"(3) FEDERAL SHARE; MAXIMUM AMOUNT.—The Federal share of the cost of assisting a State in carrying out groundwater protection activities in any fiscal year under this subsection shall be 50 percent of the costs incurred by the State in carrying out such activities, except that the maximum amount of Federal assistance which any State may receive under this subsection in any fiscal year shall not exceed $150,000.

"(4) REPORT.—The Administrator shall include in each report transmitted under subsection (m) a report on the activities and programs implemented under this subsection during the preceding fiscal year.

Authorizations for Sec. 319(h) and (i)

"(j) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out subsections (h) and (i) not to exceed $70,000,000 for fiscal year 1988, $100,000,000 per fiscal year for each of fiscal years 1989 and 1990, and $130,000,000 for fiscal year 1991; except that for each of such fiscal years not to exceed $7,500,000 may be made available to carry out subsection (i). Sums appropriated pursuant to this subsection shall remain available until expended.

EPA required to compile information regarding federal programs/projects

"(k) CONSISTENCY OF OTHER PROGRAMS AND PROJECTS WITH MANAGEMENT PROGRAMS.—The Administrator shall transmit to the Office of Manage-

ment and Budget and the appropriate Federal departments and agencies a list of those assistance programs and development projects identified by each State under subsection (b)(2)(F) for which individual assistance applications and projects will be reviewed pursuant to the procedures set forth in Executive Order 12372 as in effect on September 17, 1983. Beginning not later than sixty days after receiving notification by the Administrator, each Federal department and agency shall modify existing regulations to allow States to review individual development projects and assistance applications under the identified Federal assistance programs and shall accommodate, according to the requirements and definitions of Executive Order 12372, as in effect on September 17, 1983, the concerns of the State regarding the consistency of such applications or projects with the State nonpoint source pollution management program.

EPA required to compile information on BMPs

"(l) COLLECTION OF INFORMATION.—The Administrator shall collect and make available, through publications and other appropriate means, information pertaining to management practices and implementation methods, including, but not limited to, (1) information concerning the costs and relative efficiencies of best management practices for reducing nonpoint source pollution; and (2) available data concerning the relationship between water quality and implementation of various management practices to control nonpoint sources of pollution.

EPA annual reports required

"(m) REPORTS OF ADMINISTRATOR.—

"(1) ANNUAL REPORTS.—Not later than January 1, 1988, and each January 1 thereafter, the Administrator shall transmit to the Committee on Public

Works and Transportation of the House of Representatives and the Committee on Environment and Public Works of the Senate, a report for the preceding fiscal year on the activities and programs implemented under this section and the progress made in reducing pollution in the navigable waters resulting from nonpoint sources and improving the quality of such waters.

EPA final report required

"(2) FINAL REPORT.—Not later than January 1, 1990, the Administrator shall transmit to Congress a final report on the activities carried out under this section. Such report, at a minimum, shall—

"(A) describe the management programs being implemented by the States by types and amount of affected navigable waters, categories and subcategories of nonpoint sources, and types of best management practices being implemented;

"(B) describe the experiences of the States in adhering to schedules and implementing best management practices;

"(C) describe the amount and purpose of grants awarded pursuant to subsections (h) and (i) of this section;

"(D) identify, to the extent that information is available, the progress made in reducing pollutant loads and improving water quality in the navigable waters;

"(E) indicate what further actions need to be taken to attain and maintain in those navigable waters (i) applicable water quality standards, and (ii) the goals and requirements of this Act;

"(F) include recommendations of the Administrator concerning future programs (including enforcement programs) for controlling pollution from nonpoint sources; and

"(G) identify the activities and programs of departments, agencies, and instrumentalities of the United States which are inconsistent with the management programs submitted by the States and recommend modifications so that such activities and programs are consistent with and assist the States in implementation of such management programs.

EPA staffing levels

"(n) SET ASIDE FOR ADMINISTRATIVE PERSONNEL.--Not less than 5 percent of the funds appropriated pursuant to subsection (j) for any fiscal year shall be available to the Administrator to maintain personnel levels at the Environmental Protection Agency at levels which are adequate to carry out this section in such year."

Policy for control of NPS pollution

(b) POLICY FOR CONTROL OF NONPOINT SOURCES OF POLLUTION.--Section 101(a) is amended by striking out "and" at the end of paragraph (5), by striking out the period at the end of paragraph (6) and inserting in lieu thereof ";and", and by adding at the end thereof the following:

"(7) it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution."

Construction grant set-asides

Governor's discretionary set-aside for Sec. 201(g)(1)

(c) ELIGIBILITY OF NONPOINT SOURCES.—The last sentence of section 201(g)(1) is amended by—

(1) striking out "sentence," the first place it appears and inserting in lieu thereof "sentences,";

(2) inserting "(A)" after "October 1, 984, for"; and

(3) inserting before "except that" the following: "and (B) any purpose for which a grant may be made under sections 319(h) and (i) of this Act (including any innovative and alternative approaches for the control of nonpoint sources of pollution),".

Sec. 205(j)(5)

(d) RESERVATION OF FUNDS.—Section 205(j) is amended by adding at the end the following new paragraph:

"(5) NONPOINT SOURCE RESERVATION.—In addition to the sums reserved under paragraph (1), the Administrator shall reserve each fiscal year for each State 1 percent of the sums allotted and available for obligation to such State under this section for each fiscal year beginning on or after October 1, 1986, or $100,000, whichever is greater, for the purpose of carrying out section 319 of this Act. Sums so reserved in a State in any fiscal year for which such State does not request the use of such sums, to the extent such sums exceed $100,000, may be used by such State for other purposes under this title".

Conforming amendments

(e) CONFORMING AMENDMENT.—Section 304(k)(1) is amended by inserting "and nonpoint source pollution management programs approved under section 319 of this Act" after "208 of this Act".

Other Miscellaneous NPS Provisions:

SEC. 212. STATE WATER POLLUTION CONTROL REVOLVING FUNDS

"SEC. 603. WATER POLLUTION CONTROL REVOLVING LOAN FUNDS"

..."(c) PROJECTS ELIGIBLE FOR ASSISTANCE.--The amounts of funds available to each State water pollution control revolving fund shall be used only for providing financial assistance (1) to any municipality, intermunicipal, interstate, or State agency for construction of publicly owned treatment works (as defined in section 212 of this Act), (2) for the implementation of a management program established under section 319 of this Act, and (3) for development and implementation of a conservation and management plan under section 320 of this Act. The fund shall be established, maintained, and credited with repayments, and the fund balance shall be available in perpetuity for providing such financial assistance.

..."(f) CONSISTENCY WITH PLANNING REQUIREMENTS.—A State may provide financial assistance from its water pollution control revolving fund only with respect to a project which is consistent with plans, if any, developed under sections 205(j), 208, 303(e), 319, and 320 of this Act.

"SEC. 606 AUDITS, REPORTS, AND FISCAL CONTROLS; INTENDED USE PLAN"

..."(c) INTENDED USE PLAN.—After providing for public comment and review, each State shall annually prepare a plan identifying the intended uses of the amounts available to its water pollution control revolving fund. Such intended use plan shall include, but not be limited to—

"(1) a list of those projects for construction of publicly owned treatment works on the State's priority list developed pursuant to section 216 of this Act and a list

of activities eligible for assistance under sections 319 and 320 of this Act;

"(2) a description of the short- and long-term goals and objectives of its water pollution control revolving fund;

"(3) information on the activities to be supported, including a description of project categories, discharge requirements under titles III and IV of this Act, terms of financial assistance, and communities served;

"(4) assurances and specific proposals for meeting the requirements of paragraphs (3), (4), (5), and (6) of section 602(b) of this Act; and

"(5) the criteria and method established for the distribution of funds.

SEC. 101. AUTHORIZATIONS OF APPROPRIATIONS

"(e) **RURAL CLEAN WATER.**—Section 208(j)(9) is amended by striking out "and" after "1981," and by inserting after "1982," the following: "and such sums as may be necessary for fiscal years 1983 through 1990,".

SEC. 503. AGRICULTURAL STORMWATER DISCHARGES

Section 502(14) (relating to the definition of point source) is amended by inserting after "does not include" the following: "agricultural stormwater discharges and".

SEC. 506. INDIAN TRIBES

"(d) COOPERATIVE AGREEMENTS.—In order to ensure the consistent implementation of the requirements of this Act, an Indian tribe and the State or States in which the lands of such tribe are located may enter into a cooperative agreement, subject to the review and approval of the Administrator, to jointly plan and administer the requirements of this Act.

"(e) TREATMENT AS STATES.—The Administrator is authorized to treat an Indian tribe as a State for purposes of title II and sections 104, 106, 303, 305, 308, 309, 314, 319,

401, 402, and 404 of this Act to the degree necessary to carry out the objectives of this section, but only if—

"(1) the Indian tribe has a governing body carrying out substantial governmental duties and powers;

"(2) the functions to be exercised by the Indian tribe pertain to the management and protection of water resources which are held by an Indian tribe, held by the United States in trust for Indians, held by a member of an Indian tribe if such property interest is subject to a trust restriction on alienation, or otherwise within the borders of an Indian reservation; and

"(3) the Indian tribe is reasonably expected to be capable, in the Administrator's judgment, of carrying out the functions to be exercised in a manner consistent with the terms and purposes of this Act and of all applicable regulations.

Such treatment as a State may include the direct provision of funds reserved under subsection (c) to the governing bodies of Indian tribes, and the determination of priorities by Indian tribes, where not determined by the Administrator in cooperation with the Director of the Indian Health Service. The Administrator, in cooperation with the Director of the Indian Health Service, is authorized to make grants under title II of this Act in an amount not to exceed 100 percent of the cost of a project. Not later than 18 months after the date of the enactment of this section, the Administrator shall, in consultation with Indian tribes, promulgate final regulations which specify how Indian tribes shall be treated as States for purposes of this Act. The Administrator shall, in promulgating such regulations, consult affected States sharing common water bodies and provide a mechanism for the resolution of any unreasonable consequences that may arise as a result of differing water quality standards that may be set by States and Indian tribes located on common bodies of water. Such mechanism shall provide for explicit consideration of relevant factors including, but not limited to, the effects of differing water quality permit requirements on upstream and downstream

dischargers, economic impacts, and present and historical uses and quality of the waters subject to such standards. Such mechanism should provide for the avoidance of such unreasonable consequences in a manner consistent with the objective of this Act.

"(f) GRANTS FOR NONPOINT SOURCE PROGRAMS.—The Administrator shall make grants to an Indian tribe under section 319 of this Act as though such tribe was a State. Not more than one-third of one percent of the amount appropriated for any fiscal year under section 319 may be used to make grants under this subsection. In addition to the requirements of section 319, an Indian tribe shall be required to meet the requirements of paragraphs (1), (2), and (3) of subsection (d) of this section in order to receive such a grant.

Appendix D

Report of the Conference Committee, U.S. House of Representatives—Management of Nonpoint Sources of Pollution

The conference substitute establishes a national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of bot point and nonpoint sources of pollution.

The provision provides $400 million over 4 years to States or combinations of adjacent States to implement nonpoint source management programs. An authorization for grants to States to carry out ground water quality protection activities as part of a comprehensive nonpoint source pollution control program, is also provided.

Each State is required to submit a report which identifies State waters which without additional action to control nonpoint sources of pollution cannot reasonably be expected to attain or maintain applicable water quality standards or the

goals and requirements of the Act. A particular water body or segment should not be excluded from identification under this subsection on a theoretical showing that it would be possible to meet water quality standards without nonpoint source controls. "Reasonably expected" is intended to mean that all waters for which nonpoint controls would be an appropriate and effective means to achieving water quality standards will be identified in the State's report.

The report shall also include identification of and management practices for categories and subcategories of nonpoint sources and may include, where appropriate, particular nonpoint sources which add significant pollution to each portion of the identified waters. It would be appropriate to identify such particular sources where they contribute significant nonpoint pollution to water not meeting water quality standards.

States or combinations of adjacent States shall also prepare and submit to EPA Management Programs for implementation, which shall include an identification of best management practices and measures which the State will undertake. When identifying best management practices for categories and subcategories which will be undertaken to reduce nonpoint pollution, it is appropriate for States to focus on specific categories and subcategories or watersheds where nonpoint pollution is a significant problem and to set priorities among categories, subcategories and watersheds. Setting priorities, however, should not be construed to allow States to exclude watersheds not meeting water quality standards, or categories or subcategories contributing significant nonpoint pollution, from the report and management program submitted by the State.

The Management Programs shall also identify the programs (including, as appropriate, nonregulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology, transfer, and demonstration projects) to achieve implementation of best management practices; a schedule containing annual implementation milestones and providing for utilization of

best management practices at the earliest possible date; and an identification of Federal programs and projects which the State will review pursuant to the procedures set forth in Executive Order 12372, as in effect on September 17, 1983, to determine whether such assistance is consistent with the purposes and objectives of the program under this section. Programs shall be developed and implemented, to the maximum extent practicable, with the involvement of local and other entities with expertise and experience in control of nonpoint sources of pollution. States shall, to the maximum extent practicable, develop and implement programs on a watershed-by-watershed basis.

The States shall submit their reports and management programs to EPA within 18 months of enactment. The Administrator must approve or disapprove the submissions within 180 days or they are deemed approved. The Administrator may disapprove a program or portion of it upon determination, among other considerations, that it is not likely to satisfy the goals and requirements of the Act, or that the practices and measures proposed in the plan are not adequate to reduce nonpoint source pollution and to improve water quality. The State shall have 3 months to revise its plan and the Administrator shall approve or disapprove the revised program within 3 months. If a state fails to submit the report, or if it is not approved, a local public agency or organization with expertise in and authority to control nonpoint sources may, with the approval of the State, develop and implement a program for its area.

Where waters in a State with an approved program are not meeting applicable water quality standards or the goals and requirements of the Act because of upstream pollution, the State may petition EPA to convene and EPA shall convene, or EPA may initiate, an interstate management conference to develop an agreement. Nothing in the agreement shall supersede or abrogate water rights established by interstate water compacts, Supreme Court decrees or State water laws. Nor shall the subsection apply to any pollution

subject to the Colorado River Basin Salinity Control Act. The requirement that the Administrator convene a conference shall not be subject to Section 505 of this Act. To the extent that States reach agreement through the conference, their management programs will be revised to "reflect" agreements reached at an interstate management conference. It is intended that the agreements will be incorporated in revised state programs and will be carried out. Management programs shall be consistent with Federal and State laws.

In making grants under this provision, the Administrator shall give priority to effective mechanisms which will control particularly difficult nonpoint source problems; implement innovative methods or practices; control interstate nonpoint source pollution; or carry out ground water quality protection activities.

The Federal grant share shall not exceed 60% of the implementation costs, and non-Federal sources shall provide at least 40% of the costs.

States may use Federal funds authorized by the bill for financial assistance to individuals only insofar as the assistance is related to costs of implementing demonstration projects. Federal funds are not to be used as a general subsidy or for general cost sharing to support implementation of best management practices.

No grant may be made unless the Administrator determines that the State has made satisfactory progress in the preceding year in meeting its schedule.

Each State shall submit annual progress reports to the Administrator. The Administrator shall transmit to the Office of Management and Budget and appropriate Federal departments and agencies a list of the programs and projects identified by each State under the consistency provision, and each Federal department or agency shall modify its regulations and accommodate the concerns of the State according to the requirements and definitions of Executive Order 12372 as in effect on September 17, 1983.

The Administrator shall report annually to Congress on the activities, programs and progress made in the preceding year, and shall transmit a final report not later than January 1, 1990 on the activities carried out under this section.

The conference substitute contains both the Section 205(j)(5) and Section 201(g)(1) set-aside provisions.

Appendix E

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Appendix F

Major Nonpoint-Source Pollution Categories and Subcategories

NONPOINT SOURCES

Agriculture

- Nonirrigated crop production
- Irrigated crop production
- Specialty crop production (e.g., truck farming and orchards)
- Pastureland
- Rangeland
- Feedlots - all types
- Aquaculture
- Animal holding/management areas

Silviculture

- Harvesting, reforestation, residue management
- Forest management
- Road construction/maintenance

Construction
- Highway/road/bridge
- Land development

Urban Runoff
- Storm sewers (source control)
- Combined sewers (source control)
- Surface runoff

Resource Extraction/Exploration/Development
- Surface mining
- Subsurface mining
- Placer mining
- Dredge mining
- Petroleum activities
- Mill tailings
- Mine tailings

Land Disposal (Runoff/Leachate from Permitted Areas)
- Sludge
- Wastewater
- Landfills
- Industrial land treatment
- On-site wastewater systems (septic tanks, etc.)
- Hazardous waste

Hydrologic/Habitat Modification
- Channelization
- Dredging
- Dam construction
- Flow regulation/modification
- Bridge construction
- Removal of riparian vegetation
- Streambank modification/destabilization

Other

Atmospheric deposition
Waste storage/storage tank leaks
Highway maintenance and runoff
Spills
In-place contaminants
Natural

Source: U.S. Environmental Protection Agency, *Guidelines for the Preparation of the 1988 State Water Quality Assessment (305(b) Report*, April 1, 1987, p.19.

Appendix G

Agricultural Chemicals for which EPA Has Recommended Water-Quality Criteria

Aldrin/Dieldrin
Ammonia
Chlordane
Chlorophenoxy Herbicides (2,4,5-TP and 2,4-D)
DDT & Metabolites (DDE and TDE)
Dioxin (2,3,7,8-TCDD)
Endosulfan
Endrin
Heptachlor
Malathion
Methoxychlor
Mirex
Nitrates
Parathion
Phosphorus
Toxaphene

Source: U.S. Environmental Protection Agency, *Quality Criteria for Water*, EPA report 440/5-86-001, Office of Water Regulations and Standards, Washington, DC, May 1, 1986.

References

INTRODUCTION

1. Edwin H. Clark II, Jennifer A. Haverkamp, and William Chapman, *Eroding Soils: The Off-Farm Impacts*, (Washington, D.C.: The Conservation Foundation, 1985), p. 8.

2. Ibid.

3. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, *National Water Quality Inventory: 1984 Report to Congress*, Report No. EPA 440/4/85/029 (Washington, D.C.: U.S. Environmental Protection Agency, August, 1985).

4. Section 316 of the Water Quality Act of 1987 (Management of Nonpoint-Sources of Pollution) amends Section 319 of the Clean Water Act. This amended section, along with other provisions of the Water Quality Act relevant to nonpoint-source pollution, is reproduced in Appendix C. More information can be found in the relevant section of the conference report, which is reproduced in Appendix D. EPA has provided guidance on this legislation. Contact your regional EPA nonpoint-source coordinator or EPA headquarters in Washington, D.C. (see Appendix A).

TIPS

1. National Wildlife Federation, *The 1987 Conservation Directory*, (Washington, D.C.: National Wildlife Federation, 1987). 1412 Sixteenth Street, N.W., Washington, D.C. 20036.

CHAPTER 2

1. Kenneth Webb and Harry P. Hatry, *Obtaining Citizen Feedback* (Washington, D.C.: National Wildlife Federation, 1987).

2. National Wildlife Federation, *The 1987 Conservation Directory* (Washington, D.C.: National Wildlife Federation, 1987).

3. U.S. Environmental Protection Agency, *Quality Criteria for Water 1986* (EPA Report 440/5-86-001, May, 1986) (Washington, D.C.: Office of Water Regulations and Standards).

CHAPTER 5

1. Executive Order No. 12372 of July 14, 1982, "Intergovernmental Review of Federal Programs," 47 F.R. 30959.

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ISBN 0-89164-105-X