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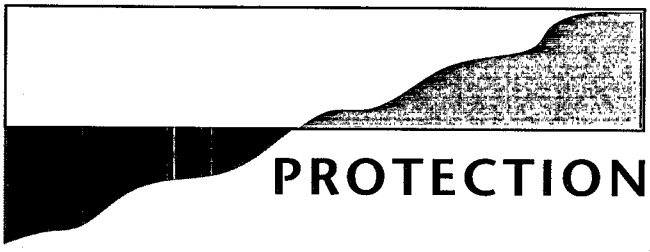
The Watershed Protection Approach

An Overview

WATERSHED



PROTECTION

• An Integrated, Holistic Approach •

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What Is the Watershed Protection Approach?

State and Federal water protection programs have been very successful in reversing or preventing degradation of water quality throughout the country during the last 20 years. Much of this progress is due to nationwide regulations limiting point source discharges by industrial and municipal facilities. Many significant water quality challenges remain, however, including difficult and controversial problems, such as pollutant runoff into waterways or seepage into groundwaters from nonpoint sources and the destruction of wetlands and other vital habitats.

What Is a Watershed?

The term *watershed*, as used in the United States, refers to a geographic area in which water, sediments, and dissolved materials drain to a common outlet — a point on a larger stream, a lake, an underlying aquifer, an estuary, or an ocean. This area is also called the *drainage basin* of the receiving water body.

The Watershed Protection Approach described in this booklet does not require a particular definition of watershed. Local decisions on the scale of geographic unit consider many factors, including the ecological structure of the basin, the hydrologic factors of underlying ground waters, the economic uses, the type and scope of pollution problems, and the level of resources available for protection and restoration projects.

Uniform Federal regulation of these problems would be vastly expensive and would impinge on traditional State and local prerogatives, such as land use and economic development. Governments at all levels, therefore, are broadening their outlook on water quality protection, seeking nonconventional, cost-effective ways to address the remaining problems. Experience and common sense both point toward approaches that get "the biggest bang for the buck" by singling out the most threatened locales for coordinated action by all interested parties.

This document describes efforts within the U.S. Environmental Protection Agency (EPA) and other State, Federal, and local agencies to refocus existing water pollution control programs to operate in a more comprehensive and coordinated manner. The concepts described in this document are not new and have been applied to a limited extent in the past. There is, however, a growing consensus that the pollution and habitat degradation problems now facing society can best be solved by following a basin-wide approach that takes into account the dynamic relationships that sustain natural resources and their beneficial uses. EPA uses the term Watershed Protection Approach to encompass these ideas.

Targeted, Cooperative, Integrated Action

The Watershed Protection Approach is built on three main principles. *First*, the target watersheds should be those where pollution poses the greatest risk to human health, ecological resources, desirable uses of the water, or a combination of these. *Second*, all parties with a stake in the specific local situation should participate in the analysis of problems and the creation of solutions. *Third*, the actions undertaken should draw on the full range of methods and tools available, integrating them into a coordinated, multiorganization attack on the problems.

The diagram on the next page illustrates the interconnection of these three key elements — risk-based targeting, stakeholder involvement, and integrated solutions.

An Emerging Framework

The Watershed Protection Approach is not a new centralized government program that competes with or replaces existing programs. It is a flexible framework for focusing and integrating current efforts and for exploring innovative methods to achieve maximum efficiency and effect. This framework is derived from the experience gained over the last few years in many States and in collaborative activities, such as the National Estuary Program and the Clean Lakes Program. As experience grows and techniques evolve, this holistic, locally tailored approach gradually will become — indeed, *must* become — a routine process for protecting and restoring water quality.

Elements of the Watershed Protection Approach

Potential participants in watershed protection projects include

State environmental, public health, agricultural, and natural resources agencies
Local/regional boards, commissions, and agencies
EPA water and other programs
Other Federal agencies
Indian tribes
Public representatives
Private wildlife and conservation organizations
Industry sector representatives
Academic community.

Risk-Based Geographic Targeting

Manmade pollution and natural processes pose risks to human health or the environment, or both, in many water body systems. The highest-risk watersheds are identified and one or more are selected for cooperative, integrated assessment and protection.

Problems that may pose health or ecological risks in a watershed include

Industrial wastewater discharges
Municipal wastewater, stormwater, and combined sewer overflows
Waste dumping and injection
Nonpoint source runoff or seepage
Accidental leaks and spills of toxic substances
Atmospheric deposition
Habitat alteration, including wetlands loss
Flow variations.

Stakeholder Involvement

Working as a task force, stakeholders reach consensus on goals and approaches for addressing a watershed's problems, the specific actions to be taken, and how they will be coordinated and evaluated.

Integrated Solutions

The selected tools are applied to the watershed's problems, according to the plans and roles established through stakeholder consensus. Progress is evaluated periodically via ecological indicators and other measures.

Coordinated action may be taken in such areas as

Voluntary source reduction programs (e.g., waste minimization, BMPs)
Permit issuance and enforcement programs
Standard setting and enforcement programs (nonpermitting)
Direct financing
Economic incentives
Education and information dissemination
Technical assistance
Remediation of contaminated soil or water
Emergency response to accidental leaks or spills.

What Is a Watershed Protection Project?

Numerous projects using the Watershed Protection Approach have been implemented, and many more are in various stages of planning. These activities were not mandated by EPA or any other central agency; they have arisen spontaneously as the most effective way to address pressing local or regional problems. While they differ widely in their objectives and methods, watershed protection projects have several characteristics in common that distinguish them from conventional water quality initiatives.

- They are discrete activities, often structured as a task force or work group, spearheaded by a State agency, an EPA regional office, or another authoritative environmental management organization.
- They encompass all or most of the landscape in a well-defined watershed or other ecological, physiographic, or hydrologic unit, such as an embayment, an aquifer, or a mountain valley.
- They provide a well-structured opportunity for meaningful participation by State, Federal, tribal, county, municipal and other government agencies, as well as private landowners, industry representatives, other interested parties, as well as the general public.
- They identify the most significant threats to water quality, based on a comparative risk analysis of the human health, ecological, and economic impacts, and they target resources toward these high-risk problems.
- They establish well-defined goals and objectives for the watershed, including objectives for:
  - Chemical water quality ("conventional pollutants" and toxics)
  - Physical water quality (e.g., temperature, flow, circulation)
  - Habitat quality (e.g., channel morphology, composition, and health of biotic communities)
  - Biodiversity (e.g., species number, range).
- They devise and implement an integrated action agenda for achieving the objectives, incorporating all appropriate authorities and techniques (e.g., permit reissuance, education programs).

The box below and those on the next page describe some recent watershed protection projects, which were initiated at various levels of government.

The Merrimack River Watershed Protection Project

Federal and Interstate Commission

The Merrimack River is New England's largest river-based source of drinking water, serving more than a quarter million people. The watershed and river system face increasing multiuse demands for water supply, waste assimilation, hydropower generation, wildlife habitat, and flood control. Recreational use is also expected to increase dramatically during the 1990s. Wastewater discharges, toxic contaminants, and wetlands loss are among the threats to long-term water quality and ecological integrity.

In 1988, EPA's Region I office in Boston, the States of Massachusetts and New Hampshire, and the New England Interstate Water Pollution Control Commission began an initiative to improve and protect water quality in the Merrimack system, enabling it to support multiple uses. Joined by regional planning agencies, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, the U.S. National Park Service, and the U.S. Army Corps of Engineers, the work group developed an action plan for collective, focused effort.

Accomplishments to date include greater emphasis on enforcement of water quality requirements and on targeting of river segments for concerted action. Planned activities for coming years include managing existing pollution sources, conducting water supply planning, and enhancing data management and transfer among agencies.

Watershed Protection Projects Initiated at Various Levels

The Stillaguamish Watershed Protection Project

Local

The Stillaguamish Watershed in Washington State is a significant source of nonpoint source pollution to Puget Sound. The principal pollutants are bacteria from livestock wastes and onsite sewage disposal systems and sediment runoff from forests, farms, and development sites. Partially because of these pollutants, shellfish beds in Port Susan have been declared unsafe for commercial harvest.

The Tulalip and Stillaguamish Tribes nominated the watershed to the Washington Department of Ecology for planning efforts. With a grant from the State agency, a Watershed Management Committee (WMC) was formed in 1988 to develop an action plan. The group contained representatives from the Tulalip and Stillaguamish Tribes, county and city governments, environmental and business interest groups, and homeowners and citizens' organizations. State and Federal environmental regulators participated via a technical advisory committee.

The Stillaguamish Watershed Action Plan, completed in 1989, consists of five source control programs, a public education program, and a monitoring program. WMC recommendations include developing farm conservation plans, reducing improper disposal of human waste, preventing urban runoff, and sampling on a regular basis to track water quality trends.

The Colorado River Watershed Salinity Control Project

Multistate

Salinity is recognized as the major water quality problem in the Colorado River Basin. Changes in salinity can result from both natural processes and human activities. Virtually any water or land use can affect the river's salinity, including irrigation return flows and land use disturbances, which cause salt loading, and diversion of high-quality water, which causes increased salt concentration. The salt adversely affects household, agricultural, and industrial uses of more than 18 million people and affects more than 1 million acres of irrigated farmland. Economic damages, primarily to California, Arizona, and Nevada, are estimated to average $311 million or more annually.

In 1972, the seven Basin States voluntarily formed the Colorado River Basin Salinity Control Forum to develop and oversee implementation of salinity control standards. EPA Regions VI, VIII, and IX are also involved.

This initiative has achieved signficant progress. The basin States, acting through the forum, developed and adopted salinity control standards in 1975, which EPA approved. The States were also successful in getting the Colorado River Basin Salinity Control Act passed in 1974 and amended in 1984. In addition, the forum has been effective in securing Federal funding for salinity control in the Colorado River Watershed.

The Canaan Valley Watershed Protection Project

Federal

The Canaan Valley in West Virginia, designated as a National Natural Landmark in 1975, encompasses a fragile wetlands complex containing a unique boreal ecosystem. The Blackwater River, originating in the wetlands at the valley's southern end, is an important source of drinking water and the largest stream complex in the State with a self-sustaining brown trout population.

The valley is subject to numerous threats from nonpoint source pollution, development, mining, and other sources. Recognizing that these mounting threats could harm the valley's ecological resources irrevocably, EPA's Region III office in Philadelphia organized the Canaan Valley Task Force in 1989 to develop and implement a protection strategy. The task force includes representatives from EPA, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the West Virginia Division of Natural Resources, county government bodies, landowner associations, environmental interest groups, development interest organizations, and the general public.

An early accomplishment of the Canaan Valley Task Force is the Corps of Engineers' suspension of Nationwide Permits for wetlands use in the valley. Work has begun on wetlands surveillance and enforcement, public outreach, and wetlands identification. The group has also provided a forum for discussing a National Wildlife Refuge proposal and the county commission's master plan for Tucker County.

What Is a Watershed Protection Program?

Several State agencies and EPA regional offices recently took steps to institutionalize the Watershed Protection Approach as a cornerstone of their water quality management activities. Anticipating that they will undertake more and more watershed protection projects, these organizations have devised well thought-out frameworks to guide them. Such frameworks provide essential structure for the systematic watershed protection programs emerging around the country.

Circumstances vary widely, of course, and there is no simple prescription for a program structure that will meet every organization's needs. The following three *components* are important to all frameworks, however:

- Well-defined *goals and objectives* for the ongoing program
- A set of *criteria* for selecting high-priority watersheds
- A flexible *process* for planning and implementing the watershed protection measures.

A closer look at two fledgling watershed protection programs — an EPA regional office program and a State program — illustrates how a detailed framework can be built on this foundation. Federal, State, and local agencies wishing to establish their own programs may find these examples to be useful models.

An EPA Regional Office Watershed Program

In 1990, EPA's Region IV office began the Savannah River Watershed Protection Project (see box). In designing the approach for this specific project, EPA regional staff also established the general process (the program basis) that they will use when applying the watershed protection approach more widely in the future. The program has the following six basic *objectives*:

- Identify critical watersheds, with EPA and State participation, based on known problems and use impairments
- Define clearly the problems, general causes, and specific sources of water body use impairment and risks to human and ecological health in each selected watershed
- Develop potential pollution prevention and control strategies, including determining total maximum daily loads where appropriate
- Implement point source and nonpoint source controls aggressively
- Develop scientifically valid indicators (i.e., practical measures for gauging the risks in a watershed and the progress in reducing them)
- Develop ecological criteria that States may use in formulating standards for ecology-based pollution prevention and control.

The Savannah River Watershed Protection Project

Federal

Numerous water quality problems have been detected in the Savannah River and its estuary, much of which forms the border between Georgia and South Carolina. For example, dioxin and PCBs have been found in fish in the river and the estuary. In addition, upstream wastewater discharges and a tide gate in the estuary are affecting salinity, toxicity, and dissolved oxygen levels.

In 1990, EPA's Region IV office in Atlanta initiated a project to examine all of the threats to the Savannah River and to develop an interagency action plan. Georgia and South Carolina State agencies, city and county representatives from Savannah, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and local environmental action groups will probably participate in assessment and planning activities.

Several existing activities may be incorporated or expanded into an integrated watershed protection project, including State/EPA data collection and modeling to support development of total maximum daily loads, wetlands evaluation by the U.S. Corps of Engineers, and the environmental impact statement being prepared for the Corps' tide gate and harbor deepening projects.

Establishing watershed selection criteria is a prerequisite for accomplishing the first objective. The EPA Region IV office plans to use the following eight *criteria* to identify the highest-priority watersheds:

- Magnitude of risks to human and ecological health
- Possibility of additional environmental degradation if no action is taken
- Feasibility of implementing corrective or protective measures in the watershed
- Likelihood of achieving demonstrable results
- Value of the watershed to the public
- Extent of alliances needed between EPA, States, and other agencies to coordinate actions and resources
- Degree to which information on watershed conditions is readily available or can be obtained economically
- Level of EPA resources required.

When the decision is made to embark on a new watershed protection project, the Region IV office will follow a predefined series of steps to organize and conduct the initiative. Their generic *process*, which can be tailored to meet the needs of a particular project, is outlined below.

The EPA Region IV Watershed Protection Process

1. Designate a Coordinator for the project. The Coordinator is the project's "champion" within the regional office and its day-to-day facilitator.
2. Write a brief description of the watershed, including a preliminary list of environmental problems, based on available information.
3. Delineate the project's preliminary scope and goals clearly.
4. Form an EPA watershed team containing a representative from each program that has an active role in environmental management in the watershed. This team will coordinate EPA programs during the project.
5. Assemble and evaluate available information on the extent and causes of water body use impairment and the risks to human health and the environment.
6. Form an interagency watershed coordinating committee containing appropriate technical and management representatives from key government agencies (State, regional, and local), industries, and citizens groups. This committee will facilitate communication among the groups involved in watershed management and will help develop and implement the watershed protection plan.
7. Hold regular meetings of the EPA watershed team and the interagency coordinating committee to identify issues, discuss solutions, build consensus, and obtain commitments for action.
8. Identify all EPA and non-EPA activities and key participants that are involved with environmental problems in the watershed. Identify major milestones in each of these existing activities.
9. Develop a Watershed Management Plan that
   - Identifies the highest-priority problems, as determined by consensus of the participants
   - Specifies total maximum daily loads and other water quality-based control approaches
   - Describes specific actions to address problems and identifies who will take these actions
   - Specifies problems or issues that require additional data gathering and analysis
   - Identifies opportunities for cooperative efforts
   - Delineates ways to leverage resources
   - Sets priorities for the EPA programs with regard to the watershed.
10. Support further characterization of the watershed's problems or the potential solutions, as resources allow.
11. Implement the corrective actions identified in the strategy.
12. Develop environmental indicators that, through monitoring, will be used to measure the success of the corrective actions.

A State Watershed Protection Program

Some States also are moving rapidly toward integrated watershed management. North Carolina's Division of Environmental Management (NCDEM) Water Quality Section, for example, has outlined an ambitious plan to make basins, not stream reaches, the unit of water quality management in the State. NCDEM's Basinwide Water Quality Management Initiative *objectives* include the following:

- Identify priority problem areas and sources (both point and nonpoint) that merit particular pollutant control and enforcement efforts or modification of regulations or statutes
- Determine the optimal water quality management strategy and distribution of assimilative capacity for each of the 17 major river basins within the State
- Produce comprehensive basinwide management plans that communicate to policymakers and the general public NCDEM's rationale, approaches, and long-term management strategies for each basin
- Implement innovative management approaches that protect North Carolina's surface water quality, encourage the equitable distribution of assimilative capacity, and allow for sound economic planning and growth.

The whole-basin initiative is envisioned as a fully integrated approach to water quality assessment and management, incorporating monitoring, modeling, point source and nonpoint source controls, and enforcement. NCDEM has already rescheduled its NPDES permit activities so that renewals within a given basin will now occur simultaneously and will be repeated at 5-year intervals.

Because the program intends to address each of the 17 basins over the next 5 years, the targeting step involved prioritizing the full list of problem areas rather than identifying just the most critical cases. NCDEM's *criteria* for scheduling the basins included the nature and magnitude of known problems, a basin's importance in terms of human use, the availability of data providing a base for modeling, and staff workload balancing.

For each basin in turn, North Carolina will perform the 15-step *process* outlined at the right. Depending on the basin and its problems, other organizations will be invited to participate in problem identification and basin management planning. The NCDEM Water Quality Section has better coordinated staff duties for greater efficiency in whole-basin planning. In 1991, NCDEM assembled existing data for the first basin and began basin-level water quality modeling in preparation for permit renewals scheduled for 1993.

North Carolina's Whole-Basin Protection Process

1. Compile all existing relevant information on basin characteristics and water quality.
2. Define the water quality goals and objectives for water bodies within the basin. (Revise as necessary as more data are gathered and analyzed.)
3. Identify the critical issues (e.g., water supply protection) and current water quality problems within the basin and the major factors (point and non-point sources) that contribute to these problems or concerns.
4. Prioritize the basin's water quality concerns and critical issues, in consultation with other government agencies and appropriate nongovernment organizations.
5. Define the subbasin management units, considering basin hydrology, physiographic boundaries, problem areas, and critical issues.
6. Identify needs for additional data.
7. Collect additional data as appropriate.
8. Analyze, integrate, and interpret the data collected. Revisit Steps 2 through 5 in light of the new information.
9. Determine and evaluate the management options for each management unit in the basin.
10. Select final management approaches for the basin and targeted subbasins.
11. Complete the draft Whole-Basin Management Plan. Perform additional modeling analyses if necessary to finalize the wasteload allocations.
12. Distribute the draft plan for review and comment from the Environmental Management Commission (EMC) and arrange for a public hearing.
13. Revise the plan as appropriate in response to comments and obtain final EMC approval.
14. Implement the management approaches, including point and nonpoint source control strategies.
15. Monitor the program's success and update the plan every 5 years.

What Role Does EPA Headquarters Play?

EPA's Office of Water wishes to encourage and advance the Watershed Protection Approach at all levels of government. The Office of Wetlands, Oceans, and Watersheds (OWOW) is the Office of Water's focal point for promoting collaboration among EPA programs and for coordinating technical support to EPA regional offices and other organizations in pursuing their watershed protection objectives.

Technical Tools and Assistance

The Office of Water (OW) is continuing and reorienting its traditional role of developing water quality standards and techniques and guidance for their application. In addition to refining health-oriented criteria for point source controls, the office is placing more emphasis on ecological protection tools and on standards for nonpoint source control. As watershed protection programs evolve and mature, OW will initiate and coordinate tool development and technical assistance in many areas of direct use to the participating organizations, including the following:

- Numeric ecological criteria that States can use in adopting standards for ecology-based pollution prevention and control programs
- Assessment and problem diagnosis methods including models for calculating water quality-based controls
- Methods for watershed characterization
- Environmental indicators that best reflect the ecological integrity of ecosystems and the effectiveness of protection activities
- Technical assistance to States in implementing technology-based best management practices for nonpoint sources
- New or refined monitoring methods, including biological monitoring techniques.

Information Transfer

The success of the Watershed Protection Approach depends on the exchange of experiences, ideas, techniques, and results among Federal, State, and local agencies, as well as others involved in water quality management. OW seeks to foster this interchange by disseminating descriptive and technical information pertaining to the Watershed Protection Approach, facilitating technology transfer, conducting a public information campaign, providing liaison and high-level negotiation with other Federal agencies, and encouraging cross-program team building at EPA Headquarters.

Resources

Most resource support for watershed protection projects comes from budget reallocations in EPA regional offices and in State agencies, taking advantage of local efficiencies and national priority shifts. OW works within EPA's budgeting process to give the regional offices the flexibility to reorient a portion of their resources toward identifying and focusing on the watersheds of greatest concern. At the same time, OW is redirecting its own resources to devote a larger share to activities that support the Watershed Protection Approach. Some potential funding sources are listed in the box below.

Potential EPA Sources of Resources for Watershed Protection Projects

Section 106 Grants
Section 604(b) Grants
Section 314 Grants
Section 319 Grants
Wastewater Permits Program (NPDES)
Wetlands Protection Grants
State Revolving Funds
National Estuary Program
Near Coastal Waters Program

For more information on the Watershed Protection Approach, contact:

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