

National Water-Quality Assessment Program

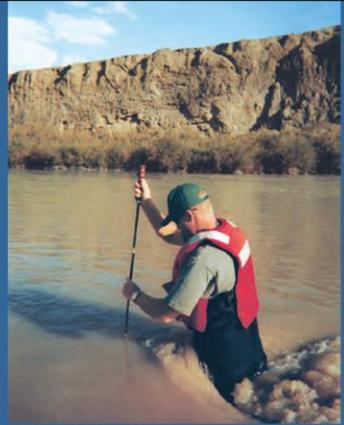
Goals:

Assess the current quality of the Nation's fresh water resources

Assess how water -quality conditions are changing over time

Evaluate how natural and human factors affect water quality

Predict the effects of human activities, climate change, and management strategies on future water quality and ecosystem conditions



The mission of the USGS is to assess the quantity and quality of the earth resources of the Nation and provide information that will assist resource managers and policy makers at all levels in making sound decisions.

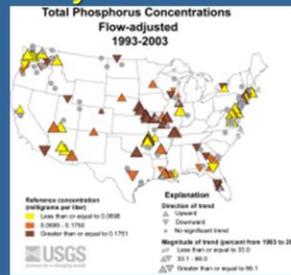
Sound decisionmaking to address water-quality issues requires that we identify problem areas before they reach crisis proportions, understand the causes of such problems, and are able to predict adequately the effects of changes in water quality and the impacts of attempts to improve or protect water quality. In other words, we need:

- 1) Data quantifying hydrologic, chemical, biological and other relevant parameters in space and time;
- 2) Ancillary information about the past and present land and water use and hydrologic conditions obtained by collating, organizing and interpreting available data and information; and
- 3) Knowledge about the cause and effect relationships between water quality variables and the factors that influence them over space and time.

All three are important and build on each other, but ultimately knowledge and understanding, which are essential for predictive capability must be the goal of any program that supports water quality decision making.

What is the difference between Monitoring and Assessment?

- Monitoring
 - Data Collection
- Assessment
 - Data Collection
 - Analysis
 - Interpretation
 - Synthesis



Given these needs, a water quality “assessment” must do more than “monitor” (e.g. collect data). Assessment, goes well beyond monitoring and data collection to include the analysis, interpretation, and synthesis of data and theory to enhance our understanding of the environment. While data collection activities are critical, a true national assessment improves our knowledge and understanding (National Research Council, 1990)

Why is this a responsibility of the federal government and USGS?

- Mission of the USGS is to assess the quantity and quality of the earth resources of the Nation and provide information that will assist resource managers and policy makers at all levels in making sound decisions.
- No regulatory or management responsibilities
- National scale, long-term focus, and inclusion of pesticides and other potentially toxic contaminants are unique
 - Large Rivers especially interstate and International boundaries
 - Only federal program that assesses groundwater quality



USGS has no management or regulatory responsibilities which helps to ensure that the bureau can provide an objective perspective

Strong reputation for leadership in data collection at national, State, and local levels. USGS has been collecting and interpreting water quality since the latter part of the 19th century

Water Science Centers located in every State and Puerto Rico provide a critical connection to other federal, State and local agencies—so that we stay aware of the issues; and national capability.

USGS monitors water quality at all scales; but, what is unique is our attention to regional and national scales and long term

Lower detection levels for pesticides and other potentially toxic contaminants? Why? USGS analytical methods are designed to measure concentrations as low as economically and technically feasible. These types of data help identify emerging issues and provide the ability to track changes in concentrations over time.

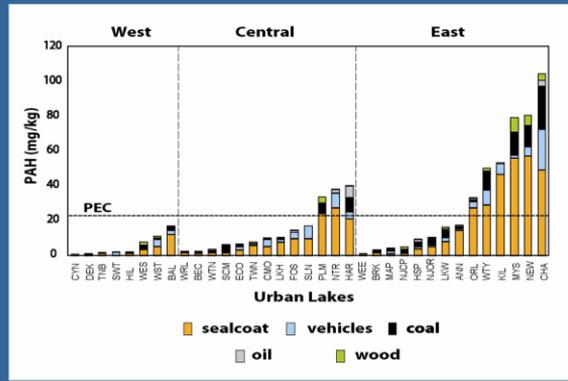
What is the value of long-term data? To provide temporal context for individual measurements made over a short period of time; and also because we cannot always anticipate what questions and issues will arise in the future. Example use of HBN data to evaluate the effectiveness of the Clean Air Act.

Large Rivers and groundwater—USGS provides most of the water-quality data for the Nation for large rivers,-- particularly those that are interstate. Similarly, USGS provides most of the Nation's data on the quality of ambient groundwater.

USGS is unique in providing national synthesis of water quality of streams and groundwater : pesticides, nutrients, volatile organic compounds, source water for domestic and public supply

Analysis and Interpretations

- Targeted Regional Studies will be done collaboratively with other agencies
- Trend Analysis

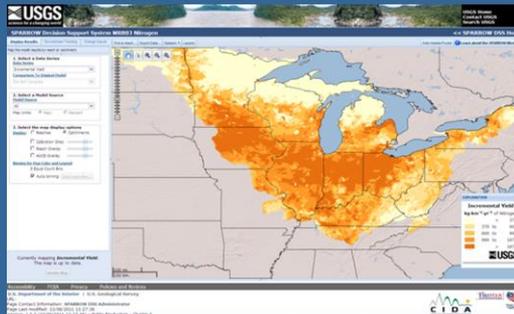


Targeted regional studies, to be done in collaboration with other agencies and organizations, are being planned to provide resource managers with data and tools to understand and predict ecological conditions in relation to streamflow alteration and concentrations of contaminants, nutrients, and sediment. These efforts address a key issue being addressed by the WaterSmart initiative. The first of these assessments is being developed with the States and USEPA as part of the National Rivers and Streams Assessment and will focus on stream quality in 12 States in the agricultural midwest. Other regional studies may be done in the humid southeast, arid southwest, and the Atlantic Highlands and the Rocky Mountains.

Trend analyses will be done with suitable data from both USGS and other agencies to produce a series of topical and geographic trend assessment products through Cycle 3 (2013-2022). In addition to long-term data sets available through NWIS and STORET, NAWQA is working with the States to determine if there are other suitable long-term datasets for this effort.

Modeling and Decision Support Tools

- Investments in USGS water-quality monitoring and modeling have resulted in outcomes that have evolved from providing data and trend analysis to those that include the potential to predict and forecast contaminant occurrence and trends under multiple scenarios at nationally significant scales



We discussed the importance of linkages between monitoring and modeling in the presentation two weeks ago. Successful management of our Nation's water resources requires a commitment not only to monitoring but also to the development of predictive tools such as models. Such tools are needed to extrapolate measured water-quality conditions to unmonitored areas

Expanding and enhancing development of NAWQA modeling tools was second in priority only to restoring the monitoring among stakeholders and the National Research Council

The ability to extrapolate or make predictions is critical for cost-effective assessment of our Nation's streams and groundwater, which requires more information than can be measured directly in all places and at all times. The expense of monitoring limits the number of stream miles that can be assessed. For example, the most recent 305 (b) reports indicate that States have assessed less than one-sixteenth (or only about 20 percent) of the more than six million stream miles in the Nation.

Models are powerful tools. They can be used to assess water quality over broad regions and the Nation. In addition, models can establish linkages between water-quality conditions and contaminant sources on land; track contaminants from their upstream origins to downstream destinations; and simulate changes in water quality resulting from management actions or trends in human activities. Such information provides estimates of conditions that often cannot be directly measured, such as the percentage of contamination in a stream that originates from different sources or the effects of specific pollution controls.

Models are incomplete tools without monitoring. Model predictions are only reliable and successful if

they are developed and verified on the basis of credible, comparable, and comprehensive data from “on the ground” monitoring, assessment, and research.

National Synthesis



- *The coordinated application of comparative hydrologic studies at a wide range of scales, which simultaneously provide new insights in the status and trends of the Nation's water quality, and more importantly improve our understanding of physical, chemical, and biological processes and causal relationships*

National Synthesis is “unique” to the NAWQA Program and is supported by about 10% of the resources.

National benefits of NAWQA accrue in at least two ways. The first is the accumulation of findings resulting from high quality, perennial assessments of the largest and most important rivers and aquifers in the country.

The second way that National Assessment can be achieved is topic by topic. When we began the NAWQA Program, we asked our stakeholders which topics or issues were most important to them. They responded with Pesticides, Nutrients, volatile organic compounds, and stream ecology. Unfortunately, we weren't able to afford the intensive sampling required to assess sediment conditions during the 90's but, we're working on this topic using existing information and applications of hydroacoustic technology (that is also used in measuring streamflow provides some reason for optimism.

In the NAWQA Program, national synthesis results from the integration of existing information from programs and studies of USGS and others, NAWQA monitoring, regional studies to produce a national assessment that is more meaningful and complete than a simple accumulation of independent water quality studies..

Discussion and Questions

