



## Testimony

Before the Subcommittee on Fisheries, Wildlife, and  
Water, Committee on Environment and Public Works,  
United States Senate

For Release on  
Delivery Expected  
At 10:00am EST  
Thursday  
March 23, 2000

# WATER QUALITY

## Identification and Remediation of Polluted Waters Impeded by Data Gaps

Statement of Peter F. Guerrero, Director,  
Environmental Protection Issues,  
Resources, Community, and Economic  
Development Division



**G A O**

Accountability \* Integrity \* Reliability

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here to discuss the adequacy of the data that the Environmental Protection Agency (EPA) and the states have for making critical water quality decisions required by the Clean Water Act. The act has been credited with greatly improving the condition of the waters in the United States. This success comes largely from the control of pollutant discharges from industrial facilities and wastewater treatment plants—also called “point” sources of pollution. Despite these strides, however, there are still many waters that do not meet water quality standards. Of particular concern in recent years are “nonpoint” sources of pollution—diffuse sources that include a variety of land-based activities such as timber harvesting, agriculture, and urban development—which are widely regarded as contributing to the largest share of remaining water quality problems. Nonpoint sources must be addressed in order to achieve the nation’s clean water goals.

The ability to deal with these problems cost-effectively depends heavily on states' efforts to monitor their waters to identify where their most serious problems are and to develop strategies to address those problems. States submit a list (known as the “303(d) list”) to EPA identifying waters that do not meet applicable water quality standards and develop total maximum daily loads (TMDLs) for waters on their lists. TMDLs are intended to help restore water quality by reducing the amount of pollution entering a body of water to a level that will enable it to meet standards. Comprehensive and reliable monitoring data have become particularly important in recent years as national attention has focused on the soundness of regulatory decisions required to deal with the nation’s most heavily polluted waters. Attention to our remaining water quality problems has been amplified by numerous lawsuits calling for accelerated cleanup of these waters through the 303(d) and TMDL processes. The basis for many of the lawsuits is that EPA and the states have not implemented these requirements of the Clean Water Act. EPA proposed revisions to its regulations on the management of water quality in August 1999 to strengthen the TMDL program.

At the request of the Chairman of the Subcommittee on Water Resources and Environment, House Committee on Transportation and Infrastructure, we recently completed an evaluation of the adequacy of the data available to states to carry out several key water quality management responsibilities. That evaluation also examined whether the information in EPA's *National Water Quality Inventory* is reliable and representative of water quality conditions nationwide. We issued our report to the Subcommittee last week.<sup>1</sup> Our testimony today discusses the findings from that report as they relate to (1) the adequacy of the data for identifying waters for states' 303(d) lists, (2) the adequacy of data for developing TMDLs for those waters, and (3) key factors that affect the states' abilities to develop TMDLs. During the course of our work, we conducted a survey of the officials responsible for these water quality management activities in the 50 states and the District of Columbia (hereafter, collectively referred to as states), and interviewed water quality officials in 4 states.

In summary, Mr. Chairman, we found the following:

- Only 6 states reported that they have a majority of the data needed to fully assess their waters, raising questions as to whether states' 303(d) lists accurately reflect the extent of pollution problems in the nation's waters. While the state officials we interviewed feel confident that they have identified most of their serious water quality problems, several acknowledged that they would find additional problems with more monitoring.
- States reported that they have much more of the data they need to develop TMDLs for pollution problems caused by point sources than by nonpoint sources. States can more readily identify and measure point sources of pollution because these sources generally discharge pollutants through distinct points, such as pipes. Conversely, nonpoint sources are difficult to identify and measure because of their diffuse nature. As a result, developing TMDLs for pollution problems caused by nonpoint sources often requires additional data collection and analysis. Only three states reported

---

<sup>1</sup> Water Quality: Key EPA and State Decisions Limited by Inconsistent and Incomplete Data (GAO/RCED-00-54, March 15, 2000)

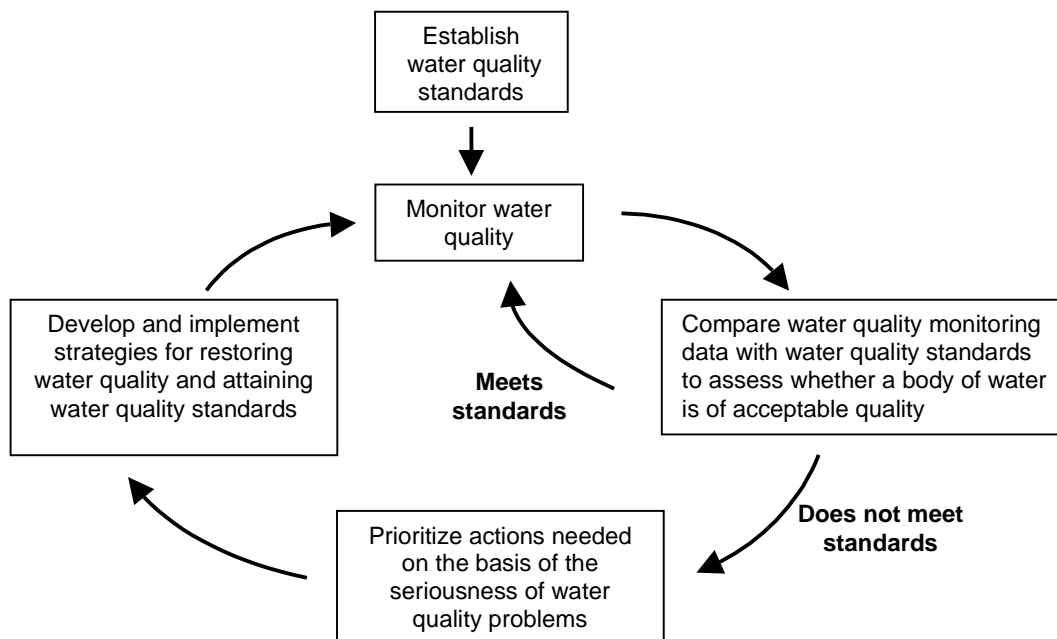
having a majority of the data they need to develop TMDLs for these types of problems.

- States reported that they have been developing TMDLs for waters polluted by point sources for many years and, therefore, have expertise in analyzing these types of pollution problems. In contrast, however, states told us that their ability to develop TMDLs for nonpoint sources is limited by a number of factors. States overwhelmingly cited shortages in funding and staff as the major limitation to carrying out their responsibilities, including developing TMDLs. In addition, states reported that they need additional analytical methods and technical assistance to develop TMDLs for the more complex, nonpoint sources of pollution.

### Background

Monitoring water quality is a key activity for implementing the Clean Water Act. The act requires states to set standards for the levels of quality that are needed for bodies of water so that they support their intended uses.<sup>2</sup> States compare monitoring data, or other information, with water quality standards to determine if their waters are of acceptable quality. Figure 1 shows these and other activities for managing water quality.

Figure 1: Process of Managing Water Quality



<sup>2</sup>Under the Clean Water Act, states identify uses for their waters such as for public water supplies, recreation, and protection of fish and wildlife.

States report to EPA on the condition of their waters via two primary mechanisms. First, states report every 2 years on the quality of their waters including information on the percentage of waters they assessed, the number of waters meeting standards, and the primary causes and sources of pollution in their waters. EPA compiles the states' reports, analyzes them, and presents this information in the *National Water Quality Inventory*, which is EPA's primary tool for communicating about water quality conditions to the public. Second, states identify waters for which existing pollution controls are not stringent enough to enable them to meet applicable standards and place these waters on their 303(d) lists.

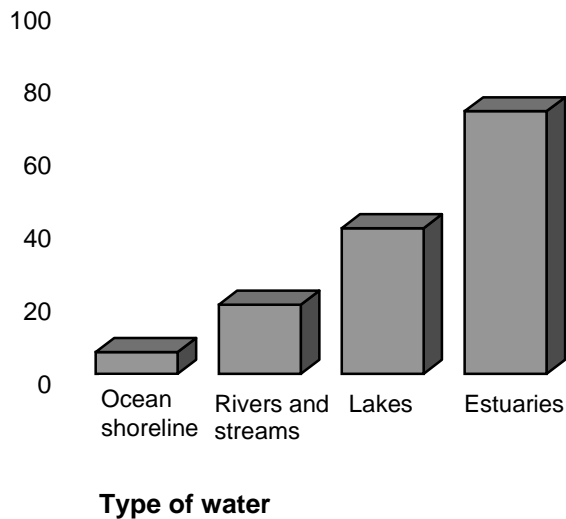
The Clean Water Act sets forth a procedure for states to follow in addressing waters that do not meet standards. Specifically, the act requires that states establish TMDLs for waters on their 303(d) lists. A TMDL refers to the maximum amount of a pollutant that a body of water can receive on a periodic basis and still support its intended uses. Generally, TMDLs are developed by (1) analyzing the pollutants and sources of those pollutants causing a water quality problem and (2) determining how much the pollutants need to be reduced in order to enable the body of water to meet standards.

### **States Do Not Have the Data They Need for the 303(d) Listing Process**

States' 303(d) lists may not accurately reflect the extent of pollution problems in the nation's waters because many waters have not been assessed. In our survey, only six states responded that they have a majority of the data needed to fully assess all their waters. This response is consistent with the relatively low percentage of waters that states reported assessing for the *National Water Quality Inventory*. In 1996, for example, states assessed 19 percent of the nation's rivers and streams and 40 percent of the lakes and reservoirs. (See fig. 2.) Despite not having assessed all their waters, the state officials we interviewed said they feel confident that they have identified most of their serious water quality problems. States tend to focus their monitoring on waters

with suspected pollution problems in order to direct scarce resources to areas that could pose the greatest risk.

**Fig. 2: Percentage of Waters Assessed in the 1996 *National Water Quality Inventory***



Source: *National Water Quality Inventory* (1996).

Note: The figure for estuaries does not include estuarine waters in Alaska because no estimate was available.

However, studies that have more thoroughly monitored water quality conditions—either through monitoring previously untested waters or conducting different types of monitoring tests—have identified additional pollution problems. For example, a 1993 EPA-funded study of toxins in lakes showed widespread elevated levels of mercury in Maine lakes, despite Maine officials’ assumption that these waters were likely meeting standards because they are in areas with little or no human activity. As a result of these findings, the state issued advisories against consuming fish from all the state’s lakes. In addition, a study conducted by Ohio’s environmental protection agency found that using additional types of monitoring tests identified a significant number of pollution problems in waters that had been shown by other monitoring efforts to be meeting standards. The state officials we interviewed acknowledged that they would likely find additional problems if more thorough monitoring were conducted.

Data limitations also affect states' abilities to make decisions regarding which waters should be placed on their 303(d) lists. Most states reported that they do not have all the data they need to place waters that they have assessed on their 303(d) lists. State officials said that their inability to make a listing decision stems from the fact that some of their assessments are based on what is called "evaluated data." Evaluated data include site-specific monitoring data more than 5 years old and information that serves as an indicator to potential water quality conditions, such as anecdotal evidence or reports on wildlife or habitat conditions. EPA and state officials acknowledge that these data sources are less reliable than current, site-specific monitoring data. Some state officials told us that while they may use this information to make an assessment of water quality conditions for the *National Water Quality Inventory* report, they prefer not to use it for making decisions about whether to place these waters on their 303(d) lists because of the requirement to develop a TMDL for those waters. State officials said that they prefer to conduct additional monitoring in these waters to determine whether they are meeting standards.

While state officials acknowledged that they may not have identified all waters that need TMDLs, they also told us that there are some waters on their 303(d) lists that do not need TMDLs. The reasons for this varied widely. For example, officials in one state said that they mistakenly assessed some waters against higher standards than necessary, which resulted in these waters being placed on their 303(d) list. In another state, officials told us that about half of the waters on their 303(d) list were listed on the basis of evaluated data. Upon additional monitoring of these waters, the state has found that many meet standards and, therefore, do not need TMDLs.

### **States Lack Data for TMDL Development**

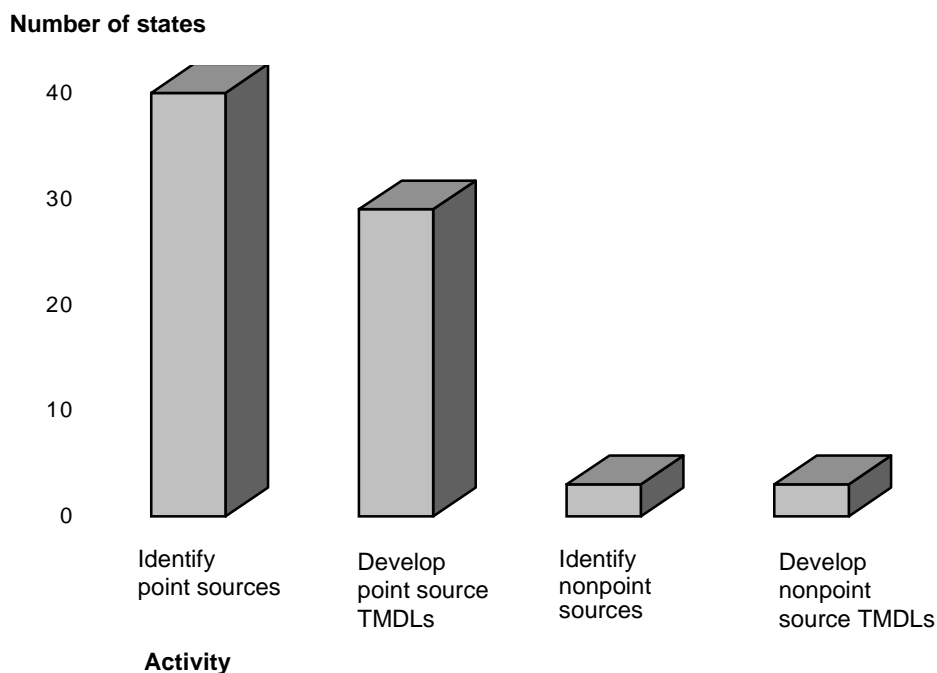
Our survey showed that states are much better positioned to develop TMDLs for pollution caused by point sources than nonpoint sources.<sup>3</sup> (See fig. 3.) States generally

---

<sup>3</sup>Current and proposed EPA regulations require that states develop TMDLs for waters polluted by nonpoint sources.

have better data and capabilities for analyzing point sources of pollution because much of the last 27 years of the Clean Water Act’s implementation has focused on addressing this type of pollution. In fact, the state officials we spoke with said they have been following the TMDL process for point sources for many years as a way of achieving water quality standards and developing appropriate pollutant discharge limits. In addition, much of EPA’s guidance on developing TMDLs, which dates from the 1980s, has focused on point sources of pollution. Responses to our survey indicate that most states have much of the data needed to address point source pollution. Specifically, 40 states responded that they have a majority of the data they need to identify point sources of pollution, and 29 states reported having a majority of the data needed to develop TMDLs for these problems.

**Figure 3: Number of States That Reported Having More Than Half of the Data Needed to Address Waters That Do Not Meet Standards**



In contrast, a vast majority of states reported that they do not have much of the data they need to address nonpoint sources of pollution. Addressing nonpoint source pollution is essential to meet the nation’s clean water goals because there is wide agreement that most remaining water quality problems are caused, at least in part, by nonpoint sources.



Unlike point sources, whose pollutant contributions can be directly measured as they come out of a pipe, nonpoint source pollution may come from many disparate sources. For example, rainwater may carry fertilizer, manure, pesticides, and soil with it as it runs off of farm fields into bodies of water. Measuring how much pollution comes from these various sources can be extremely difficult and frequently requires the use of analytical methods, such as mathematical models.

Developing TMDLs for nonpoint source pollution often involves data collection and analysis beyond what is done by routine water quality monitoring. An EPA study of 14 TMDL development efforts—all but one of which included nonpoint sources of pollution—found that each entailed additional data collection. This additional data collection accounted for an average of about 40 percent of the total cost of developing the TMDL.<sup>4</sup> Responses to our survey show that most states lack the data they need to address pollution caused primarily by nonpoint sources. For example, only three states reported that they have a majority of the data they need to identify nonpoint sources causing pollution, and 29 states reported having much less than half or almost none of the data needed. In addition, only three states reported having a majority of the data needed to develop nonpoint source TMDLs. Officials in some states told us that because they lack the data needed for certain TMDL projects, they are focusing on TMDLs that are relatively easy to develop, rather than those that are of higher priority. These officials said this is due to the pressure they feel from EPA to show they are making progress on TMDL development.

Several state officials told us that because most of the TMDLs they must develop are for pollution caused by nonpoint sources, they prefer to use methods that require less initial data collection and analysis before implementing pollution control strategies. Two-thirds of the state officials responded in our survey, for example, that using a phased TMDL approach—a process described in EPA's current guidance—is very helpful for

---

<sup>4</sup>See *TMDL Development Cost Estimates: Case Studies of 14 TMDLs*, USEPA (1996). One effort did not provide separate cost data on additional data collection conducted.

addressing pollution problems.<sup>5</sup> The state officials said that such a phased approach enables them to apply best management practices to nonpoint sources identified as contributing to a problem while, at the same time, gathering additional monitoring data to better understand the relative contributions of sources.<sup>6</sup> Several officials said they see this as a way to address water quality problems sooner, rather than to study problems extensively before taking any remediation actions.

While data collection is often required to develop a TMDL, additional data are also needed after a TMDL is established. Current EPA guidance and proposed TMDL regulations discuss the need for monitoring after pollutant controls or other activities are implemented to determine if the TMDL is working and the body of water is attaining water quality standards. This means that significant new monitoring efforts will be needed, particularly for TMDLs addressing nonpoint sources of pollution, because the effectiveness of controls to reduce such pollution can be affected by site-specific conditions.

### **Other Factors Limit States' Abilities to Address Polluted Waters**

In addition to the data gaps that states face in developing TMDLs, states also identified several factors that limit their ability to conduct monitoring and analyses to fully address the listing of polluted waters, TMDL development, and other key water quality management activities. Almost all states identified a need for additional funding and staff to carry out their duties. Most states also cited the need for additional analytical methods and technical assistance to analyze complex pollution problems and develop TMDLs.

### **Resource Shortages**

---

<sup>5</sup>As described in EPA guidance, a phased approach involves developing a TMDL on the basis of available data so that pollution reduction strategies can begin while additional data collection and analyses are conducted.

<sup>6</sup>Nonpoint sources are largely addressed through the use of best management practices, the effectiveness of which varies with site-specific conditions, such as soil type and climate. Best management practices are generally changes in the way in which individuals use land. Examples include (1) leaving strips of farmland next to waters uncultivated to minimize erosion and (2) using man-made ponds or basins to detain stormwater runoff from roads to minimize the velocity of water reaching nearby waters during storms and to allow sediment and other pollutants to settle.

Forty-five states reported that the lack of resources was a key limitation to making more progress on improving water quality. In addition, several states pointed out that they are operating under state-imposed staffing level ceilings, and other states said they are limited in how many samples they can analyze because of shortages in lab funding. EPA officials told us that overall, less resources are being devoted to monitoring and assessment at the state level than ever before. EPA is conducting a study of funding shortfalls in states' water quality programs and plans to identify alternative approaches for addressing the anticipated gap. On the basis of a preliminary analysis of 10 state programs, EPA found that states have shortfalls in most areas of water quality management, including water quality monitoring and TMDL development. The agency plans to finalize its methodology for estimating these shortfalls in spring 2000.

#### Analytical Methods and Technical Assistance

EPA has taken steps toward providing assistance in TMDL development, but the agency's current level of assistance falls short of states' needs. EPA's efforts have included issuing multiple guidance documents over the past 15 years on developing point source TMDLs, and, more recently, producing a watershed model and analysis tool to be used in developing TMDLs for more complex pollution problems, such as nonpoint source and combination point-nonpoint source pollution.<sup>7</sup> EPA has also provided a compendium of models that are available for states to use in analyzing pollution problems.

Yet a majority of the states responded in our survey that they need additional technical tools and assistance to help them with TMDL development. States are particularly concerned about their ability to develop TMDLs for nonpoint sources because they have little experience in using the advanced methods required for addressing nonpoint source problems. In addition, officials told us that they need assistance from EPA personnel in selecting appropriate watershed models for specific problems and in model troubleshooting and refinement.

---

<sup>7</sup>Watershed models are often used to analyze nonpoint source pollution because they can take into account many of the factors that influence such pollution such as land use, climate, and geographic features.

Officials in two states told us that they previously had obtained such assistance from experts in EPA's modeling lab in Athens, Georgia. This assistance, however, is no longer available because of reductions in funding, according to an official in EPA's TMDL branch. Moreover, this official told us that there is no formal mechanism for providing assistance to states for developing TMDLs. He said that assistance is provided largely in an ad-hoc fashion by EPA staff in headquarters, regions, and labs.

Some states suggested that EPA should develop sample approaches or templates that states could use to guide them through certain types of TMDLs, such as templates that indicate what type of data and analyses are needed for particular pollutants. In addition, several states pointed out the need for states to share information on TMDL projects in order to learn from the experiences of others, rather than "reinventing the wheel."

### **EPA Activities Under Way Could Address Some State Needs**

Several activities currently under way at EPA could help states in some of these areas. Perhaps most directly relevant to states' needs are EPA's efforts to provide guidance, or templates, for developing TMDLs for some of the more common pollutants causing waters to not meet standards—sediment, nutrients, and pathogens. The guidance is intended to provide states with an organizational framework for completing the technical and programmatic steps in the development of TMDLs for specific pollutants. EPA issued a guidance document for sediment in October 1999 and one for nutrients in November 1999. These documents appear to provide some of the information and specific guidance that states identified as needed, such as the suggestions for the kinds of data and analyses necessary to develop a TMDL. How useful these documents are will become clearer after they have been used in several TMDL development efforts.

In addition, EPA is conducting two pilot studies to examine methods for taking airborne sources of pollution into account when developing TMDLs by looking at mercury contamination. The studies will examine techniques for determining (1) the amount of mercury reductions needed to meet water quality standards, (2) the relative contributions of mercury from various sources, and (3) the geographic extent of sources

contributing mercury. A legal analysis of federal and state programs to address airborne sources of mercury deposited in bodies of water will also be conducted. EPA plans to issue a “lessons learned” report on the findings of the pilots in spring 2000. EPA is also working on guidance to assist states in developing criteria for nutrients (i.e., measures for determining if waters containing nutrients are of an acceptable quality) that are appropriate to different geographic regions. The need for these criteria was highlighted in 1998 in the Administration’s *Clean Water Action Plan* because assessments of the seriousness and extent of pollution problems caused by nutrients are often based on subjective criteria.

While EPA has several activities under way in areas that states cited as problems, the agency does not have an overall strategy for identifying and addressing states’ needs for developing TMDLs. EPA officials told us that EPA regions are in the process of assessing states’ TMDL programs in order to identify areas in which assistance is needed and to develop regional strategies to support states’ programs. Without an overall strategy, however, EPA cannot be certain that it is addressing these needs in the most cost-effective manner.

Additionally, EPA is not addressing one of the key needs the states identified—technical assistance in using watershed models and other analytical methods. EPA officials responded that each state can obtain such assistance from contractors. However, a more coordinated approach could be more efficient, given the fact that many states will need to develop TMDLs for similar pollutants and will likely go through similar analytical processes. Such an approach may be a more cost-effective alternative for both EPA and the states as they address this challenging problem.

This concludes our prepared statement, Mr. Chairman. We would be pleased to address any questions that you or other Members of the Subcommittee may have.

(160521)

## **Orders by Internet**

For information on how to access GAO reports on the Internet, send an e-mail message with "info" in the body to

[info@www.gao.gov](mailto:info@www.gao.gov)

or visit GAO's World Wide Web home page at

<http://www.gao.gov>

## **To Report Fraud, Waste, and Abuse in Federal Programs**

Web site: <http://www.gao.gov/fraudnet/fraudnet.htm>

E-mail: [fraudnet@gao.gov](mailto:fraudnet@gao.gov)

Automated answering system: 1-800-424-5454