

## CHALLENGES IN UNDERSTANDING AND COMMUNICATING ESTUARINE MONITORING INFORMATION - THE CHESAPEAKE BAY EXPERIENCE

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Multidisciplinary monitoring programs are needed to effectively guide and evaluate large-scale estuarine restoration programs. A comprehensive monitoring program has been operating in the Chesapeake Bay for over a decade and has produced much valuable information for managers of this system. Nevertheless, there is still much room for improvement in how these data are analyzed, interpreted and finally communicated to interested citizens and managers. Specific examples of past successes and future challenges can be drawn from experiences within the Chesapeake Bay region.

The current monitoring program for the Chesapeake Bay's estuarine waters includes several important ecosystem elements. At the head of tide of the largest tributaries, the amounts of fresh water, nutrients and sediments entering the system are measured. In the estuary, fundamental water quality constituents such as nutrients, oxygen, turbidity and phytoplankton biomass are measured along with rates of sediment-water column exchanges of nutrients and assays of nutrient limitation of phytoplankton growth. Several biological communities are also monitored including phytoplankton, zooplankton and macrobenthos. Contaminants are monitored in sediments and through directed studies at sites of suspected impacts.

Biological information is typically the most challenging to interpret and relate to the effects of nutrients and contaminants. For many of the biological communities, for example, eutrophication can either enhance or diminish certain attributes, making it difficult to interpret status and trends relative to nutrient control efforts. Furthermore, biological communities are subject to many simultaneous influences including eutrophication, contaminants, predators and climatic fluctuations, making the linkage to any one problematic. Careful selection of community attributes for analysis, normalizing for climatic fluctuations, and associated research studies are often needed to provide information that is useful for management. The most recent and successful examples of analysis and interpretation of complex Chesapeake Bay monitoring information will be presented.

The scientific interpretation of monitoring data, while often extremely challenging, is not sufficient to influence management decisions. This information must be communicated effectively to at least three major audiences -- the public, industries, and government managers. The information content and level of detail needed by these audiences is similar. They all need clear and concise presentations of monitoring and related information to effectively identify where problems exist, what progress is being made, and which actions must be taken to continue the restoration of degraded estuaries.

Demonstrating the connections between management programs on point and nonpoint sources of pollution and estuarine conditions of water quality, habitat and biological communities to these audiences is a key challenge in the Chesapeake Bay region to promote continued support of, and participation in, pollution control programs. Another challenge is the communication of monitoring results to the vast numbers of citizens, industries and local government managers spread throughout this large watershed. The distribution of information via the Internet and World Wide Web has provided tremendous new opportunities to reach the numerous individuals and agencies that ultimately support and shape the character of the Chesapeake Bay restoration effort. The Internet has been a particularly effective tool in reaching students, an important sector of the public audience, because of their familiarity and access to this medium. Examples of the most current techniques of communicating monitoring information to the aforementioned audiences in the Chesapeake Bay region will be presented. These will include indicator graphics, written documents and World Wide Web pages. For examples of these materials, see the following World Wide Web pages and the links contained therein:  
<http://www.gacc.com/dnr/Bay/> and <http://www.epa.gov/r3chespk/>