



RECOMMENDATIONS OF THE AD HOC WORKGROUP TO ASSURE STRONG WATER DATA & SCIENCE IN A CONSTRAINED/SHRINKING BUDGET

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USGS has dealt with budget limitations for some time. In an age where more science is needed for decision-making, the challenge has been to find funds to develop and apply our water science more efficiently to serve many purposes. Long-term water quantity and quality data collection, especially in critical watersheds and water-short areas, where groundwater is essential for development, is essential for the economic strength of the nation.

Management and protection of water resources in the United States requires coordination on many levels. The USGS capability to develop data and analyses enables the nation to make some of the most challenging decisions for the allocation, protection and treatment of water to maximize economic opportunities and public safety in a changing world. Because water is a multi-jurisdictional issue critical to the long-term sustainability of ecosystems, communities and economies, it is a federal responsibility, in conjunction with many potential partners, for USGS to lead the nation in collecting long-term data, synthesizing the data and providing projections of future conditions or needs of the nation.

Budget decisions should support the USGS Water Resources Mission to provide reliable, impartial, timely information that is needed to understand the Nation's water resources and to actively promote the use of this information by decision makers to –

- Minimize the loss of life and property as a result of water-related natural hazards, such as floods, droughts, and land movement.
- Effectively manage ground-water and surface-water resources for domestic, agricultural, commercial, industrial, recreational, and ecological uses.
- Protect and enhance water resources for human health, aquatic health, and environmental quality.
- Contribute to wise physical and economic development of the Nation's resources for the benefit of present and future generations.

The Task at Hand. We have been asked to provide advice and recommendations to Interior and USGS for the delay new initiatives or the reduction of current efforts with minimum adverse impacts to USGS Mission and to the many other public and private programs, projects, policies and plans (**INSERT synopsis of Nov6 letter, the scope and timeframe, and a short synopsis of our meeting presentations, discussions, participation**)

Federal Funding is Warranted by Federal Responsibilities & National Benefits. The workgroup understands the importance of recognizing the specific federal responsibilities and national benefits that warrant federal funding. *Federal responsibility* is based on many factors, including compliance with international water treaties, interstate water compacts and tribal water settlement agreements, the development and enforcement of federal regulatory standards, and the science needed to support federally funded programs (e.g., establishing and enforcing regulatory standards under the Clean Water Act and

Safe Drinking Water Act, FWS and NMFS consultations and recovery plans under the Endangered Species Act; USFS, BLM & NPS resource management plans; Water SMART planning grants & Title XVI projects; and the plans for restoring and managing major ecosystems, including the Everglades, Chesapeake Bay, Long Island Sound, Great Lakes, Sacramento-San Joaquin Bay-Delta, Puget Sound, Colorado River, Mississippi River and Gulf of Mexico).

National benefits result from federal agency leadership in initiatives that transcend specific regional or local levels, including, for example, the monitoring, modeling and assessment required to forecast flooding; to provide safe and sustainable water supply; to protect and restore ecosystems; to understand the sustainability of intergovernmental water allocation agreements; to invest in the nation's water infrastructure; to enhance the value of data collected by others; and, in general, to help all officials, leaders and the general public understand and utilize the complex science associated with flooding, droughts, sea level rise, water pollution, endangered species, ecosystems and recreation. National benefits are also developed through open public deliberation and by the opportunities for innovation created by USGS scientists working directly with water managers to meet local, state, regional and national needs.

Finally, as recognized in the *Principles and Requirements for Federal Investments in Water Resources*, "America's water resources support billions of dollars in commerce, provide safe drinking water for millions of Americans, supply needed habitat for fish and wildlife, affect public safety, and provide a variety of other important benefits." Each of these benefits has national economic implications, which is why maximizing sustainable economic development is a key federal objective of the *Principles* and why USGS leadership in water science is so valuable to the nation.

GUIDING PRINCIPLES

To fulfill its mission, the Workgroup identified the following set of six principles to guide decisions affecting the USGS water budget. The goal is to ensure that such decisions safeguard the ability of USGS to provide the reliable, impartial and timely information needed by other federal agencies, non-federal agencies, businesses, universities and the general public to understand and manage the nation's water resources. The Workgroup believes that these six principles, when applied as a package, will help USGS and Interior Department leaders make budget decisions that will not impair this overarching goal:

- **Water Science Informs Decisions;**
- **Water Science Addresses the Whole Water Cycle;**
- **Water Science Requires Continuity;**
- **Uncertainty and Risk must be Weighed Against Costs and Benefits;**
- **Research and Development Underpin Water Science; and**
- **Collaboration Leverages Ideas and Resources**

WATER SCIENCE INFORMS DECISIONS: Water data is the foundation of water science; unbiased, water science¹ is the basis of sustainable water management² and human and ecological health. USGS must continue providing high quality and unbiased water science, unencumbered by regulatory or other responsibilities, necessary for informed decision making.

America needs USGS to lead its water science efforts. USGS must continue providing essential "backbone" elements of the nation's water data collection and delivery system and serve as an objective expert for other federal agencies and for interstate, state, tribal, and local agencies with responsibility for public health and managing water and related resources throughout the United States.

¹ The term "water science" is used in this report to refer to data collection, management and delivery, analysis, interpretation, and application in maps, models and other decision support products.

² The term "water management" is used in this report to include the full spectrum of protection and utilization activities to support all existing and future needs.

WATER SCIENCE ADDRESSES THE WHOLE WATER CYCLE: Each element of the water cycle (both quantity and quality) is linked to the rest. The nation must understand the whole water cycle if it is to manage, use and protect its water resources intelligently. USGS must play a leadership role in addressing the water cycle.

The nation's water data system must clearly characterize each element of the water cycle to describe the hydrologic system and for water management to be sustainable. We depend on USGS to anchor the collection and assessment of water cycle information. Interpretive and forecasting tools are only as good as the actual measurements available. Research has repeatedly shown that these components must be considered together for effective water resources management.

WATER SCIENCE REQUIRES CONTINUITY: Understanding relationships, trends and variations over the long term is a prerequisite for the development of tools to predict effects on water resources, information essential to land and water managers. USGS has the national perspective (unaffected by regulatory or resource management responsibilities) and expertise necessary to meet these demands and to lead America's water science community.

Understanding the nation's water resources and the threats to them requires a sustained commitment to research, data collection and assessment across short and long spatial and temporal scales. Long-term monitoring is needed to distinguish short-term variation from long-term drivers, such as land use and climate variability. Existing long-term records provide important information on trends of water quality and water availability that are used for future projections. Extending these records will provide valuable information about the impacts of water current and future withdrawals and use, climate impacts and land use changes.

USGS application of consistent monitoring methods across hydrogeologic and ecological regions at various appropriate scales provides important and comparable information on quality trends, impaired waters, water use, and management alternatives. USGS is in the best position to apply and encourage states or other collaborators to use these methodologies. USGS currently provides an important "backbone" of data collection and science, critical for decision-making for many who work for state, tribal, federal, and other organizations.

UNCERTAINTY AND RISK MUST BE WEIGHED AGAINST COSTS AND BENEFITS: Understanding water resources requires an understanding of the uncertainty that is inherent in measurement, analysis, and assessment. The risk to people and ecosystems varies widely over time and space with uncertainty in each of these functions. The risks associated with those uncertainties in our water science must be weighed against the cost and benefits of reducing or eliminating uncertainty.

USGS should not spend resources to reduce uncertainty for its own sake, but rather the benefits of doing so can be reasonably projected. The goal is to balance desired decision confidence with the cost to attain that confidence level. Where the risk to existing and future communities from the use of less certain information is low, less rigorous efforts to reduce uncertainty may be desirable.

Effective decision-making requires deliberate consideration of uncertainty, often in quantitative terms. The value of reducing uncertainty to decision-making must be more specifically understood; in some cases, effective decisions can be made even though uncertainty may be relatively large; in other cases, uncertainty may be large enough to prevent effective decision-making. In situations where the latter is true and the consequences of poor decisions are large, projects that reduce uncertainty may receive a high priority.

RESEARCH AND DEVELOPMENT UNDERPIN WATER SCIENCE: Research defines, develops and refreshes the nation's understanding of water resources and the programs designed to manage these resources. USGS research provides a valuable feedback mechanism to help in optimizing data collection efforts.

The budget should recognize the value of research in driving and supporting the national scientific mission, including applied research that directly supports the operational parts of USGS water science, and basic research that propels the scientific mission forward. USGS is critical to the delivery of real time watershed data collection and delivery, and timely development of predictions, forecasts and decision support tools for users or potential users in those watersheds. Greater emphasis must be placed on research for which results may be more tangible, provided the interruption of promising in-progress basic research can be avoided.

COLLABORATION LEVERAGES IDEAS AND RESOURCES: Collaboration builds partnerships and enhances opportunities for understanding water science, drawing attention and resources to the most immediate management challenges, building support for water management activities, and leveraging private, local, state and federal dollars, ideas, experience, and capabilities.

Collaboration is needed to support integrated science in concert with partners in other disciplines, mission areas and agencies. Collaboration is a natural outcome of the goal of being responsive to a wide range of decision-makers. Three important science activities in which integration occurs are ecology, energy, public health and multiple hazards.

RECOMMENDATIONS

The following recommendations will be presented to the full ACWI at its next meeting.

Recommendations that produce benefits within the FY-2015 Planning Horizon

- **Sustain the national monitoring network** for surface water, groundwater and water quality and extend coverage to address any significant gaps in the network which interfere with the fulfillment of federal responsibilities or the maintenance of national benefits.
- To the extent necessary to sustain the USGS monitoring network, **defer grants, interpretive investigations, analytical studies and research** (new projects first, but ongoing efforts if necessary; including any monitoring that is needed primarily for these projects) in a manner that will minimize immediate and long-term adverse consequences for water resource management decisions.
- To the extent that identified, national or regional needs can be served, **sustain funding to continue cost-shared investigations, studies and research.**
- The USGS should continue providing incentives for projects and programs that build partnerships that **leverage resources for water science.**

Recommendations that are Beneficial for the Longer-Term

- Encourage WSCs to **collaborate on monitoring site maintenance** responsibilities (among themselves and with other agencies) to reduce travel time and expenses.
- USGS provides **standards and training for data collection.** If those standards and training are more strongly promoted, along with an increased role for other agencies, organizations and monitoring councils there may be the potential to offset a portion of budget reductions without a loss of data greater collaborative effort. It would be useful for USGS to list the situations in which other agencies have taken responsibility for significant elements of the USGS monitoring network and to summarize the successful and unsuccessful aspects of the recent experience; if possible, the analysis should identify the circumstances that increase the likelihood of successful collaboration.
- **Redesign the NSIP** for the “budget constrained world” and to anchor other monitoring efforts by USGS, other federal agencies and others, while meeting same 5 national needs for water science and take better advantage of remote sensing and other new technologies.

- The WSCs should convene regular meetings with the state agencies responsible for water monitoring and prepare reports to the Assistant Secretary [or to the Associate Director for Water?] regarding the distribution of monitoring responsibilities, what the shared priorities are, and where there are significant **opportunities to increase efficiency and reliability** in case of further budget cuts.
- Use the 2004 Government Accountability Office report (Better Coordination of Data Collection Efforts Needed to Support Key Decisions, GAO-04-382) as the basis for **designating USGS as the lead federal agency** to coordinate data collection, processing and delivery and to promote consistency among data collection and management protocols nationwide. The **water data portal** concept developed for groundwater and water quality data would fit nicely into this role and should be extended to surface water measurements, although it requires new funding.
- Develop & maintain a clear **monitoring network design description** for each of the three networks. Include network maps & implementation progress assessment in an annual update. The surface water, water quality and groundwater monitoring network initiatives seem like a patchwork, rather than an efficient and deliberate design. Without a clear, strategic design, it appears that USGS operates disparate networks and it is more difficult to assure that we are making the most strategic investment of the available resources
- Is there a more effective way to organize the **surface water and water quality monitoring** responsibilities/staffing? Is there a more efficient allocation of the OSW, CWP, NSIP and surface water quality monitoring program responsibilities?
- The Groundwater Resources Program and the National Water Quality Assessment Program should develop recommendations for groundwater quality monitoring, building off of the concepts in the updated national groundwater monitoring framework document on **monitoring parameters and frequency**.
- USGS staff should assess the benefits (including cost efficiencies, potential for encouraging collaboration, appropriate circumstances for use of each) of the **USGS-EPA model** and the **NGWMN portal model** and recommend further opportunities to extend these benefits.
- The USGS should lead a national initiative to **characterize and promote better understanding of the uncertainty** inherent in all water monitoring and science applications, with the goal of providing a scientific framework for improving the national (and other) investments in our monitoring networks and their strategic design.
- In a constrained budget environment, there could be a trade-off between the size of the monitoring networks and the **level-of-effort going into quality assurance**. In the near-term, we are persuaded that the actual measurements that USGS collects are so sparse that quality should not be compromised. However, if the monitoring network design strategies and implementation are clear and strong, the consequences reducing the calibration frequency by 20-30% at some of the monitoring sites should be assessed in terms of the uncertainties of the resulting measurements, estimates and models, and the implication for various types of decisions.
- The USGS Water SMART initiatives should **focus on the interpretive science and modeling tools** that advance our understanding of the water cycle, and encourage other federal agencies, state, tribal, interstate and local agencies to develop the site-specific watershed applications.
- Establish a **Research, Development and Innovation Subcommittee (RDIS)** of the ACWI to identify and propose initiatives that produce innovations that can be used to reduce costs and maintain adequate data quality for stream gage and groundwater level monitoring by through: 1) The use of new technologies; 2) Enhancement in monitoring processes; 3) Increasing efficiencies in approaches to work; and 4) Improvements in personnel management. The assessment of the opportunity for innovation may have historically been hindered by the lack of applicable innovations that could be beneficial to short-term budget priorities. RDIS will complete its work under the context that identifying short-term innovation opportunities to address the anticipated reductions in water monitoring networks is ideal but may not be achievable. Nevertheless, its work must initiate now and

continue to be ongoing to support the monitoring networks maintained federal agencies as fiscal uncertainty will continue to persist into the future. RDIS should evaluate innovation opportunities in the context of economic, technical benefits and cost. Recommendations made by RDIS relative to monitoring innovations shall either improve existing methods of managing water monitoring networks by reducing costs or by producing higher quality data for the same cost. (more detailed description in Appendix __)

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