

MEETING RECAP




WATER: Quality, Quantity, and the Need for Innovative Technologies

Government-University-Industry
Research Roundtable
June 29-30, 2010

This meeting recap was prepared by National Academies staff as an informal record of issues discussed during public sessions of the June 29-30, 2010 meeting of the Government-University-Industry Research Roundtable (GUIRR). The document is for information purposes only and supplements the meeting agenda available online at www.nas.edu/quirr. It has not been reviewed and should not be cited or quoted, as the views expressed do not necessarily reflect the views of the National Academies or members of GUIRR.

In the context of continuing population growth and rising per capita use, the issues of water quality, quantity, and management demand the attention of governments worldwide, of companies – especially manufacturers highly dependent on the commodity – and of university research leaders, laboratories, and innovators. This particular meeting of the Government-University-Industry Research Roundtable (GUIRR) was intended to provoke cross-sector thinking and dialogue around water as an underestimated, finite, and exhaustible resource. Three objectives were established at the outset. Presenters and participants were invited to (1) lay out the various water challenges to the U.S. and the world, (2) showcase some technological solutions, including innovation from industry, university research efforts, and governmental interventions, and (3) identify what the federal agencies, universities and companies might do together to increase awareness of shortages, promote efficient and sustainable usage, and facilitate competitive R&D programs for rollout of new water resource technologies.



Patricia Mulroy, General Manager of the Las Vegas Valley Water District and Southern Nevada Water Authority, opened the meeting with the "Overcoming History, Culture, and Tradition." She began by articulating the biggest water concern of today: climate change and its ramifications on providing water for diverse communities across America. The Colorado River has long provided ample water for consumer, industrial, and agricultural use to Western states and Mexico, but it was not until the 1990s when it was discovered that its water supply was significantly dropping. This is notably seen in the Colorado River reservoir Lake Mead, where the gross water level has declined from 1220 feet above sea level in 1998 to 1093 feet today. Mulroy predicts that the reservoir will reach 1075 feet, a state of water emergency, in the next two years, and quite possibly drop to 1050 feet, the level at which Hoover Dam will stop generating electricity, shortly thereafter. The impending circumstances worsen, she noted, since the reservoir and dam serve the water and energy requirements of the populations of California, Colorado, Utah, New Mexico, and parts of Mexico. Furthermore, upon loss of these crucial agricultural sites in the nation, these areas will have to import water from eastern states, and the U.S. will become an importer of not only foreign oil, but also foreign food. In order to maintain life and economic progress in the southwest and other regions, Mulroy emphasized the need for individuals and communities to take a role in conserving water and implementing sustainable and/or alternative energy programs.

The meeting continued the next day with an opening presentation by **William J. Cooper** titled "Water: The Big Picture, the 30,000 Foot View in a Flat World." Dr. Cooper is Professor of Civil and Environmental Engineering at the University of California at Irvine, where he is also the Director of the Urban Water Research Center. Performing research across the U.S. and abroad in Africa, he cited the foremost causes for global water issues, namely climate change and uncontrolled population growth, which both have detrimental effects on water availability for private and public, national and international consumption. (Currently there are upwards of 6.7 billion people on the planet with 1 billion without access to water and 2.5 billion without access to adequate sanitation.) He outlined the need for more economically and environmentally efficient solutions to the rising water crises, which included biosolid/sludge and reverse osmosis treatment systems, as well as a renovated local and national water infrastructure.

He additionally noted that water has been traditionally undervalued and that to create the necessary management, its economic worth needs to be adjusted higher. With rising national and global issues, water is becoming more strongly linked to energy; improving upon the efficiency and sustainability of agricultural practices and energy systems could drastically alter the momentum of the water-energy plight.

Barton H. ("Buzz") Thompson, Jr., Professor in Natural Resources Law at Stanford Law School and the Director of the Woods Institute for the Environment at Stanford University, expanded on the economic and legal issues in water policy with his presentation: "Can Current Water Laws and Institutions Meet 21st Century Challenges?" The problem with national water policy is that there is none; water law is partitioned under federal and state control. Broadly, as a nation, we seek to create a water policy that is sustainable, flexible, and efficient, and that has integrated management. Sustainability, he noted, includes many facets, such as preserving the Endangered Species Act (which can protect species living in or dependent on bodies of water) and unifying the management of surface water and groundwater supplies. The need for a flexible system is crucial in the face of climate change, whereby some communities will find themselves with an overabundance of water, while others could be critically without. He pointed to an economic solution through solidly defining water rights and transferring water from a public good to a private one. Subsequently, a water market could be created, giving cities the ability to buy and sell water per necessity. Similar to Dr. Cooper's remarks, Thompson posited that water need be correctly valued through a metered and tiered system, showing that when metered, water usage is reduced by approximately a third. These proposals could effectively construct incentives to conserve and reduce water wasting, make water accessible to where it is needed, and increase the technology to keep water safe and of high quality.

Brooke Barton next presented "Murky Waters: Corporate Reporting and Water Risks." Her work with Ceres has focused on providing risk assessments for companies and investors in the context of climate change and resource scarcity in the upcoming decades. Seminal documents for businesses, investors, and the public have been in the area of disclosure; these include the Carbon Disclosure Project (CDP) and the U.S. Securities & Exchange Commission's climate guidance report (January 2010), both of which demonstrate how



companies should be disclosing their financial, performance, and accountability filings as they relate to climate change. Ceres' *Murky Waters* report found that a majority of companies across various sectors have poor disclosure and voluntary reporting. Furthermore, data that were disclosed, such as water withdrawal and discharge, were aggregate and lacking in context. On a related note, though they are sought after by investors, businesses currently have vague or no outlined goals for their global water impact and approach.

Barton summarized that industry water practices are a concern for all sectors. The federal government can provide information and data for areas under water stress, while academia can provide tools for business best practices, accounting, and risk assessments. With a more comprehensive understanding in government and universities, companies may be more adequately prepared to report financial findings related to water (globally and in the local context), create efficient management strategies and systems, and address risks.

GUIRR members next heard from a three-person panel representing the perspective of industry. **Dan Bena** began by addressing "Industry's Role in our Water Future." Bena is the Director of Sustainable Development for PepsiCo. He articulated a call for businesses in the 21st century to engage with policy-makers, stakeholders, and communities for both philanthropic and economic success. PepsiCo's annual report *The Promise of PepsiCo* documents the company's commitment to analyzing its water footprint throughout the production line. Key to mitigating excessive use and managing efficient systems is considering both the components and context of the water footprint in the diverse regions of operation.

Jim Loving expanded on industry responsibilities through "Smarter Water Management." Loving handles business development for IBM and its portfolio of solutions within Energy, the Environment, and Sustainability. IBM discovered in 2008 that a majority of companies set sustainability at high importance, not just for societal benefit, but also to function as corporate strategy to achieve competitive advantages and decrease costs. The issue which IBM attempts to address is the lack of information available to implement a sustainability strategy. The company's water-focused Global Innovation Outlook Report details the importance for institutions in government, academia, and industry to standardize and share information. Through collaboration, disparate stakeholders within and between these sectors can more

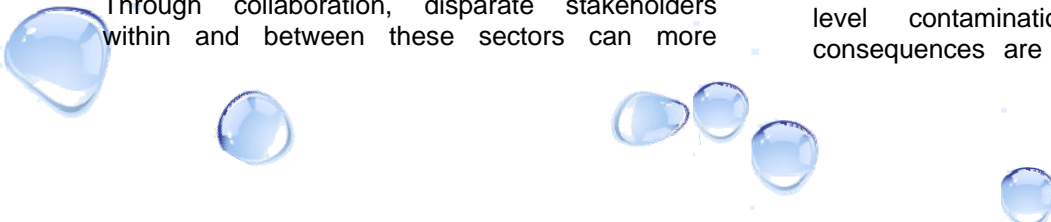
adequately undertake challenges in water management and infrastructure.

Kevin Mathews, Director of Health and Environmental Affairs for Nestlé Waters, spoke to the tumultuous current and future crises facing this most necessary and irreplaceable good, given the swelling world population and regional water scarcity. Nestlé, the largest food and beverage company in the world, has committed to reducing water use and working toward long-term sustainable management to contribute to lessening the world water crisis. Through the Nestlé Waters Global Initiative and Global Environmental Footprint Tool, the company is able to analyze water use at various points in food production and packaging and identify ways to increase efficiency.

Ronald T. Green followed the industry panel with a presentation entitled "The Dynamics of Water Resource Management between Urban and Rural Communities in Response to Limited Resources." Green is an Institute Scientist in the Geosciences and Engineering Division at Southwest Research Institute (SwRI). He detailed through various data and models of the southwest region the issues faced in combating decreased water availability:

- There are competing interests between urban needs and rural supply;
- The amount of available water is limited, uncertain, and varies yearly;
- Arid and semi-arid regions with high population growth are vulnerable to limited groundwater recharge during periods of drought;
- Variability in availability has to be recognized, and junior and senior water rights require management and compromise;
- Water resources need to be allocated at appropriate levels;
- Engineered solution options are needed (aquifer storage recovery, pipelines, recharges structures, etc.); and
- The true value of water needs to be evaluated and accurately set during drought and "average" conditions.

Cynthia Dougherty, Director of the Office of Ground Water and Drinking Water at the U.S. Environmental Protection Agency (EPA), presented a recap and discussed the direction of water quality and quantity in the U.S. in "Safe Drinking Water: Now and in the Future." Based on the Clean Water Act, there have been incremental changes in EPA's water policy over the past decades. While approximately 92% of America has access to water that meets EPA safety standards, the effects of low-level contamination and long-term health consequences are still concerns. The EPA is



currently driving a systematic approach to more robustly address public health, by organizing the wide range of contaminants into related groups, developing new treatment technologies, combining various authorities and statutes to expand public health protection, and partnering with states to expand detection systems and data collection.

An integral note in developing solutions to water quality, and especially quantity, Dougherty noted, is the necessity of using the correct information and not overly relying on past climate data. EPA is in the process of coordinating monitoring and data-collecting efforts with states to more fully understand public drinking water quality, public health protection, and also water system sustainability. Strategies to ensure better water systems include properly pricing water, matching water quality to use, increasing product efficiency and conservation (through programs such as EPA's WaterSense), and diversifying portfolios to incorporate more adaptive management protocols

(such as the National Drinking Water Advisory Council).

Elsevier Vice President, Academic and Government, **James Tonna**, its Director of Project Management **Daniel Calto**, and Executive Publisher **Christiane Barranguet** together demonstrated the utility of Elsevier's tool *Scopus* and how it can be used to analyze the diversity of global publication and collaboration in water research. Scopus not only details where research is being performed and by whom, but it also allows for financial transparency and tracking of social and economical benefits from basic research. Currently, Elsevier retains approximately 30% of the market share of publications in the field of water resources. Using this extensive database, the Elsevier representatives described the growth of water-related publications globally: the greatest increases in articles are in the disciplines of economics, math, and computer science. The U.S. and China are leading in published water-related research, but growth is greatest in Iran, Russia, and Mexico.

ABOUT GUIRR

MISSION

GUIRR's mission is to convene senior-most representatives from government, universities, and industry to define and explore critical issues related to the national and global science and technology agenda that are of shared interest; to frame the next critical questions stemming from current debate and analysis; and to incubate activities of on-going value to the stakeholders. This forum facilitates candid dialogue among participants, to foster self-implementing activities, and, where appropriate, to carry awareness of consequences to the wider public.

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