

## **What Your Manager Needs to Know About Monitoring**

Protecting our Nation's water resources – quantity and quality - has become more challenging in the face of often competing water users, diverse pollution sources, and climate change. Given these challenges, the need for comprehensive, high quality data is increasingly important to water resource managers. Such information is needed at the local level where on-the-ground management decisions are made, and at the state, Tribal, and federal levels where regional and national policies are set. Access to timely and unbiased information should underpin the development and implementation of sound resource policy and management.

Many federal, state, and local water monitoring programs across the nation gather chemical, physical, and biological data on water resources; interpret this information; and communicate it to decision makers. To ensure the relevance of these programs and to communicate results effectively, monitoring staff must ensure that managers appreciate the value and necessity of monitoring, and conversely to understand what types of information decision-makers need to make sound resource management.

The purpose of this white paper is to help monitoring program staff understand what managers need to know about monitoring. There are two facets to this issue. The first is to ensure that managers understand the value of monitoring; that is, why other programs cannot be fully effective without water quality monitoring. The second facet is making sure that once monitoring results are available, the information is communicated to managers in a way that is understandable, to the point, and can be useful for informing resource decisions. Both of these aspects are discussed in this paper.

### **I. Why is monitoring essential to water quality management?**

Water quality monitoring is an essential component of the mission of most federal, state, tribal, and local agencies responsible for environmental protection. Comprehensive monitoring is necessary to improve natural resource management, maintain sustainable ecosystems, and protect public health. An effective monitoring program supports objective water quality decision-making at all levels of government, and informs the public about water quality conditions and changes. In a broad sense, monitoring data can be used to answer the following questions:

- What is the current condition of waters, and are water quality standards being met?
- What are the causes/sources of water quality impairment/degradation?
- Is water quality changing over time? How does water quality vary spatially?
- Are prevention, protection, and restoration programs effectively improving water quality?
- Are there new and emerging issues impacting water quality which warrant further investigation or controls?

Despite the importance of high-quality information for resource management and protection, water quality monitoring is often one of the first programs cut during periods of shrinking agency budgets. Although there may be a variety of reasons for this, there seems to be a common perception that water quality monitoring is a luxury rather than a necessity. That is, while most everyone agrees that data collection is a good thing, perhaps it is not absolutely critical. When faced with cutting budgets and/or

staff for NPDES permits, non-point source programs, compliance/enforcement efforts, and monitoring, most managers choose the last of those. On the surface, such a decision seems reasonable. Issuing permits, controlling non-point sources, and ensuring compliance are important activities that merit management support. The perception among state managers that monitoring is not quite as important as those other programs may be reinforced by conversations and interactions with USEPA, in which states often get more “bean” credits for other programs than for a robust monitoring program.

In reality, the view that monitoring is a luxury is not accurate and staff/managers most directly responsible for water quality monitoring should push back against this view. Large sums of money are spent each year on water quality protection activities by all levels of government. If even a small percentage of these dollars (say, 20%) is targeted to areas that may not really have a problem, or are focused on the wrong cause/source, the result is a substantial amount of money essentially wasted or at best not targeted at the most pressing problems. To ensure that these funds are spent wisely, it is critical that managers understand whether there is a problem at a site; what is causing the problem; how it compares to other problems/stressors/sources; and whether water quality improves after the implementation of these activities. None of these issues can be addressed without water quality monitoring data. Furthermore, cutting monitoring programs assumes that funding is a zero-sum game. That may be the case sometimes. However, if agencies can demonstrate water quality improvement after a specific action is taken, legislators and the public are much more likely to continue (or increase) funding for water quality protection.

An important point for monitoring program staff/managers to convey to high-level managers is that a truly effective monitoring program must be long-term. Monitoring practitioners in Oklahoma have effectively made this point using the analogy of a person getting an annual physical exam. Ideally, a person doesn't go to the doctor only when there are signs of trouble; rather, she will go routinely each year for a check-up in which certain vital indicators (blood pressure, cholesterol, weight, etc.) are measured and evaluated against benchmarks, including results from previous years. Likewise, monitoring should be a routine, ongoing effort to measure vital water quality indicators for comparison to benchmarks (e.g. standards) and past results (trends). If there is no monitoring until an emergency occurs, there likely won't be data to which results collected after the emergency can be compared. Such a situation would make it exceedingly difficult to determine whether an incident had an impact on aquatic life, for example, or the extent of any impacts. Certainly, an evaluation of temporal trends in water quality is virtually impossible without a consistent data set collected over many years using standardized, quality assured methods. Likewise, one cannot evaluate the effectiveness of a best management practice implementation without data collected prior to the implementation.

Aside from data quality and quantity concerns, a long-term, consistent monitoring program makes sense from a purely fiscal perspective. While funding is required to maintain the program each year, that funding level will likely be reasonable as monitoring programs generally become more effective and more efficient if maintained and continually evaluated/improved. In contrast, frequently initiating and stopping a monitoring program usually requires heavy start-up costs since any previous monitoring infrastructure (staff knowledge, equipment) has eroded or disappeared. Such a situation also makes it difficult to achieve maximum efficiency, requiring more sample collection and analysis than might otherwise have been necessary had the

monitoring program been operating consistently. Thus, the cost-benefit balance will be much higher (i.e. greater cost per given benefit) under an on-again, off-again monitoring program.

Managers oftentimes approach monitoring staff and ask what monitoring is necessary. In most cases, this is not the ideal approach. Rather, managers should know the question(s) they want answered before approaching monitoring staff, and instead ask what monitoring needs to occur to answer the question(s). If asked, monitoring staff can usually identify some monitoring needs. However, the most effective monitoring programs are those integrated with other programs, with monitoring being used to support “clients” such as NPDES, Non-point Source, TMDL, and Water Quality Standards (among others). Those programs should know what information they need to support water quality management and protection, and charge the monitoring staff to come up with the most effective approach to get that data.

## **II. How can monitoring results be communicated effectively to management?**

The second component of this white paper is to provide guidance on how monitoring data can be effectively communicated to various program staff and higher-level managers. Monitoring should not be an end in itself; rather, it is a tool to be used by NPDES, nonpoint source, compliance/enforcement, and other programs to identify stressors, sources, and the effectiveness of implemented solutions. It also can be used by managers to determine whether water quality is improving and to identify emerging issues. To ensure that monitoring information is actually used for these purposes, it is critical that the results of specific assessments be communicated to managers in a clear, concise manner. There are a number of steps that can be taken to increase the chances that the data are used.

In many cases, there is a need for detailed technical reports when communicating the results of a monitoring study. Such reports can serve to build the case for interpreting the data and drawing conclusions. However, these reports ideally should be accompanied by a fact sheet or a briefing paper, or at a minimum an executive summary in the technical report. With the number of issues on their plates, managers generally will not have the time to read and digest long technical reports. It can be difficult to glean the “take-home message” in such reports. An accompanying fact sheet or briefing paper, on the other hand, can highlight the essential results and conclusions from a monitoring study, and is more likely to be read by management. These documents should focus on the big-picture implications of the results, and avoid getting immersed in details. To borrow a cliché, the manager should be able to see the forest through the trees.

Regardless of the method used to communicate monitoring data to managers, there are some basic components to any effective reporting mechanism. The first is that the goal(s) and objectives(s) of the study should be identified at or near the beginning of any report/summary. The question being addressed should be clearly stated, so there is no ambiguity in a reader’s mind as to why the study was conducted. Then, the data summary should be presented in a way that links back to the study goals/objectives. It is extremely frustrating to read a report where one has to search to determine whether the data answered the original question(s).

A second important component of an effective report to managers is identifying the level of uncertainty associated with the data. Do the monitoring results provide an unequivocal answer

to the question being asked? Or, is additional monitoring needed before one can be confident in taking specific management actions? If he/she is going to take action, a good manager will want to know that the action likely will result in improving water quality. Ensuring effective use of limited resources is essential to maintaining support for water quality programs, including monitoring. There is nothing wrong with saying that additional data are necessary to be confident of next steps, but the report should explicitly lay out what additional data collection activities are needed to determine a policy course of action.

After the results of a monitoring study are available, a manager may want to know what policy options are available to address the problem. In some cases the options may be obvious; in other cases, the monitoring staff may have to work with other program staff to identify possible management options. Obviously, monitoring staff shouldn't go beyond their area of expertise. However, if a problem or source has been identified, working with other program staff to frame the issues and identify potential options is important to "keep the ball rolling" and ensure follow-up action, rather than having the report sit on a shelf without any follow-up.