

Sensors: Making Monitoring More Useful

Charles S. Spooner
U.S. Environmental Protection Agency
Office of Water
Washington D.C. 20460

While the importance of monitoring to the management of water quality is well known, more thought needs to be given to how to make the science and practice of monitoring more useful.

We know that water Quality programs rely on the interest and support of an informed public. When the public understands the complexity of environmental systems and the uncertainty of the impacts of proposed controls, it is willing to support the iterative procedures of adaptive management that develop management plans with goals, objectives, and activities; develop and implement a monitoring plan and then analyze data and communicate the conclusions of those studies, and then start over with refined goals and monitoring. Any analysis of this process places monitoring on the critical path of this process, and monitoring can be more useful if it shortens the time it takes to provide insightful information. Only data we have refines our objectives and influences our decisions. Data somewhere in a pipeline of monitoring procedures has no value.

Sensors are already reducing the iterative loop of adaptation in management. Stream gages are now largely real-time and their measurements are on the web. Drinking water security has prompted new capabilities in monitoring distribution systems, and the economics of closed beaches is prompting new interest in rapid monitoring procedures. Reducing the information cycle-time needs to be a goal for all our monitoring programs, and sensors are central to doing this.

Sensors can also reduce uncertainty. They can increase the number of sample points that reveal variations that can only now be inferred from the procedures we now use. In a world known to be so influenced by time-varying flows and loads, this uncertainty is critical to both setting our goals and to better establish cause-and-effect relationships between sources, controls, and impacts. As we collect data that reflect actual variations, we expect that better models, ones with shorter time steps and with more insightful outputs will provide better tools for management.

The National Water Quality Monitoring Conferences since 2004 have featured many papers on the application of sensors to water quality monitoring, and papers at this conference in 2008 continue to reveal that interest. Together, they reveal that sensors are now more capable and more ready for these applications than many of us realize. While they cost more than traditional monitoring the case can and should be made that they are worth it. It is reassuring to think that their costs are likely to come down as power needs for mobile devices go down and new technologies are miniaturized, but our profession shouldn't wait for this evolution. Our interest in the technical elements of these tools should be matched with an effort to inform ourselves and our constituencies of the opportunities they present us.

KEYWORDS: sensors, National Water Quality Monitoring Conference